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# CZECH REPUBLIC

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# OECD Environmental Performance Reviews: Czech Republic 2018

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# *Preface*

This third Environmental Performance Review of the Czech Republic shows that despite having relatively few natural resources and growth above the OECD average, the Czech Republic has managed to decouple many environmental pressures from its economic growth and improve environmental infrastructure.

The country renewed its commitment to sustainable development by adopting a whole-of-government approach to define priorities for implementing the 2030 Agenda. Relative to the OECD average, the Czech Republic performs well on Sustainable Development Goals related to poverty, water and biodiversity. Protected areas covered 22% of the territory in 2016, above the Aichi target of 17% for 2020. However, the country's strong industrial base and its reliance on coal place it among the most energy- and carbon-intensive economies in the OECD and air pollution is a serious health concern.

Strengthening political commitment to a low-carbon economy and aligning the State Energy Policy with the Paris Agreement objectives are key priorities. Nuclear power has been gradually replacing coal in the electricity mix. The Czech Republic surpassed its Kyoto target of reducing greenhouse gas emissions by 8% over 2008-12, achieving a 30% reduction below 1990 levels. It seems on track to reach its 2020 objectives. However, achieving mid- and long-term targets will require further progress, in particular on carbon pricing.

The review looks in detail at waste management, the circular economy and sustainable urban development. The Czech Republic has made progress in waste recovery but landfilling remains the main treatment method, partly due to inadequate price signals. Current plans and programmes on waste management and prevention, secondary raw materials, eco-innovation and cleaner production should help in moving forward. Promptly adopting the pending new Waste Act will help provide better incentives to exploit the raw material potential of waste.

The Czech Republic has experienced a process of suburbanisation. In Prague's outer zone, built-up areas are growing and car traffic volume is increasing, exacerbating air and noise pollution. The review identifies several measures that could help make urbanisation more sustainable. These include strengthening the urban governance system, adopting compact-city policies, reviewing the land use planning system, promoting the development of brownfield sites and continuing to promote Local Agenda 21, a voluntary tool for sustainable development at the local level.

This review is the result of a constructive policy dialogue between the Czech Republic and the other members and observers of the OECD Working Party on Environmental Performance. It provides 46 recommendations to help the country green its economy and improve its environmental governance and management.

I am confident that this collaborative effort will support progress in achieving national and international environmental commitments and promote better environmental policies for better lives in and beyond the Czech Republic.

Angel Gurría

Secretary-General, Organisation for Economic Co-operation and Development (OECD)

# *Foreword*

The principal aim of the OECD Environmental Performance Review programme is to help member and selected partner countries improve their individual and collective performance in environmental management by:

- helping individual governments assess progress in achieving their environmental goals
- promoting continuous policy dialogue and peer learning
- stimulating greater accountability from governments towards each other and public opinion.

This report reviews the environmental performance of the Czech Republic since the previous review in 2005. Progress in achieving domestic objectives and international commitments provides the basis for assessing the country's environmental performance. Such objectives and commitments may be broad aims, qualitative goals or quantitative targets. A distinction is made between intentions, actions and results. Assessment of environmental performance is also placed within the context of the Czech Republic's historical environmental record, present state of the environment, physical endowment in natural resources, economic conditions and demographic trends.

The OECD is indebted to the government of the Czech Republic for its co-operation in providing information, for the organisation of the review mission to Prague and Litoměřice (12-16 June 2017), and for facilitating contacts both inside and outside government institutions.

Thanks are also due to the representatives of the two examining countries, Herman Huisman (Netherlands) and Björn Svensby (Sweden).

The authors of this report were Oscar Huerta Melchor, Myriam Linster, Alexa Piccolo, Sarah Sentier and Frédérique Zegel from the OECD Secretariat. Nathalie Girouard and Frédérique Zegel provided oversight and guidance. Sarah Sentier provided statistical support, Mika Hosokawa, Annette Hardcastle and Natasha Cline-Thomas provided administrative and editorial support, and Rebecca Brite copy-edited the report. Preparation of this report also benefited from inputs and comments from several members of the OECD Secretariat, including Rudiger Ahrend, Peter Börkey, Kurt Van Dender, Luisa Dressler, Jane Ellis, Guillaume Gruère, Alvaro Pereira, Soňa Perglerová and Mikaela Rambali, as well as Sylvia Beyer of the International Energy Agency.

The OECD Working Party on Environmental Performance discussed the draft Environmental Performance Review of the Czech Republic at its meeting on 14 February 2018 in Paris, and approved the Assessment and Recommendations.

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## Signs

The following signs are used in figures and tables:

.. : not available

– : nil or negligible

. : decimal point

## Country aggregates

OECD Europe: This zone includes all European member countries of the OECD, i.e. Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

OECD: This zone includes all member countries of the OECD, i.e. the countries of OECD Europe plus Australia, Canada, Chile, Israel*, Japan, Korea, Mexico, New Zealand and the United States.

Country aggregates may include Secretariat estimates.

## Currency

Monetary unit: Czech koruna (CZK)

In 2016, USD 1.00 = CZK 24.44; EUR 1.00 = CZK 27.03

In 2015, USD 1.00 = CZK 24.60; EUR 1.00 = CZK 27.28

## Cut-off date

This report is based on information and data available up to early December 2017.

## Disclaimer

* The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

# *Abbreviations and acronyms*

| | |
|---|---|
| BOD | Biochemical oxygen demand |
| CAP | Common Agricultural Policy |
| CBA | Cost-benefit analysis |
| CDW | Construction and demolition waste |
| CEI | Czech Environmental Inspectorate |
| CENIA | Czech Environmental Information Agency |
| CMCEK | Czech-Moravian Commodity Exchange in Kladno |
| $CO_2$ eq | Carbon dioxide equivalent |
| COD | Chemical oxygen demand |
| CZSO | Czech Statistical Office |
| DMC | Domestic material consumption |
| EC | European Commission |
| EEA | European Environment Agency |
| EGSS | Environmental goods and services sector |
| EIA | Environmental impact assessment |
| EKO-KOM | Producer responsibility organisation |
| ELD | Environmental Liability Directive |
| ELV | End-of-life vehicle |
| EMAS | Eco-Management and Audit Scheme |
| EMS | Environmental management system |
| ETS | Emissions Trading System |
| EU | European Union |
| FUA | Functional urban area |
| GDP | Gross domestic product |
| GHG | Greenhouse gas |
| GPP | Green public procurement |
| IEA | International Energy Agency |
| IMPEL | European Union Network for the Implementation and Enforcement of Environmental Law |
| IPPC | Integrated pollution prevention and control |
| ISO | International Organization for Standardization |
| IUCN | International Union for Conservation of Nature |
| MIT | Ministry of Industry and Trade |
| MOA | Ministry of Agriculture |
| MoE | Ministry of the Environment |
| MOT | Ministry of Transport |
| MRD | Ministry for Regional Development |
| Mtoe | Million tonnes of oil equivalent |
| NBS | National Biodiversity Strategy |
| NGO | Non-government organisation |
| $NH_3$ | Ammonia |
| $NO_x$ | Nitrogen oxides |
| PAYT | Pay as you throw |
| $PM_{10}$ | Particulate matter smaller than 10 microns in diameter |
| $PM_{2.5}$ | Particulate matter smaller than 2.5 microns in diameter |
| PPP | Purchasing power parity |
| R&D | Research and development |
| RBMP | River basin management plan |
| RIA | Regulatory impact assessment |
| SAO | Supreme Audit Office |
| SDG | Sustainable Development Goal |

| | |
|---|---|
| SEA | Strategic environmental assessment |
| SEF | State Environmental Fund |
| SEP | State Energy Policy |
| SMEs | Small and medium-sized enterprises |
| SMO CR | Union of Czech Towns and Municipalities |
| SMS CR | Association of Local Governments |
| $SO_x$ | Sulphur oxides |
| TACR | Technology Agency of the Czech Republic |
| TPES | Total primary energy supply |
| USD | United States dollar |
| WEEE | Waste electrical and electronic equipment |
| WFD | Water Framework Directive |
| WMIS | Waste Management Information System |
| WMP | Waste Management Plan |
| WPP | Waste Prevention Programme |

# *Basic statistics of the Czech Republic*

2016 or latest available year* (OECD values in parentheses)[a]

| | | | | | |
|---|---|---|---|---|---|
| **PEOPLE AND SOCIETY** | | | | | |
| Population (million) | 10.6 | (1 286) | Population density per km$^2$ | 134.5 | (35.4) |
| Share of population by type of region: | | | Population compound annual growth rate, latest 5 years (%) | 0.1 | (0.6) |
| Predominantly urban (%) | 24.6 | (47.5) | Income inequality (Gini coefficient) | 0.26 | (0.32) |
| Intermediate (%) | 54.2 | (27.4) | Poverty rate (% of population with less than 50% med. income) | 5.3 | (11.3) |
| Rural (%) | 21.2 | (25.1) | Life expectancy | 78.7 | |
| **ECONOMY AND EXTERNAL ACCOUNTS** | | | | | |
| Total GDP (billion CZK) | 4 715 | | Imports of goods and services (% of GDP) | 76.8 | (28.5) |
| Total GDP (billion USD current PPPs) | 367 | (53 867) | Main exports (% of total merchandise exports) | | |
| GDP compound annual real growth rate, latest 5 years (%) | 1.7 | (1.8) | Electrical machinery and equipment and parts thereof | 20.0 | |
| GDP per capita (1 000 USD current PPPs) | 34.7 | (41.9) | Vehicles other than railway or tramway rolling stock, and parts and accessories thereof | 18.7 | |
| Value added shares (%) | | | Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof | 17.0 | |
| Agriculture | 2.5 | (1.8) | Main imports (% of total merchandise imports) | | |
| Industry including construction | 37.8 | (24.8) | Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes | 18.5 | |
| Services | 59.7 | (73.4) | Electrical machinery and equipment and parts thereof | 17.7 | |
| Exports of goods and services (% of GDP) | 83.0 | (28.9) | Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof | 9.9 | |
| **GENERAL GOVERNMENT as percentage of GDP** | | | | | |
| Expenditure | 39.9 | (40.9) | Education expenditure | 4.9 | (5.2) |
| Revenue | 40.5 | (38.1) | Health expenditure | 7.6 | (7.8) |
| Gross financial debt | 49.7 | (112.0) | Environmental protection expenditure | 1.1 | (0.5) |
| Fiscal balance | 0.6 | -(2.8) | Environmental taxes: (% of GDP) | 2.6 | (1.6) |
| | | | (% of total tax revenue) | 7.9 | (5.2) |
| **LABOUR MARKET, SKILLS AND INNOVATION** | | | | | |
| Unemployment rate (% of civilian labour force) | 4.0 | (6.3) | Patent applications in environment-related technologies (% of all technologies, average of latest 3 years)[b] | 10.7 | (10.9) |
| Tertiary educational attainment of 25- to 64-year-olds (%) | 23.0 | (35.7) | Environmental management | 6.3 | (4.3) |
| Gross expenditure on R&D (% of GDP) | 1.9 | (2.4) | Water-related adaptation technologies | 0.8 | (0.5) |
| | | | Climate change mitigation technologies | 6.8 | (8.6) |
| **ENVIRONMENT** | | | | | |
| Energy intensity: TPES per capita (toe/cap.) | 3.9 | (4.1) | Road vehicle stock (veh./100 inhabitants) | 61.3 | |
| TPES per GDP (toe/1 000 USD, 2010 PPPs) | 0.13 | (0.11) | Water stress (abstraction as % of available resources) | 10.0 | (9.7) |
| Renewables (% of TPES) | 10.5 | (9.7) | Water abstraction per capita (m$^3$/cap./year) | 152 | (812) |
| Carbon intensity (energy-related $CO_2$): | | | Municipal waste per capita (kg/cap.) | 317 | (520) |
| per capita (t/cap.) | 9.4 | (9.2) | Material productivity (USD, 2010 PPPs/DMC, kg) | 2.0 | |
| per GDP (t/1 000 USD, 2010 PPPs) | 0.32 | (0.24) | Land area (1 000 km$^2$) | 77 | (34 404) |
| GHG intensity[c] | | | % of arable land and permanent crops | 41.7 | (12.2) |
| per capita (t/cap.) | 12.0 | (12.0) | % of permanent meadows and pastures | 12.9 | (23.4) |
| per GDP (t/1 000 USD, 2010 PPPs) | 0.41 | (0.32) | % of forest area | 34.5 | (31.3) |
| Mean population exposure to air pollution ($PM_{2.5}$), g/m$^3$ | 20.3 | (14.5) | % of other land (built-up and other land) | 10.9 | (33.1) |

* Values earlier than 2011 are not taken into consideration.

a) OECD value = Where the OECD aggregate is not provided in the source database, a simple OECD average of the latest available data is calculated where data exist for a significant number of countries.

b) Higher-value inventions that have sought patent protection in at least two jurisdictions. Average of latest three years.

c) Excluding emissions/removals from land use, land-use change and forestry.

*Source:* Calculations based on data extracted from databases of the OECD, IEA, Eurostat.

# *Executive summary*

## Progress on Sustainable Development Goals but continued high carbon intensity of the economy

The Czech Republic has a small, very open economy that has grown faster than the OECD average for much of the 2000s. The country has made progress in decoupling environmental pressures from economic activity. The 2017 Czech Republic 2030 strategy defines priorities for implementing the 2030 Agenda for Sustainable Development. Relative to the OECD average, the country performs well on Sustainable Development Goals related to poverty, water and biodiversity. However, its economy remains among the most energy- and carbon-intensive in the OECD due to the strong industrial base and reliance on coal. The population is also exposed to high levels of air pollution.

Strengthening political commitment to a low-carbon economy and ensuring that the long-term targets of the State Energy Policy are compatible with the Paris Agreement objectives are key priorities. Nuclear power has been gradually replacing coal in the electricity mix. The share of renewables also grew significantly, although it remains lower than the OECD average. The Czech Republic overshot its 2008-12 Kyoto target of reducing greenhouse gas emissions and seems on track to reach its 2020 objectives. However, achieving mid- and long-term targets will require further progress in energy savings in a context of significantly increasing emissions from road transport.

## Enhancing inter-municipal co-operation to deliver efficient environmental services

Accession to the European Union in 2004 helped strengthen the environmental agenda but central and subnational authorities have not been proactive on environmental policy. Although administrative capacity is generally sufficient, high turnover of environment ministers and staff has caused implementation gaps. Czech municipalities and regions are among the smallest in the OECD, which contributes to governance fragmentation. Enhancing their collaboration is a necessary step to increase their efficiency in providing environmental services.

Since the 2005 OECD Environmental Performance Review, progress has been made in strengthening environmental impact assessment, regulatory impact assessment and strategic environmental assessment. Still, the Czech Republic should expand the use of cost-benefit analysis of environmental policies and increase *ex post* evaluation of their implementation. Public participation in environmental decision making and access to information have improved. Despite progress in mapping and remediating contaminated sites, a large number of them continue to represent a hazard to the environment and human health. Exemptions from remediation costs granted to polluters complying with environmental permits should be removed, in line with OECD best practices.

## The pathway to green growth requires increasing carbon prices

Ensuring coherence between environment and energy policies remains a challenge. Pricing carbon will help in tackling climate change and air pollution cost-effectively. It could contribute to improving energy affordability. The government has been considering a carbon tax for years but has never adopted one. Although taxes on natural gas, solid fuels and electricity were introduced, rates were set at relatively low levels and were not adjusted for inflation. Several tax exemptions reduce incentives to save energy or to switch to cleaner fuels. To promote investment in low-carbon technology, the Czech Republic should also increase more rapidly the share of permits auctioned in the power sector under the EU Emissions Trading System and set a stable support framework for renewable development.

Lower and differentiated taxes on road fuels have boosted diesel consumption. While the average age of cars is about 15 years, tightening environmental criteria of vehicle taxes would promote fleet renewal towards cleaner vehicles. Extending distance-based charging would help address air pollution and congestion and also fund transport infrastructure, which is poor. EU cohesion policy has been a major source of funding for transport and environmental infrastructure. It helped increase the connection rate for public wastewater treatment plants in line with the OECD average. Making the most of EU funds will require improved strategic planning and procurement practices.

## Progress in waste recovery but continued reliance on landfilling

Landfilling, though reduced, remains the most common waste treatment method. Monitoring of progress is hampered by the existence of two competing information systems that produce divergent data. The Czech Republic has a fairly complete policy framework for waste and materials and a mature extended producer responsibility system for packaging waste, and has long been active in the field of cleaner production. It has progressed with recovery and recycling and with separate collection of municipal waste. However, it has not yet succeeded in exploiting the raw material potential of its waste. Improvement has been marginal regarding economic analysis of waste management or waste prevention in industry and upstream in the value chain (design phase).

Essential steps need to be taken to follow the waste hierarchy, divert waste from landfilling, invest in recycling infrastructure, develop markets for secondary raw materials and improve the cost-effectiveness and transparency of the extended producer responsibility system for waste electrical and electronic equipment. Current plans and programmes on waste management and prevention, secondary raw materials, eco-innovation and cleaner production should help in moving forward. Improving information on waste and materials is crucial, as is speeding up adoption of the new Waste Act, which has been pending for two years.

## Compact-city policies can contribute to sustainable development

The Czech Republic is among the least urbanised countries in the OECD. In recent decades, it has experienced a process of suburbanisation. Housing affordability has become a major concern due, in part, to a lengthy building approval process. While Czech cities continue investing in public transport, improvements are counterbalanced by increased car use, exacerbating air pollution. Investment in soft transport mode

infrastructure is pending. Territorial fragmentation and a highly centralised public finance system limit efficient co-ordination of investment in metropolitan areas.

Measures that could help make urbanisation more sustainable include strengthening the urban governance system; adopting a compact, co-ordinated, connected development model with a holistic approach to urban development; reviewing the land use planning system; promoting the development of brownfield sites; improving the use of environmental fees and taxes at city level to tackle air pollution and congestion; and continuing to promote Local Agenda 21.

# Assessment and recommendations

*The Assessment and recommendations present the main findings of the OECD Environmental Performance Review of the Czech Republic and identify 46 recommendations to help the Czech Republic make further progress towards its environmental policy objectives and international commitments. The OECD Working Party on Environmental Performance reviewed and approved the Assessment and recommendations at its meeting on 14 February 2018. Actions taken to implement selected recommendations from the 2005 Environmental Performance Review are summarised in the Annex.*

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## 1.1. Environmental performance: trends and recent developments

After joining the European Union (EU) in 2004, the Czech economy grew at a faster pace than the OECD average until it was hit by the global downturn due to its reliance on exports – mostly from the machinery and automobile industries. Convergence of income levels towards the OECD average has stalled since the crisis, reflecting weak productivity growth (OECD, 2016). Nevertheless the unemployment rate has steadily decreased since 2010 and is one of the lowest among OECD countries. The poverty rate in the Czech Republic is the second lowest among OECD countries. GDP growth picked up in 2015, with the absorption of expiring EU funds, before moderating in 2016. It is expected to remain above 3% in 2017-18 (OECD, 2017a).

The Czech Republic has made progress in decoupling environmental pressures from economic activity (Figure 1). However, its strong industrial base and reliance on coal place the country among the most energy- and carbon-intensive economies in the OECD and the population is exposed to severe levels of air pollution. Increased use of road transport, changes in land use, infrastructure development and intensive farming undermine the resilience of ecosystems. Czech Republic 2030, approved in 2017, is the overarching policy document defining long-term priorities for implementing the 2030 Agenda for Sustainable Development. Relative to the OECD average, the country performs well on goals related to poverty, water and biodiversity, but is behind on gender equality, climate and energy (OECD, 2017b). Progressing towards sustainable development will require strengthening political commitment to a low-carbon economy and implementing more cost-effective environmental policies.

### *1.1.1. Transition to a low-carbon and energy-efficient economy*

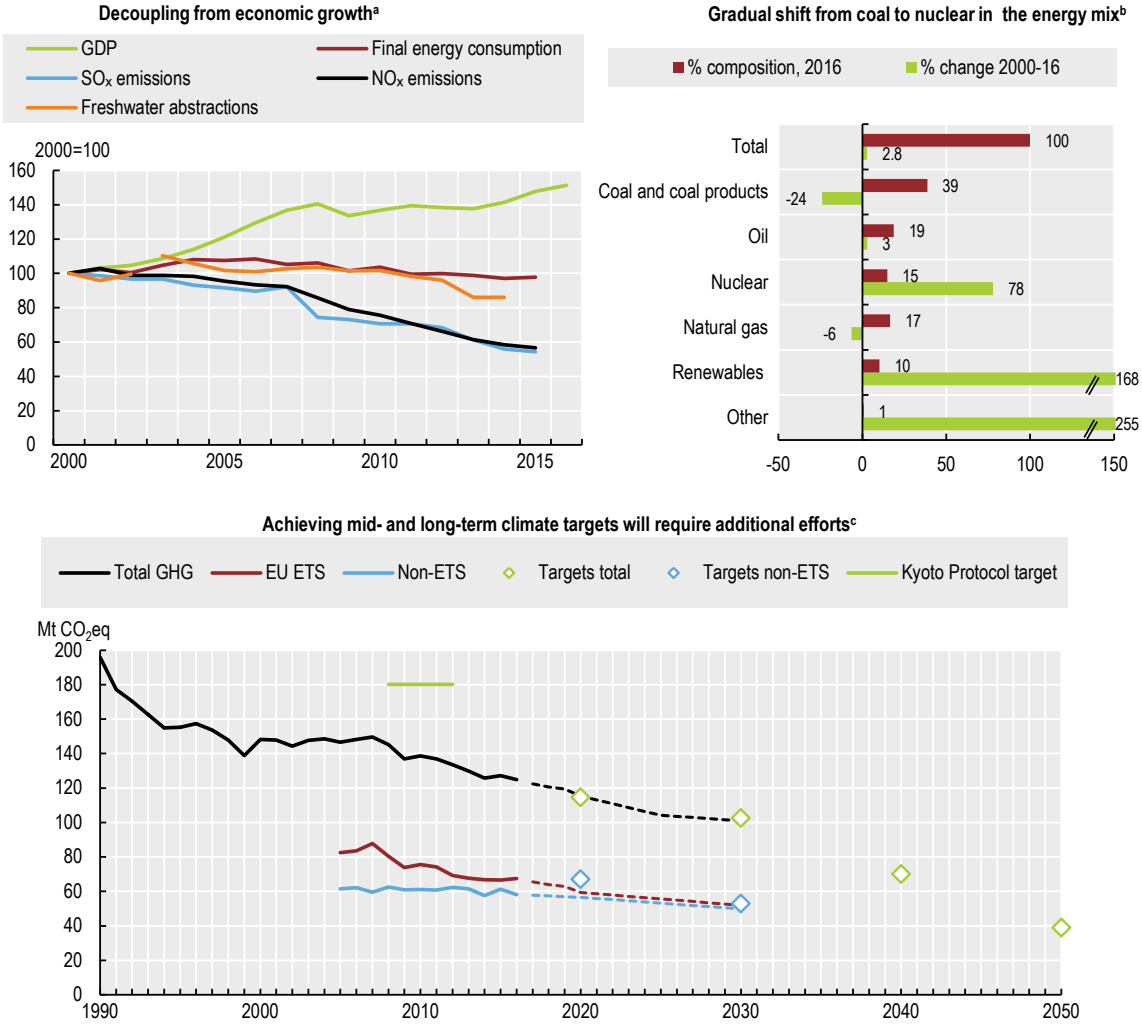
The Czech Republic has succeeded in decoupling greenhouse gas (GHG) emissions from economic growth. After almost a decade of relatively stable level of GHG emissions, they started decreasing due to the economic crisis and declining use of fossil fuels. The country overshot its Kyoto target of reducing GHG emissions by 8% over 2008-12, with a 30% reduction below 1990 levels (Figure 1). According to government projections, the country is on track to reach its 2020 and 2030 objectives. However, this will require further progress in energy savings and development of renewable energy resources in a context of economic recovery and a significant increase in GHG emissions from road transport.

The policy framework was improved with the adoption of the 2017 Climate Protection Policy, and the 2015 Strategy on Adaptation to Climate Change, with its 2017 action plan (MoE, 2017a, 2017b, 2015). The Climate Protection Policy sets 2020 and 2030 emission reduction targets and indicative long-term objectives for 2050, in line with EU commitments. The next update of the 2015 State Energy Policy (SEP) will have to be aligned with EU objectives on energy efficiency and renewables for 2030 and to ensure long-term targets are compatible with the Paris Agreement objectives. The Czech Republic was the last EU member to ratify the Paris Agreement, in October 2017, due to lengthy parliamentary debates. Like other EU members, it has to develop an integrated national energy and climate plan by early 2019 to ensure the climate and energy targets for 2030 are on track.

Nuclear power has been gradually replacing coal in the electricity mix (Figure 1). However, fossil fuels (with coal accounting for about half) make up three-quarters of the energy supply. The Czech Republic has relied on domestic coal to ensure energy security,

but this has been detrimental to the environment. In addition to being the largest source of GHG emissions, coal combustion is a major source of local air pollution. The SEP aims to further shift the energy mix from coal to nuclear energy, which benefits from strong public support. However, the target ranges are so wide that they create uncertainty for investors (IEA, 2016, MIT, 2014).

**Figure 1. Selected environmental performance indicators**




*a)* Gross domestic product at 2010 prices and purchasing power parities.
*b)* Total primary energy supply. Breakdown excludes electricity trade.
*c)* Total GHG emissions excluding land use, land use change and forestry. Dotted lines refer to projections with existing measures for emissions covered and not covered by the EU Emissions Trading Scheme.
*Source:* OECD (2017), "Aggregate National Accounts: Gross Domestic Product", *OECD National Accounts statistics* (database); IEA (2017), *IEA World Energy Statistics and Balances* (database); OECD (2017), *OECD Environment Statistics* (database); MOE (2017), Climate Protection Policy; EEA (2017), "Approximated European Union greenhouse gas inventory: proxy GHG emissions for 2016".

StatLink http://dx.doi.org/10.1787/888933723663

The SEP also aims to support development of renewables up to 22% of the total energy supply and 25% of electricity production by 2040. Since 2000, the share of renewables has almost tripled in the energy supply and quadrupled in electricity generation. By 2015,

the Czech Republic had exceeded its targets set for 2020 under the EU Renewable Energy Directive, except in transport. However, the share of renewables in electricity production remains below the OECD average and is unlikely to increase in the medium term following the abolition of support mechanisms for renewable-sourced electricity (IEA, 2016). Renewable development and closer integration into European networks represent alternatives to ensure energy security.

Since 2000, the Czech Republic has managed to decouple its energy consumption from economic growth, but energy intensity remains high due to the importance of heavy industry. Energy use in the transport sector grew strongly to 2008, slowed during the crisis, then recovered in 2014. The Czech Republic is not on track to achieve its saving targets under the EU Energy Efficiency Directive and measures to reduce transport energy use could be better emphasised in the National Energy Efficiency Action Plan (NEEAP).

Emissions of major air pollutants have been further decoupled from economic growth through stricter regulation. The Czech Republic met its 2010 targets under the EU National Emission Ceilings Directive and seems on track to achieve the 2020 objectives, except for $NH_3$ (EEA, 2017). However, significant additional efforts will be required for 2030. The rate of mortality from ambient air pollution is nearly twice the OECD average. It is estimated to have cost 7% of GDP in 2015 (Roy and Braathen, 2017). Although declining, mean annual exposure to $PM_{2.5}$ concentrations remains above the OECD average. EU limit values for $PM_{10}$, $PM_{2.5}$, benzo(a)pyrene and ozone have repeatedly been exceeded. The main sources of local air pollution are road transport and fossil fuel combustion for residential heating. The Moravian-Silesian region is also affected by industrial sources and transboundary air pollution at the Polish border.

### *1.1.2. Transition to efficient resource management*

The material intensity of the Czech economy is higher than the EU average due to its large amount of coal and construction materials use, but it is not among the most intensive OECD economies. Since 2000, domestic material consumption has decreased while GDP increased, suggesting improvement in material productivity. This trend is explained by the reduction in the share of solid fuels in the energy mix and the decline of construction activity during the economic crisis. However, progress has slowed since 2012 and material consumption started to increase with the economic recovery. The Czech Republic is heavily dependent on imports of oil, natural gas, metallic minerals and some industrial minerals, but is self-sufficient in biomass and construction minerals.

Over most of the past ten years, total waste generation was relatively stable, but it increased in 2015 due to construction activity. According to the Czech Statistical Office, municipal waste evolved broadly in line with private final consumption. Landfilling is declining but still accounts for about half of municipal waste treatment. The coexistence of two information systems on waste hampers assessment of performance in this domain (Section 1.4).

Chemicals consumption has doubled in the last decade with an increase in both production and imports (Eurostat, 2017). Efforts to comply with international and EU requirements have resulted in a general decline in, and subsequent stabilisation of emissions of, key pollutants and levels of certain chemicals tracked through human bio-monitoring studies. Nevertheless, the number of emergencies involving leakage of hazardous chemical substances requiring intervention by fire brigade units has increased noticeably in recent years and monitoring studies have identified concerted areas for improvement (CZSO, 2016). Environmental and bio-monitoring programmes should

continue to be supported to identify where further chemical risk management is required. Moreover, ensuring sufficient resources for enforcement and other enabling activities under European chemicals legislation (REACH and CLP) will be critical in preventing and controlling chemical pollution.

More than 40% of the territory is covered by arable and crop land. Since 2000, there has been a slight shift to permanent grassland and meadows, driven by implementation of the EU Common Agricultural Policy and the EU milk crisis. Agricultural production remained broadly stable, decreasing livestock production being offset by a slight increase in crop output. At the same time, consumption of nitrogen fertiliser per hectare of agricultural land increased sharply, highlighting the need to decouple agricultural inputs from production. Overall, pesticide use also increased, though it started to fall in 2012 with implementation of the National Action Plan to Reduce the Use of Pesticides. Adopting and implementing measurable targets would help in tracking progress on reducing risk associated with pesticide use and its impact on human health and the environment (EC, 2017a). Intensive agricultural practices remain a major source of water pollution, habitat alterations and biodiversity loss. The Czech Republic has implemented three consecutive action plans on organic farming. Since 2000, the share of agricultural area under organic farming has tripled, reaching 12% in 2015, below the 15% national target but one of the highest shares in the OECD.

### *1.1.3. Management of natural assets*

Substantial progress has been made in expanding protected areas, which covered 22% of the territory in 2016, above the Aichi target of 17% for 2020. However, the share of area under the highest level of nature protection (mostly national parks) is low and the establishment of a fifth national park has been under discussion since 2010 (CENIA, 2016). There is room to complete the list of sites designated under the EU Natura 2000 network and to ensure their effective management (EC, 2017b). Despite improvement, only 16% of habitats and 27% of species of community importance have favourable conservation status. Urban sprawl and road infrastructure development are fragmenting landscape and habitats. Over 2000-15, built-up areas expanded by 4%, mostly due to land take of agricultural surfaces for road infrastructure. The 2016-25 National Biodiversity Strategy seeks to address the weaknesses of the previous strategy, in particular by raising awareness of the economic consequences of biodiversity loss to better mainstreaming biodiversity in sector policies (MoE, 2016a).

Freshwater resources are scarce compared with other OECD countries. However, water stress remains low thanks to below-average and declining abstraction levels (Figure 1). Climate change is expected to lead to increased variability of precipitation and more frequent floods and droughts, with adverse effects on biodiversity, soil erosion and water quality.

EU funds helped increase the share of population connected to public sewage treatment plants to 81% in 2015, in line with the OECD average. Although the Czech Republic met the 2010 requirements of the EU Urban Waste Water Treatment Directive in terms of collection, it did not achieve the objectives on secondary and more advanced treatment. Better access to wastewater treatment has helped improve water quality. However, the status of water bodies largely remains unsatisfactory. In 2012, only 19% of surface water bodies achieved good ecological status, while 61% of surface water bodies and 27% of groundwater bodies reached good chemical status. The main pressures include flow

regulation and hydro-morphological alteration, which affect two-thirds of surface water bodies. Diffuse pollution is a concern for more than half of water bodies.

**Recommendations on climate change, air, chemicals, water and biodiversity management**

**Climate change, air and chemicals management**

- Strengthen political commitment to a low-carbon economy: develop an integrated energy and climate plan to reach the 2030 and 2050 GHG reduction targets, in line with EU climate policy and the Paris Agreement; develop analysis of the economic, environmental and social impact of the underlying scenarios; consider restoring mining limits.
- Implement the National Adaptation Strategy and complete local strategies in Prague, Brno and Pilsen as a pilot for other cities. Mainstream climate change adaptation into government policies.
- Implement the National Emission Reduction Programme to comply with standards for protection of human health. Raise awareness of the effects of local air pollution on health.
- Pursue efforts to monitor chemicals in environmental media and in humans to identify where risk management is required. Allocate sufficient resources for enforcement and other enabling activities under European chemicals legislation (REACH and CLP) to prevent and control chemical pollution. Adopt and implement the 2018-22 National Action Plan to Reduce the Use of Pesticides and assess progress towards targets.

**Water and biodiversity**

- Address diffuse pollution from agriculture by reducing the use of fertilisers and pesticides and by speeding up implementation of measures such as information, training, research and funding of environmentally sound agricultural practices. Improve the water quality monitoring system to better measure effectiveness of pollution reduction measures. Develop market opportunities to swiftly achieve the target of 15% of agricultural land under organic farming.
- Continue to improve information on biodiversity by assessing the extent and values of ecosystem services and promoting the use of these evaluations in policy decisions. Complete the designation of protected areas under the EU Natura 2000 network and ensure their effective management (e.g. by clearly defining conservation objectives and measures and providing adequate resources for their implementation). Consider expanding the national park network to protect the most valuable species and habitats. Prevent habitat fragmentation associated with infrastructure development and develop ecological networks to facilitate wildlife migration.

## 1.2. Environmental governance and management

### *1.2.1. Institutional framework*

The Czech Republic is a unitary state with three government levels: central, regional and municipal. The Ministry of the Environment (MoE) is the main authority for environmental policy, compliance monitoring and enforcement, and environmental

quality monitoring. Though administrative capacity is generally sufficient, high turnover of ministers and staff has caused implementation gaps. The Government Council for Sustainable Development brings together representatives of all ministries, Parliament, municipalities, non-government organisations (NGOs), trade unions, industry and academia. In addition, the inter-ministerial commenting procedure on draft policies and legislation contributes to horizontal co-ordination by gathering input from regions, municipalities and NGOs.

The country has some of the OECD's smallest municipalities and regions (14 regions and 6 258 municipalities), which contributes to governance fragmentation. Closer inter-municipal collaboration could increase efficiency by reducing duplication and streamlining provision of some services. Municipal and regional co-operation is through the Union of Czech Towns and Municipalities (SMO ČR), the Association of Local Governments (SMS ČR) and the Association of Regions. Regional authorities have environmental departments dealing with transport, biodiversity, spatial planning, health and tourism. Local authorities are in charge of local transport, waste management, wastewater treatment, local planning and housing.

Nine MoE regional departments oversee lower-level authorities, although the ministry has not yet developed implementation guidelines. The Czech Environmental Information Agency (CENIA) supports regional authorities in issuing integrated permits. Vertical co-ordination is also carried out through SMO ČR, SMS ČR and the Association of Regions. The two municipal associations participate in the preparation of draft legislation on topics pertaining to municipal responsibilities. The Association of Regions represents regional interests before Parliament and the government.

### *1.2.2. Regulatory framework*

EU accession in 2004 helped strengthen the environmental agenda, but over the past decade central and subnational authorities have not been proactive on environmental policy. Over the years, there have been gaps in the transposition of EU directives on water management, environmental impact assessment (EIA) and air quality.

Since the 2005 OECD Environmental Performance Review (EPR), the Czech Republic has made progress in *ex ante* evaluation by introducing regulatory impact assessment (RIA) and expanding the use of strategic environmental assessment (SEA) of plans and programmes. While RIA is based on cost-benefit analysis, such analysis is generally conducted in more qualitative than quantitative terms, and it is rarely applied to policies and strategies. No clear criteria on how to do cost-benefit analysis have been defined, including rules for covering GHG emissions in assessments (OECD, 2017c). *Ex post* evaluations have been carried out on an ad hoc basis. The Czech Republic is working on a proposal to develop methodological guidelines for *ex post* evaluations.

The country has had challenges in incorporating the EU EIA directive into national law. It has made EIA conclusions binding for zoning decisions and for construction and operation permits, in line with the last EPR recommendation to strengthen use of EIA (Tomoszkova, 2015). In accordance with OECD best practices, consideration of project alternatives should be integrated into the EIA process. In the Czech Republic, such consideration is rarely undertaken beyond the "zero alternative", i.e. not carrying out the project. Permits based on integrated pollution prevention and control (IPPC) have been introduced for economic activities with high environmental risk, and their conditions are based on best available techniques.

### *1.2.3. Compliance assurance*

The Czech Environmental Inspectorate (CEI) is responsible for monitoring and enforcing compliance with environmental law. There are binary performance indicators that register facilities' non-compliance rates, but the country could consider introducing more meaningful ones to more effectively evaluate compliance assurance. Inspections follow a risk-based planning approach for IPPC installations, but not for all facilities.

The CEI can impose administrative fines of up to CZK 50 million (about EUR 1.8 million), which is high compared to other OECD countries. Criminal sanctions on environmental violations were introduced in the 2009 Criminal Code, last amended in 2011, which provides for imprisonment of up to five years for the most serious environment-related offences and stipulates criminal fines (CEI, 2015; Zicha, 2012). There is no information available about the effective use of criminal sanctions.

The liability regime is fault-based rather than strict, which means the polluter is exempt from remediation costs if the damage occurred despite the operator taking all necessary steps to prevent it. Hence compliance with environmental permit conditions releases the polluter from liability. Operators whose activities may cause significant damage must obtain insurance covering remediation costs. In accordance with the polluter-pays principle, liability for cleaning up historic contamination lies with the polluter if it can be identified and is financially solvent. Otherwise, the state undertakes remediation (Rovenský and Sequens, 2015). Despite progress in mapping and remediation, a large number of contaminated sites continue to pose potential risks to the environment and human health (CENIA, 2016).

The MoE has not developed any information tools to strengthen compliance promotion targeting small and medium-sized enterprises. Such tools could include seminars and workshops, direct advice during inspections, and written guidance for regulated entities.

### *1.2.4. Environmental democracy*

As the 2005 EPR recommended, progress has been made in improving public access to environmental information and participation in decision making. A 2015 amendment of the EIA Act significantly contributed to this goal by expanding citizens' and organisations' access to environmental decision making, information and justice.

The Charter of Fundamental Rights, which is part of the Constitution, enshrines the right to participate in administration of public matters and the right to information. EIA, SEA, permitting procedures and the development of safety programmes and emergency plans are open to any member of the public. Anyone can submit comments orally (especially at public hearings) or in writing (including electronically). The EIA procedure requires a public hearing if dissenting comments on the EIA report are submitted. The competent authority has an obligation to consider all comments received and to provide a justification for those that are not accepted, which is good practice not always followed by other OECD countries. A recent amendment of the Building Act could reduce public participation in permitting procedures of projects that do not undergo EIA.

The extensive range of tools to disseminate environmental information includes annual MoE reports on the state of the environment and the Statistical Environmental Yearbook, both available online. Documents submitted for or resulting from the EIA process are also available online. Individual facilities' compliance records are publicly available upon request.

The 2015 amendment of the EIA Act improved access to justice on EIA and permitting. In permitting procedures for projects subject to EIA, interested parties and NGOs that have operated for at least three years before the permit was issued, or that are supported by at least 200 persons, have legal standing in the permitting procedure and may challenge the procedural and substantial legality of a permit. The Charter of Fundamental Rights allows citizens and NGOs to ask the competent authority to take action or impose corrective measures. In addition, the Czech Republic should make sure the public can exercise its right to go to court if an authority fails to act in response to non-compliance.

Environmental education and awareness raising are well developed and emphasised in the State Environmental Policy. The State Programme for Environmental Education and Public Awareness and its action plan contain clearly defined objectives and indicators with which to evaluate results. Environmental education is part of the general curricula at all education levels, from primary to post-secondary. Around 80% of primary schools have a co-ordinator for environmental education to develop environmental targets for the school and organise activities (MoE, 2016b).

**Recommendations on environmental governance and management**

**Institutional framework**

- Enhance collaboration between municipalities to increase their efficiency in providing environmental services (e.g. by setting minimum size or standards for service provision, establishing a dedicated central government unit to facilitate and monitor co-operation). Improve vertical co-ordination by strengthening guidance from the MoE to regional and local authorities.

**Regulatory framework**

- Ensure consideration of alternatives in EIA, beyond the "zero alternative".
- Enhance the use of, and human resource capacity for, cost-benefit analysis for assessing environmental policies, and expand *ex post* evaluation of their implementation.

**Compliance assurance**

- Enhance risk-based planning of environmental inspections by applying risk criteria to all regulated activities, including low risk ones.
- Consider introducing additional performance indicators to evaluate the effectiveness of compliance assurance, such as compliance rates diversified by the gravity of violation.
- Establish and enforce strict (independent of fault) liability for environmental damage by removing exemptions for compliance with environmental permits. Continue to update the register of contaminated sites and develop a financing mechanism for their gradual remediation.
- Strengthen compliance promotion targeting small and medium-sized enterprises through online information tools and guidance to regulated entities.

**Environmental democracy**

- Continue extending citizens' and organisations' access to justice in environmental matters to guarantee broader environmental democracy by

ensuring that the public and NGOs have a right to go to court if the competent authority fails to act in response to non-compliance.
- Ensure that recent amendments to the Building Act do not restrict public participation in permitting proceedings.

## 1.3. Towards green growth

### *1.3.1. Framework for sustainable development and green growth*

The Czech Republic has improved its institutional framework for sustainable development. In 2014, the Government Council for Sustainable Development was moved from the MoE to the Government Office, supporting a whole-of-government approach for developing the 2017 Sustainable Development Strategy. However, ensuring coherence between environment and energy policies remains a challenge. The government commitment to a low-carbon economy seems mainly driven by EU obligations and the 2015 decision to lift the restriction on lignite mining sent a contradictory signal. Although the SEP envisages a switch from fossil fuels to nuclear power and renewables, uncertainty remains on financing the expansion of the nuclear plant fleet and on scaling up energy efficiency and renewables.

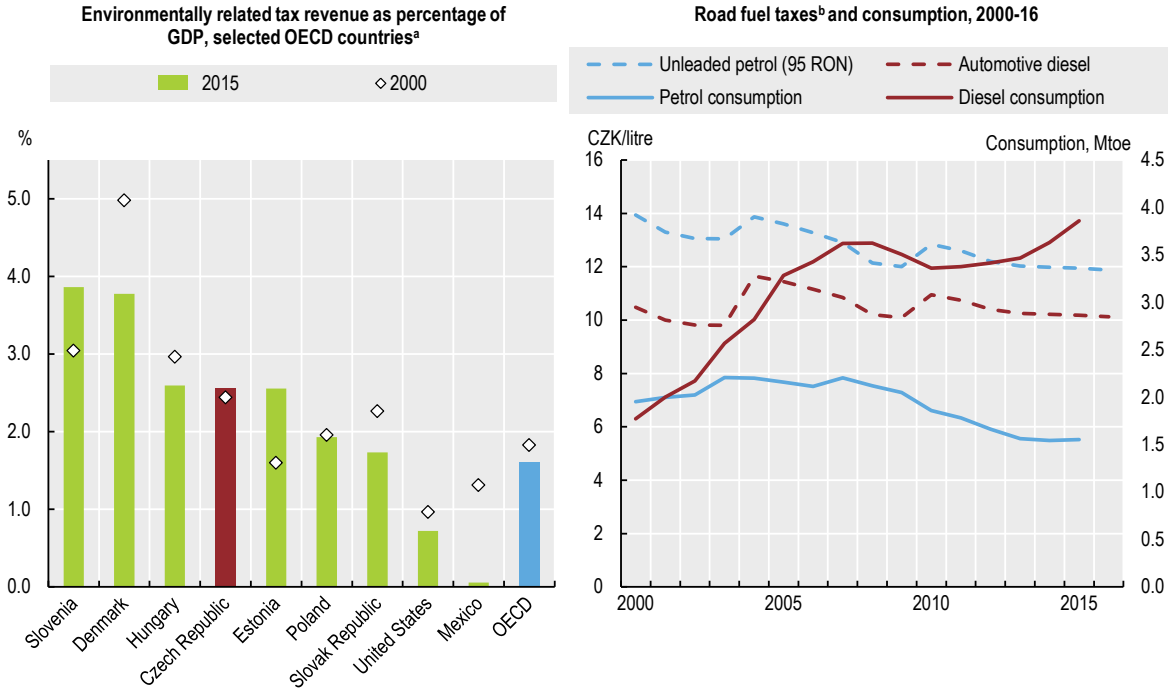
There is no government green growth strategy, though the Czech Republic applied the OECD monitoring framework to develop a set of green growth indicators. However, there is little evidence of their use in policy making. While the SEP promotes conventional energy sources as the main opportunity for growth and jobs, assessing the social costs of carbon lock-in and the benefits of a low-carbon economy would help support the transition and gain social acceptance of carbon pricing.

### *1.3.2. Greening taxes and subsidies*

While public debt is low and the budget is broadly in balance, future pension expenditure may pose a challenge for public finances (OECD, 2016). Raising environmental taxes can help finance social expenditure and lower the tax burden on labour, which is heavy in the Czech Republic. “Taxing bads”, such as pollution, can raise revenue at lower economic cost than “taxing goods”, such as labour income (OECD, 2017d). Environmentally related tax revenue rose from 2.4% of GDP in 2000 to 2.9% in 2011 before declining to 2.6% in 2015, well above the OECD average of 1.6% (Figure 2).

Taxes on energy products account for the bulk of these receipts (78% compared with the 70% OECD average). Related revenue rose in real terms over 2000-08, mainly driven by increased road fuel consumption. After a peak in 2011 due to a rise in motor fuel taxation, revenue decreased because of a slowdown in consumption, lower real tax rates and a switch from petrol vehicles to more lightly taxed diesel ones. Like most OECD countries, the Czech Republic grants preferential tax treatment to diesel despite its higher carbon and air pollutant emissions. The share of diesel in road fuel consumption grew from 46% in 2000 to 66% in 2015. Although taxes on natural gas, solid fuels and electricity were introduced in 2008 to comply with the EU Energy Taxation Directive, rates were set at relatively low levels that do not reflect the estimated environmental costs of fuel use, thus giving polluters no incentive to take account of these costs. They are also not adjusted for inflation. The exemptions currently in place mean energy taxes do not provide a consistent carbon price signal across fuels and energy uses, which is necessary to maximise cost-effective carbon abatement.

**Figure 2. Lower and differentiated taxes on road fuels have boosted diesel consumption**




*a)* Czech Republic and Denmark: 2015, Poland: 2013, other countries: 2014.
*b)* Excise taxes at 2010 prices.
*Source:* OECD (2016), "Instruments used for environmental policy", *OECD Environment Statistics* (database); IEA (2017), *IEA Energy Prices and Taxes Statistics* (database); IEA (2017), *IEA World Energy Statistics and Balances* (database).

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Like other Central and Eastern European countries, the Czech Republic has maintained low energy tax rates out of affordability concerns: about 14% of households face energy affordability risk[1] (Flues and Van Dender, 2017). Providing direct support to vulnerable households decoupled from energy use and setting tax rates at levels that better reflect the environmental costs of energy use would be more efficient at achieving both efficiency and equity. OECD simulations have shown that using a third of the additional revenue from higher taxes on heating fuels and electricity would decrease the share of Czech households facing energy affordability risk by 15% with an income-tested benefit. This would also improve health by reducing air pollution.

Several tax exemptions applied to various fuel uses decrease end-use prices and reduce incentives to save energy or to switch to cleaner fuels. For example, exemptions apply to natural gas used for residential heating and coal and natural gas used in combined heat and power plants, and part of the excise tax on diesel used in agriculture is refunded. It has been estimated that these provisions resulted in revenue losses equivalent to 5% of energy tax revenue in 2014. There is no comprehensive information on potentially environmentally harmful subsidies and tax expenditure in the Czech Republic. The annual report of the new National Budgetary Council could be a vehicle for screening public support programmes against their potential environmental impact. This would be useful for reforming subsidies and special forms of tax treatment that are not justified on economic, social or environmental grounds.

More than 75% of $CO_2$ emissions from energy use are priced via energy taxes and the EU Emissions Trading System (EU ETS). However, when considering the combined price signal from taxes on energy and allowance prices, in 2012 only 16% of emissions were priced above EUR 30 per tonne of $CO_2$ (a conservative estimate of the climate damage from one tonne of $CO_2$ emissions), and emissions priced at this level were primarily from road transport. Carbon pricing instruments thus do not provide an adequate price signal corresponding to the external costs of fuel use, in particular outside the road sector. The EU ETS has not provided a strong price signal to induce low-carbon investment. Installations consistently received free excess allowances over 2005-12. Although an increasing share of emission allowances must be auctioned in the third period (2013-20), most energy-intensive industrial installations continued to be allocated free allowances in 2016, exceeding actual emissions in some sectors (e.g. iron and steel). Like other lower-income EU countries, the Czech Republic received a derogation to provide free allowances to its power sector worth about EUR 1.9 billion over 2013-19, conditional upon investment of equivalent value to modernise electricity generation and diversify the energy mix. However, over 2013-15, investment was mostly devoted to modernising lignite- and hard coal-powered plants (EEA, 2016). Compared with auctions, free allocations weaken emission abatement incentives for firms and imply large costs for government due to forgone revenue (OECD, 2017e).

Since 2000, revenue from vehicle taxation has doubled in real terms driven by strong growth in road freight transport and the introduction of a toll system. However, it continues to make up a relatively small share of revenue from environmentally related taxes (16%, compared to the 26% OECD average), leaving room to review the rates to better address environmental externalities. In 2007, the Czech Republic introduced a distance-based charge for trucks and buses on motorways and high-speed roads. The rate varies by emission class, number of axles, road type, day and time. It has proven effective for reducing traffic during peak times. Such a system could be extended. The one-off registration and annual recurrent taxes on vehicles do not take environmental parameters into account. The average age of the car fleet is about 15 years. In 2009, an environmental tax was introduced on top of the registration tax for second-hand, high-polluting cars. However, the emission criteria were not adjusted to car market evolution and old car registrations increased steadily. As the 2005 EPR recommended, there is room to further develop traffic management in urban areas where the share of cars in passenger transport is growing.

The government outlined the principles of an environmental tax reform in 2007. The plan was to implement it gradually over ten years, and it was expected to be revenue neutral. The first step was implementation of the EU Energy Taxation Directive in 2008, associated with the introduction of a single personal income tax rate and a reduction of corporate income tax rates. The second phase was supposed to include a carbon tax but its introduction has been postponed. Contrary to the principle of the reform, the implicit tax rate on energy[2] has declined since 2011, while implicit tax rates on labour increased. Air pollution tax rates were increased, but are too low to motivate emission reductions. While it is rational for the Czech Republic to focus on $CO_2$ and local air pollutant emissions, there is room to review environmentally related taxes and charges on the basis of other environmental parameters. For example, opportunities exist to better reflect the environmental and resource costs in water charges and to address diffuse pollution, which affects the majority of the Czech water bodies.

### *1.3.3. Investing in the environment to promote green growth*

Public and private environmental expenditure[3] rose from 1.2% of GDP in 2005 to 1.5%[4] in 2015, boosted by public investment in wastewater management and higher private investment in air and climate protection. Increased operational expenditure on waste management did not result in an equivalent improvement in performance, highlighting the need to better control the cost of service provision (Section 1.4). In 2016, environmental expenditure fell to 1.2% with the transition to the new EU programming period.

EU cohesion policy has been a major source of funding for environmental infrastructure. Over 2007-13, EU funds[5] allocated to the Czech Republic represented 2% of GDP a year, on average (EC, 2016a). Transport was the first priority, receiving 35% of funds, followed by environment (18%), mostly financed through the environment operational programme. However, implementation of EU co-financed projects on environmental infrastructure has been delayed and some funds have been lost due to irregularities in procurement processes and inadequate public control. Although measures taken significantly increased the absorption rate of 2007-13 funds at the end of the programming period, the uptake of EU funds for 2014-20 has been slow and deficiencies remain (EC, 2017c).

Higher than average public spending on wastewater management has helped the Czech Republic meet the connection rates required by the EU Urban Waste Water Treatment Directive. In 2015, 81% of the population was connected to public sewage treatment plants, in line with the OECD average. However, treatment level objectives were not achieved. Full compliance will require additional and better-planned investments to avoid oversized infrastructure, as sometimes happened over 2007-13. The regulatory office for the water and sanitation sector, established in 2015, is a welcome step to streamline a fragmented sector and improve the cost-effectiveness of service provision. Although infrastructure is in good condition, ageing of assets is becoming an issue as many were built in the 1970s and 1980s (World Bank, 2015). Despite significant increases in the past decade, tariffs remain too low to cover renewal and new investment costs for water and sanitation infrastructure. While the Czech Republic should take redistributive impact into account when pricing water services, some studies suggest achieving full cost recovery would not lead to substantial affordability issues (Reynaud, 2016).

Although the Czech Republic made good progress towards meeting its 2020 climate target, achieving more ambitious targets in 2030 and 2050 will require substantial investment in clean energy infrastructure. A range of regulatory measures and investment programmes promote energy efficiency. For example, the Green Saving Programme, which supported energy saving in the housing sector through the sale of emission allowances under the Kyoto flexible mechanism, was instrumental in meeting the energy saving goal for 2010. However, the numerous programmes implemented have been fragmented and cost-inefficient, and some (e.g. boiler replacement) have provided incentives for continued reliance on coal (IEA, 2016). While NEEAP lags behind the planned targets, introducing savings obligations for energy providers, as many European countries have done, could help promote demand-side management. Such an option would require careful analysis of interaction with other instruments (e.g. the EU ETS and energy taxes), and a well-defined and transparent evaluation framework. In addition, measures to address energy efficiency in transport should be strengthened.

A feed-in tariff (FIT, guaranteed price) and feed-in premiums (FIPs, paid on top of the market price) boosted investment in renewables until 2013. In 2010, favourable market

conditions and generous FITs resulted in the Czech Republic becoming the Europe's fourth-largest solar photovoltaic (PV) market (IEA, 2016). However, as in other OECD countries, high FIT rates were not adjusted quickly enough as production costs declined, which led to a rapid and costly expansion of PV installations. To curb rising electricity prices, the government first tightened the conditions then removed the FITs and FIPs in 2014. In addition, profit taxes on FITs and FIPs were imposed retroactively on PV installations. These changes have stopped the expansion of renewable electricity capacity. Reaching the SEP target of 25% renewables in electricity production by 2040 will require new support mechanisms such as capacity auctions or quotas, to avoid excess production (IEA, 2016). Introducing a carbon tax or increasing existing energy taxes on emissions in sectors outside the EU ETS would be a cost-effective tool to stimulate greater investment in renewables and energy efficiency. The Czech Republic has a power system with sufficient, but inflexible, capacity reserves (mostly lignite and nuclear). Its high level of interconnection capacity provides some flexibility but there is a need for a closer market integration to reduce overflows of renewable power from neighbours. Within the domestic market, the grid flexibility could be increased by fostering market signals for investment in flexibility and demand response.

Poor transport infrastructure continues to hamper Czech competitiveness. The quality of the roads is significantly below European standards and the rail network requires substantial modernisation (EC, 2017c). After sharp growth over 2000-08, investment in transport infrastructure fell substantially to 2013 before recovering with the late absorption of EU funds. Implementation of transport infrastructure projects is affected by structural deficiencies including lengthy procedures for issuing building and land use permits (EC 2017b). In 2015, investment in transport infrastructure represented 1.2% of GDP, far below the 2.5% annual expenditure required to operate, maintain and develop the country's transport infrastructure (MOT, 2013). Over 2000-15, road infrastructure absorbed two-thirds of investment. To stabilise government funding of infrastructure, the transport policy suggests extending distance-based charging to a wider network and other vehicle categories. Differentiating toll rates by vehicle emissions and congestion levels, and implementing low-emission zones, would help address some external costs linked to road transport more efficiently. Instead of earmarking revenue for one expenditure type, project selection should be based on evaluation of social returns. Public-private partnerships are envisaged only for the most important sections of the road network.

### *1.3.4. Expanding environment-related markets and employment*

The environmental goods and services sector (EGSS) accounts for an estimated 1.8% of total employment and 2% of GDP, on a par with the EU averages. Waste management accounts for most jobs and the bulk of the value added in environmental protection activities, while management of minerals and renewables contribute the most to resource management activities. However, with the removal of support programmes, more than half the jobs in the renewables sector were lost over 2012-14. Information on the EGSS needs to be improved to support reallocation of labour from shrinking to growing sectors. The authorities could draw on the experience of other countries (e.g. Austria, France) in monitoring existing skills and forecasting future skill requirements for the transition to a low-carbon economy.

### *1.3.5. Promoting eco-innovation*

The Czech Republic is an average eco-innovation performer, according to the EU scoreboard (EC, 2017d). Since 2000, public budget and patent applications have shifted from environmental management to climate- and energy-related technology.

In contrast with the trend in IEA countries, public expenditure on energy-related nuclear research, development and demonstration increased to absorb more than half of spending in 2015. Since 2011, this shift has been accompanied by declining budgets for energy efficiency and renewables. The National Research, Development and Innovation Policy 2016-20 and the Smart Specialisation Strategy put a clear focus on nuclear energy and adaptation of conventional combustion installations to comply with emission limits (GOCR, 2016a, 2016b).

While there is no national policy outlining a coherent approach on eco-innovation, some funding programmes, agencies and ministries support eco-innovation and a circular economy (EC, 2016b). Support programmes for R&D are the main instruments used but demand-side instruments, including regulations, standards, labelling and certification, have played an increasing role. Use of price and tax instruments has been limited, and green public procurement has not progressed as planned. Eco-innovation faces the same challenges as general innovation: weak outcomes of R&D activities, limited co-operation between academia and business, a fragmented R&D policy and funding framework, high dependence on the activities of foreign-owned companies and inefficiency in the business environment.

**Recommendations on green growth**

- Implement an environmental tax reform so that prices better reflect environmental externalities, including GHG emissions and local air pollutants:
  - introduce a carbon component in energy product taxation to reflect the external costs associated with carbon emissions outside the EU ETS and provide a stronger and more consistent price signal across the economy; raise the excise tax on diesel to at least match that on petrol, and index the taxes on both fuels to inflation; consider recycling part of revenue from higher taxes on heating fuels and electricity to vulnerable households using an income-tested cash transfer.
  - extend distance-based charging to a wider network; link road tolls for passenger vehicles to the vehicles' emission standards; extend the annual road tax to all (not only business) vehicles; make its rate vary by fuel economy and air emission standards and delink it from the age of vehicles; harmonise the rates of the registration tax on new and used vehicles and tighten environmental criteria to promote fleet renewal towards cleaner vehicles; implement low-emission zones as planned in the Air Protection Act.
  - remove environmentally harmful exemptions to the energy and vehicles taxes; consider establishing a green tax commission, possibly as part of the National Budgetary Council, to review the environmental effects of fiscal instruments, identify subsidies with adverse environmental effects and prioritise which to phase out.
  - ensure that groundwater abstraction charges reflect resource scarcity and remove exemptions that are not justified on environment grounds. Consider

introducing taxes on fertilisers and pesticides.

- Improve the effectiveness of EU funding for green infrastructure by strengthening public procurement procedures, improving project co-ordination, oversight, planning and evaluation, and ensuring the achievement of measurable environmental targets.
- Promote investment in low-carbon energy technology: assess the environmental impact of investment in electricity production under the national plan on free allocations and select projects with the highest social return; increase more rapidly the share of permits auctioned in the power sector under the EU ETS.
- Strengthen cross-government co-ordination on energy efficiency activities; reinforce transport-related measures in NEEAP; streamline support programmes for households and phase out support to coal boilers; consider introducing energy savings obligations for energy providers; develop the capacity of the banking sector to leverage investment in energy efficiency.
- Introduce new support mechanisms for renewable electricity, avoiding any retrospective changes; strengthen the national electricity grid and increase power system flexibility, including through enhanced regional co-operation and demand response.
- Promote efficient provision of water services by improving the regulatory framework, including for the financing of these services; apply user charges that allow sustainable cost recovery; promote inter-municipal co-operation; ensure systematic monitoring by independent regulatory authorities of utilities' efficiency and service quality.
- Develop monitoring and analysis of the EGSS; forecast skill requirements resulting from the transition to a resource-efficient and low-carbon economy and adapt education and training policies accordingly.
- Develop and implement a comprehensive and coherent framework for promoting eco-innovation by improving the co-ordination of energy, innovation and environmental policies across the government; streamline public support for R&D and ensure that it targets long-term priorities; improve co-operation between academia and business and ensure sound framework conditions for business innovation; develop demand for environmental goods and services.

## 1.4. Waste, materials management and circular economy

### *1.4.1. Introduction*

The Czech Republic has well-developed and fairly complete policy and legal frameworks for waste and materials management, supported with quantitative targets, voluntary agreements and economic instruments. The country has progressed on several recommendations of the 2005 EPR and further aligned its policy framework with EU legislation.

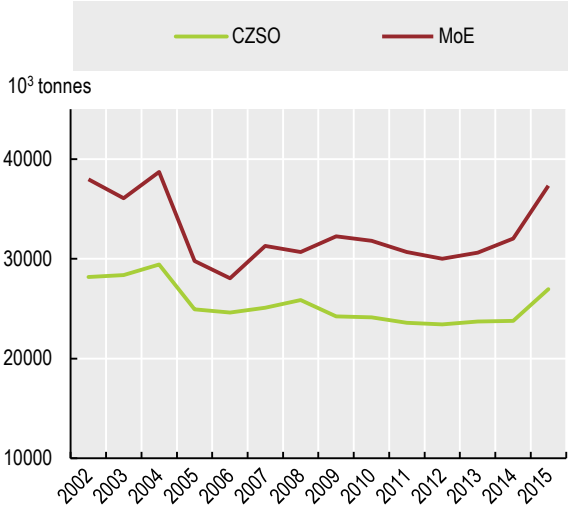
But the pace of progress since 2005 has been insufficient to consolidate the advances made in the late 1990s and 2000s, and to seize the benefits of continued EU support. Implementation has been partial and not sufficiently co-ordinated. Some targets of the 2003-14 Waste Management Plan were not met. Most achievements were driven by EU requirements and funding. In areas such as landfilling of municipal waste, economic analysis of waste management and investments in recycling, improvement has been

marginal. Waste prevention has not received sufficient attention. The Czech Republic's performance in waste management has improved but remains modest. The current Waste Management Plan contains measures which should help achieve a better performance over 2015-24 (MoE, 2014). The emphasis is on the value of waste as a resource, with the aim of reducing amounts going to final disposal, increasing recycling and reuse, and preventing waste generation.

### *1.4.2. Producing reliable information on waste and materials for decision making*

Two information systems on waste generation and treatment co-exist: the MoE waste management information system and the CZSO waste and material flow statistics, which are based on different EU legal acts. The two systems produce data that differ greatly in terms of definitions, reporting boundaries and surveying methods. This leads to duplication and gaps, impedes policy planning and evaluation, and wastes public money. In 2016, the two institutions and the Government Office agreed to co-operate to review and consolidate the information base. Implementation of this agreement is essential and should be speeded up, supported with a related provision in the new Waste Act.

**Figure 3. Waste generation: two data sources, two messages**




*Note:* Official statistics on waste, produced by the CZSO are used to report under the EU Waste Statistics Regulation. The data refer to primary waste. Data from the Waste Management Information System of the MoE, are used to develop the country's Waste Management Plan, monitor its implementation and report on EU waste policy objectives. The data include both primary and secondary waste.
*Source:* CZSO (2016), *Generation, recovery and disposal of waste*; MOE (2017), *Waste Management Plan*.

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Material flow accounts are well established, but not integrated with waste statistics. Waste reduction efforts in the business sector are rarely monitored. It is thus not easy to get a complete picture of material flows through the economy and how they relate to waste streams and recycling efforts. The Czech Republic could make much better use of the data produced if they were harmonised and integrated. Industry should also be

encouraged to integrate this information in corporate reporting, performance assessments and financial statements.

### *1.4.3. Creating incentives for more cost-effective waste management*

Economic instruments have long been established but do not create the right incentives for compliance with the waste hierarchy. Municipal waste fees are too low to spur waste reduction and recycling, and to cover the cost of service provision. Pay as you throw systems for collection of mixed household waste are in place in only 15% of municipalities. Associated with free separate collection of recyclable waste, expansion of the pay as you throw system could become an important tool for reducing waste going to final disposal.

Landfill taxes remain very low. Landfilling is up to six times cheaper than incineration with energy recovery, contradicting the objective of promoting recycling before energy recovery and final disposal.

In recent years, energy and heat recovery from waste has been promoted to contribute to renewables targets and divert waste from landfills. The Waste Management Plan calls for an expansion of waste-to-energy facilities by 2024. Given the amount of investment involved in such infrastructure and the risk of creating a lock-in effect, it is important for the long-term costs and benefits of alternative waste technology and infrastructure to be carefully examined, along with existing capacity in neighbouring countries.

### *1.4.4. Strengthening waste reduction and recycling*

Waste recovery and associated recycling rates are growing but remain below those in many other OECD and EU countries. The material intensity of the economy has been reduced, more than in most other OECD and EU countries. A well-functioning extended producer responsibility system deals with packaging waste and has met EU targets. The Czech Republic was the first Eastern European country to adopt extended producer responsibility for packaging, in 2000. It has since expanded the system to end-of-life vehicles, tyres, batteries, and waste electrical and electronic equipment (WEEE), and achieved most of the relevant EU targets. Producer responsibility for products other than packaging, particularly WEEE, is not yet sufficiently efficient, however, and lacks transparency.

The country's system of green public procurement encourages recycling markets, as does the government's recent secondary raw materials policy. Recycling markets, however, remain weak. A trading system for recycled and recyclable materials and products was envisaged but is not operational. Awareness among businesses about the benefits of waste prevention and a circular economy seems low.

Despite efforts to move to a more knowledge-intensive economy, Czech companies' innovation performance is lagging, and R&D remains insufficiently connected to business needs. Developments in eco-innovation and clean production technology related to waste management and a circular economy have suffered as a result.

### *1.4.5. Improving the effectiveness of waste management*

Waste is not managed in a cost-effective and environmentally sound manner. Current measures to minimise the environmental impact of waste and materials over their life cycle are insufficient. Direct landfilling still represents a much higher share than in other OECD countries. The recovery target of 50% of municipal waste by 2010 set in the 2003

Waste Management Plan was not met (SAO, 2011). Nor was the EU target of halving the amount of landfilled biodegradable municipal waste from the 1995 level by 2013 (SAO, 2017). Energy recovery is promoted, including as a way to divert waste from landfill. Weaknesses in the monitoring of waste sent to landfill lead to hazardous waste being landfilled by circumventing the landfill risk fee (SAO, 2013).

Waste reduction at source and reduction of hazardous substances in products are encouraged through the producer responsibility system and implementation of the EU directive on Restriction of Hazardous Substances and regulation on the Registration, Evaluation, Authorization and Restriction of Chemicals, but their outcomes are not well known. Synergies with chemicals policies could be strengthened, and businesses should be given greater incentives and guidance on design for environment, including through the producer responsibility system.

Despite important reforms, irregularities in public procurement and lack of transparency still exist (OECD, 2013).

At the national level, co-operation between the MoE and other ministries (industry, agriculture) works well for issues related to waste management. But there is no institutional platform for broader co-operation to steer the transition to a circular economy and related investment choices, nor any platform where businesses, banks and other stakeholders can meet.

At the local level, the large number of municipalities, their autonomy and inefficient inter-municipal co-operation imply a lack of capacity to absorb and implement new policies. Municipalities need more support to carry out their responsibilities. Harmonised guidance by the government is needed to set up a system to assess municipalities' performance in providing waste services, including through the use of cost accounting indicators.

### *1.4.6. Performance outlook*

The Czech Republic's modest performance in waste management means essential steps need to be taken before circular economy approaches can be implemented. In the years ahead, it will be important to effectively implement the Waste Management Plan and associated Waste Prevention Programme, and to use synergies with the secondary raw materials policy and the eco-innovation and cleaner production programmes. Adoption of the new Waste Act is crucial in this regard and should be speeded up. The proposed increases in the landfill tax to divert reusable, recyclable and recoverable waste from landfill, for example, cannot be done until the new act is adopted. Its approval before the end of 2018 thus seems indispensable.

The establishment of a reliable, transparent and integrated information system on waste and material flows will be essential to monitor progress and should be reflected in related provisions of the act. Stronger efforts are required to encourage waste prevention in production processes and further upstream in the value chain (design phase), to stimulate "upcycling" of waste into higher-value products and to assess opportunities arising from circular business models. Such efforts must be on a par with modernisation of Czech enterprises, effective alignment of measures and objectives across policies and ministries, and increased co-operation.

**Recommendations on waste, materials management and circular economy**

**Improve the information base on waste and materials to support policy making**

- Harmonise the national waste management information system and official statistics on waste and materials to create a consolidated, transparent integrated system that supports development, implementation and monitoring of national policies and international reporting. Ensure that a related provision is included in the new Waste Act.
- Encourage industry to use waste and materials flow information in combination with accounting data to establish material flow cost accounts so as to better understand the environmental and financial consequences of material and energy use practices and identify opportunities for efficiency improvements (e.g. production processes and product supply chains where material losses could be reduced).

**Increase the environmental and economic efficiency of waste management**

- Speed up the adoption of the new Waste Act, ensuring its approval no later than end of 2018.
- Review waste-related taxation in line with the waste hierarchy: gradually increase the landfill tax to a level high enough to divert waste from landfill; consider introducing a tax on incineration for reusable and recyclable waste; ensure municipal waste fees cover the full costs of service provision, and extend the pay as you throw system to all areas.
- Provide greater incentives to households to participate in separate collection by implementing door-to-door separate collection.
- Improve separate collection rates for WEEE and improve the cost-effectiveness, monitoring and transparency of extended producer responsibility for WEEE. Conduct a competition assessment to identify how market forces can be further strengthened.
- Enhance co-operation between government levels and find ways for more efficient inter-municipal co-operation on waste management by encouraging the creation of inter-municipal organisations.
- Encourage the use of harmonised cost accounting indicators as part of a broader system to assess municipalities' performance in providing waste services.

**Promote waste prevention and circular business models**

- Expand efforts early in the value chain to reduce waste generated and hazardous substances in recovered materials. Provide incentives and guidance to businesses on eco-design, including through the producer responsibility systems.
- Strengthen waste prevention in industry by fostering awareness among businesses of the economic and environmental benefits of a circular economy, and by creating incentives for the adoption of new technology and environmental management systems. Exploit the synergies between measures on cleaner production, eco-innovation, waste prevention and secondary raw materials by establishing effective mechanisms for co-ordinating and monitoring the actions of all ministries involved.

- Strengthen markets for secondary raw materials and recycled goods by stimulating the upcycling of waste, including construction and demolition waste, into high-quality, high-value products, and by integrating secondary raw materials and recyclable waste in the appropriate commodity exchange.
- Strengthen the institutional framework to steer the transition to a circular economy and related investment choices, and set up a platform for broader co-operation where businesses, banks and other stakeholders can meet.

## 1.5. Sustainable urban development

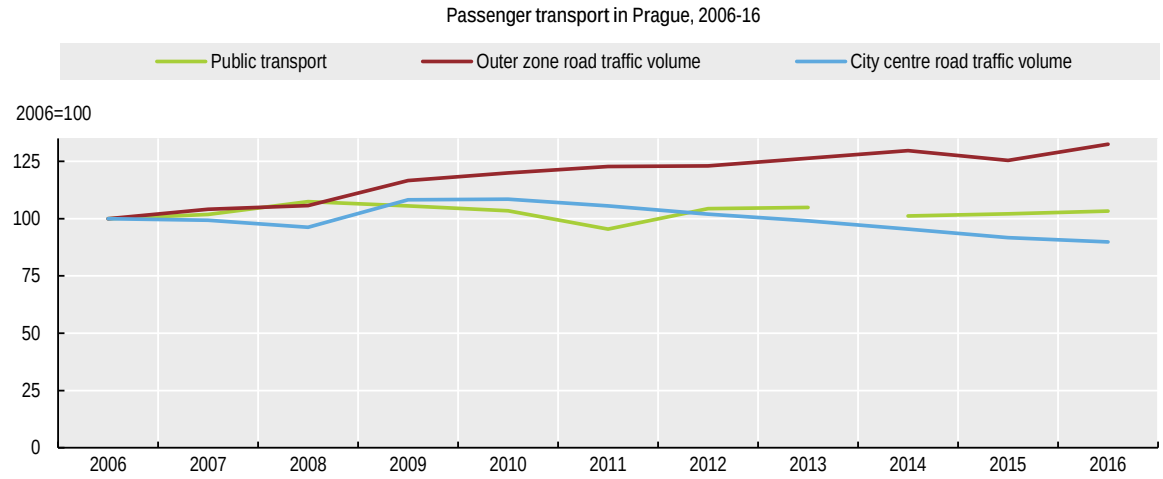
### *1.5.1. Key urban and environmental trends*

The Czech Republic has 16 functional urban areas[6] (FUAs), which are its economic power source. Together, the FUAs of Prague, Brno and Ostrava account for 41% of GDP, 31% of employment and 30% of the population. This suggests that productivity and competitiveness improvements in these areas will have positive repercussions nationwide. According to the OECD regional typology,[7] the Czech Republic is among the least urbanised countries in the OECD. In recent decades, it has experienced a process of suburbanisation. Changes in urban population have been mainly driven by migration. In Prague, for instance, 97% of the total population increase over 2000-16 was due to migration and 3% to natural increase. The Czech Republic is also undergoing a demographic shift as the population ages, bringing about long-term challenges related to housing, transport, water and other public services.

Prague has the highest population density in the country, but the level is lower than in cities of neighbouring countries such as Poland and Slovakia. Among Czech major cities, the capital and its surroundings in the Central Bohemia region have seen the strongest population growth. Built-up area has been growing, especially in Prague's commuting zone. This expansion has created short-term growth, but evidence suggests that, in the long run, compact cities are more resilient and have better environmental outcomes (e.g. lower energy consumption).

Despite the economic benefits cities bring to the Czech economy, they are a source of long-term challenges regarding housing, transport and environmental protection. Housing affordability has become a major concern. Free market affordable housing is mostly located on the fringe of Prague in housing estates. Although significant investment is being made to regenerate housing estates inherited from the Soviet era, many lack adequate maintenance. The high rate of home ownership limits labour mobility. While Czech cities continue investing in urban mobility, improvements in public transport are counterbalanced by increased car use (Figure 4). This trend is exacerbating air and noise pollution, which remain major health concerns. The development of environment-friendly transport infrastructure and related incentives for public transport and cycling, as recommended in the 2005 EPR, is still pending. The 2016 Programme to Improve Air Quality in Prague is rightly linked to transport strategies reflecting a more integrated approach to urban development. In large cities, almost all residents are connected to public water supply and sewage treatment. However, financing the operation, maintenance and upgrade of the infrastructure remains an issue.

**Figure 4. Car traffic volume is growing in Prague's outer zone**




*Note:* Public transport: index based on the number of passengers transported; break in time series in 2014. Traffic volume: index based on the number of vehicles over the 24 hours of an average workday. City centre delineated at Petřín in the west, Letná in the north, Riegrovy sady in the east and Vyšehrad in the south (the Strahov and Mrázovka tunnels lie outside the central cordon). Outer zone: volume of traffic at the entrances of the main roads and motorways into the continually settled area of the city.
*Source:* City of Prague (2006-17), Prague transport yearbook.

StatLink http://dx.doi.org/10.1787/888933723720

As the 2005 EPR recommended, Local Agenda 21 (LA21) – a voluntary tool for sustainable development at the local level – is being implemented, mostly through the Healthy Cities platform. The municipalities that have adopted the agenda seem to have made some citizens and economic actors more environmentally aware (Kveton et al., 2014), although they remain a minority. The national government should disseminate the agenda's benefits more widely through the Union of Czech Towns and Municipalities. The Sustainable Municipalities Committee of the Government Council for Sustainable Development has created methodological tools for evaluating LA21 initiatives that could be used more broadly.

### *1.5.2. Urban governance*

The Czech Republic is adopting an integrated approach to territorial development so as to use EU structural and investment funds in certain areas, not only to support national competitiveness but also to reduce territorial disparity. Instruments to use these funds include integrated territorial investment, integrated territorial development plans and community-led local development. However, individual investment projects cannot replace metropolitan-area planning. For instance, Prague has no metropolitan-wide planning approach to land use. This lack compromises Czech cities' socio-economic and environmental performance.

The territorial organisation is among the most fragmented in the OECD. A majority of municipalities have fewer than 500 inhabitants. A municipality with at least 3 000 inhabitants can be considered a city. The capital, Prague, has the level of a regional government. The distribution of responsibility across government levels is complex. The Ministry of Regional Development is responsible for national policy on regional and spatial development and urban issues. Regional responsibilities include upper secondary education, regional roads, public transport, health care/general hospitals, economic development and planning, as well as social assistance for disadvantaged groups.

Municipalities are responsible for local planning and also public transport and the management of local roads, housing, the environment, infrastructure (water and waste management, urban heating, environmental protection), agriculture, primary health care, social care services and local development in general. In addition, the national government has district offices that supervise municipal-level implementation of some central functions.

### *1.5.3. Policy framework*

Czech Republic 2030 and the 2015 Spatial Development Policy set the main priorities on sustainable urban development: integrated development in cities and regions, prevention of spatial-social segregation, redevelopment of brownfield sites and improvement of public urban transport and connectivity. The 2007 Building Act introduced "development principles" as a regional planning tool. The Principles of Urban Policy, a comprehensive cross-sector document presenting the central government's views on urban development, was updated in 2017 to reflect the Sustainable Development Goals and the UN-Habitat New Urban Agenda. The principles provide guidance and aim to co-ordinate urban development activities at all levels of government.

At the local level, cities' strategic development plans indicate that environmental protection and sustainable development are key priorities. For instance, the 2016 Strategic Plan of Prague seeks to promote creativity, citizen participation in urban life, enhanced social cohesion, green infrastructure, the sustainable development of peri-urban landscape and revitalisation of public spaces. However, these development plans lack a holistic approach to align housing, spatial planning and transport policies. Sectorisation and specialisation seem well rooted in the Czech administration and while these characteristics have provided clarity for accountability and responsibility, their drawback is that they limit ministries' ability to co-operate on holistic solutions.

### *1.5.4. Policy instruments*

Spatial planning instruments are well defined and regularly updated, and have a clear multilevel structure. Cities are not legally required to adopt land use plans, but, once adopted, such plans are binding. At the national level there is a hierarchical system of plans, with the Spatial Development Policy at the top of the hierarchy (MRD, 2015). Although it contains planning guidelines and delimits development areas as well as the main transport and infrastructure corridors, it does not outline a general vision for spatial development. As spatial planning and economic policy are separated from territorial planning,[8] they lack immediate connection to central, regional and municipal financial planning. All three levels of government often make spatial and land use plans without clearly anchoring them in public budgets, so there is a mismatch between resources and objectives.

Prague's intensive suburbanisation suggests that its land use planning system is highly permissive, a situation that seems to be replicated in other municipalities. Its urban core has a share of developed land per person only slightly below the European average, but its commuting zone is characterised by dispersed development. Since 2000, developed land across the Prague FUA has grown faster than the OECD Europe average. By far the greatest increases have been in the commuting zone, indicating that better links between rural and urban areas are needed. The updated Principles of Urban Policy suggest that rural-urban partnerships working through a functional approach may be the way forward. Prague's 2016 Strategic Plan aims to reduce pressure on the urban core and improve the

quality of the urban environment and architecture. It focuses on encouraging development in built-up areas and protecting unbuilt ones (open landscape, agricultural land) from development. Prague's latest land use plan – the Metropolitan Plan – aims to control sprawl and protect green areas in the municipality. However, due to legal restrictions, the Metropolitan Plan does not cover the entire metropolitan area, which is seeing considerable peri-urban growth.

Although local authorities seem to acknowledge the importance of developing brownfield sites, it is not clear if they have the financial and technical instruments to do so. In many cases, site ownership is unclear, so local authorities' ability to act on their regeneration is limited. Brownfield development presents a valuable opportunity for cities to prevent loss of green areas, enhance urban spaces and remediate sometimes contaminated soil. Such sites could help solve the housing shortage in central areas, as they are usually well connected within the urban boundaries, offering a competitive alternative to greenfield investment. Public urban transport seems to be a success story, at least in the city cores. Prague, for example, is well served by urban transport, though connections to the suburbs are rather limited. The lack of mobility options in the suburbs has led to increased car ownership, traffic and pollution (Figure 4). Green mobility options are largely underdeveloped. Prague's building regulations promote better, more sustainable urbanisation but the lengthy approval process compromises their effectiveness.

Improving energy efficiency in buildings is a priority of the government. The focus is on improvement in the thermal properties of buildings and the insulation of houses and apartment buildings. Litoměřice is a good example of national efforts to increase energy efficiency. Since 2012, the city has refurbished public buildings through the Municipal Energy Plan. This is expected to reduce energy consumption by at least 20% by 2030. A revolving energy savings fund has already saved about EUR 830 000. However, despite increased funding for energy efficiency programmes, investment needs are high.

Czech cities face increasing risk of flood and drought. The government's water policy aims to enhance flood protection and ensure long-term sustainable use of water resources. With the expansion of impervious surfaces and the shrinkage of green areas, heavy rains can lead to sewer overflow and release of untreated wastewater into the environment. Thus, a critical challenge for cities is to build systems to discharge storm water and keep it from mixing with wastewater, taking into account local specificities. Czech cities could learn from what other cities are doing and gain transfer of knowledge and secure capacity building.

Cities need a mix of economic instruments for urban development adapted to their specific situation. Fiscal policy is sometimes at odds with spatial and environmental objectives. Prague does not use fiscal instruments to encourage density despite this being a critical spatial objective. A mixture of congestion charges, vehicles taxes and parking charges could be considered as a way to address Prague's congestion and pollution issues. The introduction of a low-emission zone is being considered but not until the long delayed ring road is completed. For a city like Ostrava, where air pollution is also linked to industrial sources, emission taxes might have more effect.

### *1.5.5. Financing and investment*

The public finance system is highly centralised. Central government spending accounts for two-thirds of general government expenditure (OECD, 2017g). Municipalities have greater spending responsibilities than regions. Subnational government spending is sizeable on education, economic affairs (particularly transport), general public services and environmental protection (particularly waste and wastewater management). However,

discretionary powers of subnational governments are limited, as much spending is on behalf of the central government. In practice, local governments have limited fiscal and spending autonomy and in many respects are centrally regulated.

Subnational governments are financed through a mix of shared tax, grants and transfers from the central government and fees for public service provision (OECD, 2016). The share of taxes allocated to municipalities is mostly based on demography, which can act as an incentive for sprawling development. Municipalities have more revenue from their own sources than regions but their autonomy is limited by centrally determined restrictions. In addition, most of them impose minimum rates for the recurrent tax on immovable property. Increasing the share of municipal revenue that is directly controlled could help drive improvement in public service provision by strengthening the link between taxation and services.

**Recommendations on sustainable urban development**

**Urban governance**

- Strengthen the urban governance system by i) sharpening the distribution of expenditure responsibilities across levels of government; ii) using a functional rather than administrative approach in delimiting metropolitan areas; iii) considering creating metropolitan governance bodies (e.g. have the Prague Institute for Planning and Development cover the entire metropolitan area and/or integrate responsibility for transport and housing planning in a single metropolitan body); and iv) incentivising co-operation through concrete inter-municipal projects (e.g. infrastructure or even cultural events).
- Enhance horizontal collaboration across government agencies on urban policy by i) ensuring that related recommendations of the Government Council for Sustainable Development are implemented and ii) making responsibilities of ministries, agencies and municipal departments more cross-cutting and clarifying their role in urban development.

**Policy framework**

- Increase sustainability through density by i) adopting the compact, co-ordinated, connected development model, with a holistic approach to urban development; raising awareness on the benefits of a compact city model to achieve sustainability among public, private and non-profit stakeholders; and ii) easing administrative burdens of the building approval process to support urban regeneration and brownfield redevelopment.
- Continue to promote Local Agenda 21 beyond the Healthy Cities platform by developing the use of evaluation tools and disseminating benefits through a dedicated communication strategy.
- Ensure that the Principles of Urban Policy emphasise i) monitoring and evaluation as permanent features of the urban planning system and its programmes; ii) the need for strong political and organisational leadership, long-term vision, and citizen engagement in urban life (based on the experience of Litoměřice in energy efficiency); iii) integrated policies for urban development that link transport solutions to housing and land use policies and facilitate synergy building in various policy domains involving all municipalities in the Functional Urban Area; and iv) building rural-urban partnerships for regional development.

**Policy instruments**

- Review the land use planning system to promote urban sustainable development by: i) making land use planning, including implementation strategies, mandatory; ii) adopting integrated spatial planning to coordinate investments; iii) using fiscal incentives to complement spatial development objectives; iv) encouraging metropolitan spatial planning through fiscal incentives and regulatory frameworks set by the national government; v) ensuring that cities, particularly Prague, align sector and borough-level plans with the strategic plan; vi) linking urban transport solutions to housing and land use planning to improve mobility and reduce air pollution; and vii) monitoring the impact of spatial development plans in relation to urbanisation, land use, and environmental objectives.
- Adopt a wide set of measures to deal with the housing shortage by i) revising building laws to reduce unnecessary procedures that lead to higher construction costs; ii) establishing a one-stop process for building permits so that the onus is not on the developer to obtain multiple approvals from individual departments; iii) adopting ways for low-income households to gain access to housing (e.g. by developing the rental market); and iv) if needed, increasing the availability of land for new development through land use planning, especially on brownfield sites.
- Promote the development of brownfield sites to help deal with urban environmental challenges and bridge the housing gap. For that purpose: i) revise fiscal instruments to incentivise brownfield investment and guide land use to a more sustainable path; and ii) facilitate access to affordable, environmentally sound building materials.

**Financing and investment**

- Improve the use of environmental fees and taxes at city (municipal) level to tackle urban air pollution and congestion, considering the cost of the various options (congestion charge, vehicle tax, subsidies, parking charges); revise water and sewage treatment charges to recover the costs of investment, operation and maintenance of water and sanitation infrastructure.
- Remove the demographic criteria for tax sharing, considering population size only when assigning responsibilities to local governments. Thus, larger cities could have responsibility for some services provided by the central government in more sparsely populated regions. This could remove the incentive to compete for population to get more fiscal resources.
- Increase municipalities' capacity to adjust revenue or spending (taxing autonomy, mandatory spending), and increase borrowing (access to credit, fiscal rules), carefully monitored by the national financial authority. Provide financial incentives to support inter-municipal collaboration for service delivery and/or infrastructure projects, through matching grants or co-financing of urban projects by the national government and subnational associations. Specific contractual arrangements could be envisaged to support metropolitan areas.

## Notes

[1] Affordability is defined here as a combined notion of expenditure and disposable income. It refers to households spending more than 10% of disposable income on heating fuels and electricity and falling below the relative poverty line (60% of median income) after expenditure on energy.

[2] The ratio between total energy tax revenue and final energy consumption.

[3] Investment and internal current expenditure (excluding payments to specialised producers of environmental protection services) of the public and business sectors (including specialised producers of environmental protection services). Includes expenditure on air and climate protection, waste and wastewater management, protection and remediation of soil and groundwater, other environmental protection activities (R&D, administration, education) and biodiversity and landscape protection. Excludes expenditure on water supply.

[4] The 2.1% figure published by CZSO doubles accounts payment to, and expenditure of, specialised producers of environmental protection services, which overestimates expenditure, in particular on waste management.

[5] European Regional Development Fund and Cohesion Fund, after decommitments and corrections.

[6] Economic units characterised by densely inhabited "urban cores" and "hinterlands" whose labour market is highly integrated with the cores (OECD, 2012).

[7] The OECD classifies regions as predominantly urban, predominantly rural or intermediate, to facilitate international comparability (OECD, 2017f).

[8] Urban and territorial planning can be defined as a decision-making process aimed at realising economic, social, cultural and environmental goals through spatial visions, strategies and plans along with policy principles, tools, institutional and participatory mechanisms and regulatory procedures. It is an instrument for reshaping the forms and functions of cities and regions to generate endogenous economic growth, prosperity and employment, while addressing the needs of the most vulnerable, marginalised or underserved groups (UN-Habitat, 2015). Spatial planning focuses in broad terms on city regeneration, city expansions and planning regulations (Vogelij, 2010).

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# Annex 1.A. Actions taken to implement selected recommendations from the 2005 OECD Environmental Performance Review of the Czech Republic

| Recommendations | Actions taken |
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| **Chapter 1. Environmental performance: trends and recent developments** | |
| Strongly implement measures to achieve ambient air quality standards, especially for $PM_{10}$, $NO_2$, ozone and toxics in and near large cities. | The 2002 Air Quality Protection Act and 2006 government regulation on air quality transposed the pre-2008 EU air directives. Transposition of the Directive on Ambient Air Quality and Cleaner Air (2008/50/EC) was carried out through the 2012 Air Protection Act (Chapter 2). In 2016, EU limit values for $PM_{10}$, $PM_{2.5}$, benzo(a)pyrene and ozone were repeatedly exceeded. $NO_2$ limit values were also exceeded at four traffic-loaded locations in Prague and Brno (Chapter 1). |
| Give renewed impetus to measures for further reducing air emissions, to capture health and related economic benefits (e.g. reduced health expenditure, increased productivity) including special attention to implementation of such measures for small sources of pollution. | Decree No. 415/2012 on the permissible level of pollution and its determination, and on the implementation of some other provisions of the Air Protection Act, as amended, set stricter emission limits on medium combustion plants from 2018. The amendment also transposes Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants. |
| Implement the action plan to reduce nitrate pollution from agriculture. | The action programme was revised in accordance with Article 5 of the Nitrate Directive (91/676/EEC) in August 2016, and vulnerable zones were also revised). Water pollution by nitrates from agricultural sources remains an issue (Chapter 1). |
| Formulate and implement action programmes to prevent the discharge of dangerous substances into water. | An action programme is under development. |
| Make further efforts to improve compliance with microbiological bathing water standards. | A national directive, No. 238/2001, was amended in 2014 to include new microbiological indexes and new branding of the state of bathing water quality via signs that the public is expected to be able to better identify. Quality controls by public health offices are more frequent in summer, as is reporting. Bathing water quality has generally improved in accordance with the provisions of the Bathing Water Directive (2006/7/EC). Most inland bathing waters (92%) are of at least sufficient quality (Chapter 1). |
| Deal with floodplain management as part of the EU Water Framework Directive implementation; use various EU funding mechanisms to reduce exposure to flood risks. | The most important financial instrument supporting revitalization of watercourses and floodplains is the Operational Programme “Environment” (OPE). |
| Finalise, adopt and implement the national biodiversity strategy and related action plans. | The National Biodiversity Strategy (NBS) defines priorities in sustainable biodiversity use and conservation for 2016-25. Built on a comprehensive evaluation of the previous strategy (2005-15), it is also linked to the State Environmental Policy, the Czech Republic 2030 sustainable development strategy and concept documents across all sectors. The NBS is aligned with international commitments, notably the EU Biodiversity Strategy 2020, the Convention on Biological Diversity Strategic Plan for Biodiversity to 2020. |
| Establish the Natura 2000 network and related management, with appropriate co-ordination and consultation among national, regional and local authorities, and participation of civil society. | In 2016, Natura 2000 sites covered 14% of the Czech Republic (Chapter 1). Further areas need to be designated to complete the network. An infringement procedure was initiated in February 2016, and 51 new Sites of Community Importance were proposed that year. |
| Further integrate biodiversity concerns in agriculture, forestry and tourism; evaluate the impact of agricultural chemicals (fertilisers, pesticides) on ecosystems; take measures against soil erosion; promote natural processes | The national rural development programme is the main instrument to integrate biodiversity concerns in agriculture. Agro-environment-climate measures and support of landscape infrastructure aim at reclamation, conservation and improvement of ecosystems dependent on the agricultural sector. The National Action Plan to Ensure |

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| in the forest restoration activity; develop the strategy for sustainable tourism for protected areas. | the Sustainable Use of Pesticides seeks to reduce the adverse impact of plant protection products on human health and the environment. The main legislative instruments related to the conservation and sustainable use of biodiversity in agriculture include Act No. 252/1997 Coll., on Agriculture; Act No. 242/2000 Coll., on Organic Farming; Act No. 337/1992 Coll., on the Protection of Agricultural Land Resources; and Act No. 254/2001 Coll. on Waters (Water Act).<br>The national forestry programme seeks sustainable forest management and long-term improvement of forestry sector competitiveness. The 2009 State Nature Conservation and Landscape Protection Programme sets out the fundamental framework of use, care and protection of forest ecosystems in Special Protected Areas in open landscape. Another important document is the National Programme on Conservation and Reproduction of Forest Tree Species Gene Pool. The State Environmental Fund supports the conservation of biodiversity in forest ecosystems.<br>A number of programmes aim to increase the sustainability of tourism. Visitor attendance in special protection landscape areas and national parks is monitored. Tourism is regulated by statutory limitations (e.g. entry into protected areas) and strategic plans on sustainable tourism destinations. There is no special strategy for sustainable tourism in protected areas. This issue is addressed in the National Tourism Policy 2014-20. |
| Continue to establish objectives and targets for public health and the environment, building on annual health and environment surveys. | Public health targets are set in legislation, chiefly limit values (especially for dangerous pollutants). Additional targets on air quality are included in the National Emission Reduction Programme. Reducing environmental and occupational health risks is a priority of the 2014 National Strategy for Health Protection and Promotion and Disease Prevention. |
| Continue to reduce air emissions (e.g. $NO_x$ emissions) to meet the 2010 targets of relevant EU Directives and CLRTAP protocols. | The Czech Republic met its 2010 air emission reduction targets and seems on track to achieve the 2020 objectives, except for $NH_3$ (Chapter 1). |
| Continue to reduce the pollution of transboundary rivers (e.g. Elbe, Oder, Morava rivers and tributaries). | In compliance with the EU Water Framework Directive, international river basin management plans were developed in 2009 and updated in 2015. |
| Chapter 2. Environmental performance: environmental governance and management | |
| Develop the use of economic analysis of environmental projects and policies (e.g. cost-benefit analysis). | Projects supported by public funds, including those financed by OPE, are subject to cost-benefit analysis, which is rarely applied to policy evaluations. |
| Develop public-private partnerships (e.g. among national authorities, local authorities, industry, NGOs) and strengthen environmental capacities at regional and municipal levels to ensure environmental progress; monitor this progress through appropriate targets and indicators. | Voluntary agreements between the Ministry of the Environment (MoE) and companies set technology targets, emission limits and additional measures, beyond legislative requirements (Chapter 2). For example, the Declaration of Strategic Co-operation between the Czech Power Company and the MoE on air and climate protection was signed in 2010. Another voluntary agreement was concluded with the country's largest steel producer. |
| Strengthen enforcement of laws and regulations at national, regional and local levels; further ensure that polluters are effectively sanctioned. | There are administrative and criminal sanctions for violation of environmental laws. The former are imposed by the inspectorate and can include fines, injunctions and permit revocation. Criminal sanctions for environmental violations were introduced with the 2009 Criminal Code, amended in 2011 to partly transpose Directive 2008/99/EC on the Protection of the Environment through Criminal Law (Chapter 2). |
| Strengthen the use of environmental impact assessment and strategic environmental assessment.<br>Consistently apply nature and biodiversity criteria in the environmental impact assessment and strategic environmental assessment of development projects and programmes, especially for land use and transport infrastructure projects. | The Czech Republic amended the EIA Act in 2015 and 2017 to transpose the EIA Directive (Chapter 2). The 2015 amendment made EIA conclusions binding for zoning decisions and for construction and operation permits. The act also regulates SEA of plans and programmes. SEA provisions that include mandatory assessment of regional development and nature conservation plans and programmes go beyond EU SEA Directive requirements. The Building Act integrates SEA procedures into land use planning. |
| Increase the involvement of relevant ministries and agencies in implementing the Strategy for Sustainable Development of the Czech Republic and monitoring its implementation. | The Council for Sustainable Development was moved in 2014 from the MoE to the Government Office. Now chaired by the prime minister, it oversees sustainable development strategy, bringing together ministries, municipalities, non-government organisations (NGOs), social partners, trade unions and academia, though issues with implementation and monitoring persist. |

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| Continue to develop the system for providing environmental information and implement the principles of free and easy access to this information; support citizen participation in environmental decision-making and access to justice in environmental issues; implement the OECD Council Recommendation on Pollutant Release and Transfer Registers. | Progress has been made in improving public access to environmental information and participation in decision making. The 2015 amendment of the EIA Act significantly contributed to this goal by expanding citizens' and organisations' access to environmental decision making, information and justice (Chapter 2).<br>Since 2006, annual State of the Environment reports have been published on the MoE website. In 2015 the MoE started to publish annual regional State of the Environment reports and an extra report on inter-regional comparison. The Czech Republic reports on pollutant releases to air, water and land in the European Pollutant Release and Transfer Register. |
| Reinforce public participation in the context of environmental impact assessment licensing processes. | This was achieved chiefly through the adoption of the 2015 amendment to the EIA Act on the right of the public to participate in EIA procedures and subsequent proceedings (mainly those regulated by the Building Act), including access to justice. |
| Further develop the environmental training of elected officials, civil servants and teachers, and establish a training system for justice officials. | The 2016-25 State Programme for Environmental Education and Public Awareness focuses on school curricula and the non-profit sector, as well as lifelong education and training. It supports environmental programmes for educators and defines methodologies for evaluation of current programmes (Chapter 2).<br>Public administration: in 2011 the MoE developed an e-learning programme for state employees and officers focusing on environmental education. Some of the sessions are implemented by NGOs, such as the National Network of Healthy Cities and the Czech Ecological Management Centre. Training sessions focus on legislation, EMAS, ISO standards, cleaner production, voluntary agreements, waste economy, packaging, chemicals and hazardous substances, monitoring, modern technologies, international and national experience, work with the general public, codices and charts in this area, etc. Schools: the education ministry issued a new minimum standard for specialised education in the field of environment in 2015. It stipulates that specialised studies must include at least 250 hours of instruction. Of the total number of teaching hours, no more than 20% can be used for distance learning. Many school co-ordinators have taken environmental education courses recently. They are mostly organized by NGOs, sometimes in co-operation with other groups. For instance, school co-ordinators from three regions carried out environmental specialisation studies in co-operation with the Hradec Králové, Liberec and Pardubice regions and the ecological education centres Sever, Divizna and Paleta in 2015. |
| Continue to remediate contaminated sites. | Contaminated site remediation is ongoing. The Czech Republic transposed the EU Environmental Liability Directive through the 2008 Act on Prevention and Remedying of Environmental Damage, covering damage to water, land and biodiversity. The MoE has since mapped contaminated sites and classified them by remediation priority. Over 2010-15, 272 sites were fully remediated, and 51 were remediated but additional work needs to be done. A 2011 methodological guideline deals with monitoring and sampling of contaminated sites, while actual remediation is set out in a 2007 methodology on "the use of technologies in situ for remediation of contaminated sites", which includes tables of decontamination standards (Chapter 2). |
| **Chapter 3. Towards green growth** | |
| Take steps to adjust existing pollution charges for inflation and to increase their rate of collection; consider adopting product charges and work toward more internalisation of external costs.<br>Maintain the incentive value of air emission charges by regularly reviewing their rates. | Environmentally related tax and charge rates are not adjusted for inflation. The number of pollutants and facilities covered by the air pollution tax was lowered to reduce administrative costs and improve collection rates. Water pollution charges have not changed since 2002.<br>Act No. 201/2012 Coll. on Air Protection increased air pollution tax rates and will continue to do so until 2021. They remain well below the marginal cost of abatement and thus have not motivated emission reduction (Chapter 3). |
| Increase environmental expenditure to levels needed to implement the EU environmental acquis, including by use of revenues from economic instruments and EU financing. | Between 2005 and 2015, environmental expenditure rose from 1.2% of GDP to 1.5% before falling to 1.2% in 2016, with the transition to the new EU programming period (Chapter 3). OPE has been a major source of environmental infrastructure funding. Water, sanitation and waste management tariffs remain too low to cover service provision costs (Chapters 3 and 4). |

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| Improve energy efficiency by vigorously implementing and adequately funding the national programme for the promotion of energy savings. | Energy efficiency investment has been mainly financed by the state budget, EU funds (OPE and the Operational Programme "Enterprise and Innovation"), revenue from sales of carbon emission allowances (Green Savings Programme) and free allowances to the power sector (Chapter 3).Between 2000 and 2016, energy intensity declined faster than the OECD average (Chapter 1). The Czech Republic is not on track to achieve its energy saving targets under the Energy Efficiency Directive (2012/27/EU). |
| Review the environmental and economic performance of the energy sector, and revise accordingly energy taxes and prices. | The environmental performance of the energy sector improved thanks to significant investment and stricter standards and regulations. Feed-in tariffs played a key role in renewables development. Energy taxes and prices are relatively low by European standards (Chapter 3). Tax rates on transport fuels are higher than those on other types of energy use. In addition to taxes on energy, $CO_2$ emissions are priced via the EU Emissions Trading System (ETS) but permit prices are low. The introduction of a carbon tax for sectors outside the EU ETS has been discussed for many years but has never been implemented. Another feasibility study is under development by the MoE and the Ministries of Finance, and of Industry and Trade. |
| Carry out the planned construction and rehabilitation of sewerage systems and waste water treatment plants to meet the deadlines under the transition period agreed for the EU Urban Waste Water Directive. | Over 2005-15, thanks largely to a near doubling of investment, the share of population connected to public sewage treatment plants grew by 8 percentage points to 81%, in line with the OECD average. The Czech Republic met the collection requirements of the EU Urban Waste Water Treatment Directive but not the 2010 treatment level objectives (Chapters 1 and 3). |
| Monitor and report on the performance of waste water treatment utilities; encourage the use of benchmarking methods to continuously improve management at treatment stations. | An independent regulatory office for the water and sanitation sector was established in 2015. It aims to enhance regulation, ensure long-term sustainability of the sector and improve consumer protection (Chapter 3). |
| Improve funding for nature conservation and biodiversity; ensure consistency in financial assistance (e.g. in the agricultural sector). | OPE, the national environment programme and the programme to renew natural landscape functions are the major sources of funding for nature conservation and biodiversity. Consistency of these programmes with those managed by other ministries, such as Agriculture, is ensured through bilateral agreements and inter-ministerial monitoring committees and working groups. |
| Further decouple environmental pressures from economic growth, including by reducing the energy and material intensities of the economy, making the maximum possible use of the EU greenhouse gas trading system. | Environmental pressures have been further decoupled from economic growth (Chapter 1). Energy and material intensity of the economy declined. More than half the country's GHG emissions are covered by the EU ETS. Due to low allowance prices and an oversupply of tradable allowance to Czech installations, the EU ETS has not provided a strong price signal to induce low-carbon investment (Chapter 3). |
| Foster the introduction of an ecological tax reform within a context of fiscal neutrality. | Taxes on natural gas, solid fuels and electricity were introduced in 2008 to comply with the EU Energy Taxation Directive (Chapter 3). The second phase of ecological tax reform was supposed to include a carbon tax but its introduction has been postponed. |
| Continue to eliminate environmentally harmful subsidies. | Tax expenditure for fossil fuels was estimated at CZK 4.1 billion in 2014 (Chapter 3). There is no comprehensive information on potentially environmentally harmful subsidies. |
| Ensure consistency between the State Environmental Policy and other State policies; strengthen the integration of environmental concerns into energy policies. | The Council for Sustainable Development and inter-ministerial commenting procedure ensure policy coherence (Chapter 2). The State Environmental Policy 2012-20 was included in a strategy database created to improve strategic governance. Contradictions between environmental and energy policies persist (Chapter 3). |
| Increase the consistency between transport infrastructure investment programmes and environmentally sustainable transport objectives, giving higher priority to road network quality, railways and combined transport, as well as to efficient use of EU funds; increase the use of cost-benefit analysis and the effectiveness of environmental impact assessment. | Over 2000-16, transport investment was volatile and mostly dedicated to road (Chapter 3). Poor transport infrastructure continues to hamper Czech competitiveness. The public budget and EU cohesion funds are the main sources of finance. Drawing of 2007-13 EU funding was delayed by structural deficiencies in project preparation and implementation. Transport plans and programmes are subject to SEA and each project is subject to EIA and building permit procedure. Cost-benefit analysis is rarely applied to *ex-ante* evaluations of policies and strategies (Chapter 2). |
| Review transport prices and taxes to better internalise external costs; create incentives to influence transport decisions by firms and individuals (e.g. gradually extend the road tax to passenger vehicles and link it to distance | Road fuel tax rates have decreased in real terms since 2011 (Chapter 3). The Czech Republic grants preferential tax treatment to diesel relative to petrol. In 2009, the road tax was extended to vehicles above 3.5 tonnes. Vehicles powered by electricity, compressed natural gas, liquefied petroleum gas or E85 are exempt, as |

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| travelled, introduce highway electronic tolls, implement measures to compensate for rail VAT and price increases). | are hybrid vehicles. In 2007, the country introduced distance-based charges for trucks and buses. The electronic toll system operates on motorways, other high-speed roads and some first class roads. The rates vary by emission class, number of axles, road type, day and time. |
| Evaluate the effects of environmental policy on employment.<br>Promote the role of the not-for-profit sector in environmental employment, especially in environmentally sensitive areas. | There is no evaluation of the effects of environmental policy on employment. |
| Implement the measures in the national programme to abate the climate change impacts so as to get closer to the European average for greenhouse gas emissions per capita and per unit of GDP; use economic analysis to increase the efficiency of policies and measures to reduce the economy's carbon intensity. | Between 2000 and 2015, the GHG and $CO_2$ emission intensity of the Czech economy declined faster than the OECD average (Chapter 1). Emissions per capita and per unit of GDP remain above the EU averages. Economic analysis was used to compare support for investment in energy efficiency in buildings with other energy efficiency measures. The 2050 Pathways Calculator adapted to Czech conditions (http://co2.enviros.cz) was used to compare the costs of mitigation options in the 2017 Climate Protection Policy. |
| Improve the capacity to absorb European environmental support (e.g. Cohesion and Structural Funds). | Implementation of EU co-financed environmental infrastructure projects experienced considerable delay over 2007–13 (Chapter 3). Although measures taken significantly increased the absorption rate of 2007-13 funds at the end of the programming period, the uptake of EU funds for 2014-20 has been slow and deficiencies remain. |
| Continue to increase development assistance and environmental development assistance. | The Czech Republic's net official development assistance rose from 0.11% of gross national income in 2013 to 0.14% by 2016. In 2015, aid in support of environment represented 21% of bilateral allocable aid, below the OECD Development Assistance Committee average of 30% (Chapter 3). |
| **Chapter 4. Waste, materials management and circular economy** | |
| Make further efforts to bolster the waste prevention ethic in business, for example by providing information about the costs and benefits of various options and promoting cleaner technology. | Information on the costs and benefits of various options is not available.<br>Waste prevention in the business sector and reduction of the amount of waste produced and the amount of harmful substances in materials and products are encouraged through cleaner production programmes, eco-innovation and eco-design.<br>Relevant government-approved national programmes include the Eco-Management and Audit Scheme (EMAS), the cleaner production programme and the eco-label programme. The eco-design framework is found in the EU Eco-Design Directive (2009/25/EC), while the REACH and RoHS directives provide the framework for reducing toxic content in products (Chapter 4). Voluntary instruments include certified environmental management systems under ISO 14001 or EMAS, along with eco-labels: through the national programme, self-declared environmental claims by manufacturers, and environmental product declarations.<br>Special attention is given to reducing and replacing hazardous substances and materials in construction.<br>Additional measures are included in the 2015-24 Waste Management Plan (WMP) and Waste Prevention Programme, including binding measures to "support, promote and disseminate adequate information at all levels on voluntary instruments available (voluntary agreements, environmental management systems, environmental labelling systems, cleaner production systems) aiming to widen their scope". They are to be supported by i) funding under the OPE for specific projects focusing on industrial waste prevention (under Priority Axis 3), and ii) education and awareness-raising projects under a new government programme of environmental education and awareness and environmental consulting for 2016-25, approved in July 2016. |
| Pursue with determination the 22 implementation programmes of the national and regional waste management plans. | Implementation programmes were prepared and implemented for individual waste streams. |
| Further develop separate collection and recycling of municipal waste, by encouraging the development of markets in recycled products and by introducing economic instruments as incentives; encourage citizen participation in municipal separate collection systems. | Recycling of waste from households and small businesses is encouraged by free separate collection of selected materials and the extended producer responsibility systems, associated with the "pay as you throw" (PAYT) system (volume-based fees) for collection of mixed unsorted household waste (Chapter 4).<br>A 2014 amendment to the Waste Act (No. 229/2014 Coll) made separate collection of |

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| | recyclable municipal waste (paper, plastics, glass, metals, biowaste) mandatory in all municipalities and obliges municipalities to provide locations for storing biodegradable municipal waste. The amendment also provides for a ban of landfilling recyclable and recoverable waste, from 2024. A waste separation decree (No. 321/2014 Coll.) further specified the extent and manner of the separate collection of municipal waste.<br>These developments were supported by funding under OPE 2007-13 projects to increase capacity for separate collection of recyclable materials in municipal waste, and to expand processing capacity for biodegradable municipal waste.<br>As a result, separate collection expanded and the overall recycling rate improved, though it remains low. The EU target of 50% recovery of municipal waste was not met, and landfilling of municipal waste, including biowaste, remains common. Economic instruments have not created the right incentives to follow the waste hierarchy (landfill taxes are low, there are no incineration taxes, PAYT systems are in place in only 15% of municipalities).<br>Markets for recycled products are encouraged by green public procurement, but remain weak. They are expected to be strengthened with implementation of the Secondary Raw Materials Policy (adopted in 2014) and its action plan on self-sufficiency, which call for establishing a trading system for recycled and recyclable materials and products to support businesses, supported with a public catalogue of available secondary raw materials. |
| Move towards greater cost-recovery in waste management services and gradually increase the incentive value of waste-related economic instruments. | Municipal waste management services are financed through municipal waste fees, including PAYT systems, landfill taxes and financial contributions from extended producer responsibility for separate collection (Chapter 4). Municipal waste fees are calculated on the basis of costs to municipalities, but rarely cover them. About 30% of waste management is covered by municipal budgets, on average.<br>Other economic instruments include a financial reserve for the rehabilitation, restoration and after-care of landfills, which landfill operators have to create; and a tax on second-hand vehicles (categories M1 and N1) that is used to support the environmental processing of end-of-life cars: it takes the form of a maximum CZK 700 contribution per wrecked car processed in an authorized treatment facility.<br>Further progress is expected with implementation of 2015-24 WMP and the pending new Waste Act. Planned measures include strengthening the incentive role of economic instruments (e.g. increased landfill taxes, increased municipal waste charges, expansion of PAYT), which were to be implemented from 2017 but are on hold pending adoption of the delayed new Waste Act. |
| Further develop and improve the necessary facilities for proper disposal of hazardous waste and take the necessary regulatory and economic measures to ensure these facilities are used. | Separate collection of municipal waste components, including hazardous components, was improved in 2014 (Decree No. 321/2014 Coll.), and an electronic system for registration of hazardous waste movements was established in 2015 (amendment to the Waste Act No. 223/2015 Coll.) (Chapter 4).<br>This was accompanied by development of the infrastructure needed for proper handling of hazardous waste, and was supported by funding under OPE 2007-13, which included projects to increase the capacity for separate collection of hazardous components of municipal waste and for hazardous waste disposal. But some hazardous waste still gets landfilled, with the landfill risk fee being circumvented by declaring the waste as technological material. Additional measures are included in the 2015-24 WMP to further expand and complete the national network of facilities for hazardous waste management, in line with the waste hierarchy, including for hazardous waste. They include binding measures to reduce hazardous waste generation, increase the share materially recovered and minimise negative effects of hazardous waste management on human health and the environment, including through technology development and better monitoring. They also include stricter rules for hazardous waste recovery such as technological material for landfill backfilling and landscaping and a reduction of the risk fee for landfilling hazardous waste, to make it comparable to similar fees in other EU countries. |

| Chapter 5. Sustainable urban development | |
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| Further develop traffic management in urban areas (e.g. traffic restrictions in city centres, parking and road pricing, incentives to commute by public transport, establishing mobility managers in major companies and government departments). | Municipalities have rarely used the option to levy vehicle entry fees to regulate access to cities (Chapter 3). Prague is considering the introduction of a low-emission zone, but not until a long-delayed ring road is completed. Prague has low parking rates but national legislation limits the amount that can be raised through parking fees (Chapter 5). |
| Improve institutional co-ordination of transport and land use plans among the State, regions and municipalities, especially in developing and managing the road network; develop the infrastructure for cycling. | The 2015 Spatial Development Policy establishes planning priorities for sustainable development, corridors and areas for transport infrastructure and areas of expected development for energy and water management (Chapter 5). It gives the Ministry of Regional Development, the city of Prague and the Central Bohemia region responsibility for conducting regional studies focused on regional infrastructure interaction, for co-ordinating development and for conducting territorial studies on suburbanisation and unsystematic development in the area (Chapter 5). A national strategy for cycling development to 2020 was adopted in 2013. |
| Continue to promote the Local Agenda 21 among municipalities, building on support schemes such as the Healthy Cities and Environmental Education Centres. | A strategy to support Local Agenda 21 (LA21) was adopted in 2012 and an action plan in 2016. LA21 is promoted by the State Environmental Policy and Czech Republic 2030. As of 2017, 180 municipalities have adopted LA21, up from 40 in 2006 (Chapter 5). LA21 is being implemented mostly through the Healthy Cities platform but is open to all municipalities. A dedicated database was created and evaluation criteria and audits were developed. The MoE financially supports LA21 initiatives and organises annual awards. Other important initiatives include the Covenant of Mayors for Climate and Energy (9 Czech signatories) and the Village of the Year – Green ribbon award. |

*Source:* Country submission and findings of 2018 EPR.

# Part I. Progress towards sustainable development

# Chapter 1. Environmental performance: Trends and recent developments

*The Czech Republic has made progress in decoupling environmental pressures from economic activity. However, challenges remain on the path towards green growth and sustainable development. This chapter provides a snapshot of key environmental trends in the Czech Republic since 2000. It presents the main economic and social developments, and reviews the country's progress in reducing the energy and carbon intensity of its economy, in making the transition to a resource-efficient economy and in managing the natural asset base. The chapter also summarises key policy developments in specific areas, including energy, climate change, air, water and biodiversity.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

## 1.1. Introduction

The Czech Republic has a relatively small export-oriented economy that has enjoyed strong economic growth over the past 15 years. However, improvement in the level of GDP per capita stalled after the economic crisis and remains below the OECD average. The country's reliance on its substantial coal resources, as well as intensive industrial and agricultural activities and growing road traffic, have exacerbated environmental challenges.

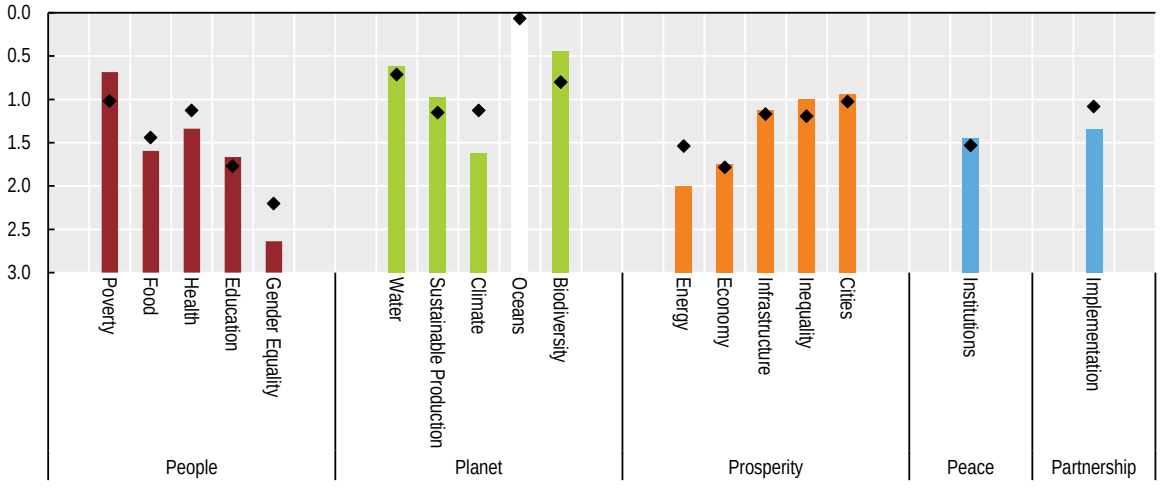
This chapter provides an overview of the Czech Republic's main environmental achievements and its remaining challenges on the path towards green growth and sustainable development. Drawing on indicators from national and international sources, it reviews progress on national policy goals, and on international commitments and targets, focusing on the period since 2000. To the extent possible, it compares the state of the environment and key environmental trends with those of other OECD countries. The chapter sketches out major policy developments in environmental sectors including air, climate, waste, water and biodiversity.

### *1.1.1. Progress towards the Sustainable Development Goals*

Czech Republic 2030, approved in 2017, is the overarching policy document defining long-term priorities for implementing the 2030 Agenda for Sustainable Development at the national level. It builds on the country's 2010 Strategic Framework for Sustainable Development and translates the 17 international Sustainable Development Goals (SDGs) into six national priority areas (People and Society, Economy, Resilient Ecosystems, Municipalities and Regions, Global Development and Good Governance) covering 97 of the 169 SDG targets. Czech Republic 2030 includes nearly 200 indicators (compared to 50 in the 2010 framework). For effective communication, the government could consider replicating the French experience by defining a limited set of indicators to inform the budget discussions (OECD, 2017a, 2016a).

The Czech Republic has reached 15 out of 95 targets for which an indicator is available. Relative to the OECD average, it performs well on the goals related to poverty, water and biodiversity. However, it lags on food, health, gender equality, climate, energy and implementation. Poor performance on this last is mostly due to its official development assistance flows being lower than the OECD average (Figure 1.1; OECD 2017a).

**Figure 1.1. The Czech Republic performs well on water, poverty and biodiversity but falls short on many other SDGs**




*Note:* This figure shows how far the Czech Republic must progress to meet each of the 17 SDGs. The bars show the Czech Republic's performance, while the diamonds show the OECD average. White bars indicate missing data. The Y axis indicates the distance from the target in standardised units. 0 indicates that the level for 2030 has been attained, and the axis starts at 3 as most OECD countries have reached this level. Distances to target are aggregated at the goal level (all targets weighted equally). To make the level of achievement within the country more distinct, this figure excludes data on official development assistance (ODA) for SDGs 1 to 16. Total ODA, ODA focusing on capacity building and national planning, and ODA commitments to statistical capacity building are included in SDG 17 on implementation under Partnership.
The analysis is based on the 128 indicators available for the Czech Republic, which allow coverage of 95 of the 169 SDG targets (using the best comparative indicators available in various OECD and UN databases, in line with the UN global indicator framework).
*Source:* OECD (2017), "Measuring distance to the SDG targets: An assessment of where OECD countries stand".

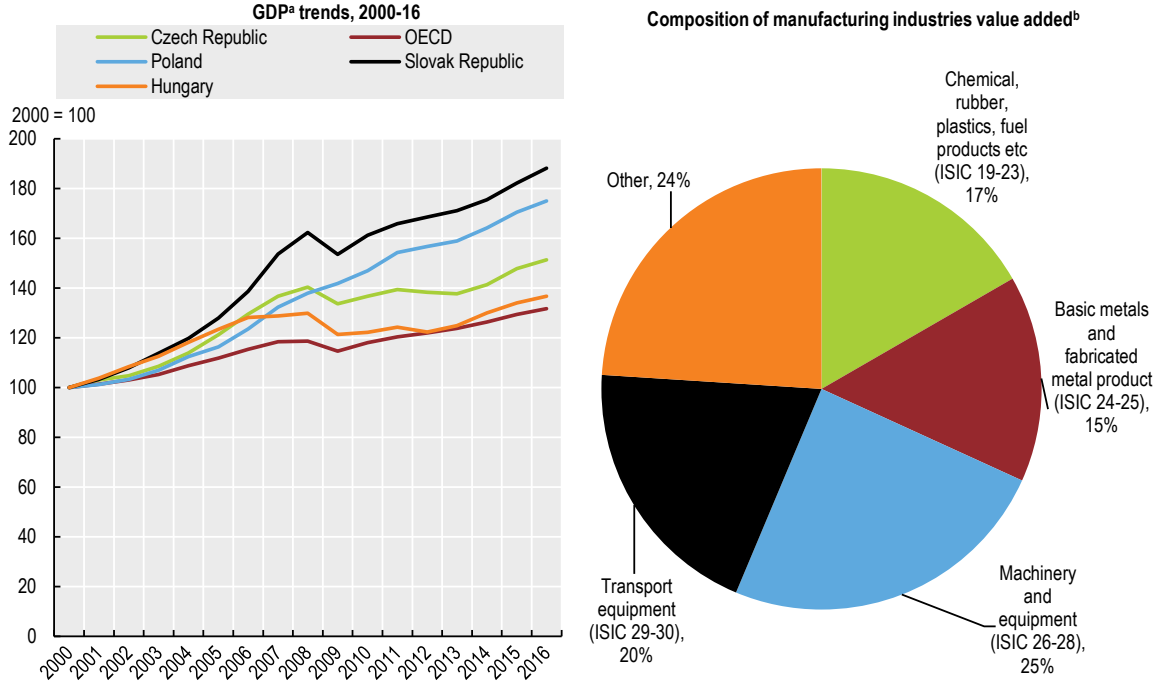
StatLink http://dx.doi.org/10.1787/888933722903

## 1.2. Main economic and social developments

### *1.2.1. Economic performance*

The Czech Republic has a small, open economy. Real GDP rose by about 51% over 2000-16, at a much faster pace than the OECD average of 32%. Economic growth averaged 4.4% annually over 2000-08, driven by opening markets and inflows of foreign investment (OECD, 2016b). With the economic crisis, GDP growth felt by 4.8% in 2009, remaining sluggish until 2013. It picked up in 2015, with the absorption of expiring EU funds, before moderating in 2016. It is expected to remain above 4% for 2017 and 3% for 2018 (Figure 1.2; OECD, 2017b).

**Figure 1.2. The Czech economy grew faster than that of the OECD as a whole**




*a)* GDP expressed at 2010 prices and purchasing power parities.
*b)* Value added in national currency, 2010 prices.
*Source:* OECD (2017), "Aggregate National Accounts: Gross Domestic Product", *OECD National Accounts statistics* (database).

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GDP per capita was 64% of the OECD average in 2000; the gap narrowed to 79% in 2008 then mainly stalled, reaching 83% in 2016. By contrast, other countries of Central and Eastern Europe, notably the Slovak Republic and Poland, continued to converge with the OECD level (OECD, 2016b).

The Czech economy relies increasingly heavily on external trade. In 2015, exports accounted for 83% of GDP and imports for 77%, well above the OECD average of 29% for each. The country is one of the most integrated in terms of global value chains, with the import content of its exports (45%) among the highest in the OECD in 2011. About 85% of Czech exports and 68% of imports are in trade with European countries; Germany in particular accounts for a third of Czech exports and a quarter of imports. Country exchanges mainly consist of vehicles, machinery, mechanical appliances and electrical machinery and equipment (Basic Statistics; OECD 2016b, 2015a).

The general government deficit has improved significantly since 2009. In the short term, Czech public finances appear to face little sustainability risk. Income growth and increased tax compliance helped turn the budget deficit into surplus in 2016 (OECD, 2017b). The debt/GDP ratio, at well below 60%, poses no significant risk to fiscal sustainability in the immediate future (Basic statistics).

While public expenditure on education and health is in line with the OECD average, environmental protection expenditure is higher due to investment in wastewater treatment (Chapter 3). Environmentally related tax revenue decreased slightly over 2011-15, from 2.9% to 2.6% of GDP, but remains above the OECD average of 1.6% (Basic statistics).

### *1.2.2. Structure of the economy and employment*

The Czech Republic is among the most industrialised OECD countries. In 2015, industry, including energy and construction, contributed to 38% of total value added, well above the OECD average of 25%. The share of manufacturing industry in value added rose from 17% to 26% over 2000-15, boosted by the increasing contribution of the automotive industry, while the share of more energy-intensive subsectors such as metal, wood and paper products decreased. Services accounted for 60% of total value added and agriculture (2%) for the remainder (Basic statistics).

The unemployment rate has declined since 2000 to a level that put the Czech Republic among the best OECD performers in 2016 (OECD, 2016b; Basic statistics). The labour force participation rate has increased markedly in recent years. Nevertheless, some groups remain significantly under-represented in the labour market – particularly women with small children, youth, the low skilled and disabled people (OECD, 2016b).

### *1.2.3. Population, regional disparities, well-being and environmental awareness*

#### *Most Czechs live in peri-urban areas; regional disparities are low*

The Czech Republic covers about 79 000 km². Its population has been slowly increasing over the past decade and reached 10.6 million in 2016. At 135 inhabitants per square kilometre in 2016, population density is above the OECD average, ranging from 71 inhabitants/km² in the Southwest to 2 538 inhabitants/km² in Prague. The Czech Republic is among the least urbanised countries in the OECD: 25% of the population lives in predominantly urban areas (compared to the OECD average of 48%) and more than half lives in intermediate regions owing to suburbanisation over the last decade (Chapter 5; Basic statistics; OECD, 2016c).

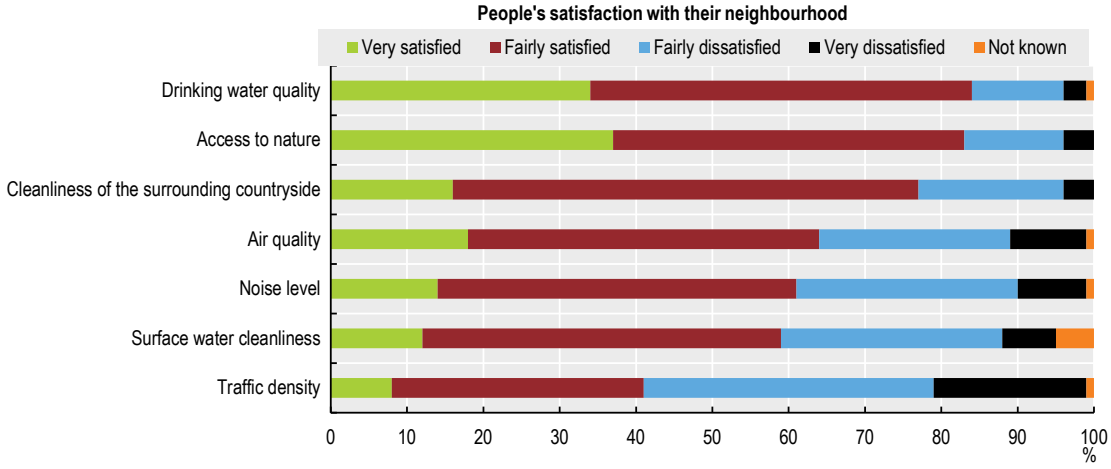
The country has improved equality among regions in many areas. Though GDP per capita disparities[1] among small regions have risen since 2000, they are below the OECD average (OECD, 2016c). The Northwest is the poorest and least productive part of the country, with the lowest life expectancy at birth and the highest unemployment rate. Traditionally industrial regions such as Moravia-Silesia are catching up to the country's best performers. Prague remains the largest contributor to GDP (accounting for 25% in 2014) (OECD, 2016c). In terms of living environment, Moravia-Silesia has the highest level of $PM_{2.5}$ concentrations while the South Bohemian region has the lowest level. Municipal waste generated per person ranges from 355 kg per year in Central Bohemia to 283 kg in the Northeast. The share of population connected to public water supply ranges from 100% in Prague and Moravia-Silesia to 83% in Central Bohemia, and connection to urban sewage treatment plants ranges from 99% in Prague to 71% in the Northeast (OECD, 2017c; Eurostat, 2017a).

#### *Well-being and environmental awareness*

The Czech Republic performs well as regards many aspects of well-being,[2] scoring above the OECD average on overall personal security, work-life balance, social connections, and education and skills. It is also among the best OECD performers concerning inequality and poverty risk. Overall, inequality and poverty were remarkably low over the past 15 years, even during the crisis. However, the country lags behind the OECD average on income, civic engagement and governance, housing and health (OECD, 2016b).

Public perception of environmental quality is evaluated through surveys, which have been regularly conducted since 2002 by the Public Opinion Research Centre. They cover people's satisfaction with the environment in the country and in their neighbourhood. Results show that interest in information about the state of the environment in the country dropped by 12 percentage points over the past decade. The surveys also revealed that the higher respondents' education and income levels were, the higher was their interest in environmental information (CENIA, 2016).

**Figure 1.3. Traffic density and surface water quality are the main environmental concerns**




*Source:* Czech Republic Public Opinion Research Centre (2016).

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The share of respondents satisfied with the state of the environment in the country increased from 40% in 2002 to 68% in 2016. Satisfaction with neighbourhood environment is generally higher (77%) and, although fluctuating, has remained stable overall (Figure 1.3; CENIA, 2016).

## 1.3. Transition to an energy-efficient and low-carbon economy

### *1.3.1. Energy structure, intensity and use*

#### *Main policies and measures*

The 2015 State Energy Policy (SEP) set a framework and objectives for the sector to ensure a reliable, affordable energy supply that would be sustainable in the long-term. It is complemented by technology-specific and sectoral action plans. Although the SEP reiterates the EU climate target for 2030, it does not commit on energy efficiency and renewable energy resources after 2020, and the long-term commitment on climate is conditional on the country's financial capacity. Through the SEP, the government does not take real ownership of long-term climate objectives, related EU commitments being presented as external conditions rather than opportunities. Moreover, the SEP claims that $CO_2$ emissions are not a key indicator for the Czech Republic, underestimating the impact of climate change for the country (IEA, 2016a; MIT, 2014).

The SEP emphasises nuclear energy, which benefits from strong public support, to ensure energy security, as well as coal as a key factor for competitiveness. The government aims

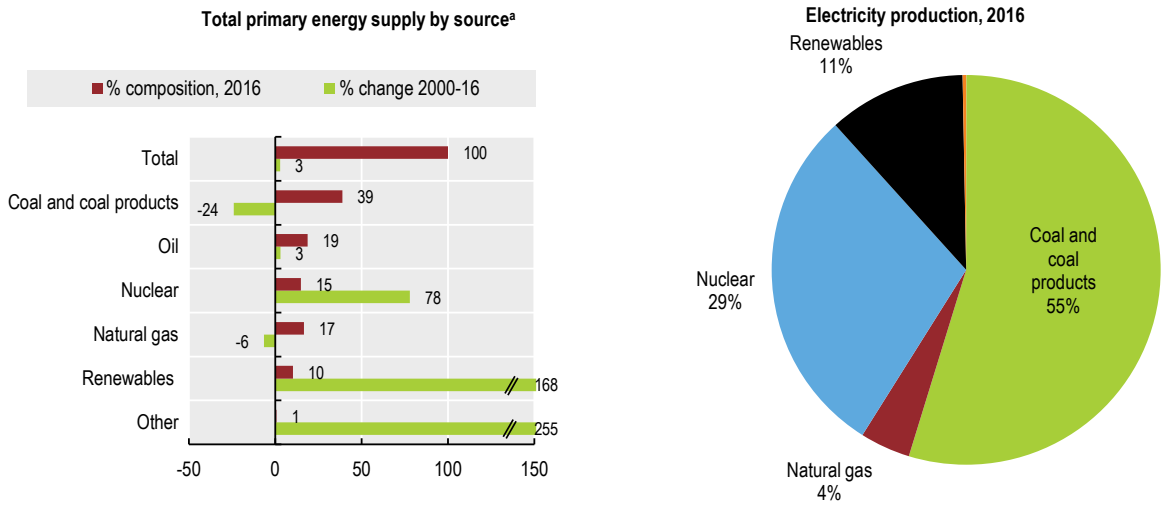
to diversify the mix of primary energy sources by suggesting wide ranges as targets for each type: thus it sees the share of coal being reduced to between 11% and 17% of total primary energy supply (TPES) by 2040 while that of nuclear energy would rise to between 25% and 33%. For electricity production, coal's share would be reduced to between 11% and 21% while that of nuclear plants would be raised to between 46% and 58%. The width of these ranges creates uncertainty for investors. In addition, a 2015 decision to lift a restriction on lignite mining sent contradictory signals (IAE, 2016; MIT, 2014).

### *A shift from coal to nuclear energy*

For decades, domestic coal helped the country be less dependent on imported natural gas than many of its neighbours. Four bituminous coal mines and five lignite mines were still in operation in 2016. In 2015, coal accounted for 39% of TPES, the third highest share in the OECD (after Estonia and Poland). More than half of electricity generation comes from coal, which also accounts for 63% of heat output, compared with 24% in the OECD as a whole. Although the contribution of fossil fuels to the energy supply has been declining, they still accounted for three-quarters of the energy mix in 2016. Due to the high carbon content of coal, coupled with the use of other fossil fuels, the average amount of $CO_2$ emitted in electricity generation and heat output in the Czech Republic is above the OECD average (Figure 1.4; OECD, 2016d; IEA, 2017a, 2016).

Coal resource depletion and the objective of decarbonising the economy while securing energy independence led to a shift from coal to nuclear energy, particularly from 2007. The share of nuclear plants in electricity generation grew from 19% in 2000 to 29% in 2016. The SEP and the National Action Plan for Nuclear Energy Development (2015) put nuclear power at the forefront of the national strategy. The government plans to extend the lifetime of the Dukovany plant to 50 or, if possible, 60 years and to add one or two reactors there and at Temelín, its other nuclear plant in operation. This would involve financing about CZK 125 billion to CZK 150 billion (EUR 4.5 billion to EUR 5.4 billion) (IEA, 2016a).

**Figure 1.4. Although declining, fossil fuels are still predominant**




*a)* Breakdown excludes electricity trade.
*Source:* IEA (2017), *IEA World Energy Statistics and Balances* (database).

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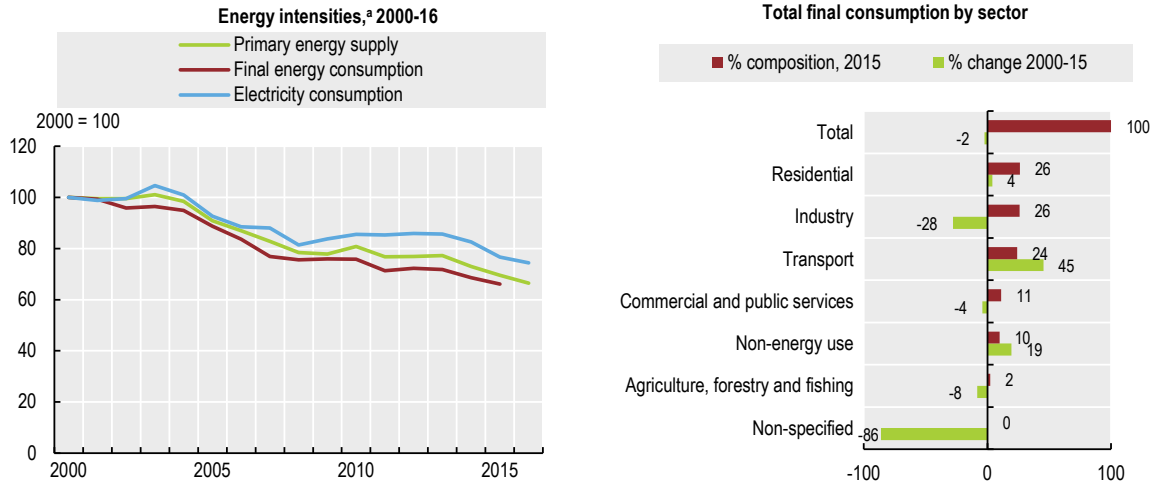
## *Energy consumption has decreased but energy intensity remains high*

Since 2000, industrial energy consumption has decreased steadily while transport consumption increased strongly until 2008 before slowing, then recovering in 2014. In the aftermath of the crisis, energy consumption in the residential, commercial and public service sectors remained broadly stable, with annual variation due to climatic conditions (Figure 1.5).

**Figure 1.5. Transport is a growing source of energy consumption**




*a)* GDP expressed at 2010 prices and purchasing power parities.
*Source*: IEA (2017), *IEA World Energy Statistics and Balances* (database); OECD (2017), "Aggregate National Accounts: Gross Domestic Product", *OECD National Accounts statistics* (database).

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With considerable reliance on heavy industry, the Czech Republic has one of the most energy-intensive economies in the OECD. Nevertheless, energy intensity declined by 34% between 2000 and 2016, a faster rate than the OECD average of 25%. Improvements were largely attributable to progress in energy efficiency, in particular since 2004, as well as to the industrial restructuring towards less energy-intensive industry (IEA, 2016b; EC, 2016a, 2016b; Figure 1.5). However, the Czech Republic is not on track to achieve its saving targets under the EU Energy Efficiency Directive (2012/27/EU), and the transport sector makes a limited contribution to the goals of the National Energy Efficiency Action Plan (Chapter 3).

*Renewable energy sources*

The National Renewable Energy Action Plan 2011-20, revised in 2012, laid out policies and measures to reach a national target of a 13% share for renewables in gross final energy consumption by 2020, in line with the relevant EU directive (2009/28/EC). The overall target, which is the fifth lowest among EU countries, is complemented by sectoral ones: 15.5% in heating and cooling, 13.5% in gross final electricity consumption and 10.8% in transport final consumption (IEA, 2016a; MIT, 2012). The SEP aims to raise the share of renewables to between 17% and 22% of TPES by 2040, and to between 18% and 25% in electricity generation (IEA, 2016a; MIT, 2014). It envisages achieving this objective principally by developing cultivated biomass so as to maximise the use of domestic, competitive sources.

In 2015, the Czech Republic had already exceeded its 2020 target on gross final consumption with a renewables share of 15%. However, like most EU countries, it was still far from the target on transport. Biofuels represented only 5% of transport energy consumption in 2015: biodiesel accounted for most of it (79%), the remainder being bioethanol (IEA, 2017b).

Over the last 16 years, renewables have almost tripled in the energy supply and quadrupled in electricity production. Their share of TPES was 10% in 2016, in line with the OECD average. Renewables generated 11% of electricity, the fourth lowest share in the OECD. The share is unlikely to rise in the medium term, as support mechanisms for renewables were eliminated (IEA, 2017b, 2016).

In 2016, solid biofuels and waste were the main component of renewable supply (90%), followed by solar and wind power (6%) and hydropower (4%). Coal boilers for space heating are gradually being replaced by biomass boilers, which drive biofuel and waste consumption in households and commercial buildings. Biofuels and waste are used in industry for space heating; the pulp and paper industry also uses them in production processes. Biofuels are used in manufacturing processes and in transport as well. Wind, hydro and solar energy are used in electricity generation, while most solar power is found in the residential sector (IEA, 2017b, 2016).

Renewables in electricity generation are solid biofuels and waste (51%), solar and wind power (29%) and hydropower (21%) (IEA, 2017b).

### *1.3.2. Road is the predominant transport mode*

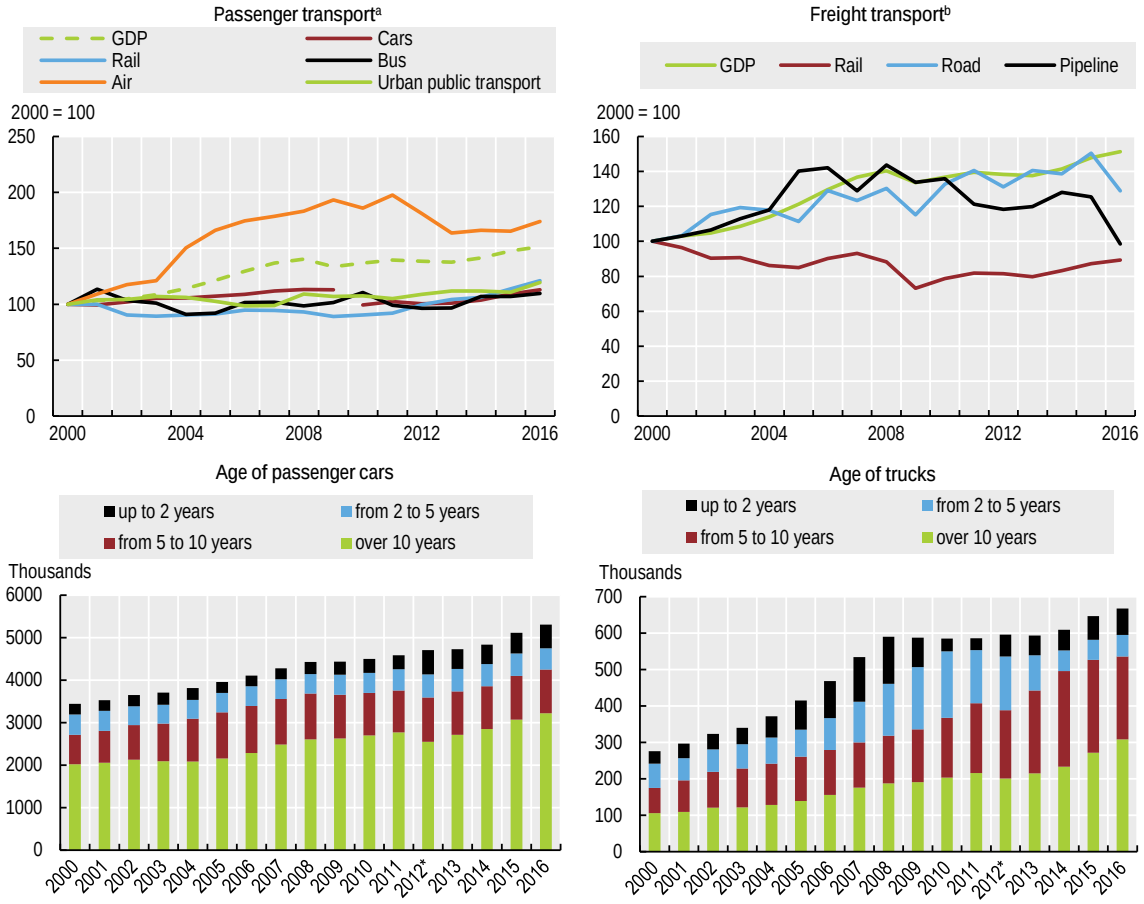
The transport sector is the second highest greenhouse gas (GHG) emitter. It is also one of the fastest-growing sources of GHG emissions and energy consumption. As in many countries, road transport accounts for most energy consumed in the sector (95% in 2015) (IEA, 2017).

The share of road in passenger transport remains predominant, accounting for 84% of total passenger transport volume in 2016. The most used transport mode is private cars (61%), followed by urban public transport (15%), air (9%), intercity bus (9%) and rail (7%). The share of private cars remained stable over 2000-09 but increased by two percentage points between 2010 and 2016 (MOT, 2017).

Motor vehicle ownership increased from 45 to 61 vehicles per 100 inhabitants between 2000 and 2015, but remains below the OECD average. The number of vehicles rose with growth in the economy and income: passenger car registrations doubled over 2004-16. The number of new cars (less than two years old) more than doubled, while that of cars older than five years jumped by about 60%. Old cars (over ten years) account for 61% of the vehicle fleet and cars aged between five and ten years represent 19% (Figure 1.6). The share of diesel in road fuel consumption grew from 46% in 2000 to 66% in 2015, while that of petrol decreased from 51% to 27%. Other motor fuel sources, such as electricity and liquefied petroleum gas, are barely developed (MOT, 2017).

Inland freight transport rose by 30% over 2000-15, driven by strong growth in road transport (+50%), before slowing down (-11%) in 2016.The share of road in total freight transport was 74% in 2016, up by eight percentage points from 2000. The increase was at the expense of rail, whose share fell from 30% to 23%. While the truck fleet is slightly younger than the passenger car fleet, vehicles older than ten years account for 46% and the share of the fleet older than five years is about 80% (Figure 1.6).

**Figure 1.6. Road transport is increasing**




* Because of a change in the of the central vehicle registration system, information on vehicles registered before 31 January 2013 is not available. Data for 2012 include vehicles registered up to July 2013.
*a)* Measures based on values expressed in passenger-kilometres. Cars: break in time series from 2009 to 2010. Urban public transport: break in time series from 2015 to 2016.
*b)* Measures based on values expressed in tonne-kilometres.
*Source:* MOT (2017), Transport yearbook 2016.

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### *1.3.3. Greenhouse gas emissions*

#### *Main policies and measures*

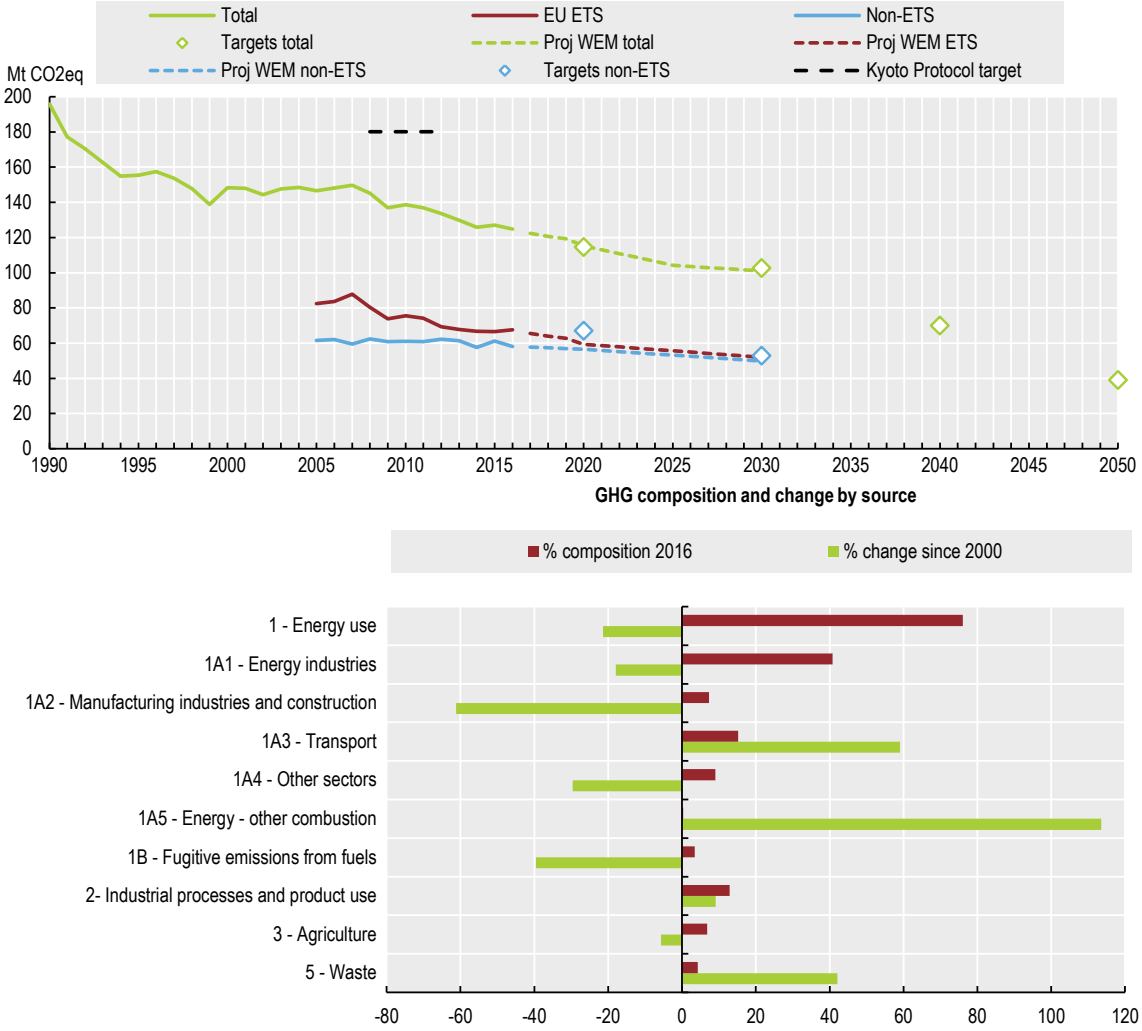
The climate policy framework has been improved. The 2017 Climate Protection Policy replaced the 2004 National Programme to Abate Climate Change Impact (MoE, 2017a). The new document sets 2020 and 2030 emission reduction targets[3] and indicative long-term objectives for 2050, in line with EU commitments. It complements the 2015 Climate Change Adaptation Strategy. However, the Czech Republic has generally not played an active role in climate policy, attempting, with other Visegrád countries,[4] to weaken EU ambitions (Dostál, 2014). It was the last EU member to ratify the Paris Agreement, in October 2017.

The Czech Republic surpassed its Kyoto target of reducing GHG emissions by 8% over 2008-12, achieving a 30% reduction below 1990 levels (Figure 1.8). The government projects that the country is on track to reach the 2020 and 2030 objectives. However, its forecasts include strong assumptions regarding progress in carbon pricing and energy savings which have yet to materialise in a context of economic recovery and the

significant increase in GHG emissions from road transport. While plans call for the Climate Protection Policy to be evaluated every five years, the country must develop integrated national energy and climate plans by early 2019 to be on track to meet the EU climate and energy targets for 2030. Scenarios developed to meet the 80% emission reduction objective for 2050 (high electricity and biomass imports, massive development of carbon capture and storage, and higher development of renewables and nuclear energy) assume large energy savings and necessitate adapting the optimised scenario in the SEP (MoE, 2017a).

In 2016, 349 Czech stationary installations and 5 aviation operators participated in the EU Emissions Trading System (EU ETS), representing slightly more than half the country's GHG emissions. EU ETS-covered emissions decreased by 18% between 2005 and 2016 (EEA, 2017a; Figure 1.7). An EU-wide cap is in place to reduce emissions in the covered sectors by 21% from the 2005 level by 2020 and by 43% by 2030.

**Figure 1.7. Achieving mid- and long-term climate targets will require additional efforts**




*Note:* Total GHG emissions excluding land use, land use change and forestry. WEM refers to projections with existing measures for emissions covered and not covered by the EU Emissions Trading Scheme.
*Source*: OECD (2017), "Air and climate: Greenhouse gas emissions by source", OECD Environment Statistics (database); MOE (2017), Climate Protection Policy; EEA (2017) "Approximated European Union greenhouse gas inventory: proxy GHG emissions for 2016".

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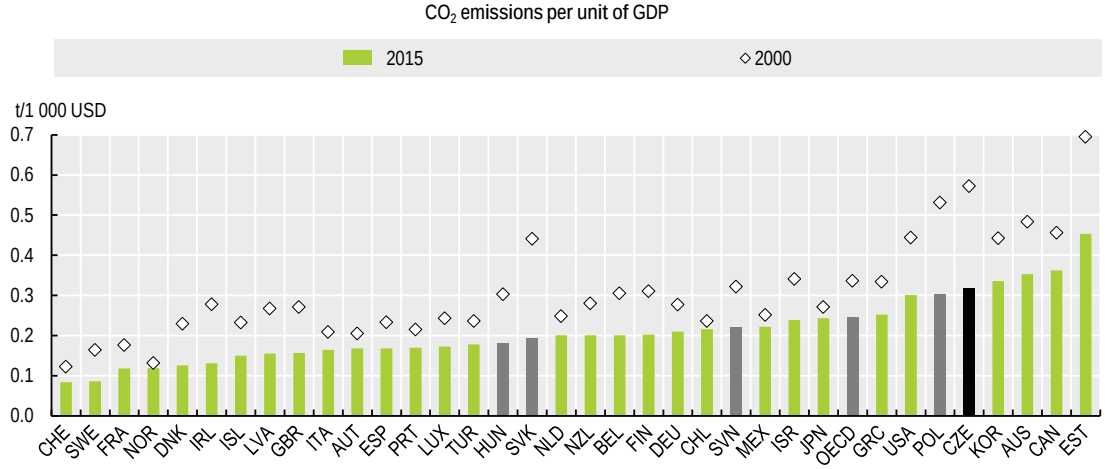
Emissions in sectors not covered by the EU ETS (such as transport other than aviation, buildings, agriculture and waste management) decreased by 5.4% between 2005 and 2016, putting the Czech Republic on track to limit the related emission increase to 9% by 2020 under the EU 2020 climate and energy package. The European Commission proposed a 14% reduction objective for the Czech Republic by 2030 (EC, 2017a).

### *GHG emissions and intensities have declined*

Total GHG emissions[5] declined by 16% between 2000 and 2016, after having decreased by 24% in the 1990s due to industrial restructuring and technological updates amid the transition to a market-based economy. GHG emissions were little changed over 2000-07 but dropped by 16% in 2007-14 because of the economic crisis and the decline of fossil fuels in the energy mix. However, emissions started to increase again in 2015 before slowing down in 2016 (Figure 1.7). As in most countries, $CO_2$ accounts for the bulk of emissions (82%), followed by methane, which represents 11% despite declines in coal mining and livestock numbers. Nitrous oxide (5%) and hydrofluorocarbons account for the rest (MoE, 2017d; CENIA, 2016; UNFCCC, 2014).

Between 2000 and 2015, the GHG and $CO_2$ emission intensity of the Czech economy declined faster than the OECD average (Figure 1.8). These trends were driven by the decrease in energy intensity of the economy and the lower share of coal in the energy mix. However, the Czech Republic remains one of the most carbon-intensive economies in the OECD, due to the predominance of heavy industries and of coal in the energy mix (Figure 1.8). In this context, the country set the objective to reduce its GHG emissions per capita by 2020 to at least the average of the EU-27 in 2005, meaning a 25% reduction of the intensity per capita, compared to the 2005 level. The country seems on track for meeting its objective as GHG emissions per capita have already decreased by 16% between 2005 and 2015. The level of GHG emissions per capita of 12 tonnes of $CO_2$ eq is nonetheless above the EU average of 9 tonnes (Eurostat, 2017c).

**Figure 1.8. The Czech Republic still has one of the most carbon-intensive economies in the OECD**




*Notes*: $CO_2$ emissions from energy use only; excluding international marine and aviation bunkers; sectoral approach. GDP at 2010 prices and purchasing power parities.
*Source*: IEA (2017), *IEA $CO_2$ Emissions from Fuel Combustion Statistics* (database).

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Energy use produces 76% of GHG emissions, in power generation (41%), transport (15%), manufacturing and construction (7%), and other sectors and fugitive emissions from fuels (13%). Since 2000, emissions from energy industries have declined, mainly due to the decreasing share of fossil fuels in the energy mix and to gains in energy efficiency. The drop in emissions from manufacturing and construction was mainly driven by the industrial restructuring and the adoption of more efficient technology, accentuated by the crisis. The decrease in emissions from heating in households and commercial buildings was driven by a shift in heating fuels from coal to natural gas and renewables, more efficient heating technology and, more recently, energy savings from improved performance in buildings. However, emissions from transport increased by nearly 60%, reflecting growing volume and the increasing predominance of road (Figure 1.7; Section **3.2**).

Non-energy use includes industrial processes (mainly mineral, metal and chemical production), which are responsible for 13% of total emissions, followed by agriculture (7%) and waste management (4%). Improved technology and a decline in livestock numbers were the main drivers for the reduction of GHG emissions from agriculture. Emissions from waste management increased by 42%. Meanwhile, land use, land use change and forestry, which act as a net sink in the Czech Republic, increased to reach 6.6 Mt $CO_2$ eq in 2015 (MoE, 2017d; CENIA, 2016; Figure 1.7; Section **3.2**, Chapter 3).

### *Climate change outlook*

Even though the Czech Republic is not among the countries most affected by climate change, its impact on the environment is already visible and expected to increase. The average annual temperature rose by about 0.3°C in 15 years and the number of days with extreme weather or temperatures grew significantly. It is estimated that by 2050, the average annual temperature will be 2.2°C higher than in 1961-90. Precipitation patterns are changing, with storms and floods alternating with more droughts. Average flow in river basins is expected to decrease, leading to recurring water deficits, as well as changes in surface water quality. Agriculture will be affected by reductions in plant and fodder production and in genetic diversity and soil fertility, as well as by soil erosion and a combination of longer growing seasons and less moisture, leading to lower yields. Ecosystems will be disturbed by an increasing number of endangered species and invasive non-indigenous species, as well as a decline in biodiversity and changes in habitats. Forests will undergo an altitude shift of many tree species and deterioration of health and stability of tree stands. The many other areas in which climate change effects are expected include human health and quality of life, transports systems, and tourism and recreation (CENIA, 2016; MoE, 2015).

The Czech Republic adopted a Climate Change Adaptation Strategy in 2015 and related action plan in 2017. Measures are proposed in ten sectors, with priority given to water management, agriculture, forestry and health. Particular attention is paid to flood risk prevention and improvement in the state of nature and landscape (MoE, 2015; EEA, 2017b; UNFCCC, 2014).

## *1.3.4. Atmospheric emissions and air quality*

### *Main policies and measures*

The 2013 EU Clean Air Policy Package set new objectives for 2030 and revised the National Emission Ceilings (NEC) Directive (2016/2284/EU[6]) in line with the revised

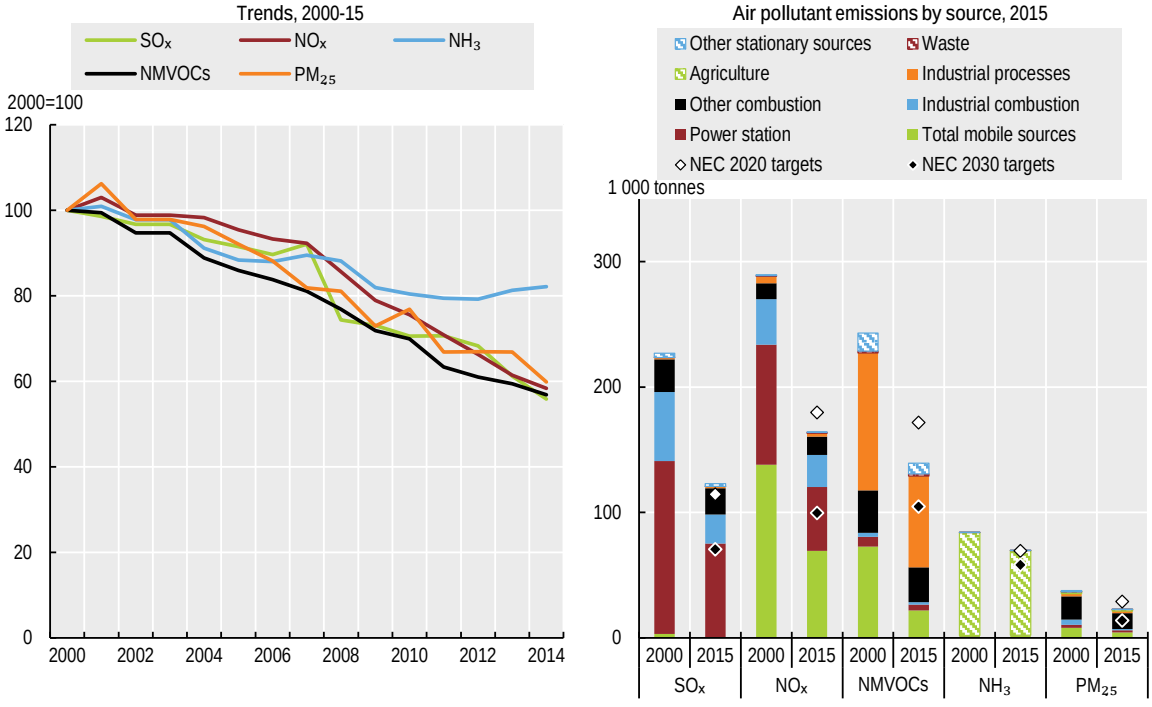
Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution. The new directive establishes national emission reduction commitments applicable from 2020 and stricter targets from 2030 for nitrogen oxides ($NO_x$), non-methane volatile organic compounds (NMVOCs), sulphur dioxide ($SO_2$), ammonia ($NH_3$) and fine particulate matter ($PM_{2.5}$).

The Czech Republic met the 2010 targets for $NO_x$, NMVOCs, $SO_2$ and $NH_3$ under the old NEC Directive. The State Environmental Policy 2012–20, the 2014-20 Operational Programme "Environment", the 2015 National Emission Reduction Programme and the Medium-term Strategy to Improve Air Quality up to 2020 transposed targets set in directives and set priorities and measures to reduce emissions and improve air quality (MoE, 2017d; CENIA, 2016).

### *Emissions and intensity levels have decreased*

Since 2000, emissions from all major air pollutants have decreased in absolute terms and therefore have been decoupled from economic growth. However, $SO_x$ intensity (per unit of GDP), although declining, remains above the OECD average and those for nearby countries. $NO_x$ emissions have dropped since 2000 to an intensity level slightly below the OECD average but above those of most European countries (Figure 1.9).

**Figure 1.9. Air pollutant emissions are declining**




*Source:* OECD (2017), "Air and climate: Air emissions by source", *OECD Environment Statistics* (database).

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The reduction in production levels at power stations and in manufacturing during the economic crisis was one of the main drivers of the emission declines for all pollutants. Other important factors were stricter regulation, the decline in fossil fuels in the electricity mix, desulphurisation of coal-fired power plants and the use of low-sulphur

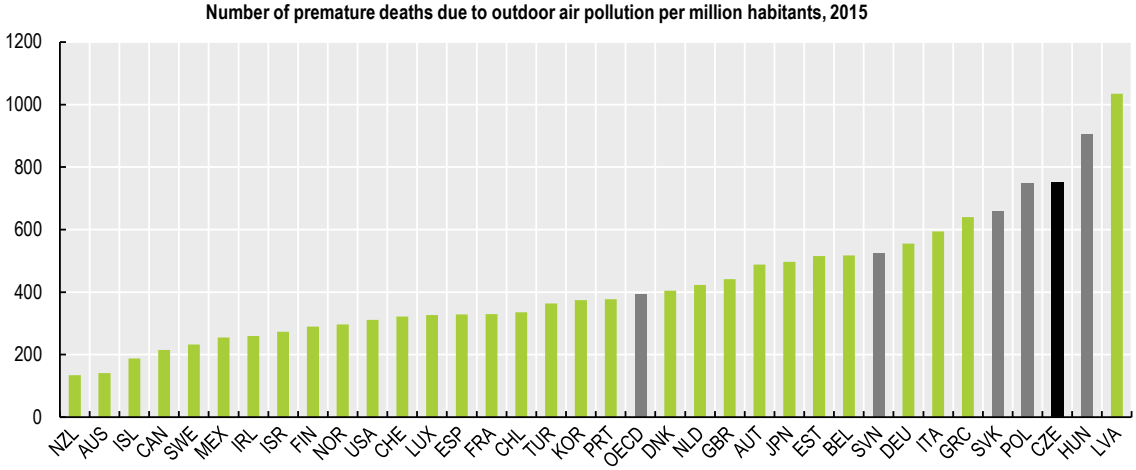
fuels. Coal consumption in residential heating fell over 2002-07, replaced by increasingly popular firewood, leading to lower particulate and $SO_x$ emissions. Since 2009, thermal insulation has increasingly been installed on buildings and high-emission heating has been replaced by more efficient technology, subsidised through the Green Savings Programme. So far, however, the measures have had marginal effect on total emissions. The reduction in $NO_x$ emissions from transport resulted from a slow but gradual modernisation of the vehicle fleet (CHI, 2016).

$NH_3$ emissions in 2015 were mainly from agriculture (67%), especially livestock and nitrogen mineral fertiliser use. The decrease in livestock, especially swine, led to an 18% reduction in $NH_3$ emissions (Figure 1.9).

### *Air quality*

The Czech population is among the most affected by outdoor air pollution in the OECD. The cost of the 7 926 premature deaths due to outdoor air pollution in 2015 is estimated at 7% of GDP, above the 4% average for OECD Europe. Compared to 2005, this represented a 5% rise in premature deaths, and a 24% increase in the associated cost. Although mean population exposure to $PM_{2.5}$ concentrations declined by 4% over 2000-15,[7] the level remains above the OECD and OECD Europe averages (Figure 1.10).

**Figure 1.10. The Czech population is among the most affected by air pollution in the OECD**




*Source:* OECD (2017), "Air quality and health", *OECD Environment Statistics* (database).

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Despite the steady emission decline since 2000, pollutant concentrations, particularly of PM, benzo(a)pyrene and ozone, are still increasing in areas where deterioration already existed. In 2016, EU limit values for $PM_{10}$, $PM_{2.5}$, benzo(a)pyrene and ozone were repeatedly exceeded. $NO_2$ limit values were also exceeded at four traffic-loaded locations in Prague and Brno (CHI, 2017). In 2016, the average duration of smog episodes due to high $PM_{10}$ concentrations was 16 days, down slightly from 2014. The Moravian-Silesian and Olomouc regions were the most affected by $PM_{10}$ concentrations, while the Karlovy Vary and Ústí nad Labem regions, the Prague agglomeration and the Central Bohemia region were the most affected by ozone. The major sources are fossil fuel combustion in local furnaces, transport, and coke and iron production, as well as tyre abrasion and particulate resuspension. The Moravian-Silesian region is also affected by transboundary

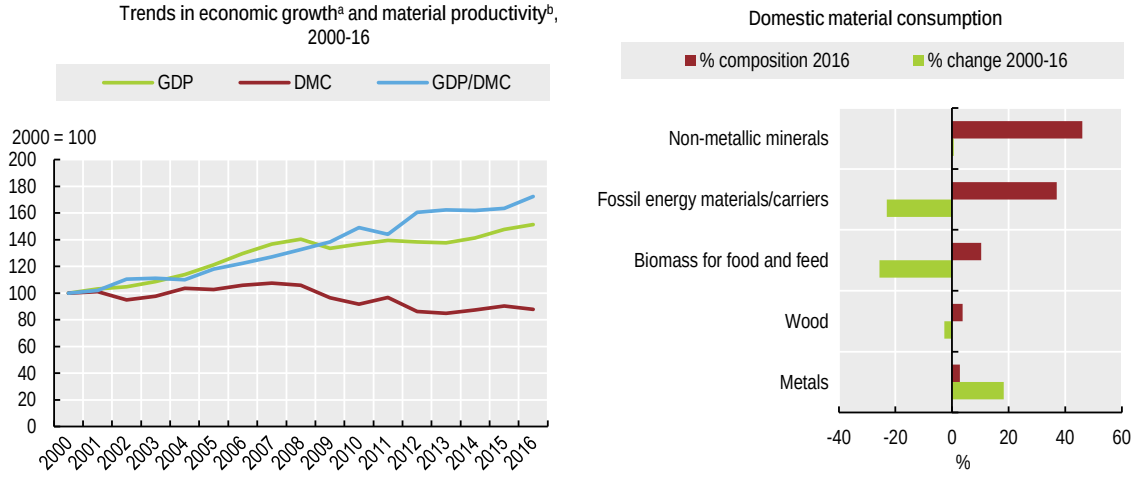
air pollution at the Polish border. Meteorological conditions also significantly influence the level of concentration (CENIA, 2016).

## 1.4. Transition to a resource-efficient economy

### *1.4.1. Material consumption*

Since 2000, material productivity[8] has increased by 72%. Domestic material consumption (DMC)[9] decreased by 12% over 2000-16: it rose by 8% between 2000 and 2007, then fell by 15% in the years after the crisis (2007-10) and has since remained relatively stable. GDP grew by 51% over 2000-16, which resulted in an overall improvement in material productivity (Figure 1.11). Per capita DMC remains above the OECD Europe average but below that of the OECD.

**Figure 1.11. Material productivity increases**




*a)* GDP expressed at 2010 prices and purchasing power parities.
*b)* Material productivity designates the amount of GDP generated per unit of materials used. It refers to the ratio of GDP to DMC, where DMC is the sum of domestic extraction of raw materials used by an economy and the physical trade balance (imports minus exports of raw materials and manufactured products). A rise in material productivity is equivalent to a decline in material intensity (i.e. DMC/GDP).
*Source:* OECD (2017), *Material resources* (database); OECD (2017), *OECD National Accounts Statistics* (database).

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The Czech Republic relies increasingly on imports, especially of oil, gas and metal minerals. Imports accounted for 47% of DMC in 2016, compared to 26% in 2000. The country is self-sufficient in biomass and construction minerals (OECD, 2017e; CENIA, 2016). As in most countries, construction minerals are the most consumed group of materials, followed by fossil fuels, biomass for food and feed, wood, metals and other non-metallic minerals. Consumption of construction minerals has remained relatively stable since 2000 but is expected to have risen in 2015 due to increased construction of railway infrastructure. Consumption of fossil energy carriers materials dropped, mainly on the reduction of coal in the energy mix (Figure 1.11; CENIA, 2016).

### *1.4.2. Waste management*

#### *Waste by sector*

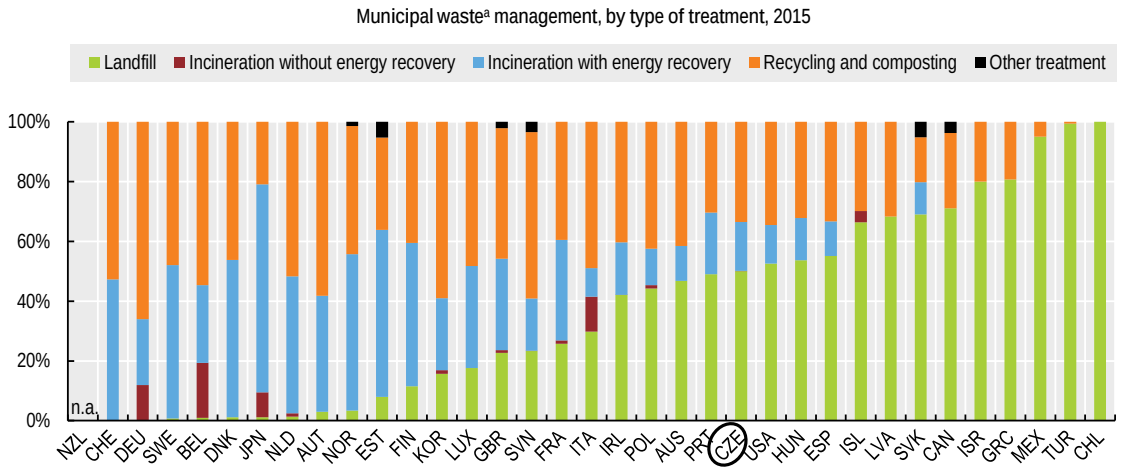
The Czech Republic generated about 26 million tonnes of waste in 2016, or 2 427 kg per capita. Total waste generated decreased by 8% between 2008 and 2014 due to the slowdown of construction after the crisis, but jumped by 13% in 2015 due to a rebound in the sector. As in many countries, the construction sector is responsible for the largest share (39%) of waste generated, followed by manufacturing (18%), particularly of computers, electronic and electrical equipment, motor vehicles and other transport equipment, and manufacture of basic metals. Municipal waste accounts for 14%; water supply, sewerage and waste treatment for 14%; other economic sectors for 11%; and energy production for 4%. In 2014, material recovery accounted for 77% of waste treatment, 38% of it being used for backfill. Energy recovery represented 5% of total treatment and landfill 17%.

#### *Municipal waste*

Municipal waste generation increased by 26% between 2004 and 2016, at about the same pace as final private consumption. Per capita municipal waste generation amounted to 337 kg in 2016, but remains much lower than the OECD average of 520 kg and the OECD Europe average of 479 kg. The share of municipal waste sent to landfill decreased by 27 percentage points but still amounted to half of municipal waste treated in 2016. In the meantime, the share of material recovery[10] rose from 6% to 34%. Recovery rates in the Czech Republic remain slightly behind those of other OECD countries, where the average share of material recovery accounts for 35% of municipal waste treatment and landfill for 43%. In 2016, only 27% of municipal waste was recycled; the Czech Republic needs much more investment to reach the 2020 EU recycling target[11] of 50% (Figure 1.12; EC, 2017b).

The ban on landfilling of recyclable, recoverable and unsorted mixed municipal waste will be difficult to implement in 2024 without adoption of the new Waste Act, which also provides for increasing the landfill tax. In addition, wide discrepancies between the Ministry of the Environment data used in the national Waste Management Plan 2015-24 and the official Czech Statistical Office (CZSO) data used for international reporting hamper assessment of performance. The new Waste Management Plan, envisaging increasing waste to energy capacity to 18% by 2020 and 28% by 2024, claims that only 11% of waste is now incinerated while the CZSO says almost 20% of municipal waste was incinerated in 2014 (Chapter 4; EC 2017c).

**Figure 1.12. Landfill remains the main treatment method**




*a)* Municipal waste: household and similar waste collected by or for municipalities, originating mainly from households and small businesses. Includes bulky waste and separate collection. CZE: 2016 data.
*Source:* OECD (2017), "Municipal waste generation and treatment", *OECD Environment Statistics* (database).

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### *Hazardous waste*

Since 2005, hazardous waste generation has decreased by 19%; it accounted for 4% of total waste generated in 2016. The largest share, 51%, is chemical and medical waste, followed by mineral and solidified waste (41%), mixed ordinary waste (6%), equipment (2%) and recyclable waste (1%). In 2014, 37% of hazardous waste was recovered, 36% was backfilled, 12% was incinerated (of which 70% with energy recovery) and 6% was landfilled (Eurostat, 2017d).

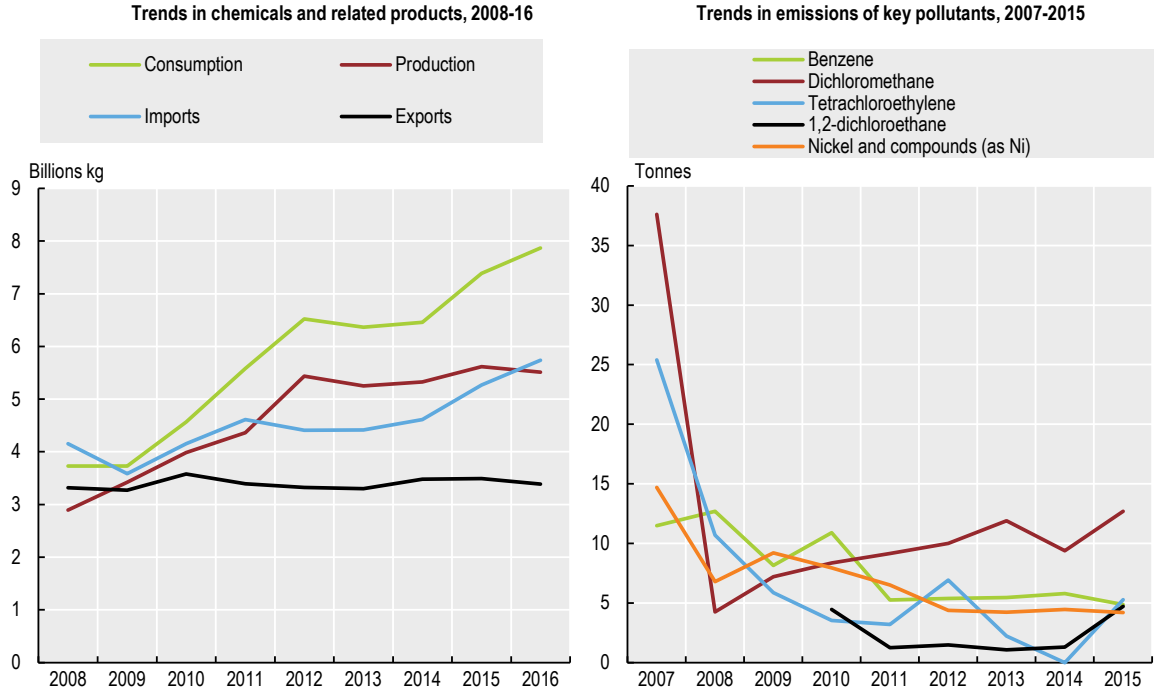
## *1.4.3. Chemicals management*

Chemicals consumption doubled between 2008 and 2016, with increase in both production and imports, but thanks to compliance efforts, the release of key pollutants has declined markedly (Figure 1.13). In 2015, manufacture of chemicals and chemical products accounted for 2.4% of employment and 3.6% of value added in manufacturing (OECD, 2017f).

A robust environmental health monitoring system has shown that blood levels of lead and mercury, PCB levels in breast milk and exposure to occupational health hazards have been reduced (NIPH, 2015). Nevertheless, the number of emergencies involving leaks of hazardous chemicals requiring intervention by fire brigade units increased from 5 300 in 2010 to 6 693 in 2015 (CZSO, 2016).

The Czech Republic is a party to the international treaties on chemicals and waste, and hosts the Stockholm Convention Regional Centre. The country complies with the EU Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), as well as the European Classification, Labelling and Packaging (CLP) Regulation and other chemicals-related EU legislation. The number of annual REACH and CLP inspections rose between 2010 and 2014 and the inspection plan was broadened (EC, 2016c). However, ensuring sufficient human and financial resources for enforcement and other enabling activities is a challenge.

**Figure 1.13. While chemicals consumption doubled, emissions of key pollutants declined**




*Source:* Eurostat (2017), "International Trade", *COMEXT* (database); EEA (2017), "European Pollutant Release and Transfer Register", *E-PRTR* (database).

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### *1.4.4. Agriculture*

#### *Agricultural inputs and pesticides*

Agriculture accounts for about 2.5% of GDP and employment, and agricultural land covers more than half the territory. Large farms cover 70% of the agricultural area and small farms (89% of farms by number) account for the remaining 30%. The real net value of agricultural production was stable over the review period, as was the area devoted to agriculture. Since 2000, there has been a slight shift to permanent grassland and meadows, driven by implementation of the EU Common Agricultural Policy (CAP) and the EU milk crisis. Output was stable: while cereal production increased by 38%, other crops by 14% and food production by 5%, livestock production fell by 12% and non-food output by 55% (FAO, 2017; CENIA, 2016).

Since 2000, nitrogen surpluses have decreased[12] by 6%. However, consumption of mineral nitrogen per hectare, which accounts for 83% of mineral fertiliser consumption, increased by 70% between 2000 and 2015:[13] it was particularly high in 2015 due to extreme drought. Phosphorus surpluses, meanwhile, decreased both in absolute tonnes (by 125%) and in terms of nutrient surpluses per hectare of agricultural land (by 140%); the phosphorus balance has been negative since 2008 (OECD, 2017d; EC, 2015; CENIA, 2016).

Pesticide consumption remained below that of most OECD countries despite increasing by 13% over 2000-15: it fluctuated but generally increased until 2012 (by 33%), then

decreased by 15% with the implementation of the National Action Plan to Reduce the Use of Pesticides. Adopting measurable targets would help tracking progress in reducing the risk and impact of pesticide use on human health and the environment (EC, 2017c). Herbicides accounted for the largest share (45%), followed by fungicides (28%), growth regulators (14%), plant protection products (8%) and insecticides (5%) (OECD, 2017d; CENIA, 2016).

In addition to pesticide use, agricultural land is polluted by past and present industry contamination from chemical incidents and leakage of contaminated water, waste discharges directly to the soil, leaching from contaminated sites, landfills, etc. As a result, limit values in soil are repeatedly exceeded for the polycyclic aromatic hydrocarbons chrysene and fluoranthene, and there is a high degree of persistence of chlorinated pesticides in soil. Concentrations of arsenic, cadmium, chromium and nickel in soil are also above limit values (CENIA, 2016).

Agriculture is a major source of diffuse pollution in both surface water bodies and ground reservoirs. It is mainly due to runoff from sprays, plant protection products and fertilisers, exacerbated by unsuitable crop composition, soil processing that increases erosion risk, compaction of the subtopsoil layer, etc. Such pollution is not monitored even though its effects on water quality are significant (CENIA, 2016).

### *Main policies and measures and organic farming*

Environmental considerations have gradually been integrated into the CAP. The 2014-20 CAP enhances the policy framework for sustainable management of natural resources, addresses climate change mitigation and reinforces the resilience of farming. EU countries need to comply with basic environmental requirements to receive full funding, in addition to which they receive financial support as a "green payment" per hectare. They must also allocate part of their budget to measures beneficial to the environment in rural development programmes (RDPs); examples include agro-environment-climate measures and organic farming. The Czech RDP focuses mainly on ensuring sustainable natural resource management and encouraging climate-friendly farming practices while increasing competitiveness in agriculture, forestry and the food industry (EC, 2015).

The share of land under organic farming tripled over 2000-11, then stalled; it accounted for 12% of the agricultural area in 2015. Implementation of the 2016-20 Action Plan for Development of Organic Farming aims to revive the positive trend and ensure that organic agriculture is a stable market by 2020. It follows two earlier organic farming action plans (2004-10 and 2011-15), each of which strengthened targets previously set for total land area under organic farming (10% of the agricultural area by 2010, which was met, and 15% by 2015, which was not). The growth of organic farming has largely been supported by subsidies paid within agro-environmental measures as defined in the RDP. Organic farmers received support either as payments per land area under organic management or in the form of a preferential points allowance according to investment projects. As about two-thirds of subsidies are allocated to livestock production, permanent grassland constitutes most of the land under organic farming (82%). The domestic organic food market remains underdeveloped, accounting for only 0.7% of food and beverage consumption in 2014, with most production exported (CENIA, 2016).

Close to half the agricultural land is potentially threatened[14] by water erosion and 11% is extremely threatened. Similarly, 18% of agricultural land is exposed to wind erosion, including 3% of the most vulnerable agricultural soil. This is principally due to intensive agricultural practices, such as large-scale unification of plots, monocultures, removal of

landscape elements, lack of grass-covered belts or terraces, land management that disregards the slope of the land and growth of crops potentially vulnerable to erosion, e.g. maize. Heavily eroded soil can, on average, reduce yields by up to 75% and cut land prices by half. In the long term, the biggest problem is soil loss in the areas with the highest soil quality, around the Elbe and in Moravian valleys. The EU Nitrates Directive (91/676/EEC), addressing pollution from agricultural activities, is being implemented. The European Soil Thematic Strategy also aims at preventing soil degradation and preserving soil as an important carbon pool (CENIA, 2016).

## 1.5. Managing the natural asset base

### *1.5.1. Physical context and land use*

The Czech Republic is medium-sized by European standards, at 78 867 km$^2$. Arable and crop land occupy 42% of the total area, followed by forest (35%), meadows and pasture (13%) and built-up and other land (11%).

Over 2000-15, the surface of mining areas decreased while transport infrastructure and public green areas increased, resulting overall in a relatively stable (+4%) surface of built-up and other areas. The take of agricultural land for road infrastructure accelerated in the early 2000s, peaking in 2008. It decreased after the crisis despite a rebound in 2013.

A major consequence of increasing urbanisation and transport infrastructure is landscape and habitat fragmentation. Between 2000 and 2010, the surface of unfragmented landscape decreased by about 7%, to 63% of the total area. Projections indicate such areas will cover only 53% of the total by 2040 (CENIA, 2016).

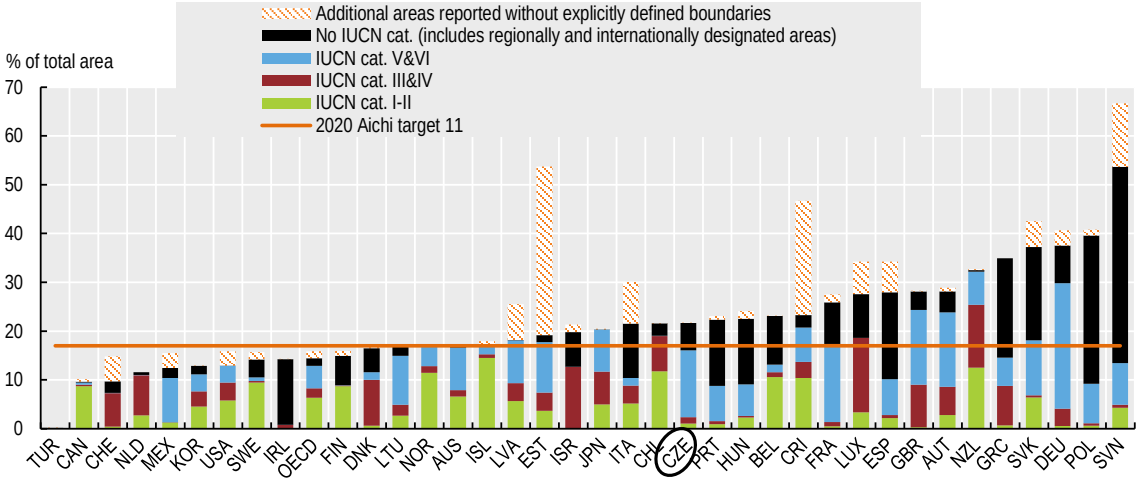
### *1.5.2. Biodiversity and ecosystems*

#### *Protected areas and Natura 2000 ecological network*

Nature and landscape protection is regulated by national and EU legislation. The 1992 Act on Nature and Landscape Protection defines six national categories of specially protected areas. As of 2016, 4 national parks and 26 protected landscapes and small areas (categorised as national nature reserves, national nature monuments, nature reserves and nature monuments) cover 17% of the territory. Protection is largely aimed at conservation or improvement of the state of a site (MoE, 2016; CENIA, 2016).

In 2016, national and international protected areas covered 22% of the territory, above the OECD average of 14% and Aichi target 11 for 2020[15] of 17%. This represents an increase of 39% since 2000. In terms of the International Union for Conservation of Nature (IUCN) categories, protected landscape and protected areas with sustainable use of natural resources (IUCN categories V and VI) were the most widespread designations, totalling 14%. Natural monuments and habitat/species management areas (IUCN categories III and IV) together account for 1% and strict nature reserves, wilderness areas and national parks (IUCN categories I and II) for a further 1%. National (no IUCN category), regional and international designations account for 5% (Figure 1.14).

**Figure 1.14. The Czech Republic has already achieved the 2020 Aichi target on terrestrial protected areas**




*Source*: OECD (2017), "Protected areas", *OECD Environment Statistics* (database); WDPA (2017), *World Database on Protected Areas* (database).

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In 2016, Natura 2000 sites covered 14% of the Czech Republic, below the EU average of about 18%. Under the Habitats Directive, EU countries submit lists of proposed Sites of Community Importance (SCIs), then designate them as Special Areas of Conservation. Special Protected Areas (SPAs) are defined in the 1979 Birds Directive, amended in 2009. Many Natura 2000 sites overlap with nationally designated protected areas. The country had 1 153 Natura 2000 sites at the end of 2016: SPAs covered 9% of the territory, below the EU average of 12%, while SCIs accounted for 10%, below the EU average of 14%. The European Commission has assessed the species and habitat types in the Habitats Directive as insufficiently represented in the Czech Republic and says further areas need to be designated to complete the network. An infringement procedure was initiated in February 2016 (EC, 2017b, 2017d; CENIA, 2016). In response, in 2016, 51 new SCIs were proposed and target feature were added to 70 existing sites (MoE, 2017d).

Under the Habitats Directive, countries must survey and report every six years on habitat and species conservation status. The state of natural habitats of community interest (i.e. those that are in danger of disappearing, have a small natural range or present outstanding characteristics and are of European importance) has improved since 2000-06 but remains poor. In 2007-12, 83% of habitats had "unfavourable-bad" or "unfavourable-inadequate" status, with only 16% deemed "favourable". Most natural and near-natural habitats are in areas with limited or less intensive agricultural production (EC, 2017b). Small coastal and halophytic habitats and forests are the most damaged, while heathlands and temperate zone shrubs are in the most favourable conditions. The state of forests, rocky habitats and caves, and natural and semi-natural grassland formations also improved. However, these positive trends are partly due to improvement in information, data collection and methodology rather than active measures (CENIA, 2016). The quality of habitats is deteriorating, for example, through eutrophication, air and water pollution, and intensification in agriculture, forest management and fish farming.

*Threatened species and bird species abundance*

The Czech Republic has a relatively wide range of animal and plant species and habitats thanks to its location at the intersection of four bio-geographical subprovinces (Hercynian, Polonian, Western Carpathian and North Pannonian) and its geological diversity. Nearly 80 000 species have been recorded on its territory. Most of the vascular plant species are native or introduced before the 15th century. There are also 886 bryophytes, 1 500 lichens and up to 40 000 fungi species recorded. Over 24 000 insects, about 8 000 other invertebrates and 711 vertebrates species have been also documented (MoE, 2014).

About one-third of species are categorised in the Czech red list as vulnerable and hundreds have disappeared. The shares of threatened mammal and invertebrate species are relatively close to the OECD average, but many others are in greater danger of extinction: 62% of reptile, 59% of amphibian, 53% of bird, 42% of freshwater fish and 33% of vascular plant and moss species are considered threatened. The most endangered species are found in natural watercourses, associated with old and decaying wood, or, most notably, tied to a mosaic of landscape elements (butterflies, amphibians and reptiles) (OECD, 2017e; CENIA, 2016).

Species are increasingly threatened by intensive agriculture, introduction of invasive alien species and loss of semi-natural biotopes to landscape exploitation. However, the Czech list of specially protected species has barely been updated since 1992 and does not reflect current needs. It includes some species no longer needing protection and excludes some species that most need legal protection. In addition, the statutory framework for species protection tends to focus more on knowledge of species than on knowledge of changes to the quality of their habitats (MoE, 2016).

Over 2007-12, the share of animal species under the Habitats Directive with "favourable" conservation status reached 27.4%, an increase of 7.4 percentage points from 2000-06, while the share of those with "unfavourable-bad" status decreased by 1.5 percentage points, though it was still 34%. The relative improvement was accompanied by a decrease in the number of species with "unknown" conservation status. The number of species with "unfavourable-inadequate" conservation status also fell, but they still accounted for 32.5% (CENIA, 2016).

Overall the state of plant species of community interest has also improved, with a growing number given "favourable" conservation status (from 15% in 2000-06 to 18% in 2007-12) and a declining number rated as "unfavourable-bad" (from 37% to 23%), although more than half of species were still categorised as "unfavourable-inadequate", compared to 37% in 2000-06. Again, it must be noted that better data collection and methodology affected the assessment (CENIA, 2016). Plants remain threatened by habitat destruction, which has reduced the area covered by native vegetation. Direct removal of plants for medicinal purposes and other forms of destruction are also a threat. The status of numerous species, particularly of those dependent on sites formed and managed by humans in the past, is getting worse (MoE, 2014).

The EU Birds Directive aims to protect 500 wild bird species from habitat fragmentation, intensive agriculture, forestry and pesticide use. Between 1982 and 2015, the populations of common, farmland and woodland bird species in the Czech Republic dropped by 6%, 31% and 17%, respectively. Intensification of agriculture, coupled with abandonment of less fertile agricultural land, was a key driver of farmland birds' decline in the 1990s.

Woodland species have dropped steadily, being gradually replaced by more widespread species, though the causes of the decline have not yet been studied (CENIA, 2016).

### *Forests*

Forests cover 35% of the land area, a slight increase from 34% in 2000. Coniferous forests are predominant (72%) due to past widespread planting of spruce and pine monocultures, which are less resistant to damage from disease and environmental pressure. Forests are among the worst-ranked habitats in the Czech Republic. Intense air pollution loads in past decades resulted in a high level of defoliation compared to other EU countries. Young forest growth is impeded by foraging by excessive numbers of game animals. The country is progressively moving towards a more natural and sustainable forest composition, which would entail the share of coniferous trees further decreasing to 64%, along with birch, elm and alder, and that of other deciduous trees, particularly beech, oak and linden, increasing from 8% to 18% (CENIA, 2016; MoE, 2016).

The country has forest management plans focusing on production in forests that account for 75% of the total forest area (EC, 2017b). The volume of growing stock has increased by 13% since 2000, and forest resource use intensity[16] is sustainable, meaning the total production volume is lower in the long term than the mean annual increment. Fluctuations in intensity are mainly due to drought, along with insect infestation and fungal disease on windbreaks (OECD, 2017e; FAO, 2017).

Over 61% of the forest area is owned by the state and 15% by municipalities. Protection regimes cover 15% of the forest area. Sustainable forest management certification programmes, such as the Programme for the Endorsement of Forest Certification and the Forest Stewardship Council, cover a declining share, which peaked at 75% in 2006 then dropped continuously to reach 68% in 2015. The decrease is attributed to the demanding certification process associated with a decline in sales of certified wood products, which consumers often considered too expensive after the crisis (CENIA, 2016).

### *Main policies and measures*

The National Biodiversity Strategy (NBS) defines priorities in sustainable biodiversity use and conservation for 2016-25. Built on a comprehensive evaluation of the previous strategy (2005-15), it is also linked to the State Environmental Policy, the Czech Republic 2030 sustainable development strategy and concept documents across all sectors. The NBS focuses on mainstreaming biodiversity protection into decision making at all administrative levels and aims to maintain a given funding level for biodiversity conservation, nature and landscapes after 2020, when current operational programmes end. A midterm implementation review of the NBS objectives will be prepared in 2020 and an overall evaluation in 2025. The NBS is aligned with international commitments: the EU Biodiversity Strategy 2020, the Convention on Biological Diversity Strategic Plan for Biodiversity to 2020 and its Aichi Biodiversity Targets (MoE, 2016, 2014).

The evaluation of the 2005-15 NBS concluded that 28% of its 161 strategic objectives were achieved, 45% were partially met, 19% were not met and 8% could not be evaluated. These results were attributed to half the objectives being too ambitious or not measurable. Consequently, the updated NBS contains fewer objectives and measures, focusing on essential and achievable priorities. It will be supplemented by more detailed measures and more specific tasks in a 2018 update of the State Nature Conservation and Landscape Protection Programme of 2009.

The NBS contains 20 framework objectives in four priority areas, 68 component objectives and 123 follow-up measures, each associated with an assessment indicator. Most indicators currently available are related to financial resources from the EU structural and investment funds; there are very few indicators to monitor the status and evolution of the state of biodiversity. Developing such comprehensive indicators is an NBS objective (MoE, 2014; NCA, 2009).

### *1.5.3. Water resource management*

#### *Main policies and measures*

EU requirements have been an important driver of improvement in water management and quality in EU countries. The Water Framework Directive (WFD) and other water-related directives[17] established community-wide objectives to address pollution, promote better use and protection of water and mitigate the impact of floods and droughts.

The Czech Republic prepared river basin management plans (RBMPs) for its river basins to comply with the WFD and has used the national Water Act as the main implementation tool. RBMPs were developed for the Danube, Elbe and Oder and for eight sub-basins. The plans in the initial cycle (2009-15) were gradually approved by early 2010. They outline measures aimed at achieving good status for all water bodies. A second river basin management planning cycle (2016-21), this time covering 10 sub-basins, was approved in 2015.

In terms of water management, the Water Act sets targets for flood protection and sustainable water use in addition to those of the RBMPs. Flood risk management plans, approved in 2015 for the following six years, were developed to address the repeated occurrence of large floods (after a century without such floods). Strategic documents such as the Climate Change Adaptation Strategy and Action Plan are also relevant for water use in a changing climate. In this context, the government in 2014 created a water-drought interdepartmental committee to find effective solutions that could be rapidly implemented to address this emerging issue (MOA, 2016).

The Drinking Water and Bathing Water Directives set water quality standards. The Nitrates Directive protects water resources from nitrate pollution from agricultural sources. The Urban Waste Water Directive addresses collection, treatment and discharge of wastewater. In addition to national legislation transposing these directives, the Czech Republic adopted national and regional development plans for water supply and sewerage systems. The national plan defined objectives to 2015, laid down principles for ensuring the long-term public interest in these areas and synthesised information from the regional plans. The Operational Programme "Environment" (2014-20) also aims to address unregulated pollution discharges (MOA, 2016; CENIA 2016).

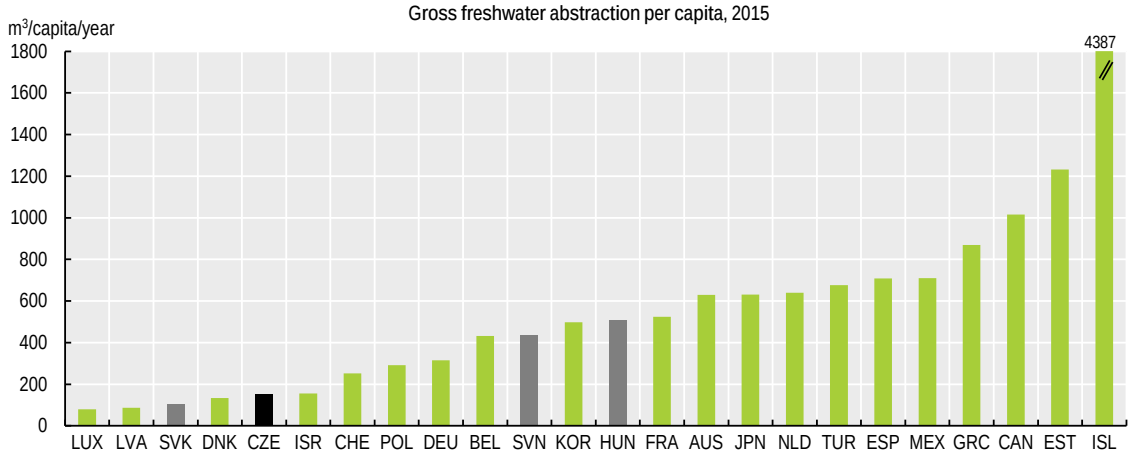
The Czech Republic is actively involved in the development of International RBMPs in the International Commission for the Protection of the Elbe (ICPE, 1992), the Danube (ICPDR, 1998) and the Oder (ICPO, 1999). During its presidency of the ICPDR in 2016 it had three main priorities: support implementation of the International Danube River Basin Management Plan and Flood Risk Management Plan, be active concerning floods and droughts, and foster co-operation not only between countries in the region but also through other initiatives, particularly the EU macro-regional strategy for the Danube Region (MoE, 2017c). Basin-wide co-operation and transboundary river basin management issues are dealt with through bilateral commissions with the Slovak Republic, Germany, Austria and Poland.

### *Water resources*

The Czech Republic is landlocked but situated in the watersheds of the North, Baltic and Black seas. As almost all its water flows into neighbouring states, renewable water resources are mainly dependent on precipitation. The country lies in the international basins of the Danube, Elbe and Oder rivers. Watercourses make up more than 30% of the national boundary.

The country has about 1 500 $m^3$ of renewable freshwater resources per capita, the third lowest level in the OECD. However, with only 152 $m^3$ of freshwater abstraction per capita, well below the OECD average of 812 $m^3$, water stress is low. Energy industries account for the largest share (40%), mainly for cooling, followed by public water supply (39%); manufacturing (16%), particularly the food, chemical and paper industries; agriculture (3%); and other (1%). Overall abstraction has declined by 24% since 2003, due to demand reduction from industry and improvements in water use technology, price increases leading to lower households consumption, and reduced water loss in the pipe network. Although room for improvement remains, with losses in the supply system still accounting for 15% of water produced for user consumption in 2016, this is significant progress compared to the 25% lost in 2000 (Figure 1.15; OECD, 2017e; CZSO, 2017; CENIA, 2016).

**Figure 1.15. The level of water abstraction is relatively low**




*Notes:* Data refer to the indicated year or to the latest available year. They include provisional figures and estimates. Freshwater abstraction: for some countries, data refer to water permits and not to actual abstractions.
*Source:* OECD (2017), "Water: Freshwater Abstractions", *OECD Environment Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933723169

The largest share of freshwater abstracted (77%) is from surface water bodies, with the remainder from groundwater reservoirs. Most surface water abstraction is for energy, manufacturing and agriculture. As groundwater quality is higher and hence there is less need for treatment to produce drinking water, about half the public water supply comes from groundwater, representing 82% of groundwater abstractions (OECD, 2017e; CENIA, 2016).

### *Water supply, sanitation and sewage treatment*

EU funds helped increase the share of population connected to public sewage treatment plants, which grew from 73% in 2005 to 81% in 2015, in line with the OECD average. The Czech Republic met the Urban Waste Water Directive requirements in terms of collection (Article 3), but not the 2010 objectives on treatment levels. By 2014, 90.5% of wastewater collected underwent secondary treatment (Article 4) and 62.7% of more stringent treatment (Article 5) (MoE, 2017b). Drinking water is of very high quality (the microbiological and chemical conformity rates reach 99.9%).

### *Water quality*

Water quality has improved over the past decade in the context of rising living standards and EU accession. Reduction in quantities of wastewater discharged and increased access to sewage treatment helped improve water quality. Pollutant concentrations in water bodies have decreased. Nevertheless, in the context of the WFD, the status of surface water bodies and groundwater in the Czech Republic is largely unsatisfactory.

Only 19% of surface water bodies met the objective of achieving at least a good ecological status in 2012, while 61% of surface water bodies and 27% of groundwater reservoirs reached good chemical status. The main pressures come from flow regulation and changes in the shape, boundaries and content of water bodies, which affect 67% of surface waters. More than half of water bodies are affected by diffuse source pollution and 44% by point source pollution. The first RBMP presented significant gaps regarding the monitoring system, assessment of pressures and classification methodology for water bodies' status, resulting in a high level of uncertainty. The European Commission has also cited a lack of transparency in the planning of physical modifications and application of exemptions, and expects the measures taken to have only a marginal impact on water status. Nitrate levels at some of monitoring points remain an issue, as does eutrophication (EC, 2017b; CENIA, 2016).

Reduction in the quantity discharged in the energy sector has contributed to an overall decrease of wastewater discharges since 2010. While wastewater discharges in the energy sector influence water temperature and oxygen regime, municipal wastewater discharges are important point sources of pollution, mainly organic. Industrial wastewater discharges (mainly from the chemical, paper, mining, and food industries) remain another important source of both organic and heavy metal pollution. Agriculture contributes to diffuse pollution in the form of runoff from farmland, which affects both surface water and groundwater quality.

Total concentrations of nitrogen, phosphorus and BOD in watercourses have decreased since 2000, but COD levels remain little changed. Concentrations of pollutants such as halogenated organic compounds, cadmium and thermo-tolerant coliform bacteria have also decreased since 2000. These favourable trends can be attributed to the construction and modernisation of municipal and industrial wastewater treatment plants, as well as to the reduction of phosphates in detergents (CENIA, 2016).

Bathing water quality has generally improved in accordance with the provisions of the Bathing Water Directive (2006/7/EC). As a result, most inland bathing waters (92%) are of at least sufficient quality (EEA, 2017c).

**Recommendations on climate change, air, chemicals, water and biodiversity management**

**Climate change, air and chemicals management**

- Strengthen political commitment to a low-carbon economy: develop an integrated energy and climate plan to reach the 2030 and 2050 GHG reduction targets, in line with EU climate policy and the Paris Agreement; develop analysis of the economic, environmental and social impact of the underlying scenarios; consider restoring mining limits.
- Implement the National Adaptation Strategy and complete local strategies in Prague, Brno and Pilsen as a pilot for other cities. Mainstream climate change adaptation into government policies.
- Implement the National Emission Reduction Programme to comply with standards for protection of human health. Raise awareness of the effects of local air pollution on health.
- Pursue efforts to monitor chemicals in environmental media and in humans to identify where risk management is required. Allocate sufficient resources for enforcement and other enabling activities under European chemicals legislation (REACH and CLP) to prevent and control chemical pollution. Adopt and implement the 2018-22 National Action Plan to Reduce the Use of Pesticides and assess progress towards targets.

**Water and biodiversity**

- Address diffuse pollution from agriculture by reducing the use of fertilisers and pesticides and by speeding up implementation of measures such as information, training, research and funding of environmentally sound agricultural practices. Improve the water quality monitoring system to better measure effectiveness of pollution reduction measures. Develop market opportunities to swiftly achieve the target of 15% of agricultural land under organic farming.
- Continue to improve information on biodiversity by assessing the extent and values of ecosystem services and promoting the use of these evaluations in policy decisions. Complete the designation of protected areas under the EU Natura 2000 network and ensure their effective management (e.g. by clearly defining conservation objectives and measures and providing adequate resources for their implementation). Consider expanding the national park network to protect the most valuable species and habitats. Prevent habitat fragmentation associated with infrastructure development and develop ecological networks to facilitate wildlife migration.

## Notes

[1] As measured by the Gini index.

[2] In terms of the OECD Framework for Measuring Well-Being and Progress.

[3] The new targets are 32 million tonnes of $CO_2$ equivalent (Mt $CO_2$ eq) of GHG emission reduction by 2020 and 44 Mt $CO_2$ eq by 2030, compared to 2005 levels (a reduction of about 40%, or 48% compared to the 1990 level).

[4] The Visegrád group consists of the Czech Republic, Hungary, Poland and Slovakia.

[5] Figures in this paragraph exclude land use, land use change and forestry.

[6] Amending Directive 2003/35/EC and repealing Directive 2001/81/EC.

[7] Based on three-year average values: 1999-2001 and 2013-15.

[8] The amount of economic wealth generated per unit of material used.

[9] The sum of domestic raw material extraction used by an economy and its physical trade balance (imports minus exports of raw materials and manufactured products).

[10] Including material recycling and composting.

[11] This report refers to the Eurostat method of calculating recycling rates and tracking compliance with the 2020 target of 50% recycling of municipal waste, but countries may choose a different method.

[12] Based on three year average values: 2000-02 and 2012-14.

[13] Based on three year average values: 2000-02 and 2013-15.

[14] Potential vulnerability expressed as long-term average soil loss (G) higher than 2.1 t.ha 1.year-1.

[15] Under the 2011-20 Strategic Plan for Biodiversity of the Convention on Biological Diversity, Aichi target 11 is to conserve 17% of the terrestrial and inland water area and 10% of the coastal and marine area by 2020 through protected area systems and other area-based measures.

[16] The indicator relates actual fellings to annual productive capacity (i.e. gross increment).

[17] The main directives on water issues are the Water Framework Directive (2000/60/EC), Drinking Water Directive (98/83/EC), Bathing Water Directive (2006/7/EC), Urban Waste Water Directive (91/271/EEC), Nitrates Directive (91/676/EEC), Groundwater Directive (2006/118/EC) and Floods Directive (2007/60/EC).

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# Chapter 2. Environmental governance and management

*This chapter evaluates the environmental governance and management of the Czech Republic since the last OECD Environmental Performance Review. It provides an overview of the environmental management institutional framework, touching on horizontal and vertical co-ordination, then discusses the regulatory framework and briefly summarises key developments in specific areas such as air quality and water management. The chapter examines the Czech approach to environmental permitting, compliance and enforcement before discussing environmental democracy, public participation and access to justice.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

## 2.1. Introduction

EU accession helped strengthen the environmental agenda of the Czech Republic. Since the 2005 Environmental Performance Review (EPR), the country has transposed important directives, including the 2004 Environmental Liability Directive and the 2010 Industrial Emissions Directive, which regulates integrated pollution prevention and control (IPPC). However, environmental policy is one of the main fields of EU infringement cases against the Czech Republic, demonstrating the insufficient transposition and implementation of EU legal requirements. Although administrative capacity is generally sufficient, high turnover of environment ministers and staff has caused implementation gaps. Since the last EPR, public participation in environmental decision making and access to information have improved, but on issues including the liability regime and access to environmental justice, current practices need upgrading.

## 2.2. Institutional framework for environmental governance

### *2.2.1. National institutions and horizontal co-ordination*

The Czech Republic is a unitary state with three government levels: central, regional and municipal. The Ministry of the Environment (MoE) is the main authority for environmental policy, compliance monitoring and enforcement, and environmental quality monitoring. Agencies under its aegis include the Nature Conservation Agency, the Cave Administration, the Czech Environmental Information Agency (CENIA), the Czech Environmental Inspectorate (CEI), the Czech Geological Survey, the Czech Hydrometeorological Institute and the State Environmental Fund.

The MoE co-ordinates environmental activities of other ministries and central administrative authorities. On specific issues, responsibility is shared with other ministries. For example, on water resource management, the Ministry of Agriculture regulates activities related to agriculture, including water use, supply and sewage systems; the Ministry of Health develops requirements for management of hazardous waste from health care facilities. Chemicals and noise management require special permits from the MoE or, when public health may be endangered, the Ministry of Health (IMPEL, 2016; MoE, 2017a).

Horizontal collaboration is mainly carried out by the advisory Council for Sustainable Development, which co-ordinates sustainable development issues across central authorities. Its nine thematic committees and working groups bring together representatives of all ministries, Parliament, municipalities, non-government organisations (NGOs), trade unions, industry and academia. Chaired by the prime minister, it meets three times a year. The council is responsible for the Sustainable Development Strategy and its reviews, biennial reporting on the strategy, co-ordination of sectoral issues and strategies across ministries, and national implementation of the Sustainable Development Goals (Government of the Czech Republic, 2017).

A broader horizontal co-operation mechanism is the inter-ministerial commenting procedure to discuss draft policies and legislation before cabinet approval. Representatives of regions, municipalities and NGOs are also involved. Drafts are available online for information and comments.

### *2.2.2. Subnational institutions and vertical co-ordination*

The Czech Republic is divided into 14 regions and 6 258 municipalities. Prague has the status of both a region and a municipality. The 1993 Constitution gives substantial independence to subnational authorities, which have delegated responsibilities but do not hold legislative powers. Subnational governments are mainly funded by central government budget allocations and fees for public service provision (Committee of the Regions, 2017).

Regional authorities have environmental departments dealing with transport (road networks, regional public transport), biodiversity, spatial planning (approval of regional planning and zoning documents), health and tourism. Local authorities oversee local public transport and roads, waste management, water supply, wastewater treatment, local planning and housing.

By population size, Czech municipalities and regions are among the smallest in the OECD, which contributes to governance fragmentation. In contrast to the trend in many OECD countries since the 1990s, the number of municipalities has not been declining, mainly due to a lack of incentives to merge. Mergers would increase efficiency by reducing duplication and streamlining provision of some services, but are politically difficult. The fragmentation issue has been dealt with so far via voluntary agreements between municipalities to co-operate on certain functions (OECD, 2016).

The MoE has nine regional departments providing oversight to lower-level authorities. However, the ministry has not developed implementation guidelines to strengthen vertical co-ordination. It should consider developing oversight procedures with systematic evaluations and indicators on subnational environmental performance. The Union of Czech Towns and Municipalities (SMO ČR), the Association of Local Governments (SMS ČR), and the Association of Regions are platforms for horizontal exchange and mechanisms for co-ordination with the central government. SMO ČR, a voluntary organisation, participates in preparation of draft legislation on topics pertaining to municipal responsibilities. It represents around 2 500 municipalities accounting for more than 70% of the population (SMO ČR, 2017). SMS ČR brings together mayors of about 1 100 municipalities to monitor key legislative proposals with a potential impact on local authorities. The Association of Regions represents the interests of all 14 regions before Parliament and the government. The associations participate in the Council for Sustainable Development's committee on sustainable municipalities. Other vertical co-ordination includes CENIA's role supporting regional authorities in issuing integrated permits. In addition, lower-level land use plans need to comply with higher-level ones.

## 2.3. Regulatory framework

Environmental legislation is heavily influenced by EU directives, particularly on such issues as integrated permitting, environmental liability, ambient air quality, waste and chemicals. However, the EU has filed many infringement procedures against the Czech Republic concerning non-conformity with, or poor application of, the EU environmental acquis (EC, 2017a). Infringements have continued to increase since 2013 and in 2016 five new environmental cases were initiated (EC, 2017b). The ten open cases, in line with the EU average, concern biocide products, flood prevention, water quality, bathing waters and air quality.

### *2.3.1. Evaluation of policies and regulations*

Regulatory impact assessment (RIA) of all bills submitted to Parliament was introduced in 2007. Ministries and other central authorities responsible for drafting bills are in charge of evaluating their expected impact according to RIA guidelines (last updated in 2016). Since 2011 the responsibility for overall co-ordination has shifted from the Ministry of Interior to the Government Office. The RIA Board, composed of independent experts, was established to review the assessments.

Cost-benefit analysis (CBA) is the principal RIA method. However, quantitative analysis of environmental costs and benefits is rarely conducted in practice, while qualitative assessment prevails. In addition, CBA is rarely applied to *ex ante* evaluations of policies and strategies. In addition, no clear criteria on how to do CBAs have been defined, including rules for assessing greenhouse gas emissions in the analysis (OECD, 2017). Other criteria considered in RIA include impact on distribution, competition, economy, security and environment. The scope of RIA depends on the expected impact of a regulation.

Another example of *ex ante* evaluation is strategic environmental assessment (SEA) of plans and programmes, which was significantly strengthened in the last decade as recommended by the 2005 EPR. SEA is regulated by the Environmental Impact Assessment (EIA) Act. The law specifies items for which SEA is mandatory, including regional development and nature conservation plans and programmes, which goes beyond EU SEA Directive requirements. The Nature and Landscape Protection Act regulates SEA on Natura 2000 sites. The Building Act integrates SEA procedures into land use planning.

*Ex post* evaluations, while not mandatory, have been conducted since 2014. This is a positive practice, as very few OECD countries systematically carry out such evaluations (OECD, 2015). Generally, there are two phases: evaluation of 1) the measures proposed and 2) the effectiveness of the indicators chosen to assess progress. However, the Czech Republic has not yet developed requirements or methodological guidelines for such evaluations, which are conducted on an ad hoc basis. For example, in 2015 a midterm evaluation of the State Environmental Policy, with stakeholders assessing each measure's effectiveness in achieving targets, informed the second planning period. Similarly, an *ex post* evaluation of the National Biodiversity Strategy was used to develop the 2016-25 strategy, including new indicators making it easier to evaluate progress and follow implementation. At the time of writing, the Czech Republic was working on a proposal to develop methodological guidelines for systematic *ex post* evaluations, which should be swiftly adopted.

### *2.3.2. Environmental standards*

This section provides a brief overview of environmental standards related to air quality and water management. Regulatory instruments for waste management are addressed in Chapter 4.

#### *Air quality*

The 2002 Air Quality Protection Act and 2006 government regulation on air quality transposed the pre-2008 EU air directives. They stipulate procedures for monitoring and evaluating air quality, ambient air quality standards, emission standards, and long-term emission targets for 13 pollutants. Transposition of the Directive on Ambient Air Quality

and Cleaner Air (2008/50/EC) was carried out through the 2002 Air Protection Act, amended in 2012. The act established permissible levels of air pollution (air quality standards), methods to assess it and tools to reduce it. It covers emissions of sulphur and nitrogen dioxide, carbon monoxide, benzene, lead, small and medium-sized particles, arsenic, cadmium, nickel and benzo(a)pyrene.

The general emission standards are specific to economic sectors or activities based on their emission and capacity threshold. Emission limit values are set for each IPPC installation and are based on EU reference documents on best available techniques. For limit values not specified, a sector emission standard is used, providing an adequate framework for regulating pollution releases. Dispersion modelling for air pollution sources ensures that ambient air quality standards are not exceeded.

### *Water management*

The 2001 Water Act, the main law for protection and management of water resources, includes provisions for water conservation, flood prevention, economic instruments for water management, and water planning and international co-operation. It also regulates water discharge permits: any activity not subject to IPPC permits and having an impact on water bodies requires authorisation.

A government order sets quality standards for surface water bodies and groundwater. As with the air quality regulation, effluent standards are sector-specific, though the specification is less detailed than for emission standards. For IPPC installations, effluent limit values are set individually in discharge permits so as to not to exceed quality standards for the receiving water body, based on modelling developed by the Czech Hydrometeorology Institute. The Water Act requires the authority setting permit conditions to take into account the achievement of a suitable status for affected surface water or groundwater and related ecosystems. The authority must consider best available techniques for wastewater treatment. Installations may be allowed less stringent discharge limits if they are just beginning operations or conducting reparation work, or after an accident.

The main measures aimed at reducing diffuse water pollution from agricultural sources include Government Order No. 262/2012 on delimitation of vulnerable areas and a related programme seeking to reduce and prevent nitrate pollution in such areas. These measures ban nitrogenous fertilisers and provide for crop rotation, soil erosion monitoring and manure storage facilities. The programme effectiveness is evaluated every four years (MOA, 2016). Despite this legal framework, nitrate levels at many monitoring points remain an issue, as does eutrophication (Chapter 1). A recent European Court of Auditors report on water quality in the Danube river basin stated that the Czech Republic lacked ambition to address eutrophication and was not fully complying with the Nitrates Directive (EC, 2017a).

The Czech Republic transposed the requirements of the EU Water Framework Directive (WFD) into the national legislation in 2010 but still needs to achieve full compliance. The first River Basin Management Plans identified significant gaps in the monitoring system, assessment of pressures and classification methodologies for water bodies' status. This results in uncertainties concerning the pressures and status of water bodies and, more importantly, the effectiveness of the planned measures to improve water quality. These measures are not expected to contribute significantly to compliance with the WFD requirements (EC, 2017a).

### *2.3.3. Environmental impact assessment and permitting*

Since the last EPR, which recommended strengthening the use of EIA, the Czech Republic has completed transposition of the EIA Directive in 2015 after several infringement procedures that lasted almost ten years (Box 2.1).

**Box 2.1. The Czech Republic has struggled to comply with the EIA Directive**

The Czech Republic first adopted EIA legislation in 1992, with an EIA Act that covered both EIA and SEA. In 2001, a new act was adopted to fulfil the requirements of the amended EU directive, but it regulated only EIA; SEA was reintegrated in 2004.

The 2001 act had shortcomings related to public participation and access to justice. It also contained restrictive requirements determining who could participate in subsequent permitting processes. The act was further considered to contravene the Aarhus Convention, which the Czech Republic signed in 1998. In 2006, the European Commission filed an initial infringement procedure for failure to comply with the directive.

Several attempts to amend the EIA Act failed, leading to the case being transmitted to the European Court of Justice. A bill amending the act finally passed in 2009, but the public participation issues were not solved, and the European Commission opened a second infringement procedure. In 2012, the Aarhus Convention Compliance Committee reiterated what it saw as the act's deficiencies.

In the third infringement procedure, launched in 2013, the Commission emphasised that, although the directive allows member states a choice on whether to link permitting procedures to EIA, the Czech Republic did not properly reflect requirements for the permitting procedure that follows EIA. The Commission raised three main issues:

- The outcomes of the EIA procedure were not binding in content for the subsequent permitting process.
- After the EIA of a project was concluded, substantial changes to the project during subsequent procedures were allowed, rendering the EIA result ineffective.
- Guarantees for public participation in the subsequent procedures and for timely and efficient access to justice for members of public concerned remained insufficient.

Under the threat of heavy financial sanctions for non-compliance, the Czech Republic made complying with the EIA Directive a priority and approved a new bill amending the act, which took effect in April 2015. The main changes were:

- The environmental impact statement resulting from an EIA procedure became binding in its content for the authority deciding in subsequent proceedings whether to grant a permit.
- At least 30 days before submitting a permit application, the applicant must submit project documentation to the EIA authority, which certifies that the documentation is in line with the environmental impact statement and that the project has not significantly changed since. If there have been substantial changes, these must undergo a screening procedure.
- The public concerned was more clearly defined, including natural and legal persons and organisations, and was given legal standing in the permitting procedure following EIA.

*Source*: Tomoszkova (2015), Implementation of the EU Directive on Environmental Impact Assessment in the Czech Republic: How Long Can the Wolf Be Tricked? http://scholarlycommons.law.wlu.edu/jece/vol6/iss2/5.

The 2015 EIA Act amendment, which addressed the infringements at that time, still raises issues related to the consideration of project alternatives (J&E, 2012a); in fact, the law does not define "reasonable alternatives". It does state that the competent authority may require consideration of alternatives, but in practical terms the only alternative generally considered is not carrying out the project. This is not in line with the OECD acquis on EIA,[1] according to which alternative solutions should be incorporated in the assessment of environmental impact in order to select the best environmental option. The September 2017 amendment of the EIA Act, aimed at transposing the revised EIA Directive, is focused on streamlining and shortening the procedure.

Activities subject to EIA are divided into two categories: projects with expected high impact, such as large energy and infrastructure projects, must undergo mandatory EIA, while those with less potential impact are only subject to EIA following a decision of the competent authority. Depending on the type of project, the competent authority is either the MoE or a regional authority. Screening is based on information provided by the project proponent regarding the planned activity and the local state of the environment. The authority publishes an announcement online and notifies affected municipalities; these in turn are to inform the public, which has 30 days to submit comments. Screening results in a conclusion issued by the authority. For projects likely to be of high impact, the conclusion includes requirements for preparing an EIA report, which is circulated and made available to the public for 30 days. The authority then issues a statement, which, since the 2015 amendment, is binding on the authority in charge of issuing a permit for the project (e.g. a construction permit, a mining concession). Before submitting a permit application, the applicant submits documentation to the EIA authority allowing it to certify that the project conforms to the EIA statement and has not been modified (Tomoszkova, 2015). The new Building Act introduces a "joint procedure" combining EIA, planning and building permit proceedings, which will result in single construction permit.

The IPPC system governed by the EU Industrial Emissions Directive was transposed effectively by the 2002 Integrated Prevention Act. It provides for an integrated permit, covering the entire environmental impact of the facility (emissions, noise, waste, chemicals, technological processes), to be issued in a single administrative procedure. An integrated permit is mandatory for the types of facilities listed in Annex 1 of the act. Operators of other facilities can apply for an integrated permit voluntarily, but this option has rarely been used (Clifford Chance, 2013).

To obtain an integrated permit, an operator files an application with the regional government. The CEI, river basin authorities and regional public health authorities are consulted and can issue statements of proposed requirements to the regional authority. The authority, in turn, can decide whether to integrate the statement in its final decision; if it chooses not to do so, it must provide justification. The MoE is directly responsible for issuing permits for installations with an international transboundary impact.

In accordance with the EU directive's requirements, permits conform to best available techniques. All permits granted are available on the MoE website. There are about 1 800 IPPC permits registered, of which around 1 500 are linked to active installations. The highest share was for intensive livestock rearing. Permitting can take between 117 and 185 days and a permit can be granted for a definite or indefinite period, depending on factors including the facility's projected lifespan (MoE, 2017a; IMPEL, 2016).

Integrated permits are only in place for large industrial installations, while those that fall outside the scope of IPPC are granted single-medium permits or notifications. These are

based on requirements set in air, water and waste legislation. Installations below certain thresholds, as specified in the legislation, do not need environmental permits. Single-medium permits cover construction and operation of stationary sources, water abstraction, wastewater discharges and waste management, including hazardous waste. The application process can be electronic except in particularly complex cases. Sector-specific rules for lower risk activities comprise emission/effluent standards and other requirements. They are set in air and water regulations and are in some cases diversified based on the installation's production capacity.

## 2.4. Compliance assurance

Compliance assurance covers compliance monitoring, enforcement and promotion, as well as responsibility for environmental damage. The Czech Republic has a traditional (binary) performance indicator of the percentage of sites or installations identified as non-compliant. This is an important indicator but can be complemented by more meaningful ones, such as indicators measuring the gravity of non-compliance or the time it takes violators to take corrective action and return to compliance. The Scottish Environment Protection Agency, for example, sets targets for improvement and measures year on year performance at non-compliant sites. The Czech Republic should consider introducing additional, more policy-relevant indicators.

The CEI is responsible for ensuring compliance with environmental law, under the aegis of the MoE. It consists of a central directorate in Prague and ten regional branches. The principal areas of its activity are air quality, waste management, nature, water and forest protection, each dealt with in a dedicated technical department. The CEI also has responsibilities in ozone protection, handling of chemical substances, industrial accidents and management of genetically modified organisms. It conducts inspections and enforces compliance by ordering corrective or remedial action (including activity suspension) and/or imposing administrative fines. It also collects charges for groundwater abstraction and taxes on wastewater discharge and air pollution (Chapter 3).

### *2.4.1. Inspections*

Compliance monitoring follows a risk-based planning approach, which is not always the case in other Visegrád countries. Installations are classified into three categories, from those posing the greatest risk (requiring IPPC permits), inspected annually, to those posing low risk, inspected every three years. The categorisation criteria are based on a framework for mapping facilities' environmental risk, which is developed for three-year periods and can be reviewed annually and updated, if need be. The CEI uses these criteria to draft a yearly inspection programme listing facilities to be inspected, defining the inspection scope, etc. The programme can be updated in case of accidents, complaints by the media or repeated violations. Other factors contributing to facilities' risk level assessment are the environmental and health impact, location, potential for accidents and environmental management certification.

For IPPC installations, some 75% of inspections are conducted routinely and 25% are ad hoc, which shows effective risk-based targeting of compliance monitoring. In general, non-routine inspections are triggered by complaints, accidents or follow-up inspections. Inspections of non-IPPC installations have slightly increased since 2007, while detected violations have increased at a much higher rate (Figure 2.1), showing that inspections are better targeting installations at risk. Still, a non-compliance rate of 20% is high by OECD standards.

**Figure 2.1. Inspections are better targeting installations at risk**


*Note:* Includes non-IPPC installations only.
*Source:* MoE (2017b), country submission.

StatLink http://dx.doi.org/10.1787/888933723188

The Czech Republic is a member of the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL), a forum for sharing good practices. A recent peer review by fellow IMPEL members highlighted the risk-based planning approach as successfully implemented with regard to IPPC facilities, but said risk criteria should be applied to all permitted activities across all regimes (IMPEL, 2016).

### *2.4.2. Enforcement*

Enforcement of environmental law includes administrative and criminal sanctions. If the CEI identifies violations, it can impose administrative sanctions. It can impose fines, temporarily shut down a facility or revoke a permit. Fines can reach as much as CZK 50 million (about EUR 1.85 million), which is high by OECD standards. The average fine, however, is CZK 50 000 (around EUR 1 850) per offence, and total fines decreased by around 20% over 2007-16. The CEI can also transmit information to the police or public prosecutors for investigation or prosecution of environmental crimes (CEI, 2015). The country has no environmental police.

Criminal sanctions for environmental violations were introduced with the 2009 Criminal Code, amended in 2011 to partially transpose Directive 2008/99/EC on the Protection of the Environment through Criminal Law. The Criminal Code provides for up to five years' imprisonment for serious environment-related offences, such as forest damage, unauthorised release of pollutants or improper waste management, but applicable to natural persons only. Fines for criminal offences can range from CZK 1 000 to CZK 2 million (EUR 40 to EUR 75 000) per day for up to 730 days. Courts can also prohibit an activity or halt participation in a public tender or concession procedure (Zicha, 2012). There is no information available about the actual use of criminal sanctions. The 2011 Act on Criminal Liability of Legal Entities, in force since 2012, extended criminal fines to legal persons. The Czech Republic still needs to finish transposing Directive 2008/99/EC, which aims to ensure that criminal remedies are available to punish serious breaches of environmental law listed in the directive.

The Czech Republic actively participates in European networks of police, prosecutors and judges, such as the European Union Forum of Judges for the Environment, the European Network of Prosecutors for the Environment and EnviCrimeNet, to share experiences and good practices (EC, 2017a).

### *2.4.3. Environmental liability*

#### *Liability for damage to the environment*

The Czech Republic transposed the EU Environmental Liability Directive (ELD) through the 2008 Act on Prevention and Remedying of Environmental Damage, covering damage to water, land and biodiversity. The law is broader than the scope of the ELD regime with respect to biodiversity, including a larger range of protected plants and species. However, it excludes accidental contamination of water bodies, which is covered by the Water Act that also provides for remediation (J&E, 2012b).

The MoE Environmental Damage Department deals with prevention and remediation (including of past contamination), monitoring and international co-operation in case of transboundary impact. Annex I of the 2008 Environmental Damage Act lists activities that can give rise to environmental liability, including activities subject to IPPC permits, transport of chemicals, and production and handling of pesticides. Operators involved must perform risk assessment and take all necessary measures to prevent environmental damage, and repair and restore the affected area and ecosystem functionality in case of damage. Operators not covered by Annex I do not need to do risk assessment but are still obligated to take preventive measures and carry out remediation in case of damage.

The operator is responsible for covering all costs related to remediation, including the costs of risk analysis. It is, however, exempt from remediation costs in case of force majeure, if the damage was caused by a third party or if it occurred despite the operator taking all necessary steps to prevent it. Thus compliance with environmental permit conditions releases the polluter from liability, contradicting the principle of strict liability for environmental damage.

Operators whose operations may cause environmental damage exceeding the equivalent of EUR 800 000 (according to an estimate by the regional authority) must obtain insurance to cover the cost of remedying any potential environmental damage. Fines up to the equivalent of EUR 180 000 may be imposed for a breach of obligation to report information about potential damage and for not carrying out remediation (Rovenský and Sequens, 2015).

#### *Past contamination*

The total number of contaminated sites in the Czech Republic is not known but is estimated at 10 000 (CENIA, 2016). Contaminated sites include unauthorised or improperly managed landfills, abandoned industrial areas, unprotected storage facilities for hazardous waste and chemicals, former military bases, mines and quarries. Since 2008, the MoE has mapped contaminated sites and classified them according to priority for remediation (MoE, 2017a). Over 2010-15, 272 sites were fully remediated, and 51 were remediated but additional work needs to be done. The Evidence System of Contaminated Sites database is available to the public but has not been systematically updated. It currently registers 4 936 sites, of which fewer than half are up to date. Despite the significant improvements in mapping and remediating sites, there is still a large

number whose environmental and health risk is unknown (CENIA, 2016). The MoE has plans to update the database through an EU co-funded project.

Although the ELD does not cover past contamination, remediation of contaminated sites is governed by the polluter-pays principle. The polluter is responsible for the clean-up of contaminated areas; the owner or occupier is not liable if it is not the polluter. Contaminated sites are considered abandoned if the polluter is unknown, no longer exists or is insolvent. The state is responsible for cleaning up abandoned sites or those contaminated by military or industrial activities before 1989 (Rovenský and Sequens, 2015). A 2011 methodological guideline deals with monitoring and sampling of contaminated sites, while actual remediation is set out in a 2007 methodology on "the use of technologies in situ for remediation of contaminated sites", which includes tables of decontamination standards.

Financing of state clean-up activities comes from the National Property Fund of the Ministry of Finance, the MoE for Soviet-era contamination in former military areas, and funds set up by the Ministry of Industry and Trade, Ministry of Defence, Ministry of Transport and Ministry for Regional Development. In addition, regional authorities can contribute to the remediation of contaminated waters under the 2001 Water Act. Private funds and EU structural funds are also used. Since remediation financing is not centralised and various ministries deal with it, a common methodology is needed (MoE, 2017a). To avoid putting the entire burden on taxpayers, it is important to mobilise finance to ensure adequate resources for remediation when a financially solvent polluter cannot be identified or the polluter breaches its remediation obligations. The Czech Republic should consider setting up a financial mechanism, such as a special fund financed by current operators, to pay for potential clean-up carried out by the state.

### *2.4.4. Promotion of compliance and green practices*

Government promotion of compliance can reduce costs for businesses by allowing them to achieve and maintain compliance as efficiently as possible. It may also reduce regulatory costs by increasing efficiency in compliance monitoring and enforcement. Compliance promotion is particularly effective when targeting small and medium-sized enterprises and farmers. The MoE would benefit from developing information tools such as direct advice during inspections, events such as seminars and workshops, and guidance for regulated entities, typically disseminated in written form.

A few voluntary agreements exist between the MoE and companies in the Moravian-Silesian region, setting technology targets, emission limits and additional measures that companies should put in place to reduce their environmental impact beyond legislative requirements.

#### *Green public procurement*

The national action plan on green public procurement (GPP) and socially responsible public procurement dates from the beginning of the 2000s, relatively early compared to other Eastern European countries. A 2010 government decision set out GPP rules and methodologies for furniture and information technology, and approved an MoE document laying out non-binding guidance for implementing environmental requirements in public procurement. According to the decision, sellers do not need ISO 14001 certification to qualify for GPP, which has resulted in a drop of certifications since 2010.

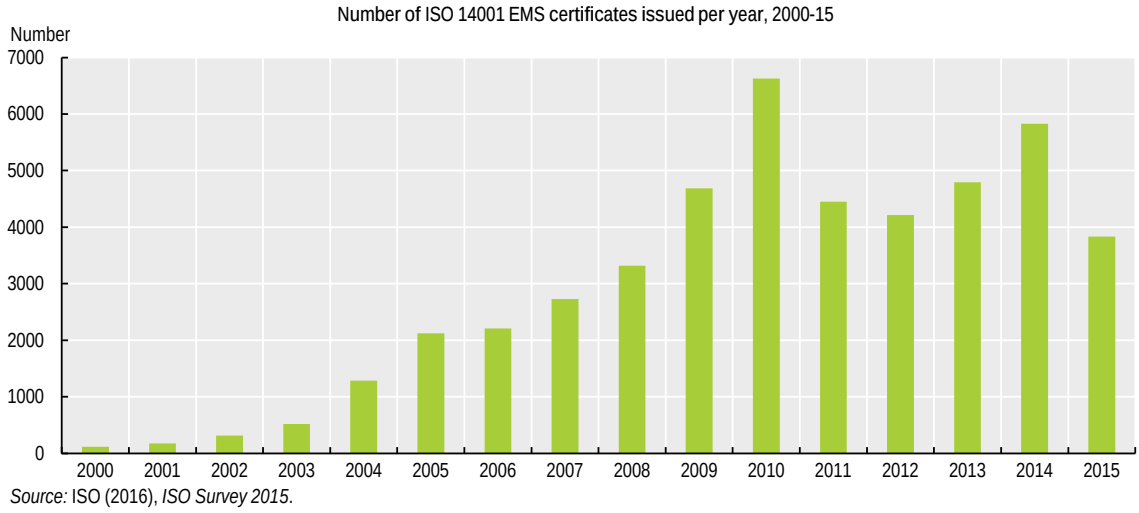
As part of the GPP decision, 25% of all state and public vehicles need to respect environmental standards. The decision also stipulates criteria for purchasing certain products. Contracting authorities should consider elements such as eco-labels, environmental standards and certification, and energy performance certificates in their procurement decisions. As GPP performance had been unsatisfactory, the strategy was revised. In 2017, the government approved a new document, "Rules for the Implementation of a Responsible Approach in the Public Procurement and Purchasing by the State and Local Governments", which includes sustainability principles and requires the MoE to publish guidelines for public procurers on green specifications for various product categories. In addition, the MoE is planning workshops and other activities to inform and train purchasers. The Czech Republic should consider introducing all the key GPP elements listed in the OECD Recommendation of the Council on Improving the Environmental Performance of Public Procurement (C(2002)3), such as analysing the environmental costs of products and services, promoting effective information tools, encouraging the development of indicators, and assessing and evaluating GPP policies.

### *Environmental management system certifications*

Environmental management systems (EMS) are not supported to a great extent by the government. EMS such as ISO 14001 are much more widespread in the Czech Republic than the EU Eco-management and Audit Scheme (EMAS). There are only 27 EMAS-registered organisations in the country. The government provides some regulatory incentives for EMAS and ISO 14001 certification. Operators of activities with high environmental risk do not have to get insurance if they have a certified EMS, though they are still liable for any environmental damage they cause.

The adoption of ISO 14001 by Czech businesses grew rapidly between 2000 and 2010, though the average number of certificates issued per year has since fallen by around 40% (Figure 2.2). The peak was largely due to the fact that until 2010 procurers could request ISO 14001 certifications as a prerequisite for GPP, which changed after the adoption of the 2010 government decision. A 2013 survey conducted to identify EMS benefits revealed that mainly large and medium-sized enterprises were certified, consistent with international practice. More than half of respondents recognised that the system helped improve their environmental performance. Other benefits included raising (or maintaining) competitiveness and improving image and credibility (Hyrslova, 2017).

**Figure 2.2. The number of businesses adopting environmental management systems has decreased significantly**




*Source:* ISO (2016), *ISO Survey 2015*.

StatLink http://dx.doi.org/10.1787/888933723207

## 2.5. Promoting environmental democracy

As the 2005 EPR recommended, progress has been made in improving public access to environmental decision making and information. The 2015 EIA Act amendment significantly contributed to this goal by expanding citizens' and organisations' access to environmental decision making, information and justice, thus strengthening environmental democracy.

The Czech Republic, like most OECD Europe countries, is party to the Aarhus Convention of the United Nations Economic Commission for Europe on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Issues. The convention, together with EU legislation on public participation and case law of the European Court of Justice, provides for the right of citizens and their associations to participate in the decision-making process for projects and plans with a potential environmental impact and to enjoy effective access to justice on environmental issues.

### *2.5.1. Public participation in environmental decision making*

Participation in administration of public matters and access to information are basic civil rights enshrined in the Charter of Fundamental Rights of the Czech Constitution. The public, defined in laws regulating various policy areas, participates in environmental policy making through the commenting procedure on draft policies and legislation, which is open to NGOs.

To date, EIA and SEA are open to any member of the public. Since the 2015 EIA Act amendment, citizens and organisations have been able to participate in the permitting processes that follow the EIA. The public is notified about intent to perform an activity in EIA and SEA proceedings, permitting procedures and the development of safety programmes and emergency plans. All relevant information is provided on the national or regional authorities' websites. Anyone can submit comments orally (especially at the

public hearing) or in writing (including electronically). If dissenting comments on the EIA report are received, a public hearing must take place. The competent authority must consider all comments and provide justification for any that are not accepted. This is a good practice, not always followed by other OECD countries. However, a recent amendment of the EIA Act, adopted in September 2017, restricts public involvement in the procedure concerning peer reviews of EIA reports, which will cease to be open for comments. This was presented as a measure to simplify and shorten the process but could in fact reduce public participation in EIA proceedings. Stakeholders are divided on this matter.

Similarly, the recent amendment of the Building Act, which entered into force in January 2018, was presented as a way to simplify and accelerate the permitting procedure for construction projects. The developer has the option to choose whether to undertake the new joint procedure or to keep leading the proceedings separately. The new procedure does not reduce public participation for projects that undergo EIA, in that a public hearing is still required. However, for projects that do not undergo EIA, NGOs can participate in permitting procedures only under the Nature and Landscape Protection Act.

The public can take part in all IPPC permitting procedures though NGOs, which can ask to participate in permitting procedures within eight days of publication of the permit application summary. The application is available on the MoE website and on the information board of the relevant regional authority. When an NGO asks to participate in the procedure, it can request the full documentation. It can then submit comments on the proposed permit conditions and take part in the oral hearing.

### *2.5.2. Access to environmental information*

The MoE publishes an annual state of the environment report and co-operates with regional authorities to issue a similar report for each region, accompanied by a comparative analysis of environmental indicators across regions. All these publications are submitted to the government and published on the MoE website. The Statistical Environmental Yearbook is prepared yearly by the Czech Statistical Office and published on the MoE and Statistical Office websites (MoE, 2017b). Asked if they considered themselves well informed about environmental issues, around 40% of Czech citizens interviewed provided a positive response, compared with the EU average of 54% (EC, 2014).

The Czech Republic reports on pollutant releases to air, water and land in the European Pollutant Release and Transfer Register. The Czech 2016 report covers pollutant releases, grouped by environmental issue, and waste generation quantities. The report covered 882 facilities, an increase from the previous year, and around 90 substances (Eionet, 2016). The Czech Pollutant Release and Transfer Register includes broader information, covering releases and transfers from almost 3 000 facilities (2016 data).

As the 2005 EPR recommended, access to environmental information has been improved, and the public has an extensive range of tools for such access. The Right to Environmental Information Act (1998) guarantees access to environmental information. It was amended to establish the GeoPortal, which allows electronic access to spatial data and a broader set of environmental information held by the MoE. The Access to Environmental Information Directive (2003/4/EC) and INSPIRE Directive (2007/2/EC) create a legal foundation for sharing environmental information between public authorities and with the public. In particular, the INSPIRE Directive aims at establishing geo-portals that indicate the levels of shared spatial data in each member state. Czech

implementation of the directive was assessed by the EU Commission as good but with room for further improvement (EC, 2017a).

The Strategic Framework for the Development of the Public Administration involves implementing a "digital by default" policy, which enables electronic forms for public services and requires every public administration client to create an electronic profile. Some tools of the policy include repositories of electronic communications between citizens and the public administration, land registries, information portals on businesses and public bodies, procurement information and news about local governments and their activities (OECD, 2016).

Details on all permits granted can be found on the MoE website. A summarised version of every IPPC inspection report is published on a publicly accessible integrated prevention information system run by the MoE. The public can also request inspection results for any regulated facility. Publicly accessible information on regulated entities' compliance records improves compliance with environmental law.

The recent IMPEL peer review acknowledged that the CEI website had a lot of information available to the public, in line with EU requirements for openness and transparency (IMPEL, 2016). If a request (or part of one) for environmental information is refused, the person requesting the information can appeal to the superior administrative body. The same applies where a request for information remains unanswered or only part of the requested information is provided, without any explanation.

### *2.5.3. Access to justice*

The 2015 EIA Act amendment to implement the EU directive helped to significantly improve access to justice on EIA and permitting. Interested parties – natural and legal persons whose rights could be affected by the post-EIA permitting procedure, as well as NGOs that have been operational for at least three years before the permit was issued, or that are supported by at least 200 persons – have legal standing in the permitting procedure and may challenge procedural and substantial legality of a permit (Tomoszkova, 2015).

The Administrative Procedure Code (2002) states that all participants in the permitting procedure can submit appeals against permitting decisions of regional authorities to the MoE. In turn, the MoE decides whether to refer the procedure to branch offices. If the permitting decision is issued by lower-level authorities, the regional authority is the appeals body. Administrative court judgements can be reviewed by the Supreme Administrative Court. There are no environmental courts; ordinary civil and criminal courts deal with environment-related disputes and crimes. The cost of bringing an environmental case to a national court is not considered particularly high in the Czech Republic (EC, 2017d).

The Charter of Fundamental Rights allows citizens and NGOs to ask the competent authority to initiate proceedings or impose corrective measures. However, in many cases authorities have discretion to act on the complaint. The Czech Republic should make sure the public can exercise its right to go to court if an authority fails to act in response to non-compliance. Regarding liability for environmental damage, interested parties have a right to request to initiate proceedings (J&E, 2012b).

### *2.5.4. Environmental education*

Environmental education and awareness are well developed regarding various sectors (Box 2.2) and are discussed in the State Environmental Policy as indispensable in making citizens aware of their responsibility to improve the state of the environment. A national environmental education and awareness programme was begun in 2000. The 2016-25 State Programme for Environmental Education and Awareness Raising and Environmental Consulting is a key document, approved by the government and accompanied by a three-year action plan. It contains strategic areas with clearly defined objectives and indicators to assess progress and evaluate results. It strongly emphasises availability of environmental information provided by national authorities and sharing of good practices. The programme focuses not only on school curricula but also on the non-profit sector, as well as lifelong education and training. It supports environmental programmes for educators and defines methodologies for evaluation of current programmes (MoE, 2016b).

**Box 2.2. Good practices in environmental education and awareness raising**

**Circular economy**

The MoE, in co-operation with the Institute of Circular Economy, an NGO, organised in April and May 2017 a pay as you throw campaign to improve waste prevention and reduce the amount of waste going to landfill. It consisted of 13 seminars in various cities aimed at raising awareness on smart solutions for waste management. The seminars provided information on waste management project financing and highlighted best practice examples on implementation of waste management options in selected municipalities. Over 600 participants were involved, which demonstrated high interest in such initiatives.

**Eco-centres**

The country has around 100 environmental education centres providing over 500 programmes a year and involving about 12 000 children. Around twenty of the centres provide overnight programmes, during which primary and secondary school students spend five days in nature to learn principles of sustainable development and strengthen their relationship with the environment. The programmes are focused on getting to know the most common habitats and species of plants and animals and becoming familiar with ecology, waste management, energy use and organic farming. There are also specific programmes for teachers, families and professionals.

*Sources*: Institute of Circular Economy (2017), website, http://incien.org; MoE (2016c), *Environmental Education in the Czech Republic*.

Since 2011 the MoE has offered an e-learning programme for civil servants, which focuses among other issues on environmental legislation, EMAS, ISO, cleaner production, waste management, chemicals and hazardous substances. Environmental education on nature, geography, sustainable consumption and climate issues is enshrined in the general curricula at all education levels from primary to post-secondary. Around 80% of primary schools have an environmental education co-ordinator in charge of developing targets for the school and organising activities. Their role may range from shaping the curricula to dealing with the school's own environmental performance.

The MoE, in co-operation with the Ministry of Education, is responsible for co-ordinating environmental education. The programmes are developed jointly with other state institutions, organisations and NGOs (MoE, 2017a). Funding comes from the State Environmental Fund, the MoE, regional budgets and private funds, including from small corporate social responsibility initiatives About EUR 30 million in EU funds were used to renovate eco-centres over 2007-14. In addition, the MoE has a subsidy programme to support NGO projects, with an annual budget of EUR 0.3 million.

**Recommendations on environmental governance and management**

**Institutional framework**

- Enhance collaboration between municipalities to increase their efficiency in providing environmental services (e.g. by setting minimum size or standards for service provision, establishing a dedicated central government unit to facilitate and monitor co-operation). Improve vertical co-ordination by strengthening guidance from the MoE to regional and local authorities.

**Regulatory framework**

- Ensure consideration of alternatives in EIA, beyond the "zero alternative".
- Enhance the use of, and human resource capacity for, cost-benefit analysis for assessing environmental policies, and expand *ex post* evaluation of their implementation.

**Compliance assurance**

- Enhance risk-based planning of environmental inspections by applying risk criteria to all regulated activities, including low risk ones.
- Consider introducing additional performance indicators to evaluate the effectiveness of compliance assurance, such as compliance rates diversified by the gravity of violation.
- Establish and enforce strict (independent of fault) liability for environmental damage by removing exemptions for compliance with environmental permits. Continue to update the register of contaminated sites and develop a financing mechanism for their gradual remediation.
- Strengthen compliance promotion targeting small and medium-sized enterprises through online information tools and guidance to regulated entities.

**Environmental democracy**

- Continue extending citizens' and organisations' access to justice in environmental matters to guarantee broader environmental democracy by ensuring that the public and NGOs have a right to go to court if the competent authority fails to act in response to non-compliance.
- Ensure that recent amendments to the Building Act do not restrict public participation in permitting proceedings.

## Note

[1] Recommendation of the Council on the Assessment of Projects with Significant Impact on the Environment [C(79)116].

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# Chapter 3. Towards green growth

*This chapter reviews efforts by the Czech Republic to mainstream environmental considerations into economic policy and to promote green growth and sustainable development. It analyses progress in using economic and tax policies to pursue environmental objectives and discusses environmentally harmful subsidies. The chapter examines efforts to scale up environment-related and low-carbon infrastructure, expand related markets and support eco-innovation as a source of economic growth. It also reviews progress in mainstreaming environment in development co-operation programmes.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

## 3.1. The economy and the environment

The Czech Republic has a small, very open economy that grew faster than the OECD average for much of the 2000s. Growth has been driven by opening markets and inflows of foreign investment, supported by a competitive industrial base and a central location in Europe (OECD, 2016a). Manufacturing industry plays an important role, with transport equipment and automotive products accounting for nearly half the country's exports. Until 2008, income per capita was catching up with the OECD average. However, in the aftermath of the global financial crisis, growth almost stopped, mainly reflecting a decline in productivity growth. GDP growth picked up in 2015, with the absorption of expiring EU funds, before moderating in 2016. It is expected to remain above 3% in 2017-18 (OECD, 2017a).

Progress has been made in reducing poverty and unemployment, energy and greenhouse gas (GHG) intensity, and the intensity of forest and water resource use. However, with a strong industrial base and reliance on coal, the Czech Republic still has one of the most energy- and carbon-intensive economies in the OECD and the population is exposed to high air pollution levels. Road remains the dominant transport mode, and changes in land use, infrastructure development and intensive farming undermine ecosystem resilience. Progress towards sustainable development will require more cost-effective environmental policies, including a long-awaited green and growth-friendly tax reform.

## 3.2. Framework for sustainable development and green growth

The annual National Reform Programme, part of the European Semester cycle, is the main document to promote economic growth and implement the Europe 2020 strategy. EU cohesion policy provides the investment framework to reach the strategy's goals. Czech Republic 2030, which the government approved in 2017, is the main implementation platform of the 2030 Agenda for Sustainable Development (GOCR, 2017). This second update of the 2004 Sustainable Development Strategy (after that of 2010) supports the long-term orientation and coherence of sectoral, cross-cutting and regional strategies. It outlines six national priority areas: people and society, economic model, resilient ecosystems, municipalities and regions, global development, and good governance (Chapter 1. ).

In 2014, the Council for Sustainable Development was moved from the Ministry of the Environment (MoE) to the Government Office. It is now chaired by the prime minister, which should support a whole-of-government approach to sustainable development. However, ensuring policy coherence remains a challenge. Contradictions between environmental and energy policies, highlighted in the 2005 OECD Environmental Performance Review (EPR), persist. For example, while the government states that the country's objective is to ensure a transition to a competitive low-carbon economy (GOCR, 2016a), the State Energy Policy emphasises that reducing $CO_2$ emissions is primarily an EU political commitment and that $CO_2$ emissions are not a key Czech environmental indicator (MIT, 2014). The Czech Republic was the last EU member to ratify the Paris Agreement, in October 2017, due to lengthy parliamentary debates. Although the energy policy envisages a switch from fossil fuels to nuclear power and renewable energy resources, uncertainty remains on the magnitude and financing of the transition (Chapter 1. , Section 3.4.4). In addition, a 2015 decision to lift restrictions on lignite mining sent contradictory signals. The adoption of the 2017 Climate Protection Policy is a positive step that should help in aligning policies.

There is no government green growth strategy, but the Czech Republic applied the OECD monitoring framework in developing a set of green growth indicators (CZSO, 2014). The indicators include environmentally related taxes, energy prices and green jobs that are not listed in sustainable development indicators. However, there is little evidence of their use in policy making. While the energy policy promotes conventional forms of energy as the main opportunities for growth and jobs,[1] assessing the social cost of carbon lock-in and the benefits of a low-carbon economy would help support the transition and social acceptance of carbon pricing. For example, it is estimated that lifting the mining limit would increase the cost of health damage from coal extraction and use from EUR 3.3 billion to EUR 5.8 billion over 2015-50, with a substantial share of the impact exported beyond Czech borders (Máca and Melichar, 2016). The Czech Republic could build on its good capacity for economic evaluation of environmental policies.

## 3.3. Greening the system of taxes and charges

### *3.3.1. Overview*

The tax burden is moderate in international terms. The ratio of tax revenue to GDP was 33.5% in 2015, slightly below the OECD average of 34.3% (OECD, 2016b). Tax evasion, which is relatively high, has become a policy priority (OECD, 2016a). Subnational government has little fiscal autonomy: local government raises only 1.2% of total tax revenue, the second smallest share in the OECD. Public debt is low and the budget is broadly in balance, but pension expenditure will rise as the population ages: the ratio of elderly to working age population is expected to grow from 27% in 2015 to 59% in 2050. As in other OECD Central and Eastern European countries, the tax mix is skewed towards labour, with higher than average social security contributions.

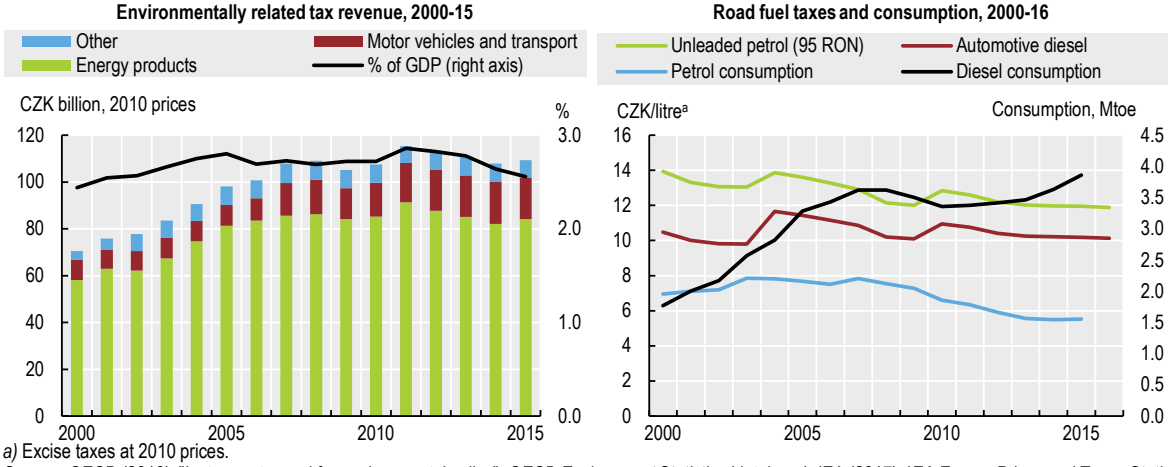
Environmentally related tax revenue rose from 2.4% of GDP in 2000 to 2.9% in 2011, then declined to 2.6% in 2015, well above the OECD average of 1.6%. Taxes on energy products account for the bulk of this revenue (78%, compared with the OECD average of 70%), while taxes related to transport (excluding fuels) generate relatively low revenue (16%, vs. 27% in the OECD). The rise in environmentally related tax revenue was driven by increased transport fuel consumption to 2008. Despite new taxes on energy products, the environmental tax burden in the economy has declined in recent years.

### *3.3.2. Taxes on energy products*

Revenue from taxes on energy products rose in real terms over 2000-08, mainly driven by increased road fuel consumption (Figure 3.1). It peaked in 2011 following a rise in motor fuel taxation, then decreased due to a consumption slowdown, a decrease in real tax rates and a switch from petrol vehicles to more lightly taxed diesel ones. Like most OECD countries, the Czech Republic grants preferential tax treatment to diesel relative to petrol despite diesel's higher carbon and air pollutant emissions (Harding, 2014). The share of diesel in road fuel consumption grew from 46% in 2000 to 66% in 2015. Raising tax rates on diesel would better reflect the higher environmental costs associated with its use. Although the Czech Republic introduced taxes on natural gas, solid fuels and electricity in 2008 to comply with the EU Energy Taxation Directive (2003/96/EC), rates were set at relatively low levels, aligned with required minimums for non-business use, and they are not adjusted for inflation. Given the exemptions in place (Section 3.3.3), energy taxes do not provide a consistent carbon price signal across fuels and energy uses, which reduces their cost-effectiveness. Nor do they generally reflect other environmental costs from

energy use, such as noise, congestion and air pollution, which does not encourage polluters to take account of these costs.

**Figure 3.1. Since 2011, lower and differentiated taxes on road fuels have reduced revenue and boosted diesel consumption**




*a)* Excise taxes at 2010 prices.

*Source:* OECD (2016), "Instruments used for environmental policy", *OECD Environment Statistics* (database); IEA (2017), *IEA Energy Prices and Taxes Statistics* (database); IEA (2017), *IEA World Energy Statistics and Balances* (database).

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Energy taxes are relatively low by European standards (EC, 2016a). Like other Central and Eastern European countries, the Czech Republic has maintained low energy tax rates out of affordability concerns: about 14% of households face energy affordability risk,[2] the fourth highest share among 20 OECD countries (Flues and Van Dender, 2017).

Providing direct support to vulnerable households, decoupled from energy use, and setting tax rates at levels that better reflect the environmental costs of energy use would be more efficient for both efficiency and equity purposes than keeping taxes low. OECD simulations have shown that using a third of the additional revenue from higher taxes on heating fuels and electricity would decrease the share of Czech households facing energy affordability risk by 15% with an income-tested benefit and by 8% with a lump-sum transfer. In addition, lump-sum transfers can mitigate regressive impact, while income-tested transfers can result in a progressive impact of the tax reform. Finally, increasing energy taxes would improve health by reducing air pollution, which could partly offset the regressive impact. As poorer people live in cities with higher air pollution from heating, they would benefit the most from improved air quality (Branis and Linhartova, 2012).

### *3.3.3. Removing environmentally harmful support to fossil fuel production and consumption*

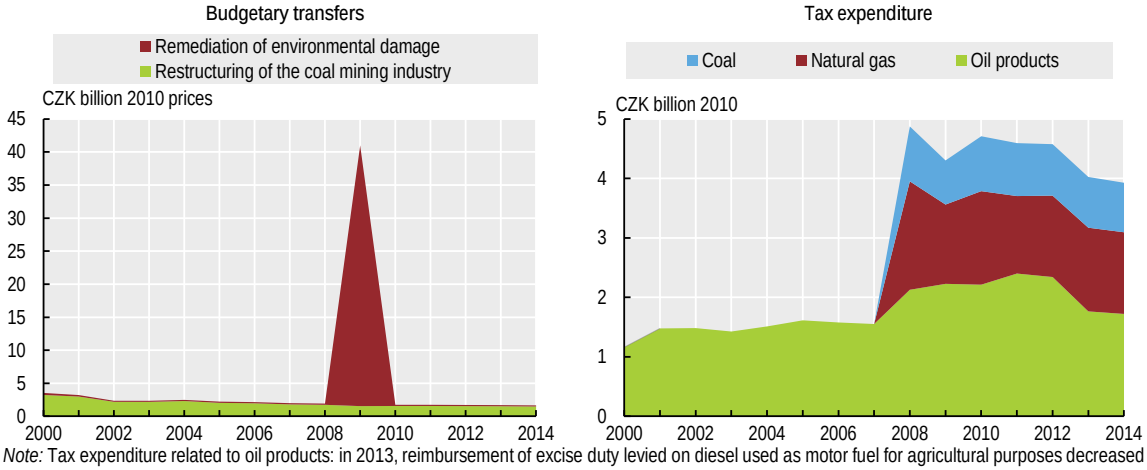
Since 2004, subsidies to the coal industry have been framed by EU rules, and state aid is allowed only for mine closure, treatment of health damage to miners and remediation of environmental liabilities related to past mining. Mining companies are held responsible for remediating damage caused by mining since 1994. The state has to deal with damage caused prior to that date. In 2009, the Ministry of Finance allocated CZK 40 billion

(about EUR 1.5 billion) to fund environmental clean-up projects on abandoned mines (Figure 3.2) (OECD, 2012a).

Support measures for fossil fuels mainly consist of tax expenditure related to energy consumption. Exemptions apply to various fuel uses: petrol and diesel not used for transport or heating; petrol and diesel used for commercial aviation and shipping; natural gas used for residential heating and in combined heat and power plants; liquefied petroleum gas used for heating; and coal and other solid fuels used in combined heat and power plants. Pure biofuels and biofuels contained in high percentage biofuel blends are subject to reduced excise duties. In addition, 40%[3] of the excise tax on diesel used in agriculture is refunded, as is 94% of the excise tax on diesel used for heating. Consumption of electricity generated from nuclear plants, renewables, biomass and/or waste is untaxed.[4] Other electricity is taxed at a single rate for all users. Fuels used for electricity generation are tax exempt (OECD, 2013a).

Despite a 2013 reduction in the refunded share of the excise tax on agricultural diesel use, total tax expenditure was estimated at CZK 4.1 billion (about EUR 150 million) in 2014, equivalent to 5% of energy tax revenue. This share is below the OECD average, a fact that may reflect lower benchmark energy tax rates.[5] Differentiated tax treatment encourages fossil fuel use, creates distortions and represents forgone budget resources that could be devoted to policies supporting economic growth, such as environment-related R&D.

**Figure 3.2. Tax expenditure for fossil fuels lowers incentives to save energy**




*Note:* Tax expenditure related to oil products: in 2013, reimbursement of excise duty levied on diesel used as motor fuel for agricultural purposes decreased from 60% to 40%.
*Source:* OECD (2015), "OECD inventory of Support Measures for Fossil Fuel", *OECD Environment Statistics* (database).

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There is no comprehensive information on potentially environmentally harmful subsidies and tax expenditure. The government plans to set up a National Budgetary Council to monitor the development of general government finances and compliance with fiscal rules (OECD 2016a). Its annual report could be a vehicle for screening public support programmes against their potential environmental impact and, more generally, for assessing their social costs and benefits. This would improve the transparency of taxation and public expenditure and could be used in reforming subsidies and special tax treatment that are not justified on economic, social or environmental grounds.

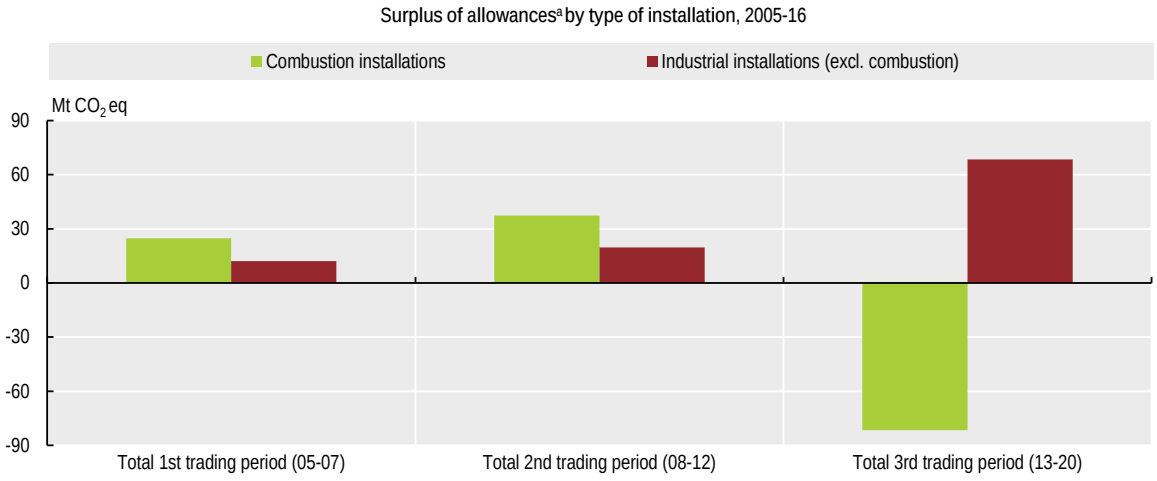
### *3.3.4. Carbon pricing through the EU Emissions Trading System*

In addition to taxes on energy, the Czech Republic prices its $CO_2$ emissions via the EU Emissions Trading System (EU ETS). The emissions are generated by 349 stationary installations and five aviation entities (EEA, 2017). In 2016, power and heat generation was responsible for 80% of ETS-regulated emissions. Taking into account the price signals from taxes on energy use and the EU ETS, the Czech Republic priced 77% of its energy-related $CO_2$ emissions, compared with 40% on average in the 41 countries[6] representing 80% of world emissions in 2012 (OECD, 2016c). However, it priced only 16% of all $CO_2$ emissions at more than EUR 30 per tonne (a conservative estimate of the climate damage from one tonne of $CO_2$ emissions) and emissions priced at this level were primarily from road transport.

Taxes on transport fuels have historically been widely used as a way to raise revenue, with tax rates and tax bases consistently higher and larger than those of other types of energy use. The majority of carbon emissions from energy use in the Czech Republic arise in the industry and electricity sectors. Emissions in these sectors are mainly priced through the EU ETS, but allowance prices are low. As a result, the combined price signal from energy taxes and the EU ETS that applies to $CO_2$ emissions outside the road transport sector is among the lowest in Europe (OECD, 2016c).

Due to low allowance prices and an oversupply of tradable allowances, the EU ETS has not provided a strong price signal to induce low-carbon investment. Both combustion and industrial installations consistently received free excess allowances over 2005-12 (Figure 3.3). Although an increasing share of emission allowances has to be auctioned in the third period (2013-20), most energy-intensive industrial installations continued to receive free allowances in 2016, exceeding emissions in some sectors (e.g. iron and steel). As a result, over 2008-16, Czech industry accumulated more than 40 million tonnes of surplus $CO_2$ allowances.

**Figure 3.3. Oversupply of allowances in the EU ETS has weakened emission abatement incentives**




*a)* Difference between allocated and verified emissions.
*Source:* EEA (2017), *EU ETS data viewer* (database).

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Since 2013, combustion installations have not received excess allowances. However, the Czech Republic, like other lower-income EU countries, was granted a derogation to provide free allowances to its power sector worth about EUR 1.9 billion over 2013-19, conditional upon investment of equivalent value to modernise electricity generation and diversify the energy mix (EC, 2012). Accordingly, it presented a national investment plan of 363 projects, with a total value nearly triple the value of the free allowances. Between 2013 and 2015, however, a majority of free allowances were invested in lignite- and hard-coal-powered plants (EEA, 2016). There is no evidence of investment helping to diversify the energy mix. Free allocations weaken emission abatement incentives for firms and imply large costs for government due to forgone revenue. Full auctioning of tradable allowances avoids these drawbacks (OECD, 2017b). The Czech Republic should more rapidly increase the share of allowances auctioned to fund its transition towards a low-carbon economy. To build support from enterprises, the revenue could be used to reduce other business tax contributions.

### *3.3.5. Transport taxes and charges*

Since 2000, transport tax revenue has doubled in real terms, driven by strong growth in road freight transport and the introduction of a toll system. However, transport-related taxes continue to represent a relatively small share of total environmental taxes. While this can be partly explained by a lower car ownership rate, it suggests there is room to increase the rates and broaden the taxes' base to better reflect environmental damage from transport.

#### *Taxes on vehicles*

While vehicle taxes are less efficient than fuel taxes and distance-based charges in reducing emissions of GHGs and air pollutants, when carefully designed, they can be effective in raising the share of low-emission vehicles in the car fleet. This is relevant in

the Czech Republic because the average age of cars is about 15 years (Cenia, 2016). The country has both one-off registration and annual recurrent taxes on vehicles, whose rates do not take environmental parameters into account. The (recurrent) circulation tax is the second largest source of transport-related tax revenue, after road tolls. It applies only to vehicles used for business activities. Personal use of company vehicles is exempted, so there is no incentive for employees to limit such use. The circulation tax rate is differentiated by engine size for passenger cars and by weight and axle size for other vehicles. Vehicles for public transport or transport of goods under 12 tonnes powered by electricity, compressed natural gas, liquefied petroleum gas or E85 are exempted, as are hybrid vehicles (ACEA, 2017).

In addition to the registration tax, an environmental tax was introduced in 2009 for second-hand, high-polluting (EURO 0-2) vehicles below 3.5 tonnes to promote fleet renewal and support the collection, processing, recovery and disposal of end-of-life vehicles (revenue accrues to the State Environmental Fund). This tax is paid for the first registration of an imported used vehicle and the first re-registration of a vehicle already registered in the Czech Republic. However, it has been ineffective in renewing the fleet because cars meeting EURO 2 and lower standards represent a decreasing segment of the car market. As a result, registrations of old cars (>10 years) increased and revenue from the tax declined.

#### *Road pricing*

In 2007, the Czech Republic introduced distance-based charges for trucks[7] and buses as a source of funding for the highway infrastructure. The electronic toll system operates on motorways, other high-speed roads and some first class roads. The rates[8] vary by emission class, number of axles, road type, day and time. The revenue is earmarked for transport infrastructure. Evidence shows peak-time traffic decreased by 15% with the introduction of time-varied charges (Gibson et al., 2014). Distance-based charges are an efficient tool to address some of the external costs linked to road transport such as air pollution and congestion, in particular if charges reflect air pollution costs of vehicles and driving location, and are linked to congestion levels. The Czech Republic could consider extending distance-based prices to passenger cars and light commercial vehicles, which pay for a vignette independent of distance travelled and emission class. Applying congestion charges in large cities, where investment in toll systems can be justified, could also help address environmental externalities. Revenue from road pricing may be used to pay for better public transport or may be recycled through an environmental tax shift potentially resulting in a double dividend. Instead of earmarking revenue to one project in particular, project selection should be based on an evaluation of social returns.

There is room to further develop traffic management in urban areas, as the 2005 EPR recommended. The share of car in passenger transport is growing, yet municipalities have rarely used the option to levy vehicle entry fees to regulate access to cities: related revenue has steadily decreased since 2000. Prague is considering the introduction of a low-emission zone, but not until a long-delayed ring road is completed.

### *3.3.6. Towards a green tax reform?*

In 2007, the government outlined the principles of an environmental tax reform (Hogg, 2016). The initial plan was to implement it gradually over ten years, and it was expected to be revenue neutral. The first step was implementation of the EU energy taxation directive (2003/96/EC, Section 3.3.2) in 2008, which was associated with the

introduction of a single personal income tax rate and a reduction in corporate income tax rates. The second phase was supposed to address air pollution through increased air pollution taxes and the introduction of a carbon tax. This phase was discussed in 2011 when the European Commission proposed revising the directive to reflect $CO_2$ emissions in energy taxation.

However, progress has stalled. Contrary to the principle of the reform, overall taxes on energy have declined since 2011, while the implicit tax rate on labour has increased. While a carbon tax is among measures proposed in key strategic documents (e.g. the 2015 National Emissions Reduction Programme and 2017 Climate Protection Policy), its implementation has repeatedly been postponed. Air pollution tax rates were increased,[9] but remain well below the marginal cost of abatement and thus have not motivated emission reduction (Kiula, 2014).

While discussions have focused on $CO_2$ and local air pollutant emissions, there is room to review environmentally related taxes and charges on the basis of other environmental parameters. For example, while significant investment is needed in the water sector (Section 3.4.2), there is scope to increase water charges to better recover water service provision cost, and to reflect the environmental and resource cost of water use. Abstraction charges do not reflect water scarcity, and exemptions undermine the incentive to use water more efficiently (OECD, 2015a, 2012b). To address diffuse pollution, which affects most water bodies, the Czech Republic could introduce taxes on fertiliser and pesticide use. Such taxes have proved successful in reducing the use of harmful substances in other OECD countries (OECD, 2017c). There are also opportunities to improve economic instruments used for waste management (Chapter 4. ). For example, the landfill tax is too low to make waste recovery cheaper than final disposal.

## 3.4. Investing in the environment to promote green growth

### *3.4.1. Environment-related measures in fiscal stimulus plans*

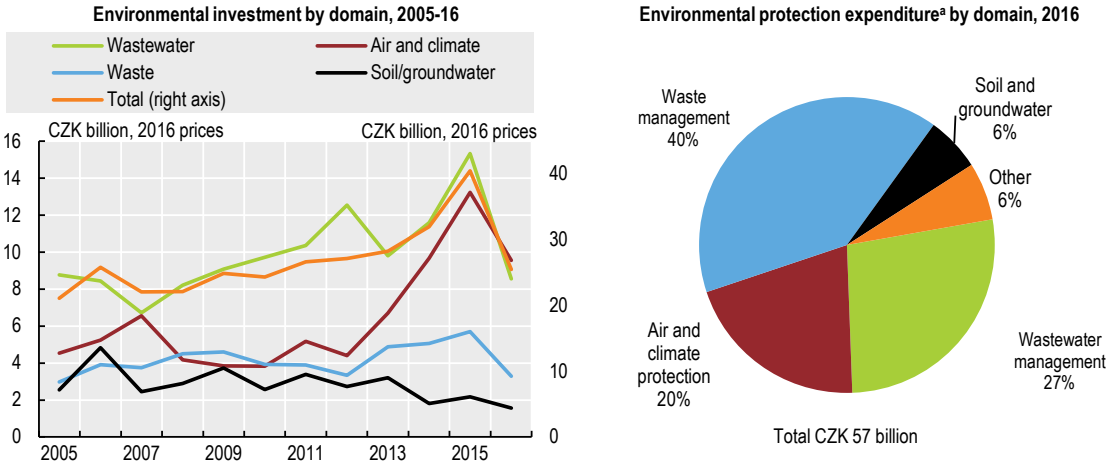
Responding to the economic crisis, the Czech Republic sold 104 million emission allowances under the Kyoto flexible mechanisms, representing about 0.5% of 2009 GDP,[10] to support energy saving in the housing sector. The Green Savings Programme, which ran until 2012, boosted GDP by nearly 0.4% in 2009 and 2010 and created more than 19 000 jobs, mainly in the construction sector (SEF, 2013). Although it did not reach its original objectives,[11] its long-term environmental benefits were found to outweigh the short-term increase in energy consumption (Pollit, 2011). It was instrumental in meeting the energy saving goal for 2010 and was subsequently renewed. The economy also benefitted from green stimulus packages similar to those in other European countries. It is estimated that the first round of a German car scrapping programme contributed 0.4 percentage point to Czech GDP growth in 2009 by boosting small car exports (Maleček and Melcher, 2016).

### *3.4.2. Expenditure for environmental protection*

Between 2005 and 2015, environmental expenditure[12] rose from 1.2% of GDP to 1.5%.[13] This trend was driven by increased public investment in wastewater management as well as higher private investment in air and climate protection stimulated by the New Green Savings Programme in 2013 (Figure 3.4). Over the same period, operational expenditure on waste management grew considerably while spending on soil and groundwater,

including contaminated site remediation, decreased. In 2016, environmental expenditure fell to 1.2% with the transition to the new EU programming period. Capital expenditure accounted for 45% of total spending on environmental protection and current expenditure for 55%.

**Figure 3.4. Investment in wastewater management and in air and climate protection increased significantly**




*a)* Investment and internal current expenditure (excluding payments to specialised producers of environmental protection services) of the public and business sectors (including specialised producers of environmental protection services). Other: environmental R&D, administration and education and biodiversity and landscape protection. Excludes expenditure on water supply.
*Source:* CZSO (2017), "Environmental Protection Expenditure - 2016" (database).

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Some of the rise in waste management expenditure can be explained by treatment improvements. However, there has been no assessment of the outcomes of public support for investment or of the cost-effectiveness of municipal waste management services (Chapter 4. , SAO, 2017). Landfilling remains the main management method. Recycling rates are well below European averages. While waste management has been increasingly contracted out to specialised operators, distortion of competition remains a concern (OECD, 2013b). A system for benchmarking costs, as envisaged in the 2014 Waste Management Plan, would help improve municipal performance in waste service provision.

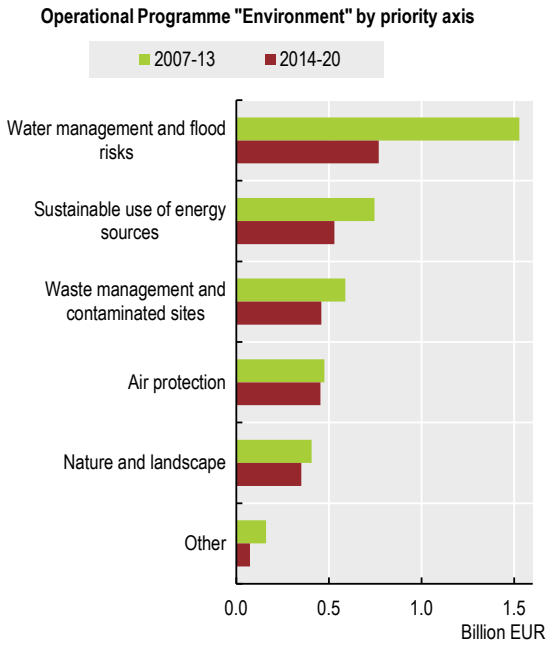
General government expenditure on environmental protection accounted for 1.1% of GDP in 2015, well above the OECD average of 0.8%, due to higher-than-average spending on wastewater management, mostly by municipalities, to meet EU requirements. Over 2005-15, the near doubling of investment helped increase the share of population connected to public sewage treatment plants, which grew by 8 percentage points to 81% in 2015, in line with the OECD average. The Czech Republic met the collection requirements of the Urban Waste Water Treatment Directive but not the 2010 treatment level objectives (Chapter 1. ). Full compliance will require investing EUR 26 million in new treatment plants, 40% of which will come from EU funds (MoE, 2017a). Public investment in the extension and renewal of existing collection systems and treatment plants is estimated at EUR 300 million annually over 2017-20, in line with the 2009-15 average.

Water services are operated by public-private companies (OECD, 2015b). Individual utilities set tariffs, subject to price controls by the finance ministry. Municipalities are responsible for new investment while the private companies are responsible for operating and maintaining the network. Water bills cover operating costs for drinking water supply and sanitation infrastructure (OECD, 2012b). However, despite large increases in the past decade, tariffs remain too low to cover infrastructure renewal and new investment, partly because legal provisions prevent depreciation costs to be fully taken into account in tariff setting. It is estimated that achieving full cost recovery would not lead to substantial affordability issues, resulting in increasing the share of income spent on water and wastewater charges by households in the first income decile from 1.7% to 2.0% (Reynaud, 2016).

### *3.4.3. Financing investment in environmental protection*

EU cohesion policy has been a major source of environmental infrastructure funding. Over 2007-13, EUR 22 billion[14] was allocated to the Czech Republic, representing an average of 2% of GDP annually (EC, 2016b). Transport was the first priority, receiving 35%, followed by environment (18%), mostly financed through the Operational Programme "Environment" (OPE) (Figure 3.5). Although OPE allocations in the 2014-20 programming period (EUR 2.6 billion) are one-third less than 2007-13 expenditure, the focus remains on issues where the country has not yet met EU obligations or is deemed at risk of failing to do so (MoE, 2015).

**Figure 3.5. Making the most of EU funds requires improved strategic planning and procurement practices**




*Note:* 2007-13: certified expenditure as of 31/12/2015 after de-commitments and corrections; 2014-20: allocated amounts.
*Source:* CENIA (2016), *Statistical Yearbook of the Environment of the Czech Republic 2015*; MOE (2015), *The Operational Programme Environment 2014-20*.

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Implementation of EU co-financed environmental infrastructure projects experienced considerable delay over 2007-13 due to problems meeting legal and administrative standards (Baun and Marek, 2013, OECD 2016a). Irregularities in procurement processes and inadequate public control have resulted in some funds being lost. Despite significant reforms in recent years, concerns remain about the lack of transparency, competition and enforcement (EC, 2017a). The lack of co-ordination between the MoE and intermediate implementing bodies (State Environmental Fund, National Conservation Agency), insufficient administrative capacity, complex procedures and a weak monitoring system have also undermined the Czech capacity to absorb EU funds (MoE, 2015). Although measures taken have significantly increased the absorption rate of 2007-13 funds at the end of the programming period, the uptake of EU funds for 2014-20 has been slow and deficiencies remain (MoE, 2017b, EC, 2017a).

The water supply and sanitation sector is fragmented into thousands of entities (owners and utilities) providing or operating public water services. Their heterogeneity impedes effective strategic planning, resource balancing and asset management of regional systems (World Bank, 2015). Planning weaknesses resulted in some EU co-financed investment being too high as water consumption fell (European Court of Auditors, 2015). The Czech Republic established an independent regulatory office for the water and sanitation sector in 2015. It aims to enhance regulation, ensure long-term sustainability of the sector and improve consumer protection (MOA, 2016). This is a positive step to improve the cost-effectiveness of service provision and it fulfils an *ex ante* condition for co-financing infrastructure projects within the OPE for 2014–20. As EU funding for

infrastructure declines, water and sanitation tariffs, along with those for waste management, will have to provide a greater share of finance.

### *3.4.4. Investment in energy efficiency and renewables*

The Climate Protection Policy states that the cost of the transition to a low-carbon economy does not differ much from the cost of renewing the ageing energy system. However, the policy does not provide a clear overview of the actual and planned investment needed to achieve its targets.[15] Improving this information would help in tracking progress and gaining the confidence of private sector investors (OECD, 2017b). The gap between the State Energy Policy optimised scenario and the investment needed to reach the indicative target of an 80% GHG emission reduction by 2050 has been estimated at EUR 1.66 billion annually over 2020-50 (Trinomics, 2017). Investment in energy efficiency and renewable energy is mainly financed by the state budget, EU funds (EUR 2.2 billion is allocated for 2014-20), revenue from sales of carbon emission allowances and free allowances to the power sector (Section 3.3.4).

#### *Energy efficiency*

Heavy industry makes the Czech Republic one of the most energy-intensive economies in the OECD. Between 2000 and 2016, energy intensity declined at a faster rate than the OECD average. Improvements were largely attributable to progress in energy efficiency, in particular since 2004, as well as to the industrial restructuring towards less energy-intensive industry (Chapter 1. ). Since 2000, industrial energy consumption has decreased steadily, whereas transport consumption grew strongly to 2008, slowed during the crisis, then recovered in 2014. In the aftermath of the crisis, energy consumption in the residential, commercial and public service sectors remained broadly stable, with annual variation due to climatic conditions.

Since 2010, the policy framework for energy efficiency has improved (IEA, 2016). An Energy Efficiency and Savings Department has been created within the Ministry of Industry and Trade, along with a cross-government co-ordination committee on energy efficiency. It is important to ensure that capacity and resources are sufficient to plan, implement, monitor and evaluate the energy efficiency policies and programmes.

The State Energy Policy aims at reducing energy intensity to a level comparable to the European average by 2020. To reach the EU 20% energy efficiency target, the National Energy Efficiency Action Plan[16] (NEEAP) set an indicative national target of 51.1 PJ of final energy savings by 2020 (MIT, 2017a). Most savings are expected in the residential and industrial sectors and from cross-sector measures (Table 3.1). Surprisingly low savings are expected in the transport sector suggesting a need to improve co-ordination on energy efficiency policies between the ministries of transport, environment, and industry and trade.

Due to delays in drawing EU funds for measures of the 2014 plan, the 2016 NEAAP introduced additional cross-sector measures to meet the 2020 target. However, the country failed to achieve the expected 2014-16 energy savings, postponing a large share of saving efforts to 2017-20 (MIT, 2017b).

**Table 3.1. Greater energy savings effort is needed over 2017-20**

| Sector | Total final energy consumption in 2015 (TJ) | Energy savings[a] in 2014-16 (TJ) | Energy savings[a] in 2017-20 (TJ) | Total energy savings[a] 2014-20 (TJ) | Public expenditure[b] (billion CZK) | Cost-effectiveness of measures (TJ/CZK) |
|---|---|---|---|---|---|---|
| Residential | 275 194 | 2 094 | 13 355 | 15 449 | 52 | 298 |
| Services | 119 279 | 2 088 | 1 510 | 3 598[c] | 16 | 229 |
| Industry | 315 639 | 2 118 | 9 640 | 11 758 | 20 | 584 |
| Transport | 271 674 | n.a. | 21 | 21 | n.a. | n.a. |
| **Total** | **1 010 197** | **6 300** | **24 526** | **30 826** | **88** | **351** |
| Additional cross-sector measures | | 10 745 | 6 000 | 16 745 | n.a. | n.a. |
| **Total NEEAP 5** | | **17 045** | **30 526** | **47 571** | | |

a) Savings reported under Article 7 of the EU Energy Efficiency Directive (2012/27/EU).
b) From EU funds and national co-financing.
c) Savings in public buildings. Some savings in the service sector are accounted in the industrial sector.
*Source*: Eurostat (2017), *Simplified energy balances* (database); MIT (2017a), *Update of the National Energy Efficiency Action Plan of the Czech Republic.*

A range of investment programmes, subsidies and loans have been promoting energy efficiency. However, these programmes have been fragmented and not cost-effective,[17] and *ex post* monitoring of energy savings could be improved (EC, 2016c). Offering a simple, co-ordinated programme for households could help deliver improved outcomes in the residential sector (IEA, 2016). Funding for energy efficiency programmes has increased significantly but investment needs are high. Renovation of residential building stock may require CZK 40-50 billion (EUR 2 billion) per year over 30-40 years (Sramek, 2017). Grants and subsidies are financed by the government budget and EU funds. Because of the uncertainty of EU funding beyond 2020, the Czech Republic should start leveraging other sources of funding, including in the private sector (e.g. banks and energy providers).

In the building sector, energy efficiency is also promoted through stricter energy performance standards and performance certificates. However, as owners often opt not to have the certificate, about 75% of dwellings have the lowest rating, which is misleading and leads to little action by consumers. Greater awareness of available incentives and the multiple benefits of energy efficiency (e.g. economic, health, property value) to consumers could help trigger greater interest in the certificates, accompanied by penalties for non-compliance.

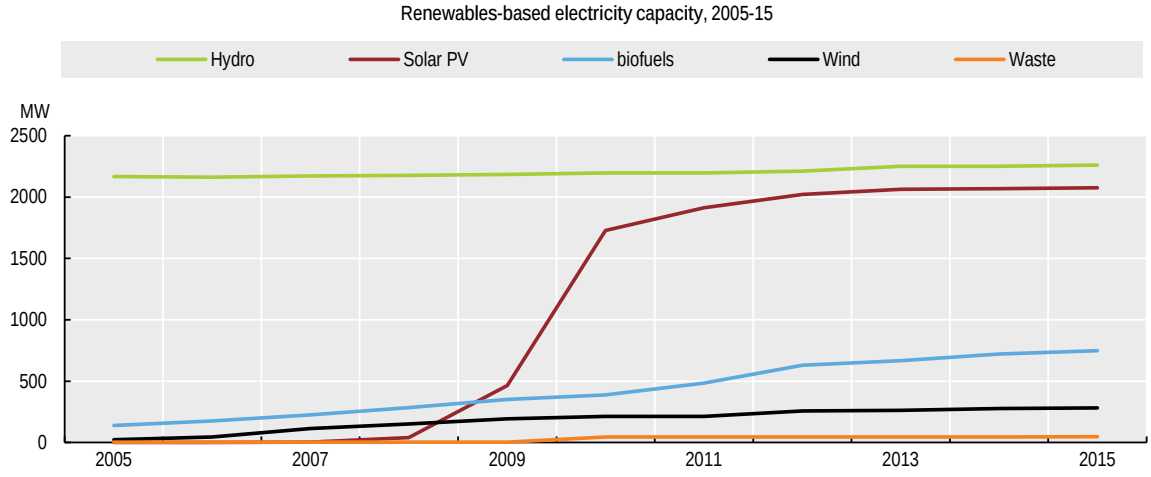
Multiple programmes support the replacement of inefficient heating equipment with highly efficient devices such as condensing boilers and heat pumps. However, the programmes also provide incentives for coal-fired heating, which should be phased out.

Like 12 other EU members, the Czech Republic adopted an alternative approach to Article 7 of the Energy Efficiency Directive, related to obligation schemes. It focuses on energy efficiency measures in the buildings sector that are important for delivering long-term energy savings in this sector. The lack of an obligation scheme, however, has made energy providers slow to address demand-side energy efficiency. NEEAP allows for the introduction of such obligation if the financial resources of the alternative approach are depleted and are insufficient to achieve the savings target set by the directive.

*Renewable energy sources*

Since 2005, power capacity based on renewables has more than doubled (Figure 3.6). Solar power was the main contributor to this growth, followed by biofuels (solid biofuels and biogases) and wind. A feed-in tariff (FIT, or guaranteed price) and feed-in premiums (FIP, paid on top of the market price) were introduced in 2005 as the main support mechanisms for renewables-based electricity. In 2010, favourable market conditions, supported by a decline in solar panel prices and generous FITs, resulted in the Czech Republic becoming the world's fourth-largest solar photovoltaic (PV) market (IEA, 2016). However, high FITs were not adjusted quickly enough to declining production costs, which led to a rapid and costly expansion of PV installations. In 2012, the government reduced its support significantly and set stricter criteria for eligibility. In addition, profit taxes of 26% on FITs and 28% on FIPs were imposed retrospectively on PV installations that began operating in 2009-10. In 2014, the FITs and FIPS were ended.[18] Profit taxes were reduced to 10% on FITs and 11% on FIPs for PV installations that entered into operation in 2010 (which benefit from the most favourable tariffs). Changes in support measure have made market conditions deteriorate considerably, and growth in renewables-based electricity capacity dropped from 43% in 2010 to 1% in 2015. Retroactive measures increased investor uncertainty and arguably resulted in a higher cost of capital for future investment (IEA, 2016).

**Figure 3.6. Since 2012, changes in support measures have stopped the expansion of renewables-based electricity capacity**




*Source*: IEA (2017), *Renewable information Statistics* (database).

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FIP and FIT payments are financed via a regulated levy on final electricity consumption, set as a component of the electricity price. The levy is paid by all end-users but industry has paid a lower rate than households since 2015 (Eurobserver, 2015). After increases in electricity prices in 2013, a share of the costs was transferred to the state budget.

Although good progress has been made towards the 2020 targets, new support mechanisms will be needed to reach the long-term targets of the State Energy Policy, which projects up to 25% renewables in electricity production by 2040. The instruments in place (subsidies and fiscal measures, such as exemptions from income, property and

electricity taxes or tax depreciation) could be combined with capacity auctions or quotas to avoid excess energy production (IEA, 2016). Introducing a carbon tax or increasing existing energy taxes on emissions in sectors outside the EU ETS would be a cost-effective tool to stimulate greater investment in renewables and energy efficiency.

The Czech Republic has a power system with sufficient, but inflexible, capacity reserves (mostly lignite and nuclear). Its high level of interconnection capacity provides some flexibility but there is a need for a closer market integration to reduce overflows of renewable power from neighbours (particularly Germany). Within the domestic market, the grid flexibility could be increased by fostering market signals for investment in flexibility and demand response.

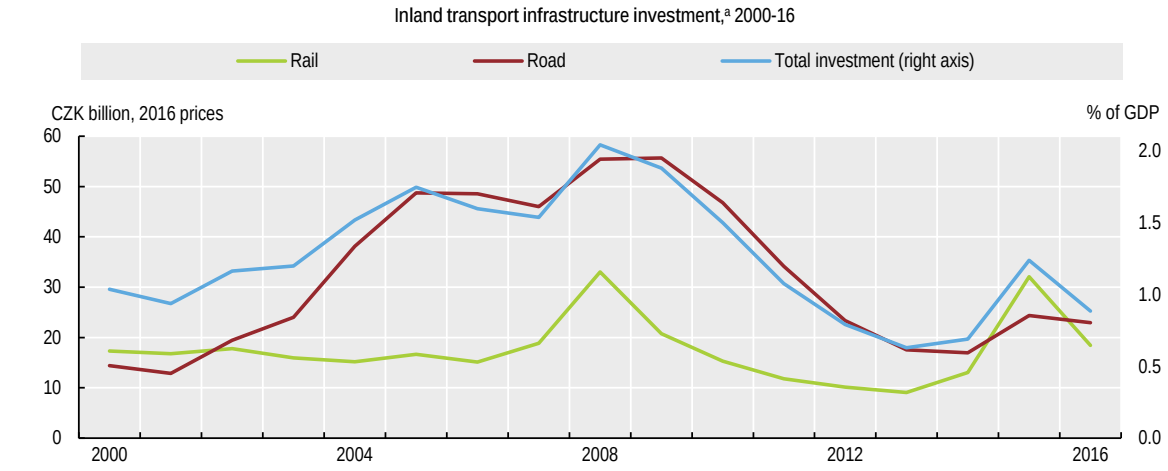
### *3.4.5. Investment in sustainable transport*

Poor transport infrastructure continues to hamper Czech competitiveness. Road infrastructure quality is significantly below European standards and the rail network needs substantial modernisation (EC, 2017a). There are no high-speed railway connections, and cross-border connections are poor. Road accounts for a growing share of passenger and freight transport. It is a major source of local air pollution and GHG emissions from the transport sector increased by 60% between 2000 and 2016.

After sharp growth over 2000-08, investment in transport infrastructure fell substantially to 2013 before recovering with the late absorption of 2007-13 EU funds (Figure 3.7). In 2015, investment in transport infrastructure represented 1.2% of GDP, significantly more than the OECD average of 0.8%. Over 2000-16, road infrastructure absorbed two-thirds of transport investment, although rail investment exceeded road in 2015.

The 2013 Transport Policy for 2014-20 estimates that annual expenditure of 2.5% of GDP is required to operate, maintain and develop the transport infrastructure. The public budget and EU cohesion funds are the main sources of finance. Drawing of 2007-13 EU funding was delayed by structural deficiencies in project preparation and implementation. These include lengthy procedures for issuing building and land use permits and problems related to public procurement transparency and corruption (EC, 2017a).

**Figure 3.7. Transport investment has been volatile and mostly dedicated to road**




*a)* Excluding air transport.
*Source*: ITF (2017), *Transport* (database); MOT (2017), *Transport Yearbook 2016.*

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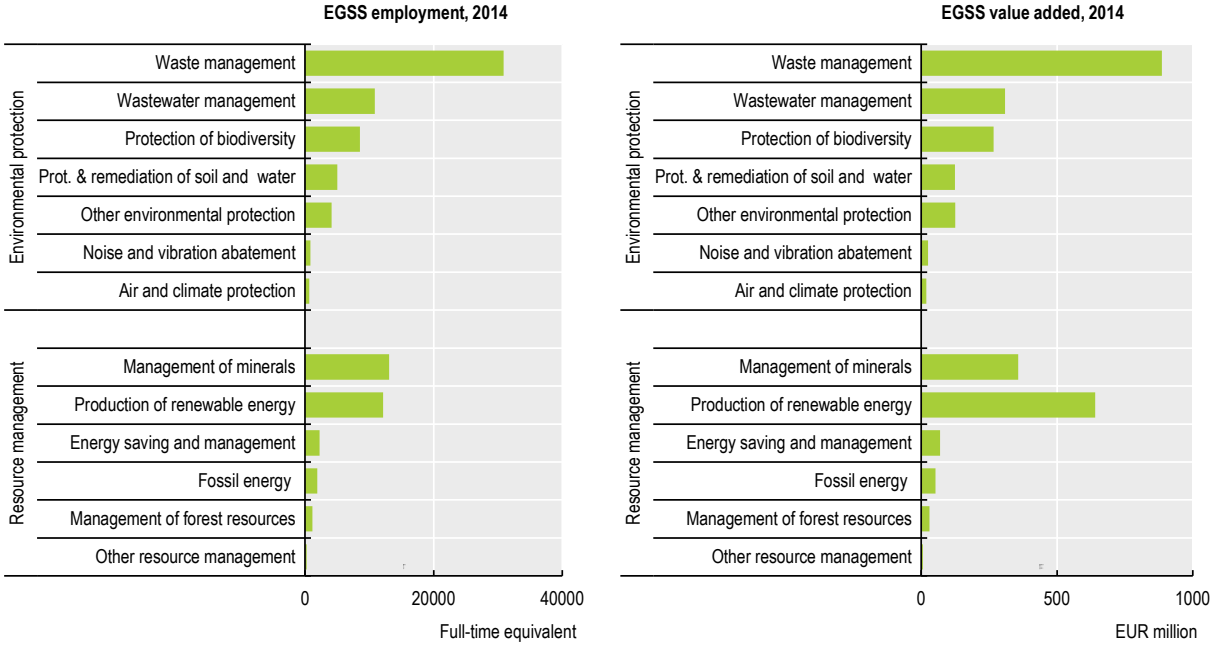
The Transport Policy suggests the Czech Republic could use various solutions to stabilise government funding of infrastructure, which would also help address the environmental externalities of road transport such as local air pollution, congestion and noise. These solutions include extending distance-based charging to a wider network and to other vehicle categories, ideally differentiating toll rates according to vehicle emissions and congestion levels and creating low-emission zones. Public-private partnerships are envisaged to finance only the most important sections of the road network.

## 3.5. Expanding environment-related markets and employment

In 2014, the environmental goods and services sector (EGSS) provided about 92 000 full-time-equivalent jobs. EGSS accounted for 1.8% of total employment and 2% of GDP, on a par with EU averages (Figure 3.8). The share of environmental protection in total employment increased from 0.9% in 2005 to 1.2% in 2014.

**Figure 3.8. The environmental goods and services sector could be better monitored**




*Note:* Environmental goods and services are those produced for the purpose of environmental protection (i.e. preventing, reducing and eliminating pollution and any other degradation of the environment) as well as resource management (i.e. preserving and maintaining the stock of natural resources and hence safeguarding against depletion).
Other environmental protection: protection against radiation; environmental research and development; other environmental protection activities.
Fossil energy: minimisation of the use of fossil energy as raw materials.
*Source:* Eurostat (2017), *Environmental goods and services sector* (database).

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Waste management provides the largest number of jobs and makes up the bulk of the value added in environmental protection activities, while management of minerals and renewables contributes the most to resource management activities. However, more than half of jobs in the renewables sector were lost between 2012 and 2014 when support was reduced, then removed.

There is no national survey on the EGSS. The CZSO estimates the sector's contribution to the economy through existing sources to meet EU requirements. Information on the EGSS is barely used in policy making and evaluation. Green jobs are scarcely mentioned in the State Environmental Policy. Existing statistics need to be improved to monitor trends in employment in green sectors and to support reallocation of labour from shrinking to growing firms and activities (EC, 2013). The Austrian and French governments, for example, regularly monitor skills and forecast future requirements for transition to a low-carbon economy (OECD, 2015c). They feed this information into education and training policy.

## 3.6. Promoting eco-innovation

### *3.6.1. General innovation performance*

The Czech Republic is a moderate innovator, ranking 16th among the 28 EU countries. The importance of science, research and innovation has grown considerably (EC, 2016d, OECD, 2016d): R&D spending as a share of GDP nearly doubled to 2% between 2000

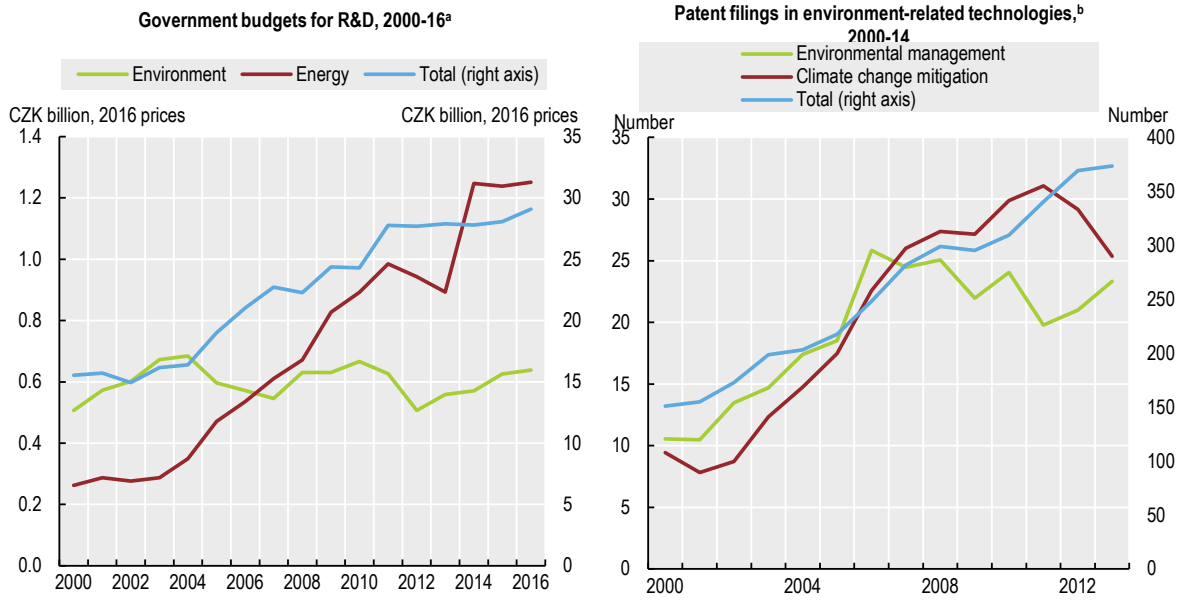
and 2015 (OECD, 2017d). With public R&D expenditure at 0.9% of GDP, the Czech Republic is on track to reach its 2020 target of 1%. Despite this progress, total R&D intensity remains below the OECD average of 2.4% of GDP, and the Czech science, technology and innovation system is still lagging. Increased spending has largely been funded by foreign-owned firms (mainly automotive) and EU funds, while domestic R&D funding has stagnated or decreased. Higher R&D intensity has not been matched by improved innovation outcomes.

The National Research, Development and Innovation Policy (NRDIP) for 2016-20 identified the following shortcomings: management and financing of research, development and innovation are fragmented, insufficiently strategy-driven and poorly co-ordinated. Limited research capacity does not generate top results globally. Collaboration between research organisations and enterprises is poor, and small and medium-sized enterprises do not innovate. The NRDIP aims to tackle these challenges by streamlining governance, implementing a new evaluation framework, developing applied research and improving research and innovation capabilities in the business sector (GOCR, 2016b).

### *3.6.2. Performance in eco-innovation*

The Czech Republic is an average eco-innovation performer: in 2016, it ranked 10th out of the 28 EU countries, just above the EU average and ahead of most other Central and Eastern European countries (EC, 2017b). Environment accounted for 2% and energy 4% of the government R&D budget, in line with the respective OECD averages (Figure 3.9). Since 2000, increased priority has been given to energy, while the share devoted to environment has fallen. The shift in focus from general environmental management to climate- and energy-related technology is reflected in patent applications in these fields, although to a lesser extent in recent years. Patents filed in environment-related technologies in the Czech Republic remain limited.

**Figure 3.9. Public budgets and patent applications have shifted from environmental management to climate- and energy-related technology**




*a)* Government budget appropriations or outlays for R&D; breakdown according to the NABS 2007 classification.
*b)* Patent statistics are taken from the Worldwide Patent Statistical Database of the European Patent Office, with algorithms developed by the OECD. Data refer to patent applications filed in the inventor's country of residence according to the priority date and apply solely to inventions of high potential commercial value for which protection has been sought in at least two jurisdictions. Data refer to three-year moving averages.
*Source:* OECD (2017), *OECD Research and Development Statistics* (database); OECD (2017), "Patents in environment-related technologies ", *OECD Environment Statistics* (database).

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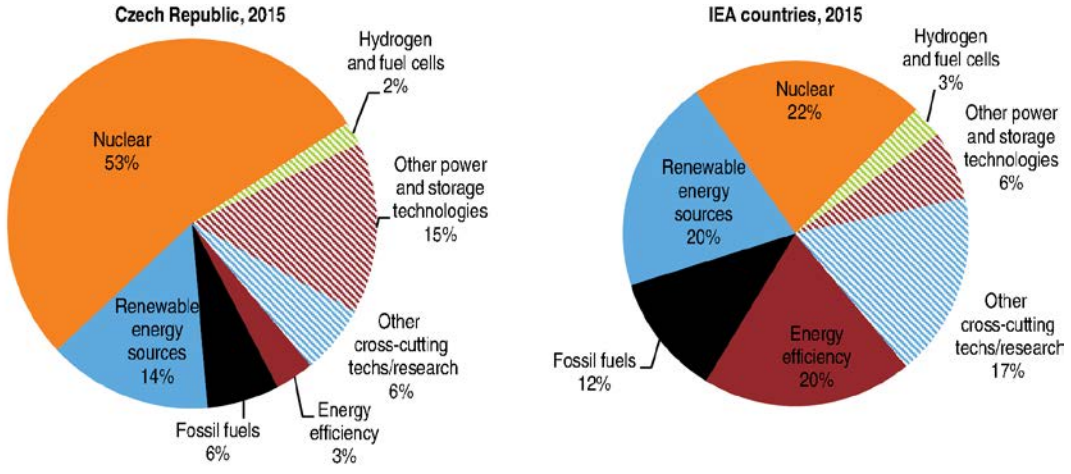
In contrast with the trend in IEA countries, public expenditure on energy-related research, development and demonstration (RD&D) has shifted towards nuclear energy, which absorbed more than half of spending in 2015 (Figure 3.10). Since 2011, this shift has been accompanied by declining budgets for energy efficiency and renewables, which accounted for 3% and 14%, respectively, of public RD&D expenditure in 2015, compared with 20% each in the OECD. Nuclear energy is followed by fossil fuels (adaptation of conventional combustion to comply with emission limits), renewables and energy efficiency as priorities for the energy sector in the NRDIP and the National Research and Innovation Strategy for Smart Specialisation (RIS3) (GOCR, 2016b, 2016c).

**Figure 3.10. The public energy R&D budget is geared towards nuclear energy**




*Source:* IEA (2016), *Energy Technology RD&D Budgets* (database) .

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There is no national policy outlining a coherent approach on eco-innovation (EC, 2017c). A programme to support environmental technology was developed in 2006 and revised in 2009 but has not been updated since then. Sustainable management of natural resources, efficient use of materials and energy are promoted in the NRDIP and RIS3. Eco-innovation is listed among solutions to ensure a healthy and good-quality environment and efficient use of natural resources, under the RIS3 priority "Agriculture and environment".[19] However, research in these areas seems to be promoted to avoid jeopardising long-term prosperity rather than as an opportunity for growth.

Nevertheless, a number of funding programmes, agencies and ministries support eco-innovation and circular economy (EC, 2016e). The MoE provided input to the NRDIP and RIS3. It co-operates with the Technology Agency of the Czech Republic to fund circular economy projects in waste management and in water and resource efficiency, including nanotechnology (Chapter 4. ). The Epsilon programme 2015-25, managed by the Technology Agency, prioritises sustainability of energy and material resources and environmental protection as means of ensuring well-being. It supports projects that develop industrial applications of new technologies and new materials in energy, environment and transport. The Ministry of Industry and Trade focuses on sustainable energy policy. For example, promotion of low-carbon technology (including management of energy and secondary raw materials) has been allocated EUR 37.5 million from the European Regional Development Fund under the Operational Programme "Enterprise and Innovations for Competitiveness" for 2014-20.

The eco-innovation policy mix is mostly composed of supply-side measures, mainly R&D support but also network and partnerships (e.g. centres of excellences on material research and on global climate and ecosystem changes), along with training and consulting services (EC, 2016e; GOCR, 2016c). Demand-side instruments, including regulations, standards, labelling and certification, have played an increasing role. However, there is limited use of price and tax instruments, and green public procurement has not progressed as planned.

Eco-innovation faces the same challenges as general innovation: weak outcomes of R&D activities, limited co-operation between academia and business, fragmented R&D policy

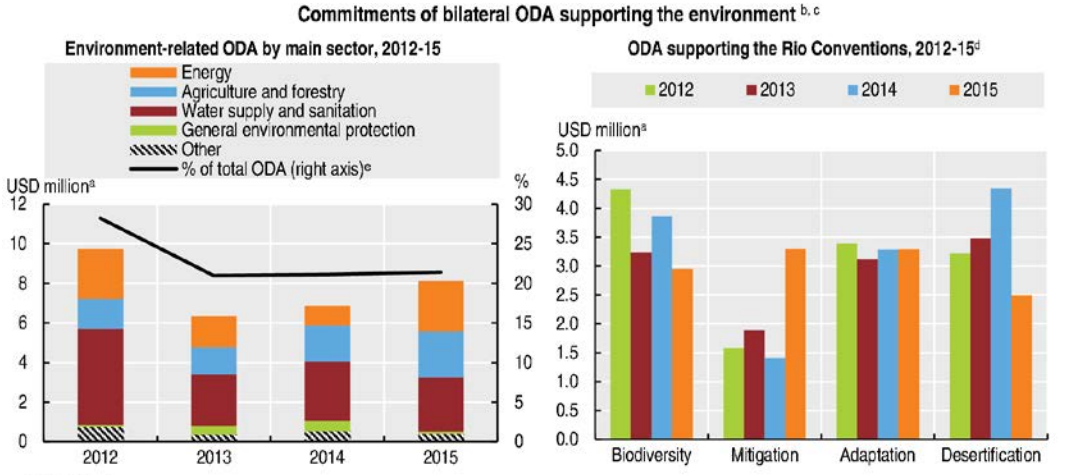
and funding framework, high dependence on the activities of foreign-owned companies, and inefficiency in the business environment, in particular related to instability of the regulatory framework and other administrative hurdles.

## 3.7. Mainstreaming environmental considerations in development co-operation

The Czech Republic joined the OECD Development Assistance Committee in 2013. Its net official development assistance (ODA) began at 0.11% of gross national income (GNI) and had risen to 0.14% by 2016. It will need to increase its budget for ODA significantly to meet its target of 0.33% of GNI by 2030 (OECD, 2017e, 2016e). Bilateral aid has focused mostly on education (17% of gross bilateral aid), government and civil society (13%), water supply and sanitation (8%) and agriculture (also 8%).

Support to the environment decreased in real terms between 2012 and 2013 before recovering (Figure 3.11). In 2015, it represented 21% of bilateral allocable aid,[20] below the DAC average of 30% (OECD, 2017f). The Czech share of bilateral allocable aid focusing specifically on climate change reached 14% in 2015, compared with 24% on average in the DAC. The country has pledged USD 5.3 million (CZK 110 million) to the Green Climate Fund.

**Figure 3.11. Aid in support of environment remains modest**




a) At 2015 prices.
b) Data refer to activities that are marked with at least one of the environment and/or Rio policy markers. They include activities targeting the environment, climate change mitigation or adaptation, biodiversity conservation and sustainable use and/or desertification control either as explicit and fundamental objective of the activities or as important but secondary objective.
c) The marker data do not allow exact quantification of amounts allocated or spent in support of the environment. They give an indication of such aid flows and describe the extent to which donors address these objectives in their aid programmes.
d) An activity can target the objective of more than one convention, thus ODA flows should not be added.
e) Percentage of bilateral allocable aid. Activities not screened against the environment marker have been excluded.
*Source:* OECD (2017), *OECD International Development Statistics* (database); OECD calculations.

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Environment and climate protection are among the cross-cutting priorities[21] of the Czech Development Co-operation Strategy (MFA, 2010). However, mainstreaming these priorities into programmes is a work in progress. The Czech Development Agency has focal points on environment. It screens and monitors projects for the environment focus and is trying to develop a methodology for integrating cross-cutting priorities into projects more systematically. Human resource capacity is constrained, however, and there is limited leadership and advocacy for these issues within the system.

**Recommendations on green growth**

- Implement an environmental tax reform so that prices better reflect environmental externalities, including GHG emissions and local air pollutants:
  - introduce a carbon component in energy product taxation to reflect the external costs associated with carbon emissions outside the EU ETS and provide a stronger and more consistent price signal across the economy; raise the excise tax on diesel to at least match that on petrol, and index the taxes on both fuels to inflation; consider recycling part of revenue from higher taxes on heating fuels and electricity to vulnerable households using an income-tested cash transfer.
  - extend distance-based charging to a wider network; link road tolls for passenger vehicles to the vehicles' emission standards; extend the annual road tax to all (not only business) vehicles; make its rate vary by fuel economy and air emission standards and delink it from the age of vehicles; harmonise the rates of the registration tax on new and used vehicles and tighten environmental criteria to promote fleet renewal towards cleaner vehicles; implement low-emission zones as planned in the Air Protection Act.
  - remove environmentally harmful exemptions to the energy and vehicles taxes; consider establishing a green tax commission, possibly as part of the National Budgetary Council, to review the environmental effects of fiscal instruments, identify subsidies with adverse environmental effects and prioritise which to phase out.
  - ensure that groundwater abstraction charges reflect resource scarcity and remove exemptions that are not justified on environment grounds. Consider introducing taxes on fertilisers and pesticides.
- Improve the effectiveness of EU funding for green infrastructure by strengthening public procurement procedures, improving project co-ordination, oversight, planning and evaluation, and ensuring the achievement of measurable environmental targets.
- Promote investment in low-carbon energy technology: assess the environmental impact of investment in electricity production under the national plan on free allocations and select projects with the highest social return; increase more rapidly the share of permits auctioned in the power sector under the EU ETS.
- Strengthen cross-government co-ordination on energy efficiency activities; reinforce transport-related measures in NEEAP; streamline support programmes for households and phase out support to coal boilers; consider introducing energy savings obligations for energy providers; develop the capacity of the banking sector to leverage investment in energy efficiency.
- Introduce new support mechanisms for renewable electricity, avoiding any retrospective changes; strengthen the national electricity grid and increase power system flexibility, including through enhanced regional co-operation and demand response.

- Promote efficient provision of water services by improving the regulatory framework, including for the financing of these services; apply user charges that allow sustainable cost recovery; promote inter-municipal co-operation; ensure systematic monitoring by independent regulatory authorities of utilities' efficiency and service quality.
- Develop monitoring and analysis of the EGSS; forecast skill requirements resulting from the transition to a resource-efficient and low-carbon economy and adapt education and training policies accordingly.
- Develop and implement a comprehensive and coherent framework for promoting eco-innovation by improving the co-ordination of energy, innovation and environmental policies across the government; streamline public support for R&D and ensure that it targets long-term priorities; improve co-operation between academia and business and ensure sound framework conditions for business innovation; develop demand for environmental goods and services.

## Notes

[1] According to the State Energy Policy, "Strong focus on renewable sources poses a considerable risk. Yet the active involvement of Czech industry in the development and production of these technologies does not require that they be situated and directly supported in the Czech Republic. This, on the other hand, is necessary in the case of advanced conventional technologies (nuclear energy, high-efficiency coal, large cogeneration) where successful reference projects are a significant aspect of competitiveness. Moreover, the multiplier effects on the economy are considerably greater."

[2] Affordability is defined here as a combined notion of expenditure and disposable income. It refers to households spending more than 10% of disposable income on heating fuels and electricity and falling below the relative poverty line (60% of median income) after expenditure on energy.

[3] The share is 40% for plant production, forestry and fish farming, and ranges from 40% to 87% for animal production, depending on livestock intensity.

[4] Electricity generated from renewables and biomass is exempted if it is produced in installations with capacity up to 30 kW and consumed on production site.

[5] Tax expenditure is a relative preference within a country's tax system, measured with reference to a benchmark set by the country.

[6] The OECD countries plus Argentina, Brazil, China, India, Indonesia, the Russian Federation and South Africa.

[7] In 2010, the charge was extended from vehicles over 12 tonnes to vehicles over 3.5 tonnes and was differentiated by time.

[8] For buses, the rate varies by emission class only.

[9] The law regulating emission taxes was amended to reduce administrative costs. The number of pollutants covered was lowered from 20 to 4 ($SO_2$, $NO_X$, VOCs and PM); the rates are to increase until 2021.

[10] Revenue from the sale of 103.7 million assigned amount units amounted to CZK 20.5 billion.

[11] These were reducing total $CO_2$ emissions by 1%, saving 6.3 PJ in heating and creating 30 000 jobs.

[12] Investment and internal current expenditure (excluding payments to specialised producers of environmental protection services) of the public and business sectors (including specialised producers of environmental protection services). Includes expenditure on air and climate protection, waste and wastewater management, protection and remediation of soil and groundwater, other environmental protection activities (R&D, administration, education) and biodiversity and landscape protection. Excludes expenditure on water supply.

[13] The Czech Statistical Office (CZSO) figure of 2.1% doubles account payment to, and expenditure of, specialised producers of environmental protection services, thus overestimating expenditure, particularly on waste management.

[14] European Regional Development Fund and Cohesion Fund, after decommitment and correction.

[15] The targets are a 32 Mt $CO_2$ eq GHG emission reduction by 2020 and 44 Mt $CO_2$ eq by 2030, compared to 2005 levels (corresponding to reductions of 42% and 48%, respectively, from 1990 levels). Post-2030 targets towards an 80% emission reduction by 2050 are indicative.

[16] Implementing the Energy Efficiency Directive (2012/27/EU).

[17] In the initial Green Savings Programme, EUR 0.39 of public funds was spent per kWh saved.

[18] Exceptions were made for wind, geothermal, biomass and hydropower installations that had secured a building permit before the legislation took effect and that were in operation by end 2015.

[19] It also includes sustainable management of natural resources, sustainable agriculture and forestry and sustainable food production.

[20] Excluding activities not screened against the environment marker.

[21] The others are i) good (democratic) governance and ii) respect for the basic human, economic, social and labour rights of beneficiaries, including gender equality.

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# Part II. Progress towards selected environmental objectives

# Chapter 4. Waste, materials management and circular economy

*The Czech Republic has increased recovery and recycling, but has not yet succeeded in fully exploiting the raw material potential of its waste. This chapter gives an overview of trends in materials use and waste generation and of related policies. It reviews the effectiveness of the instruments used to encourage waste prevention, reduction and recycling, and to reduce landfilling. It identifies implementation gaps and opportunities in moving towards a circular economy.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

## 4.1. Introduction

The Czech Republic has enjoyed strong economic growth over the past 15 years, though recovery since the global crisis has been uneven and the level of GDP per capita remains below the OECD average. The Czech economy is export-oriented and characterised by intensive industrial and agricultural activities and the presence of foreign companies that drive growth. The country has relatively few natural resources and is highly dependent on imports for many strategic raw materials and commodities. Coherent and effective waste and materials management policies are thus vital.

The Czech Republic has come a long way since it first regulated waste management in 1991. It has well-developed and fairly complete policy and legal frameworks for waste and materials management, supported with quantitative targets, voluntary agreements and economic instruments. The country has progressed on the recommendations of the 2005 EPR and further aligned its policy framework with EU legislation.

But the pace of progress since 2005 has been insufficient to consolidate the advances made in the late 1990s and 2000s, and to seize the benefits of continued EU support. Implementation has been partial and not sufficiently co-ordinated. Most achievements were driven by EU requirements and funding. Several targets of the 2003-14 Waste Management Plan were met; others were not and were later considered too ambitious by the government (SAO, 2011). In areas such as landfilling, economic analysis of waste management and investments in recycling, improvement has been marginal. Waste is not yet managed in a cost-effective manner, and current measures to minimise the environmental impact of waste and materials management over their life-cycle are insufficient. Waste prevention, particularly in the business sector and further upstream in the value chain (design phase), and "upcycling" of waste into higher-value products have not received sufficient attention. Monitoring progress is hampered by the existence of two information systems that produce data that differ greatly in terms of definitions and surveying methods, and by the lack of information on the outcomes of public spending on waste and materials management.

The Czech Republic's performance in waste management, though improving, remains modest. This means essential steps need to be taken before circular economy approaches can be implemented. The potential for progress is good. The current Waste Management Plan contains measures which should help achieve a better performance over 2015-24 (MoE, 2014). The emphasis is on the value of waste as a resource, with the aim of reducing amounts going to final disposal, increasing recycling and reuse, and preventing waste generation. It will be important to effectively implement this plan and the associated Waste Prevention Programme, and to use synergies with the country's secondary raw materials policy and the eco-innovation and cleaner production programmes. This must be on a par with modernisation of Czech enterprises, effective alignment of measures and objectives across policies and ministries, and increased co-operation. Adoption of the new Waste Act, which is still pending, is crucial, as is the establishment of a reliable, transparent and fully integrated information system on waste and materials.

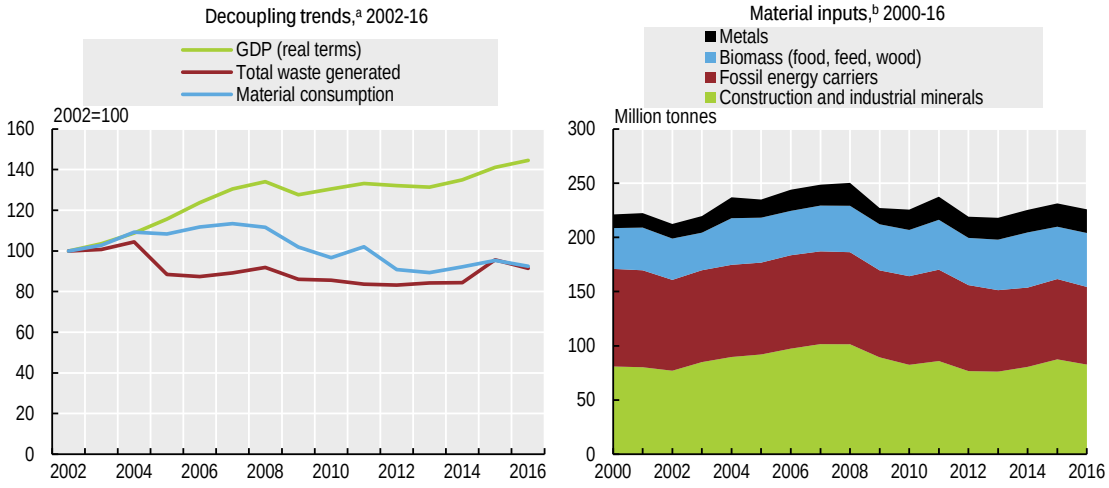
## 4.2. Trends in waste management and material consumption

### *4.2.1. The material basis of the Czech economy*

The Czech Republic has relatively few natural resources and is highly dependent on imports for many strategic raw materials and commodities. Other than biological resources, the material resource base is composed of industrial minerals (such as kaolin, feldspar, bentonite and glass sand) and construction materials. The main domestic energy resources are brown coal and, to a lesser extent, hard coal and crude oil, but these are largely insufficient to satisfy demand. The country is almost completely dependent on imports of oil, natural gas and metallic minerals, as well as some industrial minerals, e.g. for fertiliser production. Imports accounted for around 33% of domestic material input and 47% of consumption in 2016, compared to 18% and 26%, respectively, in 2000.

Domestic material productivity (economic value generated per unit of material used) increased by 72% between 2000 and 2016, from USD 1.2/kg to USD 2/kg. The level attained is only half that of the EU average, but is comparable to those of EU countries with a similar economic structure. If raw materials embodied in international trade were accounted for, material productivity would be about 5% lower (Kovanda, 2013). Domestic material consumption (DMC)[1] per capita fell by 15%, partly because the 2008-09 financial crisis led to reduced economic output. The level remains high compared to the EU and OECD Europe averages, but is below the OECD average. The materials mix is characterised by high shares of fossil fuels (with coal dominant) and construction materials that dominate material inputs into the economy and DMC. (Figure 4.1).

**Figure 4.1. Waste generation and material consumption have been decoupled from economic growth**




*a)* Total waste includes residue from treatment operations. Material consumption refers to domestic material consumption (i.e. domestic material extraction plus imports minus exports of materials and derived products).
*b)* Refers to domestic material extraction plus imports of materials and derived products.
*Source:* OECD (2017), "Material resources", *OECD Environment Statistics* (database); OECD (2017), *OECD National Accounts Statistics* (database); CZSO (2017), *Generation, recovery and disposal of waste*.

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Consumption of construction minerals grew to 2007, then decreased with the economic crisis. It is expected to rise again as construction activity, notably for railway

infrastructure, increases. Consumption of fossil fuels dropped by 22% over 2000-16, mainly due to a reduction of coal in the energy mix (CENIA, 2016).

About 11% of the materials used as inputs in the Czech economy end up as waste, of which about 77% are recovered for reuse, recycling and energy use (CZSO).

### *4.2.2. Trends in waste generation*

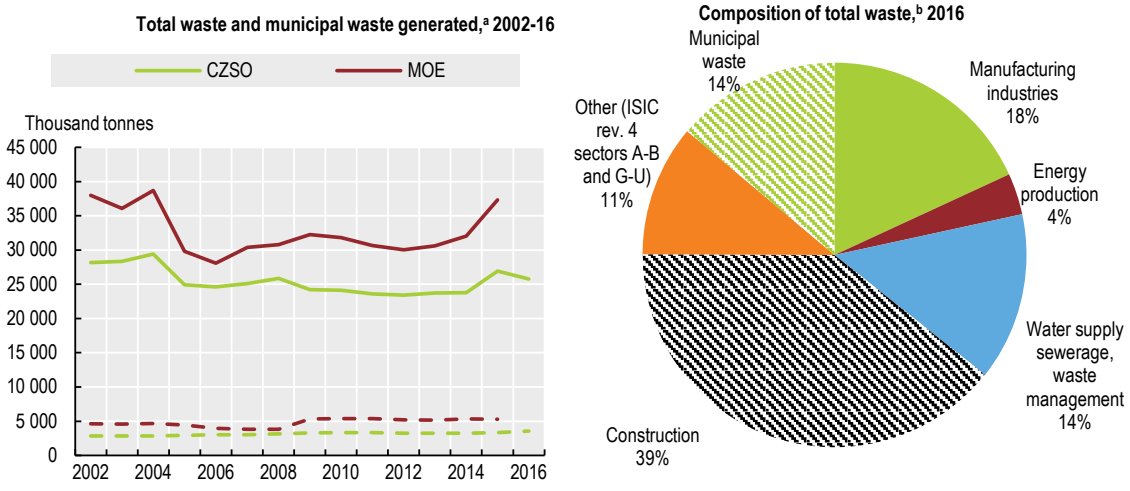
Objective assessment of waste generation and treatment trends is hampered by the fact that two information systems with differing data sets coexist in the Czech Republic: the Waste Management Information System (WMIS) used by the Ministry of the Environment (MoE) to monitor implementation of national waste policies and the corresponding EU objectives; and the waste statistics managed by the Czech Statistical Office (CZSO), used for reporting to Eurostat and the OECD. This section uses data from both sources.

#### *Total waste*

Total waste generation was relatively stable between 2005 and 2014, though it slightly decreased during the economic crisis as construction activity slowed. In 2015, it increased by 13% due to a rebound in the construction sector, and 27 million tonnes of waste was generated, according to the CZSO (26 million tonnes in 2016), while the WMIS reports 37 million tonnes.

Waste from the construction sector represents 39% of the total in the CZSO statistics (2016 data), or 65% according to the WMIS (2015 data). It is followed in the CZSO data by manufacturing waste, municipal waste and waste from water supply, sewerage and waste treatment (Figure 4.2).

**Figure 4.2. Levels of waste generated vary according to the data source used**




*a)* Official statistics on waste, produced by the CZSO, are used to report under the EU Waste Statistics Regulation. The data refer to primary waste. Data from the WMIS of the MoE, are used to develop the country's WMP, monitor its implementation and report on EU waste policy objectives. The data include both primary and secondary waste. Dotted lines refer to municipal waste.
*b)* CZSO data.
*Source:* CZSO (2017) *Generation, recovery and disposal of waste* ; MoE (2017), Country submission.

StatLink http://dx.doi.org/10.1787/888933723454

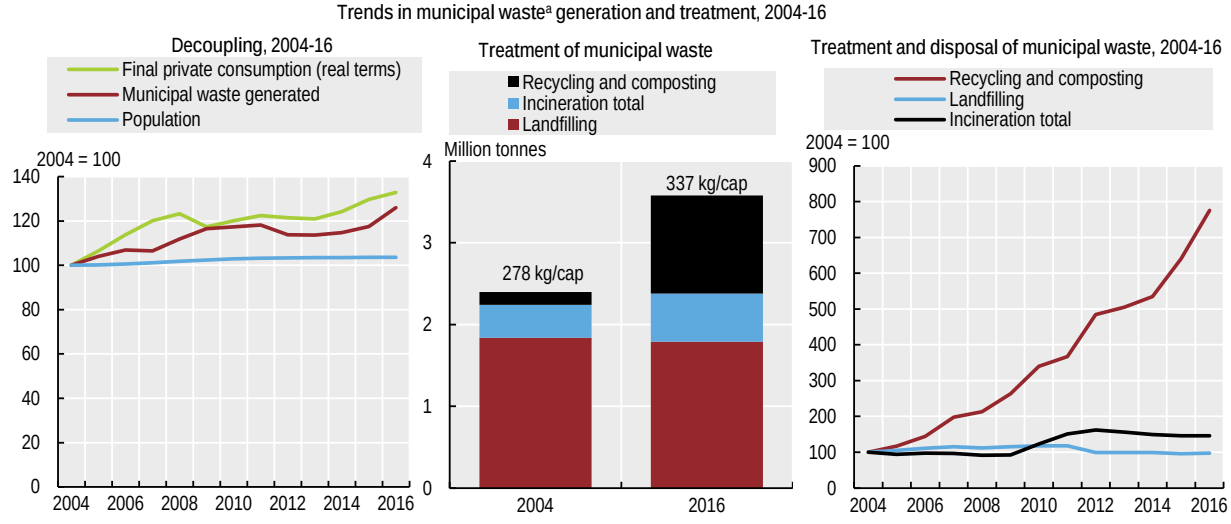
Efforts to recover and recycle waste are beginning to show results. The material recovery rate, which was quite low in the early 2000s, has increased significantly. It reached 77% (WMIS 86%) of the total amount to be managed in 2014, of which 38% was used as backfill. Landfilling remains the most common disposal method, but its share in total waste generation has significantly decreased (WMIS 10.3%, CZSO 17%). There is hardly any incineration without energy recovery. The new Waste Management Plan (WMP) encourages use of waste as an energy source, which was relatively stable over the review period and represented 5% (CZSO) of waste treated in 2014 (WMIS 3%).

### *Municipal waste*

The generation of municipal waste grew by 26% over 2004-16, according to the CZSO (WMIS 13% over 2004-15). Municipal waste generated in 2015 totalled 3.3 million tonnes (CZSO) or 5.3 million tonnes (WMIS). The CZSO reported an amount generated per capita of 337 kg in 2016, much lower than the OECD average (520 kg) or the OECD Europe average (479 kg).

As landfilling decreased, material recovery[2] rose from a very low 6% to 34% in 2016 (WMIS 35.6% in 2015). This is one of the highest increases among EU countries. Nevertheless, half of municipal waste is still landfilled (CZSO 50%, WMIS 47.4%). This is much higher than the EU-27 average (38%) and includes a large share of biodegradable waste (about 40-50% WMIS). Recovery rates lag behind those of other OECD countries and are well below the 2020 EU recovery target of 50%.

**Figure 4.3. Municipal waste has been growing, recycling has increased and landfilling is little changed**




*a)* Household and similar waste collected by or for municipalities, originating mainly from households and small businesses. Includes bulky waste and separate collection.

*Source:* OECD (2017), "Municipal waste generation and treatment", *OECD Environment Statistics* (database); CZSO (2017) *Generation, recovery and disposal of waste;* OECD (2017), "OECD Economic Outlook No. 100 (Edition 2016/2)", *OECD Economic Outlook: Statistics and Projections* (database); OECD (2017), "Labour force statistics: population projections", *OECD Employment and Labour Market Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933723473

*Hazardous waste*

Hazardous waste generation has been fairly stable, with slight variations over time; hazardous materials represent about 4% of total waste. About 37% is recovered, 36% backfilled, 12% incinerated (of which 70% with energy recovery) and 6% landfilled (Eurostat, 2017).

## 4.3. Objectives and policies for waste and materials management

The Czech Republic has well-developed and fairly complete policy and legal frameworks for waste and materials management, supported with quantitative targets, voluntary agreements and economic instruments. Strategic objectives are defined according to EU law and policies, and in line with international commitments (e.g. the Basel Convention) and OECD Council Decisions.

Resource efficiency and the principles of a sustainable material economy and of a reduced environmental impact of material flows are enshrined in the State Environmental Policy, the National Strategy for Sustainable Development, the National Reform Programme (whose objectives include effective use of secondary raw materials, conversion of waste to resources and recycling) and the Ten Year Programme for Sustainable Consumption and Production.

### *4.3.1. Policy framework and objectives*

Waste and materials management in the Czech Republic rests upon on a range of policies addressing issues related to waste, raw materials (primary and secondary), energy supply and chemicals management. The main objectives are preventing waste and moving towards a circular economy approach, minimising the negative health and environmental impact of waste management, maximising waste reuse and recovery, and ensuring raw material supply security, including replacement of primary natural resources with secondary raw materials.

The main policy documents are the WMP and Waste Prevention Programme (WPP), both mandatory under EU law; and the Raw Materials Policy (aimed at ensuring raw material security) and Secondary Raw Materials Policy (aimed at improving self-sufficiency in raw material resources by increasing use of recyclates and turning waste into resources in line with the EU Raw Materials Initiative and circular economy package).

They are complemented by the 2012-20 Biomass Action Plan, which assesses biomass use for energy purposes and provides a biowaste reduction framework and quality standards for composted material; and the 2012-40 State Energy Policy, which defines the country's energy-related objectives, including those concerning the use of waste as an energy source. The updated National Renewable Energy Action Plan assumes that energy from renewable sources will represent 14% of gross final energy consumption by 2020, slightly more than the related EU target.[3]

*The Waste Management Plan*

Each ten-year WMP specifies goals, measures and monitoring tools for national waste management, in line with EU law, and provides the basis for regional WMPs. The binding part of the national WMP is published as a government regulation, in compliance with the Waste Act. Its achievement is mandatory and applies to the national, regional and municipal levels. The 2003-13 WMP (revised in 2009, with its validity extended to

2014) included targets both in line with and going beyond EU law. The current WMP (2015-24) was developed over 2012-13 and adopted in December 2014,[4] entering into force on 1 January 2015. Its aims include increasing reuse and recovery and reducing amounts landfilled. It also integrates waste prevention principles and the WPP objectives. Implementation is to be supported by an increase in the landfill fee and an obligation to collect biowaste separately, along with tools and strategies aimed at more efficient and environment-friendly waste management and further development of waste treatment capacity and infrastructure. Separate collection of biowaste was initiated in 2015 thanks to a 2014 amendment of the Waste Act. Increased landfill fees are yet to be implemented.

The WMP is supplemented with implementation programmes focused on specific waste streams and on waste from specific sectors. WMP implementation is reviewed annually in an assessment report published on the MoE website.[5] Regional WMPs are established by each of the 14 regions, including the city of Prague. Every producer of over 1 000 tonnes a year of non-hazardous waste or more than 10 tonnes a year of hazardous waste, including municipalities, must also develop a WMP.

### *The Waste Prevention Programme*

The country's first WPP, adopted in 2014, covers roughly the same ten years as the WMP, running to 2024. It contains measures concerning waste prevention in all sectors except agriculture: mining, manufacturing, training and education, public and private consumption, product design, etc. The objective is to reduce both the amount of waste produced and hazardous components that have a negative impact on the environment and health. The reuse of products and their preparation for reuse are considered prevention measures. Particular attention is given to selected waste streams, especially food waste and its progressive reduction along the food chain. Other targeted streams include hazardous waste, construction and demolition waste, textiles and waste from end-of-life products.

The objectives are to be achieved by improving information on waste prevention and creating a freely accessible information base, raising awareness among businesses and citizens and encouraging waste prevention measures, and developing related research and development (R&D). Proposed measures include introducing waste prevention topics in curricula and research; providing manufacturers with incentives to reduce waste and the use of primary resources, and to increase the use of secondary raw materials; developing and using innovative low-waste technology in industry; and extending product service life via repair shops, charities, etc. The WPP also promotes the use of voluntary instruments such as voluntary agreements, environmental management systems, environmental labelling systems and cleaner production systems.

### *The Raw Materials Policy*

The Czech Republic has had a Raw Materials Policy since 1999. The current one, covering 2012-32, addresses energy and non-energy raw materials, ore and non-ore commodities, domestic and imported mineral raw materials, and minerals obtained from secondary sources through recycling or reprocessing. It has an environmental dimension, including environmental impact indicators.

The Secondary Raw Materials Policy, adopted in 2014, sets framework conditions for promoting the recovery and reprocessing of valuable raw materials from used products and waste, and for reducing the material and energy intensity of production. It identifies ten priority commodities and sources of secondary raw materials: metals, paper, plastics,

glass, construction materials, vehicles, electrical and electronic equipment, tyres and rubber, and batteries and accumulators. The selection criteria are the importance of the commodity for Czech industry (as a production input), the mass production of the secondary raw material, the potential for its use in the Czech Republic, and its significance. The document is to be updated as needed. Its 2015 action plan aims to support greater self-sufficiency in raw materials by replacing primary commodities with secondary raw materials. The government approved an updated action plan in May 2017.

### *4.3.2. Legal framework*

The main law on waste management is the Waste Act,[6] which is complemented by the Packaging Act.[7] They are accompanied by 15 implementing decrees focusing on specific waste streams (e.g. sewage sludge, biowaste, end-of-life vehicles) and management aspects (e.g. transboundary movements, take-back systems, separate collection, waste catalogue). A new act on end-of-life products, covering waste electrical and electronic equipment (WEEE), batteries, tyres and end-of-life vehicles (ELVs), is being prepared.

Other legislation of importance to waste and materials management includes a 2010 government decision that provides a legal basis for green public procurement (GPP) and specifies environmental requirements applying to public procurement.[8] It has recently been replaced by a broader Government Resolution[9] on socially responsible public procurement, including environmental requirements.

The 2001 Waste Act defines the waste management hierarchy,[10] emphasises prevention, includes the principles of producer responsibility and of environmental and health protection in waste handling, and sets rates for waste management and disposal fees. The act was amended in 2014[11] to introduce a ban on landfilling of unsorted mixed municipal waste and of recyclable and recoverable waste from 2024, and to expand the scope of separate collection of municipal waste from 2015, with mandatory separate collection of glass, paper, plastic, metal and biodegradable waste in all municipalities.

To support implementation of the 2015-24 WMP and fulfilment of EU targets,[12] a new Waste Act has been prepared. It emphasises the waste hierarchy and aims at increasing recycling and recovery, reducing landfilling and the use of primary raw materials, and preventing littering and illegal dumping. However, more than two years after the WMP was adopted, the new act is still pending, with passage now not expected before 2019. The provisions on economic instruments (charges and fees) supporting the landfill ban on unsorted mixed municipal waste have raised concerns from local authorities (which fear it will mean additional administrative burden and reduced revenue) as well as environmental non-government organisations (NGOs) and the Czech Waste Management Association (which argue against promotion of incineration that benefits energy companies). In the meantime, the amended 2001 act remains valid, though not fully consistent with the objectives of the current WMP.

The delay in adoption of a new act puts at risk the achievement of objectives concerning waste and materials management and reduces the time available for action. Adoption of the new Waste Act in 2018 seems indispensable if real progress is to be made. Other acts such as the new act on end-of-life products are also pending, awaiting the adoption of the new Waste Act and the EU Circular Economy Package. Speeding up the process should thus be a matter of priority for the government.

### *4.3.3. Institutional framework and governance*

The central authority responsible for national waste management is the MoE. It has a general supervisory and monitoring role, develops the national WMP, acts as the focal point for the Basel Convention and submits bills to Parliament. The 14 regions, including the city of Prague, elaborate the regional WMPs and issue permits for waste management installations.

Compliance controls and enforcement are the responsibility of the Czech Environmental Inspectorate (CEI), which has ten territorial inspectorates and two branch offices. The CEI, established by the MoE as an autonomous state body, supervises waste management (through inspections, reviews, checks, investigations, etc.), imposes fines and proposes remediation measures. It also maintains a website with annual activity reports, statistics and a discussion forum for the public. The CEI collaborates with the MoE and other agencies, including the General Customs Directorate, the Trade Inspection Authority and the police, regarding domestic and transboundary waste shipments and imports of batteries and accumulators from non-EU countries.

The MIT co-ordinates policies on resource efficiency, including energy efficiency, and secondary raw materials. The MoE collaborates with the MIT on resource efficiency and drafting a new act on end-of-life products, and with the Technology Agency of the Czech Republic (TACR) to fund circular economy projects in the areas of waste management and resource efficiency, including nanotechnology projects. Other ministries with responsibilities related to waste management include the Ministry of Health, regarding issues related to public health protection in the area of waste management and to assessment of the hazardous properties of waste; and the Ministry of Agriculture, on aspects related to the use of sewage sludge and dredged sediment in agriculture.

Horizontal co–ordination is ensured through the Waste Management Board, an MoE advisory body composed of leading experts from all government departments and NGOs; and through the MIT Secondary Raw Materials Policy as defined in its action plan and the Waste Act.

Since 2006, practical implementation has been the responsibility of the 6 258 municipalities and their environmental offices and inspectorates. Municipalities are considered waste producers and are responsible for managing municipal waste[13] on their territory. They can fulfil their obligations directly through municipal waste services, or by subcontracting the service to the private sector. Some municipalities have extended powers concerning waste management inherited from the former district authorities.

Czech municipalities have considerable autonomy. They are much smaller than the EU average; indeed, many are too small to deliver high-quality public service. Thus, around 90% of municipalities are involved in some form of inter-municipal co-operation, which is promoted by bodies such as the Union of Czech Towns and Municipalities. Co-operation is often ad hoc and relationship dependent, however, and does not necessarily occur where fragmentation is worst (OECD, 2011, 2006). Inefficiency and a lack of capacity to absorb and implement new policies may result. Encouraging more efficient inter-municipal co-operation to provide higher quality services is particularly important in waste and materials management. Approaches might include establishing inter-municipal organisations for joint provision of services and providing targeted training and harmonised guidance through the MoE. In France, for example, inter-municipal co-operation is common, and municipal waste is generally managed through

dedicated inter-municipal associations (*syndicats intercommunaux*) set up by several municipalities to save costs and gain efficiency in service provision.

### *4.3.4. Expenditure and financing*

Gross expenditure on the operation of waste management services (internal current expenditure) grew over the review period, especially between 2005 and 2011, when it doubled. About 60% of the national operational expenditure for environmental protection goes to waste management. Investment (capital expenditure) almost tripled (+146%), with growth particularly visible in the public sector (+183%), where it supported improvement in waste management services and in treatment and recovery installations (e.g. separate collection, civic amenity sites, waste-to-energy facilities, biowaste processing).

Financial support for investment mainly comes from EU funds and the State Environmental Fund (SEF). The later takes the form of grants and interest-free or low-interest loans. EU funding comes from the structural and investment funds: in the Operational Programme "Environment" for waste-related projects and the Operational Programme "Enterprise and Innovations for Competitiveness" for those related to technological change and use of secondary raw materials. Operational expenditure for waste collection and transport is from the national and local budgets. Funds are regularly transferred from the national budget to the SEF and local budgets.

In the past many waste-related projects thus benefited from EU funding or even depended on it. Over 2007-13, a cumulated total of CZK 14 billion expenditure for waste management projects under the Operational Programme "Environment" came from EU funds. There is little information about the outcomes of these projects, however, or the extent to which they contributed to achieving the WMP objectives. According to the Supreme Audit Office (SAO), the macro-level indicators that the MoE uses to monitor progress are not suitable for evaluating the benefits of individual projects, and final project evaluations by the SEF are carried out with considerable delays. (SAO, 2017).

While EU funding will continue, it will be reduced and more targeted. Public funding of waste infrastructure will need to be prioritised in line with the WMP and secondary raw materials action plan, and the country will have to find other ways to fund needed infrastructure and technology development. This presupposes a good overview of existing capacities and of the funds needed to achieve the WMP objectives and related EU targets.

Little information on the economic performance of Czech waste management or the actual cost of waste management services is available. No regular evaluations are made of the outcomes of public support for investment, the performance of economic instruments or the cost-effectiveness of municipal waste management services (Chapter 3. ; SAO, 2017). The development of specific indicators to measure performance and effectiveness, including at project level, should be considered. A system of benchmarking of costs, as envisaged in the WMP, would help improve local authorities' performance in providing waste management services. Such a system would need to build on a harmonised cost accounting framework and indicators and be supported by training and guidance from the government.

### *4.3.5. International co-operation and outreach*

The Czech Republic has been a party to the Basel Convention since 1993 and, as an EU country, is bound by the 2006 regulation on waste shipments implementing the Basel

Convention at EU level.[14] It is also a party to the Rotterdam Convention (ratified in 2000) and the Stockholm Convention on chemical substances and environmental risks.

Bilateral ties with neighbouring countries take place particularly in the framework of the Czech-German Joint Commission on the Environment, the Czech-Polish Intergovernmental Commission for Cross-border Co-operation, and with countries of the Visegrád Group (V4).[15] Regular, well-established relationships with Slovakia are part of a 1992 co-operation agreement on environmental protection. An example of concrete co-operation on waste management is the composting of Czech biowaste in Poland.

Over the 2000s, the Czech Republic benefitted from 15 twinning projects with EU partner countries, including projects on upgrading of its waste management system and infrastructure. In recent years, bilateral co-operation has included exchanging experience with Sweden on waste management, among other areas. Since 2015, co-operation with Austria, which for several years was troubled, mainly due to diverging views on nuclear energy from 2009, has been improving in many fields, including waste management, and bilateral meetings of the two countries' environment ministers have been reconvened.

Co-operation among V4 countries builds on regular meetings and contacts at all levels: heads of state, prime ministers, ministers and experts. An annual V4 environment ministers' meeting has been held since 1993. V4 countries co-ordinate their positions with relevant EU legislative and strategic proposals. The International Visegrád Fund was established in 1999 to support co-operation in culture, science, research and education, student exchanges, cross-border co–operation and tourism promotion. During the Czech Republic's presidency in 2015-16, topics addressed included the circular economy and changes in EU waste legislation.

## 4.4. Information and policy instruments for waste and materials management

### *4.4.1. The information base*

#### *Information on waste*

The Czech Republic's two information systems for waste generation and treatment are the Waste Management Information System, managed by the Czech Environmental Information Agency (CENIA) on behalf of the MoE; and the waste statistics managed by the CZSO (Box 4.1). Their data differ in terms of definitions, reporting boundaries and surveying methods. This leads to duplication and gaps, as well as uncertainty in monitoring policy implementation, and is a waste of public money. Frequent breaks in time series further exacerbate the monitoring difficulties. Targets and objectives with a base year earlier than 2002, for example, cannot be monitored reliably.

The discrepancies between the data of the two systems are major, particularly as regards specific waste streams and treatment methods, but also national totals. The WMIS reports a total of 37.3 million tonnes of waste generated, of which 5.3 million tonnes is municipal waste; the CZSO reports 26.9 million tonnes generated, including 3.3 million tonnes of municipal waste. This complicates third party assessment of Czech waste policies. The discrepancies also affect waste treatment capacity planning and lead to controversy, such as that concerning the planned expansion of waste-to-energy capacity.

Availability of reliable information on waste and materials is critical for improving waste and materials management in the Czech Republic. According to the MoE, the discrepancies in the reported indicators are due to differences in the waste classifications

used in EU legislation: the List of Waste used for the Waste Framework Directive and the statistical nomenclature used for the Waste Statistics Regulation. However, the root cause lies in a lack of co-operation between the institutions, which led progressively to the parallel development of two separate surveying processes, two data quality assurance processes and two databases, which are structured and managed differently.

The two systems need to be reviewed so they can be aligned and a harmonised information base established. Ultimately the underlying data should be fully integrated and based on a single well-structured survey and reporting process, with proper institutional arrangements for managing the information system. A unified, multipurpose information system could serve as a central data repository to both support the development and monitoring of national and subnational waste management and provide a basis for the production of official statistics and international reporting. It should be developed on the basis of the mandatory survey underlying the WMIS, in co-operation with main users, including the MoE, CZSO and CEI, and in consultation with other stakeholders, such as the Ministry of Industry and Trade (MIT) and local authorities.

The difficulties associated with the existence of two competing information systems are well known, and have been highlighted by the European Commission. Measures to address them are included in the national WMP, and in 2016, the two systems agreed to co-operate on reviewing and consolidating the information base, and to initiate an in-depth audit of the WMIS. An auditors group was set up, consisting of representatives of the MoE, CENIA, CZSO, Government Office and MIT, as well as Eurostat and independent experts. But practical work has been slow, partly due to the vested interests of several stakeholders.

Implementation of the current systems' 2016 co-operation agreement is an essential first step for establishing a unified system. It should be speeded up, and supported with a provision in the new Waste Act. New information needs and reporting requirements could be added progressively (e.g. secondary raw materials, extended producer responsibility, waste prevention in industry, costs and financing). The revised system will need to be easily accessible to the main producers and users of the information to enable coherent monitoring of progress at all levels. Its data will need to be collected and structured in such a way that they can ultimately be used as a basis for official statistics.

In the short term, the scope, definition and terminology of the derived indicators need to be reviewed and harmonised so as to avoid confusion among users. This concerns, for example, the inclusion or exclusion of secondary waste, the extent to which household-like waste from businesses is included in municipal waste, and the numerators and denominators used for calculating recycling and recovery ratios.

There are a few other weaknesses as well. Waste reduction efforts in the business sector are insufficiently monitored. Economic information on waste management is not produced systematically and is incomplete. This hampers evaluation of waste management cost-effectiveness, particularly at the municipal level. Specific indicators are needed to monitor the outcomes of public spending on waste and materials management at the national, local and project levels.

### *Information on material flows*

Material flow accounts are produced at macro level (economy-wide flows) by the CZSO and updated annually. They are complemented by research estimates of material footprints by the Charles University Environment Centre. But the results are not integrated

with waste statistics (key indicators are used for national waste and materials management policies). It is thus not easy to get a complete picture of material flows through the economy and how they relate to waste streams and recycling efforts. The Czech Republic could make better use of the data produced if they were harmonised and integrated.

Industry should be encouraged to integrate such information in corporate reporting, integrated performance assessments and financial statements, and to establish material flow cost accounts so as to better understand the environmental and financial consequences of material and energy use practices and identify opportunities for efficiency improvements.

### *Other data and information*

An inventory of hazardous waste facilities and a database on closed and abandoned mining waste facilities that pose serious environmental and health risks are maintained by the Czech Geological Survey[16] on behalf of the MoE. Budget and accounting information from all levels of the administration is publicly available on the information portal "MONITOR" of the Ministry of Finance.[17]

Information on environmental technology is available from ENVIBASE, the Czech environmental technology database, administered by the MoE. ENVIBASE contains a list of Czech companies, organisations and institutions providing environmental technology services, including for waste management. But there has been no official monitoring of eco-innovation since 2013, nor of green public procurement since 2012.

**Box 4.1. Czech information systems on waste: management information and official statistics**

**The Waste Management Information System**

The Waste Management Information System was set up to support the development and implementation of national and regional WMPs. WMIS data are used to monitor waste management policies, project waste trends, identify infrastructure needs and plan related investment. They are also used to report on implementation of EU waste directives. In addition, the CEI uses WMIS data to check compliance in the business sector (at the facility level), and the European Commission uses them to determine financial support under the operational programmes of the EU structural and investment funds.

The WMIS builds on data from a mandatory annual survey of all waste generators and processors, i.e. waste management firms, businesses and local authorities (about 31 000 respondents, including 5 000 municipalities). The data are collected by type of waste, according to the EU List of Waste, at the facility, company and municipal levels. Direct reporting is mandatory for all entities generating more than 100 kg of hazardous waste or 100 tonnes of non-hazardous waste in a given year. For waste producers below these thresholds, records (waste type, amounts, business ID of the generator, location, etc.) are kept by the entity managing the waste and processed by municipalities with extended powers.[18]

The WMIS uses the definitions of waste and waste producers provided in the Waste Act and related regulations (in line with EU waste management legislation) that differ from those used in international statistical work.

- The Waste Act considers municipalities to be the producers of all waste generated on their territory, in accordance with Chapter 20 of the EU List of Waste. This makes the definition of municipal waste broader than in many other OECD countries, as it covers all kinds of waste, including mixed unsorted municipal waste, waste collected under the extended producer responsibility system even when directly delivered by citizens to waste collectors and scrap traders, some hazardous waste, waste collected from public areas and from small businesses, as well as items such as contaminated soil and other waste from remediation of landfill sites on the municipal territory.
- To support infrastructure planning and investment decisions, the data cover both primary and secondary waste that has to be managed within the country. This may lead to double counting when calculating national totals, which generally represent amounts to be managed rather than amounts generated.

*Official waste statistics*

The other information system comprises the waste statistics produced by the CZSO, which are used to produce national statistical reports and to report to the OECD and Eurostat, in line with EU statistical regulations. They build on annual sample surveys of some 1 500 municipalities and around 6 500 businesses selected from the Statistical Business Register. Sample surveys are used so as not to overburden respondents already completing the mandatory annual WMIS survey. Direct use of the WMIS database has so far not been possible. Respondents are selected according to statistical

criteria. Since 2009, the survey has included a core part, updated annually and covering the most significant waste generators and processors, and a sample part administered on a rotating basis to one-third of other businesses every three years. Data for the businesses not surveyed in a given year are based on previous updates.

These waste statistics use the definitions and classifications provided in the EU regulation on waste statistics, and the surveys are in line with those used in the OECD and United Nations Statistics Division questionnaires on waste. They distinguish between primary and secondary waste, and are structured by material, industry (NACE codes) and type of treatment.

### *4.4.2. Policy instruments*

The Czech Republic employs a range of policy instruments to encourage waste reduction, reuse and recycling. They include separate collection requirements and mandatory recycling targets for recyclable materials in line with EU law, voluntary agreements for waste reduction and recycling by businesses, economic instruments such as volume-based municipal charging (pay as you throw system), a deposit-refund system for beer bottles, extended producer responsibility and take-back systems for selected waste streams. Most of these instruments apply to the end-of-life stage. They are complemented by demand-based instruments, including GPP, and information instruments such as ecolabels, awareness-raising campaigns and training.

#### *Targets*

Objectives and quantitative targets play an important role. Mandatory targets are set for waste treatment and disposal rates, and for recycling of packaging materials, consumer electronics, ELVs, etc., in line with EU directives and international commitments. The WMIS monitors their achievement.

The country reached most of its quantitative targets during the review period. Some targets in the 2003-13 WMP were not achieved and later judged too ambitious by the MoE (SAO, 2011). They include the targets for waste recovery (55% recovery of all waste by 2012, 50% recovery of municipal waste by 2010). The EU target on landfilling of biodegradable municipal waste (no more than half of 1995 amounts landfilled by 2013) was also not met.

The objectives and targets in the 2015-24 WMP mainly aim at meeting EU requirements and catching up in areas where performance has been modest. They relate to diversion of biodegradable municipal waste from landfills, municipal waste recycling and reduction of amounts landfilled, combined with a ban on landfilling of unsorted mixed municipal waste and recyclable and recoverable waste, by 2024.

#### *Economic instruments*

The use of economic instruments is well established but has so far not been very effective as regards waste management. The mix of instruments is unbalanced, relying heavily on financial support rather than other financial incentives.

The main instruments include a pay as you throw (PAYT) system for collection of mixed household waste, which, together with free separate collection of recyclable waste, could be instrumental in reducing waste going to final disposal; fees for landfilling and for

operation of municipal waste management systems; a financial reserve for landfill recovery and decontamination, to be created by landfill operators;[19] a deposit-refund system for beverage containers; and fines for non-compliance. A reduced rate of VAT is applied to municipal waste disposal services (OECD, 2013).

The current instruments do not create the right incentives to follow the waste hierarchy. Municipal waste fees are too low to spur waste reduction and recycling and to cover the cost of service provision. PAYT systems for collection of mixed household waste are in place in only 15% of municipalities.

Other waste-related fees include those charged for ELV collection, processing, recovery and disposal, and for packaging materials under the Packaging Act. To reduce plastic bag consumption, a ban on provision of free plastic bags in shops was introduced in January 2018. Shops have to charge a fee per bag equal to at least the cost of providing the bag to the customer.

Financial support (subsidies) is provided from the SEF and EU funds for recovery operations and from the state budget for waste transport and collection. Tax exemptions are granted for selected commodities and activities. Other financial support measures include grants and loans from the MIT for R&D, support programmes for businesses by the Czech-Moravian Guarantee and Development Bank and grants for remediation of environmental damage.

Investment in waste treatment and recycling facilities, in recycling technology and in R&D for clean production and eco-innovation benefits from government subsidies and EU funding in the form of grants and low-interest loans.

### *Voluntary instruments*

The basic voluntary instruments are part of national programmes on the EU Eco-Management and Audit Scheme (EMAS), cleaner production and environmental labelling. The instrument in widest use is environmental management certification (ISO 14001 or EMAS). Special certification for waste management companies goes beyond the international ISO 9001, 14001 and EMAS standards and aims at improving waste management quality. Voluntary agreements with business sectors exist, but mostly focus on energy, climate and air related issues.

### *Information tools*

The government uses various tools to inform the public about waste management issues and raise awareness about the importance of waste reduction and recycling and environmentally sound management. Information campaigns are used to stimulate separate collection and recycling of selected waste streams. Examples include series of seminars organised by the MoE to promote separate collection of biowaste (BIOTOUR 2015) and PAYT systems in municipalities (PAYT TOUR 2017). Waste prevention and recycling are integrated into school curricula. The MoE issues manuals to inform and guide, including on transboundary waste movements, on food waste prevention for canteens, restaurants and retailers, on construction waste, and on waste prevention in schools and in municipalities. Communication and education on waste management have been promoted as part of an action plan on environmental education and awareness for 2010-12, with an outlook to 2015, and as part of a new 2016-25 programme for environmental education and environmental awareness.

The Czech Republic has two environmental labelling programmes for consumer products. The official "environment-friendly product/service" ecolabel of the National Programme for Labelling Environment-Friendly Products is administered by CENIA on behalf of the MoE. Launched in 1994, it was extended to services in 2004, starting with tourist accommodation. The second label is the EU Ecolabel, introduced in 2004 when the Czech Republic joined the EU. The criteria in both cases are basically the same, but product categories differ. There are 72 licence holders in the national programme and 16 in the EU programme. Manufacturers also make self-declared environmental claims and environmental declarations for products.

Businesses are encouraged in several ways to exchange information and experience. Since 2014, the MoE has organised an annual conference on waste prevention at which enterprises can exchange experience on waste recycling and prevention, technology and circular economy approaches. In 2016, the MIT launched a contest called Turning Waste into Resources to promote recycling and the use of secondary raw materials. It aims to raise interest by focusing on enterprises using secondary materials, waste or recycled materials to replace raw material inputs; construction firms recycling their waste and using secondary raw materials; municipalities and other public bodies incorporating recycled waste and secondary raw materials in public tenders for new playgrounds, bike paths, roads, etc.; and students and primary and secondary schools.

## 4.5. Promoting recycling and waste reduction

Recycling and recovery are promoted mainly through separate collection of municipal waste and extended producer responsibility take-back obligations. The product take-back systems and extended producer responsibility for packaging function well. Recycling targets apply to designated waste streams and products, in line with EU law. They will be further supported by a landfill ban on mixed municipal waste as of 2024 and a progressive increase in the landfill tax for recyclable and recoverable waste.

When the Czech Republic joined the EU in 2004, it negotiated a transition period up to 2005 for reaching mandatory targets concerning the recycling of plastics and packaging waste. It achieved those targets and has since expanded the scope of its recycling measures. The overall recovery and reuse rate is relatively high (77% CZSO; 86% WMIS), but includes backfill and other low-value recovery. European Commission assessments found that waste management options such as reuse and recycling were underexploited. There is thus good potential for further improvement. In particular, the Czech Republic could be more ambitious in promoting high-value recycling.

### *4.5.1. Separate collection and recycling of municipal waste*

Recycling of waste from households and small businesses is encouraged by free separate collection of selected materials and the extended producer responsibility system, associated with the PAYT system (volume-based fees) for collection of mixed household waste. Industry co-operates with municipalities in ensuring the take-back of packaging and selected products through separate collection.

Separate collection has been expanding since the mid-2000s and is well established for packaging waste, paper, plastics, glass and hazardous fractions of municipal waste, in accordance with the 2001 Waste Act. Separate collection of metal and biowaste became mandatory in all municipalities in 2015. Deposit-refund systems for glass bottles have existed since 1950 but their role is decreasing; they currently apply only to beer bottles.

Separate collection of biowaste, while not yet well developed, has progressed rapidly since becoming mandatory in 2015.

To minimise the cost, recyclable fractions are collected through deposits at containers and civic amenity sites, and through take-back systems rather than through door-to-door collection:

- The country has a well-developed and relatively dense network of civic amenity sites where citizens can deposit special waste such as furniture, other bulky waste, hazardous waste and WEEE.
- The container network for collecting packaging waste is accessible and very dense; the number of containers reached 304 000 in 2017 and the average distance to the nearest collection point is about 100 metres. As a result, the amounts of packaging waste collected for recycling and recycled have grown significantly. Most containers are for paper and cardboard, glass and plastic. Containers are also available for textiles and WEEE.
- Metals are generally collected at recycling centres and by scrap metal traders; separate collection in specific containers plays a minor role.

The cost of separate collection through voluntary deposits is about EUR 6 per person per year, below the EU average. The total cost of municipal waste collection, including sorting and treatment, is less than EUR 100/tonne. In municipalities that do not apply the PAYT system, households pay an annual waste fee to cover collection, transport, sorting and disposal. The fee changes every year according to the amount of waste generated, but rarely covers the full cost.

Despite these promising developments and the good results for packaging waste, there is much room for further progress and efficiency gains. The recovery rate, at 30% (CZSO) or 35.6% (WMIS), is notable but low. The recovery target of 50% of municipal waste by 2010 set in the 2003-13 WMP was not met. Landfilling remains common. The share of biowaste in mixed household waste remains high (about 40-50%) and composting rates are low.

### *4.5.2. Municipal waste fees and charging systems*

#### *Municipal waste fees*

Municipalities can apply one of three types of fee on waste management:

- A local fee (under the Act on Local Fees, as amended by the Waste Act) paid by households for waste collection services, including transport, sorting, recovery and disposal. The fee has to reflect the cost to the municipality, but is capped at EUR 10 (CZK 250) per person per year for separately collected waste, plus EUR 10 for unsorted mixed waste.
- An optional fee (under the Waste Act) that can be used with a PAYT system. It is set at a level that covers the cost of the waste management system and is not capped. It is often based on the number and volume of waste containers.
- A contractual fee set on the basis of a contract between the municipality and the inhabitant or the producer of waste similar to municipal waste. It is not capped.

The fees are calculated on the basis of the costs to municipalities, but rarely cover them. Most municipalities use the fixed local fee, which is easier to manage and is based on the number of persons in a household. Only 15% of the funds collected reflect the number

and volume of containers or collection frequency (IEEP, 2009). As a result, municipalities still cover 30% of waste management costs from their budget, on average.

*Volume-based fees for municipal waste (pay as you throw system)*

Reduction of municipal waste and its diversion from landfilling are encouraged through a PAYT system applied to unsorted mixed municipal waste. The fee depends on the amount collected. The method for monitoring amounts varies by municipality. Some weigh the waste collected by trucks, others estimate the weight based on collection frequency or container size. The system, however, is in place in only 10% to 15% of municipalities, mainly small and medium-sized.

The charging system thus gives households little incentive to separate recyclable components and reduce the amount of mixed waste they generate. Municipalities should be encouraged to increase waste fees to a level that ensures full cost recovery and is connected to actual waste generation. Priority should be given to PAYT systems that link fees to the weight or volume of waste collected. Combined with free separate collection, PAYT could play an important role in further reducing the amount of waste landfilled. The use of such systems should be expanded to all areas and made obligatory. The pending new Waste Act provides for revision of municipal waste fees, with the possibility of exemptions for social reasons.

### *4.5.3. Extended producer responsibility*

The 2001 Waste Act includes the principle of producer responsibility and obliges manufacturers and importers of designated products to take the products back at the end of their service life and ensure proper recovery. Besides packaging materials, take-back obligations for producers and importers have been in place since February 2002 for products such as oil, galvanic cells and batteries, electric accumulators, fluorescent tubes and tyres, and since January 2003 for household refrigerators. Targets and deadlines for the collection and recovery of these products have been set. The Czech Republic meets current EU requirements for packaging and packaging waste, WEEE, batteries and accumulators.

A bill on end-of-life products, further strengthening the extended producer responsibility system and expanding it to WEEE, batteries, tyres and ELVs, is pending the adoption of the new Waste Act and the EU Circular Economy package.

The system in place allows for individual or collective producer responsibility. The take-back systems are managed either by individual producers/importers or by associations set up for the purpose under agreements with the MoE such as a 2001 agreement with the Czech association of producers and importers of portable batteries. The sole producer responsibility organisation, EKO-KOM, deals with packaging waste. In 2015, a collective system for tyres was introduced.

*Packaging waste*

The extended producer responsibility system for packaging is relatively mature and includes a well-performing deposit system (containers) for household packaging waste. When manufacturers or importers do not comply with the packaging law, retailers and distributors are held responsible for take-back obligations. This gives retailers a strong incentive to ensure that suppliers comply with the law and has proved to be a very efficient anti-free-riding measure (Monier et al., 2014).

The system is managed by the producer responsibility organisation EKO-KOM, founded in 1997 by producers and importers of packaging materials, followed by a voluntary agreement between the MoE and the packaging industry in 1999. Since 2000, a producer responsibility system based on the Green Dot system[20] has been in effect.

Producers, importers and retailers can join the EKO-KOM system, which fulfils their collection duties mainly through municipal separate collection. More than 20 000 companies participate in the EKO-KOM system, representing more than 80% of the Czech packaging market, as well as more than 6 000 municipalities, representing 99% of the Czech population. EKO-KOM also co-operates with waste management operators to collect packaging waste from industry and retail. EKO-KOM collects producer contributions of EUR 12-240 per tonne of packaging put on the market. The contributions depend on the packaging material and type. For municipal retail packaging waste, the producer fees cover all collection, sorting and reprocessing costs. For industrial packaging only recovery costs are covered. Companies and municipalities are regularly audited: every three years for big companies, every five years for medium-sized companies. In case of non-compliance, the CEI is asked to impose fines.

The system covers all types of packaging. The containers for separate collection of post-consumption packaging are owned by the municipalities, EKO-KOM and waste management companies. EKO-KOM co-finances the municipal collection system on the basis of a calculated average cost, applied to all municipalities. This represents about 71% of EKO-KOM's expenditure. The remaining 29% is allocated to standardised contributions for waste sorting and recover (16%), communications (4%), auditing member companies and municipalities (3%), statistical records (3%), administrative tasks (2%) and state payments (1%). The overall cost for separate collection and recycling of packaging waste is about EUR 5 per inhabitant, which is much lower than in many other EU countries. The recycling targets are differentiated by material in line with EU requirements, but set at a slighter higher rate for glass, paper and plastics (75% for glass and paper, 45% for plastic). They are reviewed periodically.

The system performs well and enabled the Czech Republic to meet the EU recycling objectives for packaging. EKO-KOM estimates that 70% of Czech inhabitants sort their waste. This is encouraged by systematic awareness campaigns, education programmes for children and technical support for local authorities. In 2016, more than 3 million tonnes of packaging were introduced in the market by EKO-KOM members, and almost 0.8 million tonnes of packaging waste were reused and recycled. The overall recycling rate was 77%.

### *Batteries and accumulators*

A voluntary agreement between the MoE and producers and importers of portable batteries, signed in 2001, set up a collective management system for used batteries and accumulators, including batteries removed from WEEE some of which previously escaped the battery take-back obligations. Currently, two such systems exist. They are efficient and expanding, and enabled the Czech Republic to meet the EU recycling and recovery objectives for 2012 in advance (a collection rate of 25%). The achievement of the 2016 targets for collection of portable batteries and accumulators (a rate of 45%) was considered more difficult and supported by information campaigns among end users (in 2015 the collection rate achieved was 36.3%).

### *Waste electric and electronic equipment*

Take-back services for electrical equipment are provided by several collective management systems. The Czech Republic meets the EU requirements for minimum WEEE collection efficiency, but questions remain as to whether it can meet the new 65% target for separate collection of WEEE by 2021.

The 16 systems for WEEE currently operating across the country are all company driven and authorised by the MoE. Their cost-effectiveness is hard to determine. The number of systems, their autonomy and the lack of co-ordination among them make it difficult for the MoE to monitor their performances and financial flows. A consolidation of the 16 systems, associated with regular monitoring and an appropriate clearing mechanism, is urgently needed. It should be complemented with a competition assessment to identify how market forces can be further strengthened. A proposal to create a national WEEE co-ordination centre under the proposed new act on end-of-life products was rejected in 2016 by the companies involved. Current plans are for a co-ordination mechanism under the lead of the MoE in co-operation with the MIT.

## *4.5.4. End-of-life vehicles*

### *Management system*

ELVs are collected at dedicated locations, with the consent of regional authorities. Operators of authorised treatment facilities have to accept the vehicles free of charge, ensure efficient removal of hazardous components and achieve a certain degree of recycling of materials from the vehicle (ecological disposal). The SEF provide maximum financial compensation of CZK 700 per vehicle, depending on the type and quantity of components recovered after dismantling. ELV facilities can use the International Dismantling Information System[21] to access car manufacturers' information on the types of vehicles put on the market, their components and the way to dismantle them.

The country has a high number of collection points and treatment facilities for wrecked cars (587 treatment facilities were registered by early 2018). This may lead to inefficiency in the system, to supervision and monitoring difficulties and to problems with the quality of end-of-life processing. The number of processed ELVs is monitored through the Car Wrecks Module of the WMIS, into which operators of processing facilities and companies enter data directly. The EU targets for the recovery and recycling of ELVs (a 95% recovery with a minimum of 85% recycling, valid from 1 January 2015) were met with a recovery rate of 95.4% and a recycling rate of 90.3% in 2016.

### *Fees for second-hand cars*

Since January 2009, a special emission tax has had to be paid for second-hand cars. The revenue feeds into the SEF, which allocates part of it to ELV processing in the form of a maximum CZK 700 contribution per vehicle processed in an environment-friendly way in a registered facility. This tax, administered by the MoE and Ministry of Transport, and collected by municipalities with extended competencies, was introduced as an incentive to renew the road vehicle fleet and support the collection and treatment of ELV. It applies to second-hand passenger cars and commercial vehicles weighing up to 3.5 tonnes.[22] It is paid once, when an imported vehicle is first registered in the Czech Republic or when a vehicle already in the central vehicle register is first re-registered. Its rate is based on the limit values for exhaust emissions, in accordance with EU regulations. Vehicles meeting at least EURO 3 emission standards are exempt. The new act on end-of-life products will

restrict exemptions to EURO 4 and 5 vehicles, increase the rate and expand use of the revenue to ELV collection in the form of a subsidy to the car owner.

### *4.5.5. Construction/demolition waste*

Particular attention is given to waste from the construction sector. Construction and demolition waste (CDW) accounts for more than half of all waste generated. The amounts generated have been growing since the early 2000s, with a slight decrease since 2010. Further increases are expected by 2020 due to current and planned construction activities (including excavated soils from contaminated sites).

The overall recovery rate of CDW is very high and already well beyond the EU target that sets a utilisation rate of 70% to be achieved by 2020. The rate increased from 56% in 2002 to 85% in 2005 and 97% in 2015 (according to the WMIS). About one-third of recovered CDW is used for backfill, and it is estimated that about 10% of building materials used come from recovered materials. This reveals a potential for more ambitious CDW management policies that ensure a greater share of high-quality recycled output and high-value use of recovered materials.

The current WMP proposes actions that would support such a move, and their implementation should be given priority. They include plans for mandatory use of recycled materials that meet construction standards in projects financed from public funds, and for a decree on asphalt mixtures. Also planned is an amendment of the law regulating technical conditions for building demolition to facilitate reuse or recycling of demolition waste. In January 2008, the MoE issued instructions for the management of construction, maintenance, refurbishment and demolition of buildings, including CDW. More recently, a guide on prevention of construction waste was developed for producers of construction materials, designers, investors, building contractors and the public. It lists construction materials containing hazardous substances and substances with negative effects on human and ecosystem health. CDW recycling is further encouraged by the Association for Recycling of Building Materials in the Czech Republic, which brings together major recyclers and experts from universities and research institutions.

However, the target for CDW recovery in the current WMP is the 70% EU target. This is all the more surprising as the targets set in the previous WMP were more ambitious (50% recovery by end 2005 and 75% by end 2012) and achieved in advance.

### *4.5.6. Waste-to-energy policy*

For the Czech government, the use of waste as an energy source is an important element of a circular economy and is seen as a way to divert waste from landfills and to achieve renewable energy targets. The State Energy Policy considers waste a secondary energy source of domestic origin whose use should be promoted to limit import dependence. Waste is also considered a renewable energy source in the National Action Plan for Renewable Energy Sources under the MIT, and in the Biomass Action Plan 2012-20 under the Ministry of Agriculture.

Czech heating systems long relied on domestic bituminous coal and lignite as their primary fuel, but coal is now being progressively replaced by energy from waste. Since 2015, heat production from biogas is at least 70% derived from animal by-products, manure and biowaste, and receives government support, mainly in the form of green bonuses for small heat production plants (maximum capacity 500 kW).

Out of the 3.3 million to 5.3 million tonnes of municipal waste generated, around 12% is currently used for energy, mainly in incineration with energy recovery (WMIS). The new WMP envisages increasing the waste-to-energy capacity from the current 12% to 18% of total treatment by 2020 and 28% by 2024. CZSO data put the current share at 18% already. Unsorted mixed municipal waste, representing 54% to 62% of total municipal waste generated, contains over 50% biodegradable material that could be extracted for energy.

## 4.6. Encouraging waste prevention

Public action on waste prevention and reduction in the Czech Republic is fairly recent. It is promoted through the PAYT system for municipal waste, cleaner production programmes and eco-innovation, and other measures in the 2014 WPP and WMP. The WPP covers all waste except bulky waste, and all sectors except agriculture (which is covered by the Biomass Action Plan). The aim is to reduce both the amount of waste produced and the amount of harmful substances in materials and products (in line with EU law). Special attention is given to reduction and replacement of hazardous substances and materials in the construction industry. Composting of biodegradable waste by households (home composting) and municipalities is encouraged by technical means and awareness-raising campaigns. Research programmes and projects related to food waste prevention are also encouraged and supported.

### *4.6.1. Product policies and eco-design*

The framework for eco-design is found in the EU Eco-Design Directive (2009/25/EC), covering 35 product groups, while the REACH and RoHS directives[23] provide the framework for reducing toxic content in products.

The outcomes of eco-design measures and reduction of toxic content in products do not seem to be well known. Little information is available on the effects of the REACH and RoHS directives on waste and materials management. Concrete measures and requirements for manufacturers concerning eco-design give priority to products' energy efficiency rather than material efficiency and component recyclability. This indicates that synergies with chemical policies could be strengthened, and that businesses could be given greater incentives and guidance on design for environment, including through the extended producer responsibility system.

The extended producer responsibility system of the Czech Republic encourages manufacturers to design and make products whose reuse, recycling and disposal at the end of their life are as cheap and easy as possible, and that contain few or no hazardous substances.[24] Final users must be informed about how and where to dispose of end-of-life products and be encouraged not to dispose of them in mixed municipal waste. In the case of packaging materials, the role of the system is now limited to provision of advice to manufacturers and importers. Given the modest performance of the Czech waste management system, the current aim is to reduce landfilling first. Other aims, such as waste prevention and eco-design, are of lower priority while recoverable materials are still being landfilled. This may change once the EU circular economy package is implemented in the Czech Republic. The package requires extended producer responsibility systems to take an active role in product design.

### *4.6.2. Businesses and cleaner production*

The Czech Republic has long been active in the field of cleaner production, especially since restructuring and upgrading of industry after 1989 offered an opportunity to move from end-of-pipe to cleaner production technology. Principles of the National Programme for Cleaner Production, launched in 2000, are to be integrated in the work of all ministries. The MoE and Czech Centre for Innovation and Development (former Cleaner Production Centre) assess implementation of the programme.

Companies respecting certain conditions can get loans or subsidies from the MoE and MIT under the Programme Framework on Sustainable Consumption and Production and the Support Programme for Environmental Technologies, both of which include GPP elements. Voluntary cleaner production measures by businesses are supported by the SEF as part of its best available technology programme.

Under the Operational Programme "Environment" 2014-20, businesses, including small and medium-sized enterprises (SMEs), can obtain subsidies covering up to 85% of eligible project costs (co-financing is a prerequisite). Specific support for SMEs, aiming to improve waste management, recycling and prevention, includes bank loans for waste management projects (e.g. from Česká spořitelna and Unicredit Bank).

### *4.6.3. Innovation and technology development*

Eco-innovation policies are guided by the 2009 update[25] of an eco-innovation support programme that does not yet reflect the orientation of the 2011 EU Eco-innovation Action Plan. Responsibility for eco-innovation is shared by several ministries, with TACR[26] playing a key role in providing access to government support for applied research and experimental development. Demand-side measures to promote eco-innovation include GPP, financial incentives and support for technology transfers.

Several projects supported by TACR focus on aspects of waste management and resource efficiency (e.g. reuse and recycling of specific waste streams, increased use of secondary raw materials, reduced resource consumption) that are of importance to a circular economy. Among these are R&D on construction materials' quality (recyclability, hazardous content) and recycling of construction and demolition waste; processing of biodegradable waste, including into fertiliser and reclamation substrates; use of waste residue from biogas plants; and reuse of recycled paper.

TACR's Epsilon Programme and the Environmental Technology Verification Programme support uptake and commercialisation of new and innovative technology.

- The Epsilon Programme supports projects that develop industrial applications using new technology and materials in energy, environment and transport. Unfortunately, little is known about developments in recent years; there has been no official monitoring of eco-innovation since 2013.
- The Czech Republic participates in the EU Environmental Technology Verification (ETV) programme, which helps companies put cutting-edge technology on the market.[27] The Czech verification body, the Czech Environment Management Centre, operates in two areas: materials, waste and resources, and water treatment and monitoring. The first technology verified, with a statement of verification granted in 2016, was aerobic fermentation for processing biowaste from farms and slaughterhouses, developed by AGRO-EKO Ltd.[28]

According to an EU assessment (EC, 2016), the overall eco-innovation performance of the Czech Republic is close to the EU average, with a high level of involvement of companies in innovation concerning material and energy efficiency, but the level of outputs in terms of patents is rather low. While aspects of Czech science, technology and innovation are catching up with OECD standards, the system as a whole still lags (OECD, 2016). Progress is hampered by weaknesses in Czech innovation policies that equally apply to eco-innovation and the circular economy. For example:

- Despite increased R&D spending in recent years, results remain weak and doubts exist about the effectiveness and efficiency of the spending.
- Czech companies, many of them SMEs, lag behind foreign companies in innovation capacity.
- Foreign companies drive Czech economic growth and are the main factors in Czech companies' growth and output. This means strategic decisions on future investment are made outside the country and foreign companies' activities in the Czech Republic often focus on low value added products and services.
- Co-operation between academia and business is limited. This hampers the commercialisation of research results and their alignment with business needs.

## 4.7. Towards a circular economy?

The Czech Republic's rather modest performance in waste management means essential steps need to be taken before circular economy approaches can be implemented. But the potential for progress is good. The transition to a circular economy is a strategic objective of the current WMP. It emphasises the value of waste as a resource, with the aim of increasing recycling and reuse and preventing waste generation, and there are many synergies with the country's secondary raw materials policy and the eco-innovation and cleaner production programmes. Their implementation must be on a par with modernisation of Czech enterprises, effective alignment of measures and objectives across policies and ministries, and increased support to businesses that lead the way.

### *4.7.1. Circular economy approaches*

Circular economy initiatives and business models are promoted by business associations, such as the Czech Association for a Circular Economy, which brings together private waste and water management service providers, academics and other entities (www.caobh.cz); the EMPRESS platform, which promotes resource efficiency and sustainable production and consumption; and the Institute for a Circular Economy, which carries out education projects with schools, firms, local authorities, NGOs and others. Enterprises can also share experiences and good practices with recycling, waste prevention, new technology and circular economy approaches at the annual waste prevention conference organised by the MoE.

In practice, circular economy initiatives and circular business models are not yet well developed, but several businesses lead the way (Box 4.2). Many efforts focus on extended producer responsibility and energy-related aspects.

The Waste Management Board of the MoE is seen as an important body for discussing circular economy issues. It includes waste management experts from the government, industry associations, the chamber of commerce, research institutes and NGOs. But there is no institutional platform for broader co-operation to steer the transition to a circular economy and related investment choices. Transition to a circular economy requires a

platform where representatives of business, finance and other stakeholders can meet. It requires measures to address the cost gap between primary and secondary raw materials, more effective incentives for recycling and reuse and better information on the supply of secondary raw materials.

**Box 4.2. Recycling and the circular economy**

Businesses engaged in efforts that could further the circular economy in the Czech Republic include the following:

Kovohutě Příbram nástupnická a.s. combines waste processing with subsequent use of the resulting raw materials in the same facility. It purchases and processes electrical waste, discarded electrical appliances, waste containing lead, lead-acid car batteries, waste containing precious metals and waste from scrapped vehicles. The resulting secondary raw materials are used in the manufacture of products for construction, engineering, health care, the chemicals industry and electrical engineering.

Replast Produkt s.r.o. in Plzen develops and manufactures recycled PVC products, including traffic marking components, and floor boards for indoor and outdoor use in industry, agriculture and sporting events.

Transform a.s. in Lázně Bohdaneč treats and recycles sorted mixed plastics from municipal waste and industry to produce glass blocks, flower-bed pavements, fence planks, cable gutters, transport pallets, boards, planks, anti-noise screens and various bar profiles.

SILON s.r.o. in Planá nad Lužnicí produces high-quality polyester fibre (TESIL®) from recycled post-consumer PET bottles. The final products include polyester staples, PET straps and PET films. During manufacturing, the polyester fibres are further stretched to a thickness suitable for use in the textile industry. In 2008, TESIL® polyester fibre was awarded the European Union ecolabel and the Environmentally Friendly Product label for textiles.

### *4.7.2. Secondary raw materials*

The country's potential for secondary raw materials is considered high. The Secondary Raw Materials Policy and its action plan on self-sufficiency encourage use of such materials in manufacturing and construction, along with circular economy principles. Planned measures include provision of financial support to businesses under the EU operational programmes and other support programmes, and the design of criteria for by-products and types of waste that are no longer considered waste under circular economy principles.

The Operational Programme "Enterprise and Innovations for Competitiveness" (2014-20) provides grants to support technological change, e.g. the use of innovative low-carbon technology in energy management and the use of secondary raw materials (under specific objective 3.4). These grants are particularly important for the many Czech enterprises that need to substantially upgrade their technological base but can't afford to stop production to do so. The grants support, for example, technology to extract secondary raw materials from waste and end-of-life products of quality suitable for further use in industrial production; technology for efficient extraction of valuable and rare secondary raw

materials from end-of-life products (particularly critical raw materials); and technology to produce innovative products from secondary raw materials.

These initiatives will need to be complemented with better information on the demand and supply of secondary raw materials in line with the Raw Materials Policy Action Plan (MIT, 2015).

### *4.7.3. Recycling markets*

Markets for secondary raw materials are important for the Czech economy, whose primary raw material base is insufficient. Waste is seen as an important source of raw materials and its use is encouraged by recycling obligations and the Secondary Raw Materials Policy. The policy and its action plan on self-sufficiency also call for establishing a trading system for recycled and recyclable materials and products to support businesses. Markets for recycled products are further encouraged by the GPP system.

#### *Markets for secondary raw materials*

Secondary raw materials were originally expected to be traded on the Waste Commodity Exchange (WCE), a section of the Czech-Moravian Commodity Exchange in Kladno (CMCEK).[29] The WCE builds on a voluntary co-operation agreement between the CMCEK and the MoE, signed in 1996 and extended in 2002. The goal was to support markets for waste and secondary raw materials by using the principles of the commodity exchange and by ensuring transparency in transactions. The system never became operational, however. CMCEK is licensed by the MIT to trade industrial commodities as well as recyclable waste and secondary raw materials. In practice, however, trading is limited to energy (electricity and natural gas) and timber.

Trading in WEEE, waste batteries and accumulators and waste tyres is encouraged under the new draft act on end-of-life products, whose finalisation is pending. Further legal developments depend on the new Waste Act, also pending, and on the EU's Circular Economy package.

Recycling markets thus remain weak, and the potential of waste as a source of secondary raw materials is underachieved. The latter situation is partly due to the fluctuating nature of demand for secondary raw materials. During the economic crisis, demand plummeted, particularly for paper, glass and scrap iron, and some recycling companies went bankrupt. The government later adopted measures to strengthen the market for secondary raw materials, but unlike, for instance, Germany, it created no specific incentives favouring them. In a transition to a circular economy, effective integration of secondary raw materials in an appropriate commodity exchange such as the CMCEK could become a powerful tool.

Demand-side measures planned as part of the Secondary Raw Materials Policy also offer opportunities to strengthen recycling markets. They include a legal obligation to use a given amount of such materials and an obligation to favour products made from such materials in public procurement. The measures are to be supported with financial incentives targeted at businesses, including financial support to compensate for the higher costs connected with the use of secondary raw materials, financial support for eco-design and grants for innovative manufacturing technology and for commercialisation of products made from secondary raw materials. These measures are to be complemented by a public catalogue of available secondary raw materials (under the action plan on self-

sufficiency in raw material resources) and regular publication of a specialised periodical on the secondary raw material market.

### *Green purchasing by the public sector*

In the early 2000s, the Czech Republic became the first Eastern European country to develop a national action plan on green public procurement and socially responsible public procurement. In 2010, a government decision[30] regulated mandatory application of environmental requirements in procurement by central and local authorities. The GPP guidelines of the decision build on the European Commission Communication "Public Procurement for a Better Environment" and the GPP Toolkit. Though called "rules", they are an expression of political will rather than actual binding rules.

The rules stipulate criteria for purchasing specific products and services, giving priority to products carrying the Czech or EU ecolabel as well as others such as the German "Blue Angel" or the Nordic "Swan", and to products made from recycled materials. Other elements authorities need to consider in procurement decisions include environmental standards and certification (e.g. EMAS, ISO 14001), energy performance certificates, labels guaranteeing the use of a renewable source of energy in production and eco-efficiency throughout the product life cycle. For information and communication technology (ICT) and office furniture, detailed methodologies were adopted and implemented as a pilot. As the pilot results were inconclusive, it was decided not to make detailed methodologies binding, so as to keep some flexibility in their application and facilitate their updating as technologies and legislation evolve.

In March 2016, the Ministry of Labour and Social Affairs, in co-operation with the MoE and Ministry for Regional Development, launched a broader project, "Support of the Implementation and Development of Socially Responsible Public Procurement", including environmental requirements. The related Government Resolution,[31] adopted in July 2017, abolishes the 2010 government decision that only covered environmental requirements. It includes "Guidelines for the Application of Responsible Public Procurement and Commissioning Applied by the Public Administration and Local Authorities" with environmental requirements concerning energy, water and raw materials consumption, waste generation, pollutant releases into the air, water and soil, and the carbon footprint. The extent to which the circularity of materials and products will be reflected in the guidelines is not yet clear. A website (http://sovz.cz/en/) serves as a platform for sharing experience and good practices.

The application of GPP rules is monitored by the MoE and related data have been released in the ministry's annual report. Unfortunately, little is known about the performance of the Czech GPP in recent years. Data collection was discontinued in 2012 and will resume once a new monitoring system under the new guidelines on responsible procurement will have been established. The latest data available indicate a share of GPP in total public procurement of 78% for ICT equipment and 56% for furniture in 2011.

Further progress will depend on overall progress in the public procurement system. Despite significant reforms since EU accession, the public procurement system is not yet in line with EU best practice. Audits have recognised some improvement in transparency and fairness, but revealed several systemic challenges that need to be addressed. The Czech administration has limited ability to use non-price criteria to evaluate bids and hence too many awards to the lowest bidder. Transparency is lacking, there are accountability issues and conflicts of interest, and public procurement legislation can be circumvented. The SAO identifies procurement as one of the areas with the highest risk

of non-observance of the principles of transparency, non-discrimination and equal treatment. (EC 2015b).

To be effective, implementation of the new flexible, non-binding guidelines for responsible procurement need to be well co-ordinated, regularly monitored and supported with proper training and capacity building. The establishment of a centralised procurement office would be useful.

## 4.8. Improving the effectiveness of waste treatment and disposal

### *4.8.1. Waste treatment and disposal*

The Czech Republic is self-sufficient as regards landfilling and incineration, but its capacity for treatment and recovery needs to be expanded significantly in light of the planned landfill ban on mixed unsorted waste and the amount of municipal waste generated: 3.3 million tonnes (CZSO)/5.3 million tonnes (WMIS).

#### *Landfilling*

The share of landfilling is much higher than in other OECD countries. Despite better alternatives promoted in the WMP, and despite EU funding to finance other methods, the country still landfills more than half its municipal waste. The Czech Republic is among the EU countries with the largest implementation gap in this area. Among the failings identified by European Commission assessments are poor or non-existent waste prevention policies, a lack of incentives to divert waste from landfill and inadequate waste infrastructure. Weaknesses in monitoring of waste sent to landfill further lead to hazardous waste being landfilled, with the landfill risk fee being circumvented (SAO, 2013).

While the Czech Republic achieved the 2010 target of the EU Landfill Directive related to biodegradable municipal waste going to landfill (maximum 75% of the 1995 level), it missed the 2013 target of a further reduction to 50%. Whether it will make the 2020 target of 35% is unclear and depends on adoption of the pending new Waste Act.[32] Separate collection of biowaste that became mandatory in 2015 is expected to help achieve the 2020 target, but will need to be supported with information and awareness raising campaigns and with an expansion of the capacities for composting and the production of biogas.

#### *Incineration and energy recovery*

The government promotes incineration with energy recovery, including as a way to divert waste from landfill. The country's four incinerators with energy recovery for mixed municipal waste have combined capacity of 777 kt per year (equivalent to 18% of the total generated, according to CZSO data; 12% according to the WMIS). They are located in very populous agglomerations that generate large amounts of waste. Three have been in operation since the early 2000s (Brno, Prague and Liberec), while the fourth (Chotíkov) is more recent. The Brno and Prague facilities are operated by companies that also carry out waste collection for the municipality.

Construction of many waste treatment installations depends heavily on public support, often from EU funds. Financial support has been essential in particular for waste-to-energy facilities, which are not economically viable under current market conditions. In the past, several projects for incinerators had to be stopped due to insufficient EU grants.

Competition in the waste disposal sector is not regulated, and the Czech Office for the Protection of Competition finds it inefficient. The main competitors of incinerators are landfills, which offer the cheapest disposal method. Landfilling costs up to six times less than incineration. Incineration prices, determined by investment and operating costs and type of material, range from EUR 56 to EUR 108 per tonne. (OECD, 2013).

In recent years, energy and heat recovery from waste has been promoted by the government to contribute to renewables targets and divert waste from landfill. The WMP calls for further expansion of waste-to-energy facilities by 2024. Given the amount of investment involved in such infrastructure and the risk of creating a lock-in effect, it is important for long-term costs and benefits of alternative waste technology and infrastructure to be carefully examined, along with incineration capacity in neighbouring countries.

### *4.8.2. Economic instruments for waste disposal*

The landfill tax for municipal waste is much lower than in other EU countries, and has so far not been effective economically or environmentally (Figure 4.4). Since 1998, it has consisted of:

- A basic component paid for all types of waste, with the revenue transferred to the municipality in whose territory the landfill is based.
- A risk component applied to hazardous waste, with the revenue transferred to the SEF.

The rates, specified in the Waste Act, were increased over 2004-09, but not since then. In 2016, the basic component amounted to EUR 19 per tonne of non-hazardous waste (about one-third of the average rate in other EU countries) and EUR 63 per tonne of hazardous waste. The fees are collected by the landfill operator, who transfers them to the beneficiaries. Exemptions are granted for waste deposited in landfills as technological material for backfilling, and municipal waste deposited in a landfill on the municipality's own territory.

With landfilling costing about EUR 19 per tonne, no other option can compete. For municipal authorities, which have little fiscal autonomy, landfilling provides regular and welcome revenue. There is thus no real incentive to divert waste from landfill and invest in alternative treatment methods.

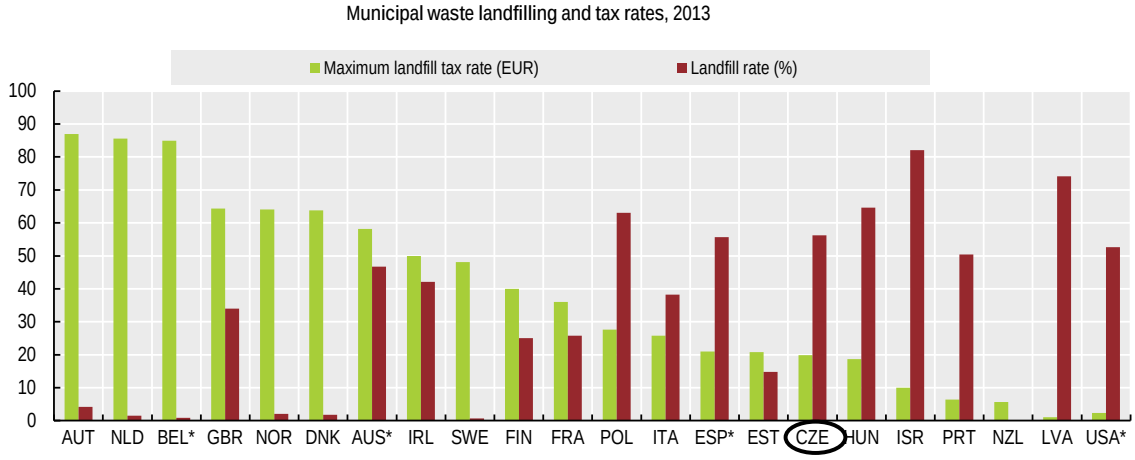
By contrast, the risk fee for hazardous waste is relatively high by EU standards. Thus, hazardous waste "owners" often circumvent it by declaring waste as technological material for landfill backfilling and landscaping, which is exempt from the risk fee. The SAO (2013) reported that most hazardous waste was landfilled almost free of charge. This means less revenue for the SEF and higher environmental risk. It also reveals weaknesses in monitoring of waste entering landfills, and in local implementation of national waste policies.

The WMP addresses these issues, and the draft of the new Waste Act includes revised landfill taxes, with a progressive and differentiated rate increase in line with the landfill ban on recoverable materials as of 2024. The rate for recoverable waste is expected to reach EUR 69 in 2023, while that for mixed non-recoverable waste will reach EUR 24 (Table 4.1). Revenue from the increased fees, other than a compensation fee for municipalities, is to be used to upgrade waste management under the WMP and to deal with waste of unknown origin.

The increased tax rates, however, are not yet in effect, since passage of the new act has been pending for two years. The delay is shortening the time available to effectively divert recyclable and combustible waste from landfill and limiting the funds available for developing alternative treatment facilities.

There is no tax or fee on municipal waste incineration. The introduction of such a tax should be considered as it is a useful instrument to follow the waste hierarchy and stimulate investments in recycling technologies and facilities. Experience in other EU countries could serve as a reference.

**Figure 4.4. Landfilling of municipal waste is encouraged through low landfill taxes**




*Notes:* *tax rates refer to Flanders for Belgium, to New South Wales for Australia, to Catalonia for Spain, and to New Jersey, North Carolina, Mississippi and Indiana for the United States. Landfill rate: Australia are 2015 data, Ireland are 2012 data.
*Source:* OECD (2017), "Municipal waste", *OECD Environment Statistics* (database); OECD (2017), "Environmental policy instruments", *OECD Environment Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933723492

**Table 4.1. Increased landfill taxes are planned, but approval has been delayed**

| | 2002-04 | 2005-06 | 2007-08 | Since 2009 | 2020 planned* | 2023 planned* |
|---|---|---|---|---|---|---|
| | (EUR/t) | (EUR/t) | (EUR/t) | (EUR/t) | (EUR/t) | (EUR/t) |
| Non-hazardous waste: municipal, other (basic fee) | 7 | 11 | 15 | 19 | — | — |
| Non-recyclable, non-recoverable waste | .. | .. | .. | | 19 | 24 |
| Recyclable, recoverable waste | .. | .. | .. | | 50 | 69 |
| Hazardous waste | 115 | 137 | 174 | 230 | 74 | 74 |
| Basic fee | 41 | 45 | 52 | 63 | — | — |
| Risk fee** | 74 | 93 | 122 | 167 | — | — |

* Proposed in the draft Waste Act (under discussion, approval not expected before 2019).
** Hazardous waste declared as technical material for landfill backfilling and hazardous waste containing asbestos are exempt from the risk fee.
*Source*: MoE (2017), Country submission.

**Recommendations on waste, materials management and circular economy**

**Improve the information base on waste and materials to support policy making**

- Harmonise the national waste management information system and official statistics on waste and materials to create a consolidated, transparent integrated system that supports development, implementation and monitoring of national policies and international reporting. Ensure that a related provision is included in the new Waste Act.

- Encourage industry to use waste and materials flow information in combination with accounting data to establish material flow cost accounts so as to better understand the environmental and financial consequences of material and energy use practices and identify opportunities for efficiency improvements (e.g. production processes and product supply chains where material losses could be reduced).

**Increase the environmental and economic efficiency of waste management**

- Speed up the adoption of the new Waste Act, ensuring its approval no later than end of 2018.
- Review waste-related taxation in line with the waste hierarchy: gradually increase the landfill tax to a level high enough to divert waste from landfill; consider introducing a tax on incineration for reusable and recyclable waste; ensure municipal waste fees cover the full costs of service provision, and extend the pay as you throw system to all areas.
- Provide greater incentives to households to participate in separate collection by implementing door-to-door separate collection.
- Improve separate collection rates for WEEE and improve the cost-effectiveness, monitoring and transparency of extended producer responsibility for WEEE. Conduct a competition assessment to identify how market forces can be further strengthened.
- Enhance co-operation between government levels and find ways for more efficient inter-municipal co-operation on waste management by encouraging the creation of inter-municipal organisations.
- Encourage the use of harmonised cost accounting indicators as part of a broader system to assess municipalities' performance in providing waste services.

**Promote waste prevention and circular business models**

- Expand efforts early in the value chain to reduce waste generated and hazardous substances in recovered materials. Provide incentives and guidance to businesses on eco-design, including through the producer responsibility systems.
- Strengthen waste prevention in industry by fostering awareness among businesses of the economic and environmental benefits of a circular economy, and by creating incentives for the adoption of new technology and environmental management systems. Exploit the synergies between measures on cleaner production, eco-innovation, waste prevention and secondary raw materials by

establishing effective mechanisms for co-ordinating and monitoring the actions of all ministries involved.

- Strengthen markets for secondary raw materials and recycled goods by stimulating the upcycling of waste, including construction and demolition waste, into high-quality, high-value products, and by integrating secondary raw materials and recyclable waste in the appropriate commodity exchange.
- Strengthen the institutional framework to steer the transition to a circular economy and related investment choices, and set up a platform for broader co-operation where businesses, banks and other stakeholders can meet.

## Notes

[1] DMC is the sum of domestic raw material extraction used by an economy and its physical trade balance (imports minus exports of raw materials and manufactured products).

[2] Including material recycling and composting.

[3] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources.

[4] Government Regulation No. 352/2014 Coll. on the Waste Management Plan of the Czech Republic.

[5] The latest such report is on the previous WMP. Available in Czech only, it is from 2010. However, the new WMP contains a more recent assessment of that plan. No assessment is yet available for the new WMP itself.

[6] Act No. 185/2001 Coll.

[7] Act No. 477/2001 Coll.

[8] Government Decision No. 465/2010 – Rules for implementing of environmental requirements in public procurement of state and local administrations.

[9] Resolution of the Government of the Czech Republic dated 24 July 2017, No. 531 on Guidelines for the Application of Responsible Public Procurement Commissioning Applied by the Public Administration and Local Authorities. http://sovz.cz/wp-content/uploads/2017/11/resolution-no.-531.pdf.

[10] The hierarchy is defined in line with the EU Waste Framework Directive: (1) waste prevention, (2) preparation of waste for reuse, (3) recycling (material recovery), (4) other recovery (e.g. energy recovery) and (5) disposal.

[11] Revision No. 229/2014 Coll.

[12] Biodegradable municipal waste diverted from landfill by 2013 and 2020; 50% of waste recycled by 2020; amount of waste landfilled reduced (ban on landfilling of unsorted mixed municipal waste and recoverable waste by 2024).

[13] Defined in accordance with the EU List of Waste (Chapter 20).

[14] Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste.

[15] The Czech Republic, Hungary, Poland and Slovakia.

[16] www.geology.cz/extranet-eng/sgs/mining-waste.

[17] http://monitor.statnipokladna.cz/en/2017.

[18] Municipalities that inherited responsibilities from the former districts (districts ceased to exist on 1 January 2003) and took over most of the administration of the former district authorities. These municipalities have extended "powers" in areas such as water management, waste management and environmental protection, population records and social affairs.

[19] Landfill owners are required by the current Waste Act to put aside funds for the reclamation and aftercare of the site. The amounts required are CZK 100 per tonne of hazardous and municipal waste and CZK 35 per tonne of other waste, including waste qualified as technological material and asbestos waste.

[20] The Green Dot indicates that an entity pays the producer responsibility organisation for take-back, sorting and recovery of packaging waste in accordance with EU Directive 94/62/EC. EKO-KOM was authorised in 2000 by PRO Europe as a licensee of this system.

[21] www.idis2.com

[22] Category M1 or N1 vehicles.

[23] Directive EC 1907/2006 on Registration, Evaluation, Authorisation and Restriction of Chemicals and Directives 2002/95/EC and 2011/65/EU restricting the use of certain hazardous substances in electrical and electronic equipment.

[24] The system applies to packaging, vehicles, electrical and electronic appliances, batteries and accumulators, fluorescent and discharge tubes, tyres and oil.

[25] Government Decision No. 938 (20.7.2009).

[26] The Technology Agency of the Czech Republic is part of the state support system for applied research, development and innovation. It was established in 2009 under the Act on Support for Research, Experimental Development and Innovations. TACR is in charge of implementing innovation policies through targeted support to applied research projects that help increase competitiveness and economic growth. Its largest programme, the Alpha Programme, supports applied research and experimental development in advanced technology, environment, energy and transport. The Epsilon Programme focuses on improving the position of Czech industry by supporting applied research and experimental development with high potential for rapid application in new products, production processes and services; one of its priority areas is the sustainability of energy and material resources.

[27] ETV, part of the EU Eco-innovation Action Plan (https://ec.europa.eu/environment/ecoap/etv/about-etv_en), is a new tool allowing claims about innovative environmental technology to be verified by qualified third parties called verification bodies. At the end of the ETV process, a statement of verification is delivered that can be used as evidence that the claims are credible and scientifically sound. Innovations can then expect easier market access and/or a larger market share, and risk for technology purchasers is reduced.

[28] https://ec.europa.eu/environment/ecoap/etv/ewa-fermenter_en

[29] The CMCEK has been in operation for more than two decades, organising markets in energy, industrial and agricultural commodities. It is a central marketplace for trading in electricity and natural gas to end customers and for trading in timber.

[30] Decision No 465/2010, “Rules for implementing environmental requirements in public procurement of state and local administrations”.

[31] Resolution of the Government of the Czech Republic dated 24 July 2017, No. 531 on Guidelines for the Application of Responsible Public Procurement Commissioning Applied by the Public Administration and Local Authorities. http://sovz.cz/wp-content/uploads/2017/11/resolution-no.-531.pdf.

[32] The Czech Republic was originally granted a four year derogation for achievement of the EU targets on landfilling biodegradable municipal waste.

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# Chapter 5. Sustainable urban development in the Czech Republic

*This chapter discusses the economic and environmental conditions of the Czech Republic's urban areas, with a particular focus on Prague and Litoměřice. It examines the cities' main challenges regarding sustainable urban development and reviews key policies and measures addressing these challenges, such as policies on land use, sustainable transport and energy, and water management, as well as the role of multilevel governance, investment and finance.*

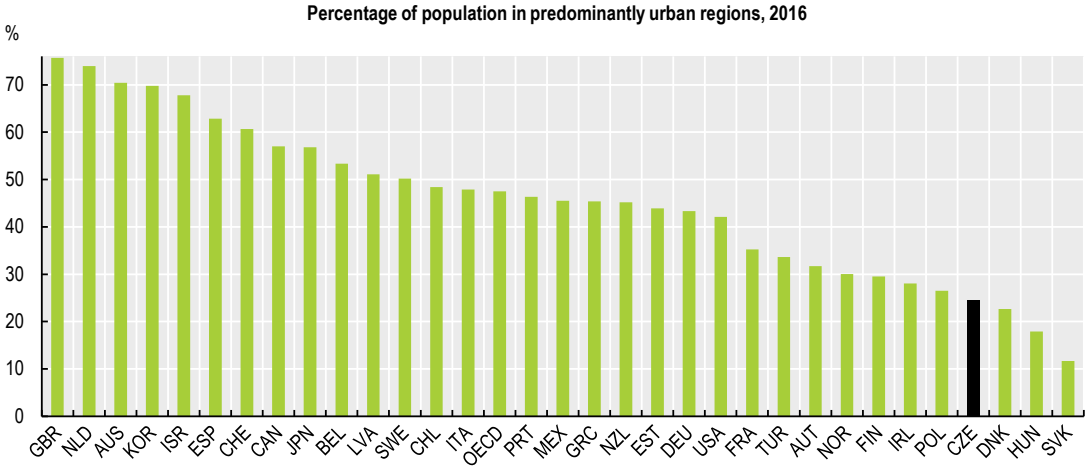
## 5.1. An overview of Czech cities

The Czech Republic's prosperity will largely depend on how well it manages its cities to promote economic growth and productivity. Cities are struggling to accommodate a more diverse population (elderly, immigrants) and provide services to people who increasingly reside outside the urban centres. The Czech Republic is among the least urbanised countries in the OECD. However, building sustainable cities, and improving the quality of life in urban centres while preserving the environment and promoting economic growth, are critical challenges.

### *5.1.1. The Czech Republic is a suburbanised country*

There are different ways to define urbanisation. According to the Czech Statistical Office, in 2016, 73% of the population lived in urban areas[1] (CZSO, 2017a). However, by the OECD regional typology,[2] the Czech Republic is among the least urbanised countries in the OECD, with one-quarter of the population living in predominantly urban regions, half the OECD average (Figure 5.1). More than half the Czech population live in intermediate regions.

**Figure 5.1. The Czech Republic is among the least urbanised of OECD countries**




*Source:* OECD (2017), *OECD Regional Statistics* (database).

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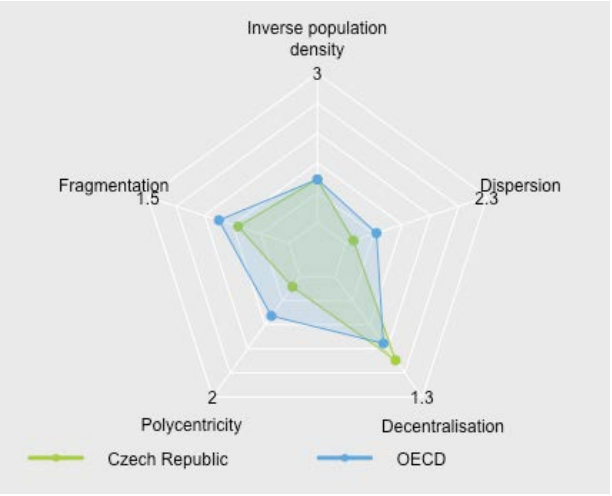
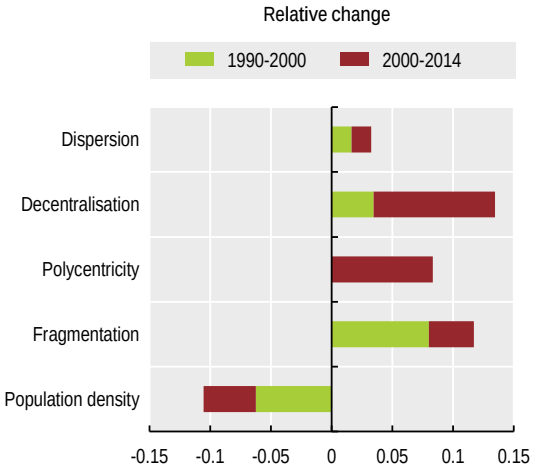
Cities of more than 100 000 inhabitants (Prague, Brno, Ostrava, Plzeň, Liberec and Olomouc) host 22% of the total population and occupy only 1.6% of the territory (CZSO, 2016). Since 2000, population has increased in Prague, Plzeň and Liberec and declined in other major cities. The capital and its surroundings in the Central Bohemia region have seen the strongest growth, with Prague's population expected to increase by 20% by 2050 (OECD, 2017b). As the decentralisation trend in Figure 5.2 shows, a rising share of urban population resides outside urban centres.

**Figure 5.2. An increasing share of urban population lives outside urban centres**

**Urban sprawl indicators**




*Note:* Data based on functional urban areas, an economic unit characterised by a densely populated "urban core" and a "hinterland" whose labour market is highly integrated with that of the core. The Czech Republic has 16 such areas, which account for nearly half the population and 29% of the land area. Population density: average number of inhabitants per square kilometre of land. Inverse population density: per capita land uptake. Dispersion: standard deviation of population density. Polycentricity: number of high population density peaks in an urban area. Fragmentation: number of urban fabric fragments per square kilometre of built-up area. Decentralisation: percentage of population residing outside areas of peak density.
*Source:* OECD (2018), *Towards Sustainable Cities: A New Perspective on Urban Sprawl.*

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As the fertility rate is low, internal and international migration is the main contributor to population growth. Over 2000-16, it accounted for 97% of the population increase in Prague, 133% in Plzeň and 56% in Liberec. The share of foreign-born inhabitants in total population rose from 4% in 2000 to 7% in 2015 (of which about 40% from Slovakia and Ukraine), well below the OECD average of 13%.

The population in major cities is ageing. This entails long-term challenges related to housing, transport, water and other public services. Such challenges are coupled with an expected rise in expenditure on pensions, healthcare and long-term care (OECD, 2016a). In Prague, the largest age group in the population is between 25 and 40, partly because of young people moving there for work. The proportion of children is smaller, however, due to families leaving for the suburbs as well as birth rates that are lower than in earlier generations (IPR, 2015).

Czech cities have relatively low population density by EU standards. That of Prague is the country's highest, yet its density level is low by comparison with the most densely populated cities in neighbouring countries (Table 5.1). Of course, population density in Prague varies by district (IPR Prague, 2015).

**Table 5.1. Czech cities have low population density**

Population density of local administrative units,[a] 2015

| | Highest | | Second highest | | Third highest | |
|---|---|---|---|---|---|---|
| | Name | (Pop./km2) | Name | (Pop./km2) | Name | (Pop./km2) |
| **Austria** | Wien | 4 335 | Rattenberg | 3 641 | Matrei am Brenner | 2 617 |
| **Czech Rep.** | Prague | 2 538 | Havírov | 2 340 | Zastávka | 2 139 |
| **France** | Paris 11th arr. | 42 138 | Paris 18th arr. | 33 798 | Paris 20th arr. | 33 117 |
| **Germany** | München, Landeshauptstadt | 4 531 | Ottobrunn | 3 972 | Berlin, Stadt | 3 837 |
| **Hungary** | Budapest | 3 347 | Szigethalom | 1 860 | Diósd | 1 674 |
| **Poland** | Legionowo | 4 008 | Piastów | 3 970 | Swietochlowice | 3 869 |
| **Slovenia** | Ljubljana | 1 044 | Maribor | 762 | Isola | 556 |
| **Slovakia** | Kosice – Siddlisko KVP | 13 922 | Kosice – Západ | 7 324 | Kosice – Nad jazerom | 6 969 |

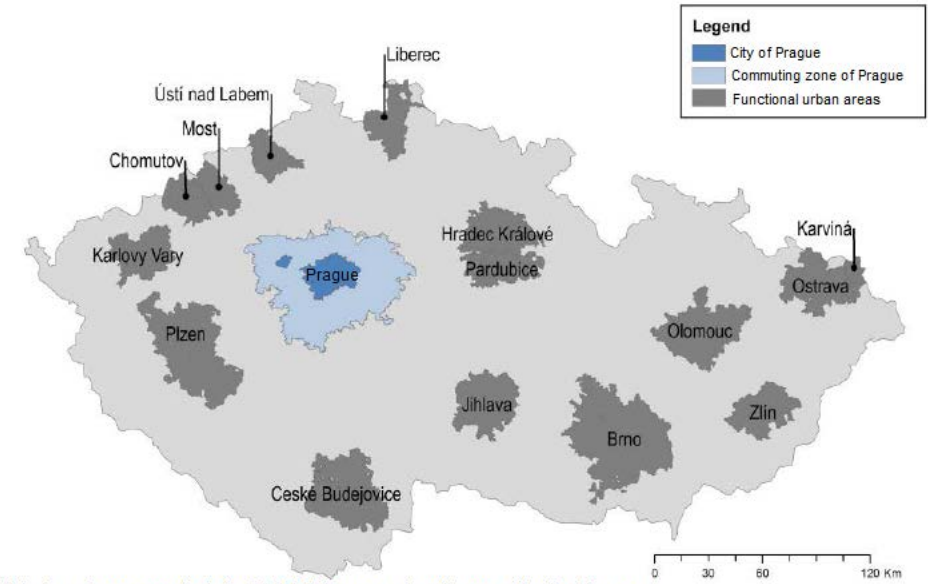
a) LAU2.
*Source*: Eurostat (2016), *Urban Europe: statistics on cities, towns and suburbs*.

Despite a relatively stable trend in the amount of built-up area over 2000-15, the land take of agricultural land resources for road infrastructure accelerated in the early 2000s (Chapter 1. ). Urban regions experienced the strongest growth in developed land but since this growth was outpaced by population growth, the per capita area of developed land declined slightly (OECD, 2017c). Since 1990, cities have become more fragmented (Figure 5.2). Prague has grown through new construction and the incorporation of outlying villages (IPR Prague, 2015).

### *5.1.2. Prague, Brno and Ostrava are important sources of economic growth*

Extending the definition of cities to their commuting zones, the Czech Republic has 16 functional urban areas[3] (FUAs), which account for nearly half of the total population (Figure 5.3).

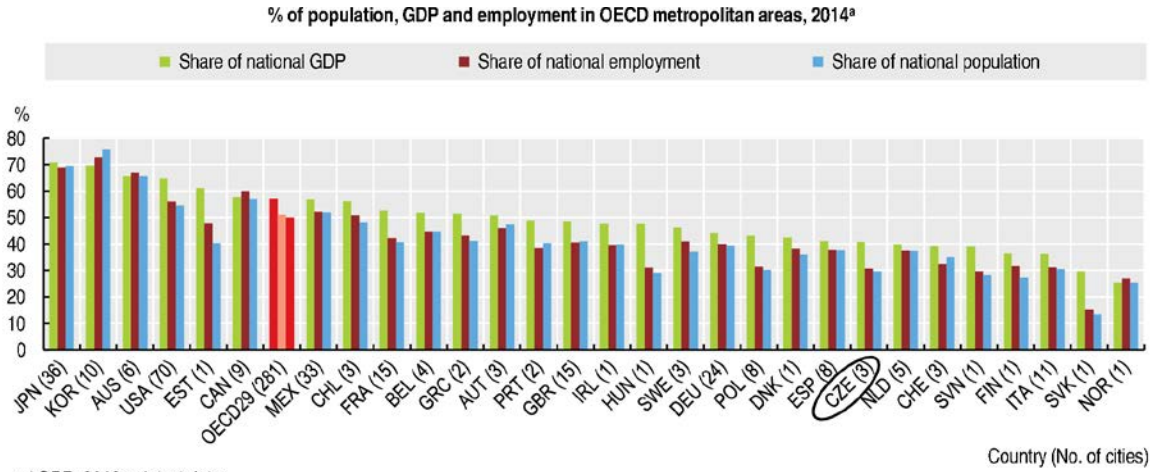
**Figure 5.3. The Czech Republic has 16 functional urban areas**




Note: Prague's core, according to the OECD definition, covers the entire area of the city of Prague as well as the nearby municipality of Kladno.
*Source:* OECD (2017b), The governance of land use in the Czech Republic: the case of Prague.

The Prague, Brno and Ostrava FUAs are the largest. With more than 500 000 people each, they fit into the definition of metropolitan areas. They account for 41% of GDP, 31% of employment and 30% of total population (Figure 5.4). This suggests they constitute the engine of the country's economic growth. Thus improving productivity and competitiveness in these three areas would have positive repercussions nationwide. Prague's FUA encompasses the territory of 435 municipalities of various sizes, Brno's 245 and Ostrava's 67.

**Figure 5.4. Metropolitan areas are the engine of economic growth**




a) GDP: 2013 or latest data.
*Source:* OECD (2017), "Metropolitan areas", *OECD Regional Statistics* (database).

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Prague (*Praha*) is by far the largest city, with 1.27 million inhabitants in 2016. It produces nearly a quarter of GDP and its disposable income per capita is 30% higher than the national average (CZSO, 2016). The service sector accounts for more than 80% of its value added. The second and third largest cities are Brno (pop. 377 000) and Ostrava (pop. 292 000). Most other cities are significantly smaller.

The unemployment rate has declined since 2000 to a level that put the Czech Republic among the best OECD performers in 2016 (Chapter 1. ). However, the level of unemployment in Brno and Ostrava remains higher than the national average (Figure 5.5). Prague's unemployment rate is among the country's lowest but has been increasing over the past ten years.

**Figure 5.5. Unemployment rates in some major cities remain high**


*Source:* CZSO (2017), "Employment, Unemployment" (database).

StatLink http://dx.doi.org/10.1787/888933723568

### *5.1.3. The urban population is well educated*

Urban populations generally have the most opportunities to pursue tertiary education. Prague and Brno have the largest percentage of university graduates (24%), followed by Olomouc (21%), Plzeň (16%), Liberec (15%) and Ostrava (14%) (Krausova, 2014). A high share of well-educated residents benefits cities because highly educated people not only are more productive, on average, but also raise less educated residents' productivity level (OECD, 2015). Czech cities have reached the target set in the Europe 2020 Strategy of at least 40% of 30- to 34-year-olds having completed higher education (EC/UN-Habitat, 2016). However, as in other EU countries, rural areas lag behind.

In 2011, 72% of those employed in Prague and 65% in Brno and Olomouc worked in services, whereas in Ostrava, Plzeň and Liberec nearly one-third worked in manufacturing and construction (Krausova, 2014). Professional and scientific activities account for a significant share of jobs in Prague and Brno: in 2016, 56% of the employed in Prague worked as managers, professionals, technicians and associate professionals, while 26% worked in clerical support and in services and sales.

As in Hungary, Poland and Slovakia, the risk of poverty or social exclusion is lower in cities (8%) than in rural areas (11%) and suburban areas (10%) (EC/UN-Habitat, 2016).

### *5.1.4. Cities face a looming housing affordability gap*

#### *Access to affordable housing is a major concern*

The cost, quality and affordability of housing are major concerns. In Prague only 30% of residents consider it easy to find good housing at reasonable prices, compared with 65% in Ostrava (EC/UN-Habitat, 2016). Demand is high in Prague, where the average price per square metre of an apartment was 30% greater than in Brno in 2016 (OECD, 2017b).

A key problem with housing is physical deterioration of housing estates. Physical obsolescence relates not only to buildings (low energy efficiency, poor technical quality, etc.), but also to neglected public spaces. Although significant investment is being made

to regenerate estates inherited from the Soviet era, many lack adequate maintenance. This has an effect on social cohesion as more affluent families move to better-off areas. Lack of finance for complex regeneration of housing estates is a crucial problem. Regeneration is mostly limited to physical renovation of panel houses (insulation, technical infrastructure, windows). A systematic approach to the surrounding greenery, public buildings and space is generally lacking (Temelová et al., 2011).

*The rate of completed dwellings decreased despite growth in the total housing stock*

Nationwide, the total housing stock increased. However, over 2010-16, the number of completed dwellings declined: by 26% for single-family houses and 18% for apartment buildings (CZSO, 2017b). Of the new housing construction in 2016, 29% of apartment blocks were built in Prague and 25% of houses in Central Bohemia. The number of building permits decreased faster in the capital (by 37%) than in the surrounding region (by 13%), including for residential buildings (down by 41% and 12%, respectively). The lengthy process for obtaining building permits contributed to the housing price increase.

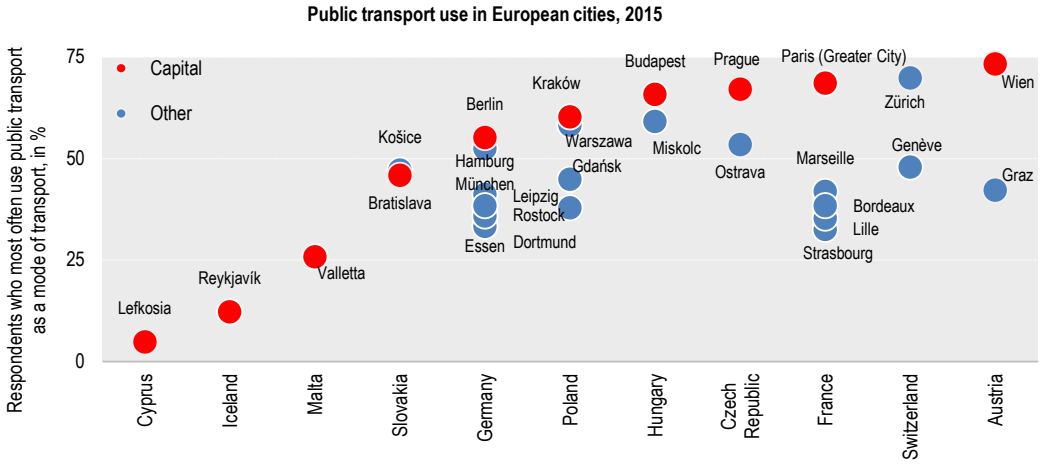
*The Czech Republic has a high rate of home ownership.*

As in other Eastern European countries, owner-occupied housing levels are high (EC/UN-Habitat, 2016). Among Prague residents, the largest share live in owner-occupied apartments (43%), followed by rented housing (31%), co-operatives and houses (11% each) and other accommodations (2%) (CZSO, 2016). It is worth noting that 76% of new houses built in Prague are for the owner's use and 24% are for sale. The percentage of housing for rent is relatively low, limiting labour mobility. There is practically no construction of flats or houses for rent. Regarding blocks of flats in Prague, the number of new co-operative buildings increased dramatically, from 70 completed in 2013 to 252 in 2015. A very accessible mortgage rate (2% per year) and economic growth have increased demand for houses in recent years, with prices rising accordingly.

### *5.1.5. Despite an efficient public transport network, car use increased*

Prague has an integrated transport system (metro, trams, buses, trains, ferries and a funicular) that covers the entire city and one-third of the Central Bohemian region. It is the main transport mode of the city's residents (Figure 5.6). Since 2010, about 1.2 million passengers a year have used urban public transport, on average (MOT, 2017). In 2016, most people travelled by metro (36%), followed by bus (32%) and tram (29%) (City of Prague, 2017). As part of city government efforts to modernise the transport infrastructure and make it more environment-friendly, ageing vehicles are being replaced with CNG and electric vehicles, with a strong emphasis on providing buses and trams accessible to people with reduced mobility. A key outcome of investment in urban transport has been the high levels of satisfaction with public transport quality in Prague (86%) and Ostrava (81%) (EC, 2016).

**Figure 5.6. Public transport is the main mode used in Prague**




*Note:* Respondents could select up to two modes.
*Source:* EC (2016), "Quality of Life in European Cities, Country report Czech Republic", *Flash Eurobarometer 41*.

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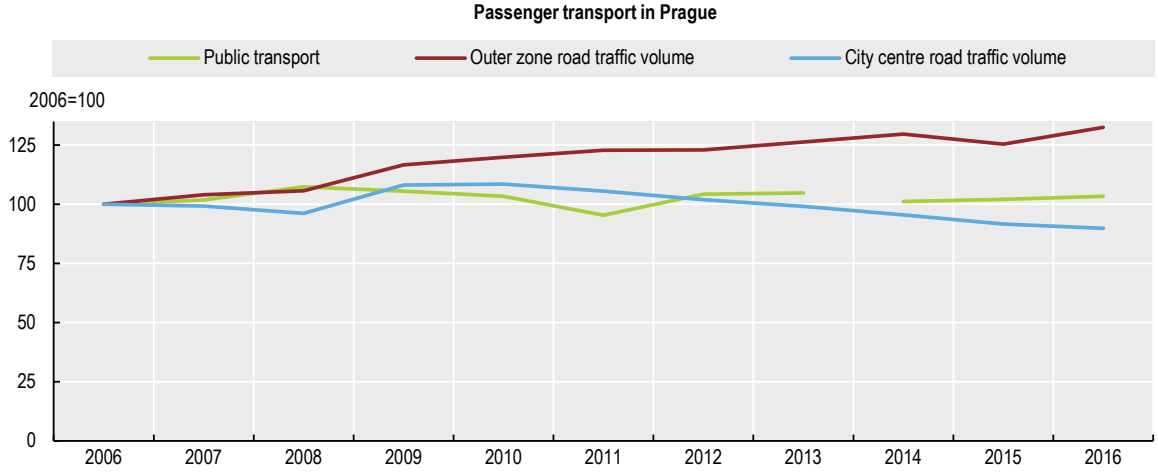
However, car ownership increased as incomes and suburbanisation rose. In Prague, it grew by 25% between 2010 and 2016, faster than in any other region. Congestion and parking problems, as well as noise and air pollution, have resulted. Over 2006-16, while the number of passengers using public transport remained broadly stable, car traffic volume increased significantly in the outer zone of the city, though it decreased in the centre (Figure 5.7) (City of Prague, 2017).

**Figure 5.7. Car traffic volume is growing in Prague's outer zone**




*Notes:* Public transport: index based on the number of passengers transported; break in time series in 2014. Traffic volume: index based on the number of vehicles over the 24 hours of an average workday. City centre: bounded by Petřín in the west, Letná in the north, Riegrovy sady in the east and Vyšehrad in the south (the Strahov and Mrázovka tunnels lie outside the central cordon). Outer zone: traffic volume is measured where the main roads and motorways enter the city centre.
*Source*: City of Prague (various years), *Prague Transportation Yearbook*.

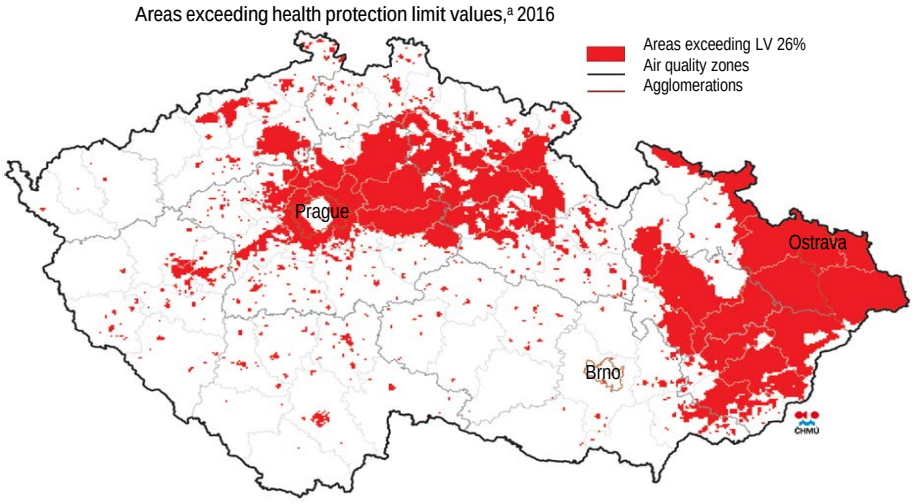
StatLink http://dx.doi.org/10.1787/888933723606

Prague lacks infrastructure for soft transport modes. It is ranked 5 (out of 100) on the Sustainable Cities Mobility Index (Arcadis, 2017). However, a limited percentage of residents use cycling as their main transport mode. Promotion of bicycle transport and installation of the necessary infrastructure are part of the city's development plan. Cycling solutions are being integrated into new building and construction projects.

### *5.1.6. Urban residents are exposed to higher air pollution levels*

Urban residents are exposed to higher air pollution levels, though to a lesser extent in Brno (Figure 5.8). In 2016, areas exceeding health protection limit values accounted for 26% of the territory and 56% of the population. When including ozone, which also affects the western regions, the shares reach 43% and 59%. The major sources of local air pollution are road transport and fossil fuel combustion for residential heating. The Moravian-Silesian region is also affected by industrial sources and transboundary air pollution at the Polish border (Chapter 1. ). Air quality poses disproportionally high health risks for the residents of Ostrava (Tomášková et al., 2016).

**Figure 5.8. Air pollution is higher in urban, suburban and industrial localities**




*a)* Annual limit values for $PM_{10}$, $PM_{2.5}$, benzo(a)pyrene, $NO_2$, lead, cadmium, arsenic, nickel and benzene, limit value for CO (max. daily 8-hour running average), daily limit value for $PM_{10}$ and $SO_2$, 1-hour limit value for $SO_2$ and $NO_2$.
*Source:* CHI (2017), *Graphic yearbook 2016*.

Metropolitan areas are large energy consumers and greenhouse gas (GHG) emitters. FUAs in the Karlovy Vary, Ústí nad Labem, Moravian-Silesian and Central Bohemian regions and Prague account for three-quarters of national $CO_2$ emissions from energy production (EEA, 2017). While lack of information at territorial level impedes benchmarking of urban GHG emissions, available data suggest emissions in Prague proper are lower than in its commuting zone (7 tonnes per capita compared with 13 t./cap. in the FUA in 2008) (City of Prague, 2016; OECD, 2017d). In the capital, total GHG emissions have decreased since 2005 but transport's share increased to 29% by 2014. $CO_2$ emissions per capita in urban areas in general are lower than those in less densely populated regions (OECD, 2013). Czech metropolitan areas could be more energy efficient if a more compact city growth model were followed. National legislation on environmental protection, land use and public health should be reviewed to promote compact urban development.

### *5.1.7. Some cities are moving towards a sustainable energy approach*

Overall, awareness of renewable energy development options seems to be low. Cities lack information about their own potential, have no conceptual documents and a low share of renewable energy use (Škopková, 2016). However, promising initiatives have been taken in some cities. Fuel consumption for heating and hot water has been decreasing over the past decade, due mostly to increased use of natural gas boilers with higher combustion efficiency. Electricity use has been continually increasing. Since 1994, the Prague city government has run a clean energy programme which provides subsidies to replace heating systems using solid fuel with environmentally friendly ones and use renewable energy sources.

Litoměřice is one of the pioneer cities in promoting clean energy. Its strategic development and energy plans aim to make it a low-carbon, energy self-sufficient city by 2030. Since 2000, it has been implementing measures to develop small-scale renewables, e.g. subsidising private solar thermal installations. Since 2012, the city has managed to save EUR 830 000 through energy efficiency projects, investing the funds back into energy saving through the Municipal Energy Savings Fund. It has also been working on an ambitious geothermal heating plant that could cover the needs of 70% of its population, but the national government's political, technical and financial support is essential. As a rather small city, Litoměřice finds it a challenge getting access to financial resources to implement its plans and programmes. To promote sustainable energy, Litoměřice, the cities of Chrudim, Kopřivnice and the district of Brno-Nový Lískovec set up a municipal energy manager association in 2014 (Covenant of Mayors for Climate & Energy, 2014).

### *5.1.8. Urban residents have almost universal access to drinking water and sewage treatment*

Most Czech residents (94%) have access to public water supply, and in large cities, connection rates reach 100%. Drinking water is of very high quality, particularly in supply zones of over 5 000 inhabitants (SZU, 2017). EU financial support helped improve water infrastructure. The share of water lost to leaks fell from 21% in 2006 to 15% in 2016. In Prague, the rate decreased from 24% to 14%.

The share of population nationwide connected to public sewage treatment grew from 73% in 2005 to 81% in 2015, in line with the OECD average (Chapter 1. ). In cities including Prague and Litoměřice, almost all households are connected to the sewerage system. The Czech Republic met the collection requirements of the EU Urban Waste Water Treatment Directive but not the 2010 treatment level objectives. By 2014, only 3.5% of wastewater collected in Prague underwent more stringent treatment, compared with 62.7% countrywide (MoE, 2017). This was largely due to delays in rebuilding the central wastewater treatment plant. The new plant, which will meet EU effluent standards, is scheduled to be commissioned in 2018 (Wanner, 2015). The Prague sewerage system mixes sewage and rainwater in the same pipes, while new housing estates on the outskirts have a system that separates the two.

## 5.2. Urban governance

### *5.2.1. The territorial division is fragmented*

The Czech Republic is a unitary state divided into 14 regions (*kraj*). The Constitution (Article 99) assumes a two-level system of local government, with municipalities as the basic territorial self-governing units and regions as the higher level of self-governing units. There is no hierarchical link between the two levels. The state can intervene in territorial self-government only when provided for by law and for reasons of upholding the law. The Constitution stipulates that the territorial units are communities of citizens with the right to self-government. A statute specifies when they have the role of administrative districts.

The Constitution guarantees independent administration of municipalities by elected assembly and council. As of 2016, the municipal level comprised 6 258 municipalities (*obce*), including 604 towns (*město*), 26 statutory cities (*statutarni město*) and 223 market towns (*městys*) (CZSO, 2017c). The number of municipalities is very large compared with countries of similar population levels; for instance, Sweden also has 10 million people but 290 municipalities. Most Czech municipalities' population is less than 500. According to the Act on Municipalities (Act No. 128/2000 Coll.), a municipality with at least 3 000 inhabitants can be considered a city. The statutory cities (accounting for 34% of the population) have special status granted by law and can establish submunicipal districts with their own mayor, council and assembly (only eight cities have chosen this option). Municipalities have the right to manage municipal property, adopt municipal budgets, establish legal entities, adopt a municipal development programme, approve local physical plans and issue ordinances. They have independence in managing their property and financial resources and in the field of local strategic development and physical planning. The number of municipalities with town status grew from 527 in 2004 to 604 in 2016.

Prague has the level of a regional government. The Act on the Capital City of Prague defines the rights and duties of its assembly and council as well as those of metropolitan districts. Prague issues regulations and decrees within its areas of competence, such as building regulations. It has the powers of a region and those of a municipality. The interplay between these levels makes planning complex (OECD, 2017b). The municipality of Prague is divided into 57 boroughs (22 of which are also administrative districts), but the crucial power is at the central Prague municipal government level, at which decisions are taken about decentralisation of responsibilities to boroughs. For example, Prague municipality owns real estate, but decentralises the management of certain properties, such as public housing, to boroughs. Urban planning, on the other hand, is done at the central municipal level.

### *5.2.2. The distribution of responsibility across government levels is complex*

The national government plays a decisive role in urban development through urban and regional policy, enactment of legislation and elaboration of national strategies and programmes.

The Ministry of Regional Development has a central role in defining regional, housing and investment policy, developing housing stock, providing the framework for spatial planning, issuing building rules and overseeing expropriation and tourism. It also administers the funding to implement the housing and regional policies and co-ordinates housing-related activities by other ministries and central government authorities. In

addition it is the national co-ordination authority for management and implementation of programmes financed by EU structural and cohesion funds.

Regions are responsible for upper secondary education, regional roads, public transport, healthcare and general hospitals, social assistance and other areas, including several functions related to planning and spatial development: they approve planning and zoning documents and oversee regional economic development and environmental protection. Regional governments can issue binding ordinances or decrees in their areas of independent or delegated authority. Municipalities are responsible for local and urban planning, public transport, local roads, housing, land use and spatial arrangements, environmental protection and infrastructure (including water management and treatment, urban heating and waste processing), agriculture, provision of primary health care and social services, and local development in general. Competencies and responsibilities of local government, particularly municipalities, on urban issues are established by national law.[4]

Municipal authorities are delegated some central level functions.[5] While municipalities have equal status, they are divided into three categories according to the scope of their delegated responsibility: 205 municipalities with extended powers; 1 036 municipalities with some delegated powers (e.g. registry office, building authority), including 388 with authorised municipal authority; and "basic" municipalities. Municipalities without extended powers are assigned to a municipality with extended powers, which fulfils several administrative functions for them, such as maintaining records of births, deaths and marriages. Most municipalities (over 90%) have delegated some functions to other municipalities. Municipalities with extended powers draw up local territorial plans, regulatory plans and planning studies for their own territory and that of adjunct municipalities without extended powers. The plans must be approved by the council of every affected municipality. Local councils can also comment on and object to regional development principles and plans of neighbouring municipalities (OECD, 2017b).

### *5.2.3. Metropolitan-wide planning approaches are lacking*

The Czech Republic is taking a more integrated approach to territorial development so as to use EU structural and investment funds in certain areas, not only to support national competitiveness but also to reduce territorial disparity. Instruments to use these funds include integrated territorial investment, integrated territorial development plans and community-led local development. However, such investment projects are hindered by a lack of effective metropolitan-area governance arrangements that support productivity and competitiveness. Integrated territorial investment cannot fully replace metropolitan-area planning because it focuses on individual projects. For instance, Prague has no metropolitan-area planning approach to land use, and its proposed strategic plan for the metropolitan area does not appear to involve significant co-operation with municipalities elsewhere in Central Bohemia. National legislation does not let Prague use land use planning tools beyond its administrative borders, contrary to the metropolitan or functional approach to managing a metropolitan area. Any future measures to enhance metropolitan-area co-ordination should focus on land use planning, including to address urban sprawl resulting from inadequate co-ordination (OECD, 2016b). Moreover, most municipalities are too small to ensure cost-effective provision of public services. Municipalities' lack of incentives to merge and form larger units has important implications for spatial and land use planning. Such decisions are made at the most local level, often resulting in conflicts, competition and apathy that prevent co-operative solutions. Territories that are functionally connected do not co-ordinate on joint spatial strategies or benefit from

approaches emphasising the collective public good, such as protection of forest, agricultural land and natural amenities. To meaningfully influence the environmental impact of urban development issues such as land use and transport, authorities must act at a level that considers central cities and suburbs together (OECD, 2015b).

In a context of high territorial fragmentation, adopting a metropolitan-area approach to urban management could bolster competitiveness and productivity and ensure better urban policy outcomes. Efforts could build upon the fact that municipalities are entitled to co-operate with other municipalities to carry out tasks in their competence. They can even form associations of municipalities to protect and promote their common interests in a wide range of areas.[6] Thus, the national government should continue providing incentives for inter-municipal co-operation and joint service provision. Contractual arrangements and financial transfers would be key tools for co-operation: the central government would commit to giving metropolitan areas specific advantages in return for stronger inter-municipal co-operation, as with France's inter-communal grants and Mexico's metropolitan fund.

Identifying concrete metropolitan-area projects (transport, water, sanitation, even cultural events), building metropolitan ownership, tailoring reliable sources of metropolitan financing, designing incentives and compensations for metropolitan compromises and implementing mechanisms for monitoring and evaluation could guide effective metropolitan-area governance reforms (OECD, 2015b). Reforms might build on transport system experience: the Prague, Brno and Ostrava metropolitan areas have governance bodies (e.g. jointly owned companies) that run integrated transport systems, successfully overcoming municipal borders and reducing the costs that fragmentation imposes (OECD, 2016a). One promising step towards a metropolitan strategy is that the 2015 Spatial Development Plan tasks the Ministry of Regional Development, the city of Prague and the Central Bohemia region with conducting regional studies focused on regional infrastructure interaction, co-ordinating development and conducting territorial studies on suburbanisation and unsystematic development in the area.

Another option would be to explore the possibility of creating "metropolitan cities" such as those in Italy, where 10 *città metropolitana* have key responsibilities in areas such as spatial planning and economic development. The Italian government provided financial incentives through EU structural funds to support investment at the metropolitan scale (OECD, 2015b). The Czech Republic has an advantage in that some municipalities can transfer responsibilities to larger municipalities, which could be the foundation for Czech metropolitan cities. The Prague Institute of Planning and Development (IPR Prague), the main city planning body, has the accumulated experience to serve as a planning institute at FUA level (IPR Prague, 2017).

## 5.3. Policy framework for sustainable urban development

### *5.3.1. The Czech Republic has a robust strategic framework for sustainable development*

Czech Republic 2030 sets the strategic vision for sustainable development (GOCR, 2017). A consensual framework for preparation of sector policies and action programmes, it is the starting point for strategic decision making within individual departments and for interdepartmental co-operation. The annual National Reform Programme, a conceptual document on stimulating economic growth (GOCR, 2016), sets priorities and reports on key measures to implement the Europe 2020 strategy, including

on transport, environment, climate and energy. The Regional Development Strategy 2014-20 aims at supporting competitiveness and reducing economic, social and environmental territorial disparity (MRD, 2013). It defines sustainable development as a priority for metropolitan areas, large agglomerations and regional centres. It covers i) management of public spaces (buildings, parks, natural habitats), ii) waste management, iii) territorial development (co-ordination of spatial planning, functional use of territory, participation of actors in land use planning), iv) smart energy management (energy saving in buildings and transport, development of biomass and other local renewable energy resources), v) reduction of air emissions and noise and vi) flood protection measures.

Czech Republic 2030 is the main implementation platform for the Sustainable Development Goals (SDGs; Chapter 1. ). Its priority on regions and municipalities provides a framework for mainstreaming sustainable development in regional and local policies. It contributes to the achievement of SDG 11 on sustainable cities and communities, among other goals. The Government Council on Sustainable Development (GCSD) co-ordinates implementation of Czech Republic 2030 and other sustainable development issues across ministries (Chapter 2. ). Its committees on sustainable municipalities and sustainable transport are very much related to urban development. But the national government does not always implement the GCSD's recommendations, with politics to play a major role. Moreover, not all stakeholders seem to have the same level of influence on the GCSD.

The 2015 Spatial Development Policy establishes planning priorities for sustainable development, corridors and areas for transport infrastructure and areas of expected development for energy and water management. It seeks to ensure integrated territorial development in cities and regions, prevent spatial or social segregation in the urban environment, support polycentric development of the settlement structure, develop brownfields to protect agricultural and forest land and preserve public green areas, improve territorial accessibility through transport infrastructure while preserving landscape permeability and minimising landscape fragmentation, improve public transport infrastructure, ensure transport connectivity of residential, leisure and production spaces, and take measures to mitigate floods. The policy sets development planning priorities of the Prague, Brno and Ostrava metropolitan areas and other main cities.

### *5.3.2. The principles of urban policy provide a specific policy reference framework*

In 2017, the national government updated the Principles of Urban Policy, a framework document, to propose guidelines and activities conducive to sustainable urban development, co-ordinate the approach taken by all government levels and ensure implementation of the UN-Habitat New Urban Agenda (Box 5.1). The principles, which reflect the interdisciplinary and cross-cutting nature of urban development, are binding for central government and are recommendations for city governments. They are also the basis for the forthcoming regional development strategy Czech Republic 2021+. They are valid until 2023, when they are to be revised and updated again. The principles aim to enhance competitiveness and sustainable development while promoting co-ordinated, integrated urban development. One aspect the new principles may need to emphasise, based on the experience of Litoměřice and OECD countries such as Sweden, is the need for strong organisational and individual leadership. Sustainable development cannot be achieved without political and public support. Similarly, the promotion of citizen engagement in urban planning should be stressed.

**Box 5.1. Principles of Urban Policy in the Czech Republic**

**The Principles of Urban Policy outline the views of the central government on cities' standing and importance for economic and regional development.**

- **Principle 1: Strategic and integrated approach to the development of cities**. City development requires a long-term vision and adequate planning tools. Urban and regional development cannot be disunited. The smart cities concept should inform the promotion of planning at the local level. Links between urban and rural policy and other relevant policies at the various levels of government need to be created.
- **Principle 2: Polycentric development of the settlement system.** Growth and development of large urban areas should not hinder the development of medium-sized and smaller cities.
- **Principle 3: Cities as poles of development in the territory.** Cites should help promote rural development, the knowledge economy and innovation in production. Brownfield redevelopment, investment in public transport and improved access to housing and public services are among the key priorities.
- **Principle 4: Protection of the urban living environment**. Strategic directions include adopting measures to prevent negative effects of climate change, efficient use of resources and energy, preservation of green areas, balance in the relationship between rural and urban areas, environmental education and public awareness.
- **Principle 5: Implementation of the New Urban Agenda.** A framework for implementation of the New Urban Agenda is to be prepared.

*Source*: MRD (2017), Principles of Urban Policy, 2017 update.

### *5.3.3. Cities' strategic plans are largely aligned with national directives*

Czech cities have strategic plans aimed at providing basic understanding of their long-term socio-economic direction. For example, the Strategic Development Plan 2030 of Litoměřice gives priority to areas such as enhancing the city's attractiveness and prosperity, making it energy independent and low emission and promoting efficient city management. The 2016 Strategic Plan of Prague seeks to promote business and creativity, foster participation and communication of citizens in the city's daily life, transform the city into a cultural centre, pursue social cohesion and revitalise public spaces. The elaboration of this plan followed a bottom-up approach, as it included the opinions of professionals and residents.

Prague's strategic plan also sets the basis for a general flood management and drainage plan for the city and a water supply and sewerage system development plan. The former, adopted in 2002, is a strategic tool to guide the planning, investment and operation of measures to manage floods and ensure the drainage of rainwater and sewage. The water supply and sewerage plan aims to ensure drinking water supply to the city and wastewater treatment. It sets the direction for investment in water supply and sewerage infrastructure construction and guides joint action with neighbouring territories on water management. The municipality of Litoměřice, by contrast, is trying to keep rainwater on its territory and is conducting a pilot project to use rainwater in the town hall.

Environmental protection and sustainable development are key priorities for Czech cities. For example, to save energy, diversify energy sources and reduce GHG emissions, the Prague city government prepared a territorial energy concept for 2013-33, in line with the National Energy Management Act and the city's land use plan. The concept seeks efficiency in energy supply and management to contribute to the sustainable development of the city. The Litoměřice strategic plan, meanwhile, has a goal of making the city energy independent, with high quality of life, by 2030. Its city energy city plan set a goal for 2030 of reducing energy consumption by 20% compared to 2012. As part of its action plan, the city government tries as much as possible to renovate and reconstruct public buildings using renewables and convert them into nearly zero energy consumption buildings.

### *5.3.4. Silo-style administration of urban policy prevails*

Interviews for this review revealed a widespread perception that urban, social and environmental policies are still largely conducted in siloes, with a lack of unified direction for ministries on policy implementation. This suggests that the urban sustainability vision has not been integrated holistically in various policy areas. Sectorisation and specialisation seem well-rooted in the administration, and while they provide clarity for accountability and responsibility, they limit the ability to co-operate on holistic solutions. For example, there is no administrative unit dealing with cross-sector issues in the city hall of Prague (Von Radecki et al., 2016).

The problem appears to be not a lack of co-ordination instruments but rather how the instruments operate. For instance, the GCSD does not fulfil its role as an intersectoral co-ordinator of sustainable development policies because it does not always influence decision making. There is no cross-cutting distribution of responsibility for urban development across ministries, which thus conduct planning and work specific to their sector not only without co-ordination but also with little reference to one another. An alternative approach would be for the Czech Republic to revise the operation of the GCSD and its working groups based along the lines of Sweden's Platform for Sustainable Cities (Boverket, 2017). The five central agencies that constitute the platform collaborate on key issues for sustainable development. The GCSD and its working groups should similarly have a mandate for specific joint delivery as well as promotion of collaboration, co-ordination, knowledge dissemination and exchange of experience. The Czech Republic could also make the allocation of responsibility across ministries more cross-cutting and give more clarity on their responsibility for urban development.

### *5.3.5. A 3C development model and more support to Local Agenda 21 could boost urban policy effectiveness*

Czech authorities may wish to pursue the type of urban development model known as 3C (compact, co-ordinated, connected), where housing and transport policies are a central part. The model may be explicit in strategic urban development documents. A 3C model provides a holistic approach to urban development by linking housing, spatial planning and transport policies to facilitate synergy building in urban development disciplines. Housing, for instance, is not only seen as basic infrastructure but valued for location, environment and services. This linkage would underpin environmental sustainability and assist authorities in their quest for better water management and flood prevention, among other issues.

At a local level, the Czech Republic could build on the Healthy Cities platform, which emphasises addressing the determinants of health through intersectoral partnerships and stresses collaboration across public, private, voluntary and community sector organisations.[7] As the 2005 Environmental Performance Review of the Czech Republic recommended, Local Agenda 21 – a voluntary tool for sustainable development at the local level – is being implemented mostly through the Healthy Cities platform. Municipalities that have adopted the agenda (180 in 2017, up from 40 in 2006) seem to have generated more environmental awareness among citizens and economic actors (Kveton et al., 2014, CENIA, 2017). The national government should further support the initiative by disseminating its advantages among other municipalities through the Union of Czech Towns and Municipalities and assessing its results. The GCSD LA21 Working Group has approved the methodological tools for evaluating initiatives under the agenda. So far, the four best-performing municipalities (Chrudim, Litoměřice, Jihlava, Kopřivnice) have been reviewed.

## 5.4. Policy instruments

### *5.4.1. Spatial planning and land use*

*The Czech Republic has a relatively solid, hierarchical planning system…*

The spatial planning system in the Czech Republic is legally robust; planning instruments are clearly defined and regularly updated, and have a clear multilevel structure (OECD, 2017b). The country has a hierarchical system in which lower level plans need to comply with higher level plans. The 2015 National Spatial Development Policy, at the top of the hierarchy, contains general guidelines for planning and specific requirements for sustainable development, outlines the key spatial relations within the country and related national government objectives (e.g. areas important to technical and transport infrastructure development) and collects and analyses data relevant to regional and local territorial planning (MRD, 2015). However, it does not outline a vision for future spatial development. Rather, it mostly focuses on identifying key areas and corridors for development and protection – in some cases, at a very detailed scale.

The 2007 Building Act introduced development principles as a new instrument of regional planning documentation. They provide details for specific policy areas (such as roads) or for territories of particular importance, set regional spatial development priorities and co-ordinate municipal planning activities.

At the municipal level there are three types of plans. First, local territorial plans show permitted land uses and cover the entire municipal territory. There is no legal obligation to adopt local territorial plans but, once adopted, they are binding for landowners. While they are strictly enforced, they are frequently updated to fit developers' needs. Second, regulatory plans are prepared for specific areas, such as redevelopment zones, and cover only small parts of municipalities. They provide further regulations on details of permitted developments, such as architectural specifications. Third, planning studies are ad-hoc documents that regional and local authorities can procure to develop solutions to particular planning problems. They are non-statutory and have no legal consequences for either landowners or public authorities. Planning studies do not have clearly defined contents and can range from broad strategic documents to precise land use plans.

Czech spatial management is affected by a lack of co-ordination between economic policy and spatial planning at all levels of government. Regional strategic and spatial

plans are disconnected. Municipal land use plans are not always well connected to regional spatial plans. There is no direct link between spatial and land use planning and financial planning: the central government, regions and municipalities often make statutory plans without clearly anchoring them in public budgets. Resources and ambitions thus may be mismatched (OECD, 2017b). Better integration of sectoral plans in spatial planning is needed to co-ordinate investment.

The system of territorial planning is strongly affected by sector policies and interests that may be difficult to reconcile and accommodate. Examples include conflicts between i) monument and nature preservation and projects for transport infrastructure, and ii) adjoining municipalities in the case of new infrastructure investment (e.g. roads, bike paths, bio-corridors) (OECD, 2017b). The effectiveness of a city's strategic plan is undermined by the fact that other municipal strategies and frameworks, programmes or sector concepts prepared by the city administration, as well as borough-level strategic plans, are not obliged to confirm to its objectives.

### *… but Prague's intense suburbanisation suggests a lax local land use planning system*

Prague has seen the most intensive urbanisation and suburbanisation of any municipality in the Czech Republic. It has a large share of agricultural and natural land in its territory,[8] but urbanisation has affected the landscape's character and landscape protection has been insufficient (City of Prague, 2016). Prague's intense suburbanisation suggests highly permissive land use policies contributing to expansionary and often sprawling development. Between 2000 and 2012, developed land across the Prague FUA increased by 0.7% per year, compared with the OECD Europe average of 0.4% (OECD, 2017b). The greatest increase was in the commuting zone, where developed land grew by 1% per year compared with 0.3% in the urban core.[9] Developed land per capita in the commuting zone is much higher than the OECD Europe FUA average. This may in part reflect a preference by commercial and industrial firms to locate operations outside the city's administrative boundary to qualify for EU funds in the Central Bohemian region. Other factors include a cultural preference for large suburban homes. The Principles for Urban Development suggest that forming rural-urban partnerships, with relevant rural and urban stakeholders working together on initiatives aimed at yielding collective benefits for all through a functional approach, may be the way forward.

### *Prague requires strategic land use planning to manage urbanisation and protect the environment*

Prague's 2016 strategic plan contains three strategic directions on the themes of i) a cohesive and healthy metropolis, ii) a thriving and creative metropolis and iii) a well-run metropolis. Prague's Metropolitan Plan, on the other hand, rather than defining zones and their functions, describes an area's characteristics and how it can be improved, given its unique character. The plan focuses on encouraging development in built-up areas and protecting unbuilt landscape and fields from development. It thus allows for increased intensity of use in inner city areas and development of brownfield sites.

Authorities in Prague have been working on a public space development plan primarily focusing on the urban character. It includes a strategy and a manual setting general principles, rules and procedures for development of public spaces. The plan's elaboration is a long-term process of updating, responding to the city's current needs and investment priorities (IPR Prague, 2014).

The city is also in the final stages of approving a new land use plan to control urban sprawl and protect surrounding green areas. However, though it is called the Metropolitan Plan, legal restrictions mean it covers only the municipality, not the larger metropolitan area, where some of the largest growth is taking place. Grounded in a compact city approach, the plan aims to concentrate and intensify use of existing areas and to develop brownfields while designating almost no greenfield areas to be developed. It further aims to reforest open areas as much as possible to increase ecological stability. The plan's main drawback seems to be the lack of reference to the FUA or regional priorities. A more promising strategy for sustainability would be to work co-operatively across administrative borders and sector boundaries to protect and manage land.

Authorities could also ensure that the zoning system is reoriented to promote overall community interests. Sound regulatory design suggests that zoning frameworks should provide as much flexibility as possible. The need for restrictions, and the benefits and costs they create, should be evaluated, taking into account the interests of the community as a whole. Authorities have learned from previous critiques of relatively closed processes, so the Metropolitan Plan's elaboration has been participatory, with many efforts to engage the public, boroughs, developers and other key stakeholders. The process has also sought to address the criticism that past land use plans have been rigid and inflexible, static regulatory documents that do not adequately encourage new and innovative uses. The new plan makes locality the basic unit, defining it by its position in the city, the prevailing character of the built-up area and landscape, and cultural and economic conditions. Preserving the urban green environment while developing a compact city that provides sufficient housing alternatives to a population that is growing, albeit slowly, is a difficult balance to achieve.

### *Brownfield development is central to environmental protection and bridging the housing affordability gap*

Brownfield sites account for a considerable share of most Czech cities' territory. Prague, for instance, has disused railway stations and factories that could be given a new purpose. Even housing estates require renovation to be attractive to residents. Brownfield regeneration offers cities a valuable opportunity to prevent loss of green areas, enhance urban spaces and sometimes remediate contaminated soil. Such sites are usually well connected within the urban boundaries, offering a competitive alternative to greenfield investment. However, cities have trouble redeveloping these spaces because i) several owners claim some properties, ii) it is easier and cheaper for investors and more attractive for potential users to develop green land, iii) it is difficult to change the land use, as the related plan would have to be modified or exemptions to it would have to be made, iv) some places are bound by historical uses and it is difficult for cities to change that, v) brownfield restoration and decontamination can be costly and technically complex, and vi) dialogue between owners and city authorities is not always fruitful.

Redeveloping brownfields could nevertheless help bridge the housing affordability gap and make more sustainable use of valuable land. Experience in other OECD countries suggests that fiscal instruments are key to provide incentives for brownfield investment and guide land use to a more sustainable path; examples include subsidised insurance, development fee waivers and property tax abatement. Portugal, for instance, imposes a heavier tax burden for development outside urban areas and provides tax relief to encourage redevelopment in the city centre. Czech cities could also explore the possibility of establishing i) revolving urban development funds, ii) land value finance tools designed to recover the capital cost of urban investment by capturing some or all of the

increments in land resulting from the investment, or iii) public-private partnerships. It is important to stress that the quality of the landscape plays an important role in brownfield development. Belgium's experience suggests that using cultural heritage and green spaces as levers to obtain public support for regeneration leads to positive results. Czech cities could explore a combination of instruments, valuation and indicators to deal with the complexity of brownfield regeneration. Local governments should ensure that citizens and investors see brownfield sites as a valuable opportunity to preserve the environment and generate economic development, rather than as a costly problem. Czech authorities could use the smart city concept and strategies to guide urban regeneration. Korea, for instance, is linking its smart city vision to urban regeneration and public housing projects. Smart cities are seen as a tool for solving urban problems and improving the quality of life by applying new technology to cities.

Specific approaches to housing estate regeneration are needed, focusing on particular aspects such as the state of physical decay and the population's ageing and socio-economic structure. Prague, for example, should continue efforts to develop brownfields, plan land use strategically and combine urban and socio-economic development policies. But it requires its own strategy, since central brownfield sites present the largest development opportunities, with potential to transform entire neighbourhoods and districts. In other cities, such as Karvina, brownfield sites are outside the city (former coal mining sites) or near housing estates (industrial zones), and city authorities and citizens lack awareness of the social and environmental problems associated with them. National, regional and municipal policies on brownfields show gaps in how they conceptualise the issue (Martinat et al., 2016).

### *5.4.2. Prague's building regulations promote better urbanisation…*

Prague has new building regulations, approved in May 2016, that are grounded in urbanism principles aiming to create walkable, bikeable, attractive neighbourhoods with high quality public and green spaces. The regulations emphasise having new or modified buildings fit the existing character of a neighbourhood. They also stress the importance of trees and green spaces to the urban landscape, along with the importance of rainwater management. Unlike other Czech cities, Prague can issue its own building regulations, although the national government reviews them and can rejected those that are deemed to not meet its standards. The focus of the 2016 regulations is to resolve the disintegration of urban structure and the associated economic, environmental and social impact. The text also contains traditional urban planning instruments, such as street and building lines.

Prague's land use plan is the key document governing what gets built where. It is complemented and made operational by the building regulations, which set out technical standards about building height, placement on a lot, distance between buildings, height of individual rooms, number of parking places, etc.

### *5.4.3. …but the lengthy building approval process compromises their effectiveness*

Prague has a lengthy two-step building approval process consisting of i) planning permission and ii) building approval. The administrative costs are low by European standards but the length of time it takes to receive a permit is much longer and the process is more complex as it requires binding opinions by 23 authorities. By contrast, the Berlin system's administrative costs are higher but the building office secures all documents needed for a project (OECD, 2017b).

The investor is responsible for collecting opinions from all relevant government authorities before proceeding with the approval process. Next, individual neighbours are informed about the proposed development directly and their remarks or objections are collected. Non-government organisations can be also involved. In the building approval phase, the construction and design are checked. Again, the investor must receive stakeholder advice; the process is similar to planning permission. If a project does not meet zoning requirements, a change to the land use plan is sought, which can take one to two years and entails several phases. The two-step process offers more space for objections, which the regional planning authorities must address. If any of the bodies involved disagree with the result, an opinion or decision of the Ministry for Regional Development may be sought. Later there is a possibility of judicial appeal.

### *5.4.4. Challenges remain in developing sustainable urban transport*

Significant transport projects have recently been completed or are planned, e.g. in Prague (Box 5.2). However, the lack of public transport options connecting the city and outlying areas has led to increased car ownership and traffic. Prague plans to build new outer and inner ring roads, which should reduce congestion. But construction delays are hampering efforts to transfer road transit transport away from the developed parts of the city.

Through a project called P+, Prague is developing a sustainable mobility plan for the city and its suburbs, which is expected to be finalised in 2018.[10] It will be the basic conceptual document on mobility and traffic infrastructure, providing a comprehensive view of traffic policy for the capital. The mobility vision, called Effective Prague, is based on improving rail transport to facilitate mass transit with a low environmental impact. It also focuses on car traffic regulation. The expected direct impact of implementing the sustainable mobility plan includes accessibility improvement, reduced pollution, increased passenger and goods transport efficiency, creation of attractive, high quality public areas and increased traffic safety.

Political support for soft transport modes seems to be lacking. However, the Prague government plans to build cycling infrastructure and to encourage walking. Given growing car use in the region, much more will be needed to promote sustainable mobility, e.g. car sharing, park-and-ride sites, regional rail and a low-emission zone (OECD, 2017b). The 2016 Programme to Improve Air Quality in Prague is rightly linked to transport strategies reflecting a more integrated approach to urban development. The Ministry of Transport is leading cross-ministerial efforts to look for ways to promote green mobility. Smaller municipalities such as Litoměřice are also promoting sustainable mobility, e.g. introducing electric vehicles and e-bikes for city employees.

**Box 5.2. Public transport improvements in Prague**

To deal with increasing use of cars, the city of Prague undertook a range of policy measures, such as parking management with preference for residents, while increasing prices and limiting parking time. Public transport improvement focused on expanding and modernising the metro, tram and bus systems and integrating fares, ticketing, routes and co-ordination among 17 public transport operators in the metropolitan area. From 1990 to 2016, Prague's metro expanded from 39 km to 65 km and the tram network from 130 km to 143 km. The bus network (urban, suburban and regional) was expanded to 2 611 km. Traffic safety was also improved, with fatalities decreasing from 94 in 1990 to 21 in 2016. The integrated transport system operates 3 metro lines, 33 tram lines, 320 bus lines, 29 railways, 1 funicular and 6 ferries. One of the biggest priorities is building a fourth metro line. The expansion of Line A in 2015 was one of the city's main public transport achievements of recent years.

*Source*: EC/UN-Habitat (2016), The State of European Cities 2016; City of Prague (2017), Prague Transportation Yearbook 2016; Kruml (2015), Extending Prague Metro Line A and Ongoing Network Construction Plans.

To improve mobility and reduce pollution levels, Prague, like other metropolitan areas in the country, needs to link new transport solutions to housing and land use policies. Many people commute to the city daily from a concentrated network of bedroom communities. Such areas have grown rapidly, despite there being ample land within the city to develop. In the US state of California, the impact of new development on transport distances is explicitly tied to ambitious targets for reducing GHG emissions. Increasing the supply of affordable housing and connecting low-income residents to areas of employment are also important drivers of the state regulations. While compact development is not cited as a priority, the requirement to assess the impact of new development on transport encourages more compact development, and connectivity is explicitly stated as a goal in state policy documents.

### *5.4.5. Progress on energy efficiency is slower than expected*

Promoting sustainable energy is one objective of the State Energy Policy (Chapter 1. ). Improving energy performance of buildings is expected to provide the largest savings in the National Energy Efficiency Action Plan (Chapter 3. ). However, government programmes for retrofitting buildings[11] lack co-ordination. There is also room to improve compliance with the EU Energy Performance of Buildings Directive (2010/31/EU).

Under the Operational Programme "Prague – Growth Pole of the Czech Republic 2014-2020", the EU financially supports sustainable mobility and energy saving projects (City of Prague, 2015). While grant applications for energy saving projects in public transport and urban road equipment have progressed, the take-up of EU funds for renovating city buildings has been low (Hope Group and Naviga 4, 2017). As a result, Prague is not on track to fulfil its intermediate objective on energy saving in public buildings. In Litoměřice, citizens can combine a small town subsidy with state grants and get up to six years' financial return on a solar installation. The city has won several awards in the Czech Solar league. About 5% of households have a solar water system, which has helped decreased particulate and $SO_2$ emissions (Dutkevicova, n.d.). The 2013 Municipal Energy Plan expects 20% energy savings by 2030 compared to the 2012 level. Photovoltaic systems have been installed in public buildings and schools. Part of the

savings generated are used to pay for other energy efficiency and renewable projects – 30% of savings is allocated to the energy saving fund for that purpose, 35% to the municipal budget, 30% to municipal organisations and 5% to the commission fund.

### *5.4.6. Czech cities face constant threats of flood and drought*

The Czech Republic already has a high degree of flood risk, and climate change is expected to lead to more precipitation extremes and climate variability in general (European Climate Adaptation Platform, 2016). It also bears noting that soil sealing through peri-urbanisation generates knock-on environmental effects, including flood risk. National water policy aims to i) protect water as a component of the environment, ii) protect against flooding and other damaging effects of water, and iii) promote long-term sustainable use of water resources, in particular ensuring drinking water supply.[12]

In the case of Prague, the city sits in the heart of the Bohemian Basin and is surrounded by high hills. It is bisected by the River Vltava, which is prone to occasional flooding. Erosion along its banks and flood protection are critical elements of land use planning for the city. In 2002, Prague experienced severe flooding, with infrastructure, housing and the environment heavily damaged. Intensive farming, forestry practices and watercourse and flood plain management have led to very low retention capacity of the landscape, augmenting the flood risk. The city has been investing in flood control measures along the river (Box 5.3). In 2014, city authorities approved the Prague Waterfront Concept, aimed at co-ordinating plans and investment of the central administration, the city of Prague and private investors to make the area around the river a public space, with both banks freely accessible within the entire city limits.

**Box 5.3. Flood protection measures for Prague**

The severe flooding Prague experienced in 2002 inflicted damage amounting to CZK 24 billion (EUR 1 billion) on infrastructure, housing and the environment. Climate change raises the likelihood of similar scenarios in the future, but the city does not have yet a strategy to deal with the impact of climate change. Its strategic plan, currently being updated, mentions tentative adaptation measures. It is expected that by 2018 the city will have developed its adaptation strategy. Meanwhile, since the 2002 floods the municipality has implemented flood control measures consisting mostly of grey infrastructure, such as fixed and mobile barriers and safety valves in the canalisation network along the River Vltava. The city also speeded up development of a more resilient flood risk management system.

The cost and benefits of the flood protection measures were calculated for a 20-, 50-, 100- and 500-year flood. The estimated total cost amounted to EUR 145.94 million in 2013. The estimated benefits include avoidance of damage to residential buildings, infrastructure, industrial buildings and equipment, of citizen evacuation and of cleaning and other costs, along with protection of environmental and cultural assets. It is estimated that even in a scenario of just one 50-year flood during the measures' expected lifespan of about 80 years, the benefits would outweigh the costs, even counting annual maintenance and storage. Prague's flood protection system is now finished and protects most of the city from events up to a 500-year flood. Overall, 52.5 $km^2$ of previously threatened area is now protected. Less densely populated areas have more limited protection.

*Source*: European Climate Adaptation Platform (2016), Realisation of flood protection measures for the city of Prague.

A critical challenge for Czech cities is to build systems that discharge storm water and avoid mixing it with wastewater. In Prague, only new developments have separate systems for rainwater and wastewater. This is an expensive and technically challenging project for all cities. In some, such as Prague, pedestrian redevelopment includes building drainage of paved areas in such a way that water does not run onto the street but soaks into the grass. To satisfy water demand, Prague is overusing its groundwater resources, which cannot be renewed sufficiently, so that water has to be brought from elsewhere, increasing costs. For Prague to restructure its water policy, the city needs to adopt a holistic approach, taking its unique characteristics into account, even at neighbourhood level. Development in areas such as green spaces, tourist facilities, buildings and commuting routes should be harmonised with water solutions. Long-term thinking in water planning, linked to land use planning, would be a way to balance water demand and supply.

### *5.4.7. Cities require diverse economic instruments for urban development*

#### *Fiscal tools are sometimes at odds with spatial objectives*

Prague has a wide variety of fiscal instruments, which it could use more effectively to meet its spatial objectives (OECD, 2017b). For example, its low parking rates incentivise commuting by car, but national legislation limits the amount that can be raised through parking fees or new tolls. Yet these are important tools for spatial and traffic management, and their use should be reconsidered.

Property taxes could be differentiated at more detailed territorial level to promote more compact cities. The rate should be based on a property's value, rather than size, to reflect the externalities of development and promote more sustainable land use. Prague does not employ any fiscal instrument to encourage density, despite this being a critical spatial objective. The city could use, for example, transfer of development rights[13] to preserve open space and limit density in underserviced peripheral areas and increase density in well-serviced ones. Another critical tool, brownfield redevelopment incentives, could help meet the city's goal in this regard more quickly by offering subsidies or grants. Such incentives can also carry other criteria, such as making high-quality public spaces part of the project. A differentiated hotel tax, with higher rates in the urban core, could encourage visitors to stay in outlying areas, thus lessening the environmental impact of tourism in the higher-use zone.

Fiscal and urban planning are poorly co-ordinated. For example, the fiscal implications of land use plans are not considered. IPR Prague is analysing the cost differential between development in inner areas vs peripheral ones.

#### *The use of environmentally related taxes and charges could be improved*

A range of environmentally related taxes and charges are in place, but their rates are too low to achieve environmental goals (Chapter 3. ). Czech cities could use a mix of fiscal instruments to reduce transport externalities, including congestion charges, vehicle taxes, subsidies for clean vehicles and public transport, and higher parking charges. Decision on the mix of instruments should be based on the type of problem and cost of solutions.

Water tariffs in Prague are below the average for statutory towns (PVS, 2016). Other cities, including Brno, Ostrava and Olomouc, have even lower prices. Water bills cover operating costs for drinking water supply and sanitation infrastructure. However, tariffs remain too low to cover infrastructure renewal and new investment, partly because legal

provisions prevent depreciation costs from being fully taken into account in tariff setting (Chapter 3. ). The national government should consider reforming the water pricing system to cover infrastructure maintenance and renewal.

Municipal waste fees are also too low to both cover the cost of service provision and provide incentives for waste reduction and recycling (Chapter 4. ). In Prague, the fees covered 56% of the cost of service provision in 2014, and the share has been steadily declining over the past decade (City of Prague, 2016). Municipal waste generation increased over 2005-11, then stabilised. While energy recovery increased, material recovery has shown no real progress since 2009.

### *5.4.8. Community engagement seems strong, but more needs to be done to retain momentum*

IPR Prague promotes participatory planning to help harmonise the views of assorted stakeholders, prevent conflict and contribute to a long-term consensus. The premise is that this will save time as well as human and financial resources, and facilitate involvement of marginalised groups in urban planning. IPR Prague has issued a participation manual to help local public employees understand participatory processes and improve their ability to involve residents in spatial and strategic planning and the design of public spaces and infrastructure. For example, for the 2015 reconstruction of Vinohradská Street, citizens got involved in preparatory work and improvement of the urban design concept prepared by IPR Prague.[14] More recently, the participatory process on updating Prague's strategic plan included professionals and the general public.[15] In-depth interviews, workshops, working groups and consultations were organised so as to develop a common vision and set development priorities. However, Veselý and Vacek (2013) argue that most Czech municipalities still distrust participatory processes, as they are afraid of civic protests. Yet it is precisely the lack of participation and information that leads to social dissatisfaction. The authors argue that residents' participation in revitalisation of public spaces is essential to enhance locals' identification with the public space.

Litoměřice also has mechanisms to encourage public participation through, for instance, the Healthy City Forum, where the public defines the top ten issues the municipality should address in a given year. Round tables and discussion groups are organised to analyse specific problems and projects. The municipality has also issued an action plan for the development of co-operation with entrepreneurs. Each city project must be in line with the plan and undergo a sustainability assessment on its economic, environmental and social impact.

## 5.5. Financing and investment

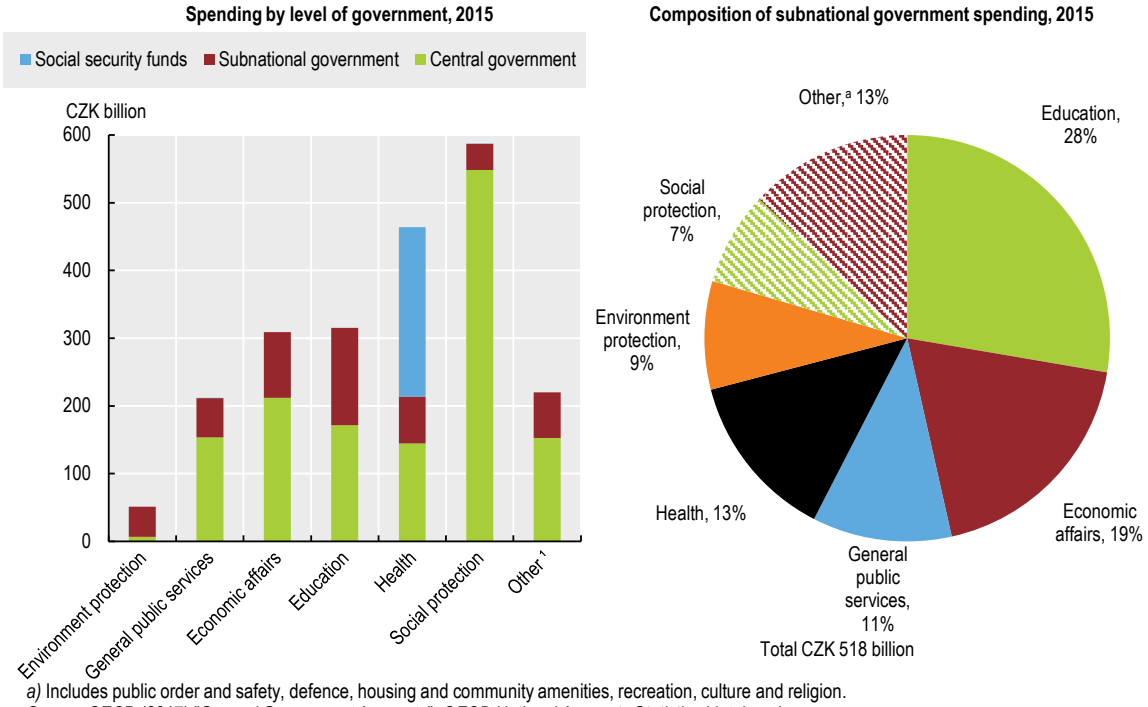
### *5.5.1. Municipalities rely heavily on central government financing*

The Czech public finance system is highly centralised. Central government spending accounts for two-thirds of general government expenditure and subnational spending for about one-quarter (OECD, 2017e). Overall, municipalities have greater spending responsibilities than regions (OECD, 2016a). Subnational government spending is sizeable on education, economic affairs (particularly transport), general public services and environmental protection (particularly waste and waste water management) (Figure 5.9). However, discretionary powers of subnational governments are limited, as much spending is on behalf of central government. In practice, local governments have

limited fiscal and spending autonomy and are in many respects centrally regulated. For example, central government regulates part of the water price, and determines local government employees' salaries (Bryson, 2010).

Subnational governments are financed mostly through a mix of shared taxes (personal and corporate income tax and value added tax), grants and transfers from central government, and fees for public service provision (OECD, 2016a). About 60% of municipalities' revenue comes from shared taxes, while the majority of regional revenue comes from grants and transfers (around 60%). Local governments raise 1.2% of total tax revenue – the second smallest share in the OECD (Chapter 3. ). Thus, municipalities are heavily reliant on central government to deliver programmes, services and infrastructure. The share of taxes allocated to municipalities is mostly based on population, which can act as an incentive for sprawling development.

**Figure 5.9. Subnational government spending is significant in some areas**




*a)* Includes public order and safety, defence, housing and community amenities, recreation, culture and religion.
*Source:* OECD (2017),"General Government Accounts", *OECD National Accounts Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933723625

Tax distribution has long been debated. The share of subnational revenue is determined annually. In 2016, it was set at about one-tenth for regions and one-fifth for municipalities (OECD, 2016a). Changes in the tax sharing formula strengthened revenue for smaller municipalities but offered few incentives for mergers. Recent amendments reduced the revenue for the four largest cities. The formula is not transparent in distinguishing between a municipality's tax raising capacity and the transfer it needs from central government.

Recurrent tax on immovable property is low, at 0.7% of general government tax revenue, compared to the OECD average of 3.3% (OECD, 2016a). This is partly because most municipalities do not impose tax rates above the minimum, even though they have the

power to charge up to five times as much. Increasing recurrent taxation on immovable property would increase the share of municipal revenue that is directly controlled. This could help drive improvement in public service provision by strengthening the link between taxation and services. In addition, the property tax could be differentiated to reduce greenfield development and increase urban density (OECD, 2017b).

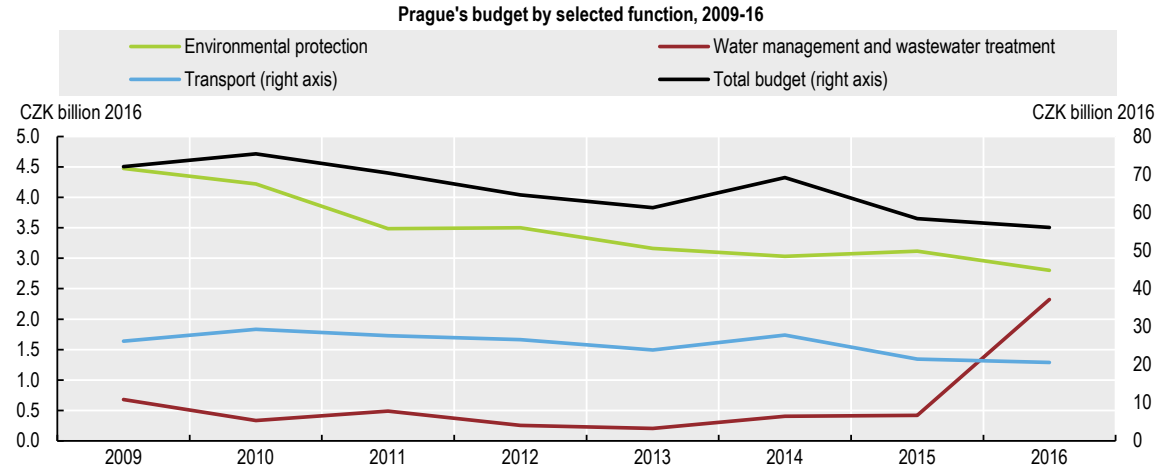
In 2015, most of Prague's revenue came from shared taxes. The largest revenue contributor was the value added tax (29%), followed by corporate (17%) and personal income taxes (16%) (CZSO, 2016). Property tax represented only 1% of total revenue. Transfers and grants from central government accounted for about a quarter of Prague's revenue. The vast majority is earmarked, mostly for education and investment (OECD, 2016a).

### *5.5.2. Expenditure for urban environment-related infrastructure and services*

#### *Expenditure for environmental protection in Prague*

Public and private investment in environmental protection[16] in Prague remained around CZK 4-5 billion over 2009-15 (CZSO, 2017d). In 2016, it nearly doubled due to increased investment in air and climate protection and wastewater treatment. In the aftermath of the crisis, Prague's environmental budget dropped significantly in real terms (Figure 5.10). The decline in the city's capital spending is a general trend which reflects rising operational costs and debt repayment. The water sector is an exception explained by the additional investment needs to meet EU requirement on wastewater treatment. Investment in this domain is nearly fully financed from the city's own resources; by contrast, less developed regions benefit from EU support. The Operational Programme "Environment" has been a major source of environmental infrastructure funding nationwide (Chapter 3. ). The 2016 Strategic Plan of Prague foresees a steady decline in investment until 2021, highlighting the need to give priority to projects with the highest social return.

**Figure 5.10. Prague's environmental budget has dropped significantly**




*Source:* CZSO (2010-16), Statistical Yearbook of Prague.

StatLink http://dx.doi.org/10.1787/888933723644

### *Sustainable transport and clean energy*

Prague's transport budget is mostly (66%) devoted to public transport, due to high operational expenditure (City of Prague, 2017). However, the share of public transport in the city's transport investment has been decreasing, suggesting growing priority on road. Prague is investing heavily in the construction of inner and outer ring roads to channel transit traffic out of the city. Although this could be influential in curbing $CO_2$ and local air emissions, it could also encourage greater use of cars. Evaluation criteria to select transport projects are unclear. The Prague Public Transport Company plans to invest CZK 6.6 billion (EUR 245 million) in 2017, including on preparation for a new metro line, modernisation of metro safety technology and renovation and construction of tram lines (UITP, 2017).

The Operational Programme "Prague" allocates EUR 121 million (half of it from EU funds) to support energy savings in public and urban road transport and in city buildings and the construction of park and ride facilities over 2015-20 (City of Prague, 2015). The city, its boroughs, organisations established and run by the city, the Prague Public Transport Company, Prague Integrated Transport Organiser, Railway Infrastructure Administration, and research and knowledge transfer organisations can apply for funds from this operational programme.

In 2015, the government adopted a national action plan for clean mobility, which plans on 250 000 electric vehicles by 2030. It includes measures such as subsidies, tax incentives and public procurement to promote clean vehicles. In cities, drivers of electric vehicles will be allowed to park free of charge and use preferential public transport lanes. Prague administration had 15 electric vehicles in 2014 (City of Prague, 2016).

In Prague, the Clean Energy Programme focuses on supporting renewable sources of energy for space heating, water heating and electricity generation in residential buildings. In 2016, the city supported 92 projects with funds that amounted to CZK 13 million (about EUR 480 000). The municipality of Litoměřice has been investing in installation of solar thermal panels with grants to citizens of up to CZK 40 000 (EUR 1 480). The aim

is to improve the environment by cutting GHG emissions through reduction in fuel and energy consumption, elimination of local heaters run on solid fuels and, especially, reduction of particulate emissions.

**Recommendations on sustainable urban development**

**Urban governance**

- Strengthen the urban governance system by i) sharpening the distribution of expenditure responsibilities across levels of government; ii) using a functional rather than administrative approach in delimiting metropolitan areas; iii) considering creating metropolitan governance bodies (e.g. have the Prague Institute for Planning and Development cover the entire metropolitan area and/or integrate responsibility for transport and housing planning in a single metropolitan body); and iv) incentivising co-operation through concrete inter-municipal projects (e.g. infrastructure or even cultural events).
- Enhance horizontal collaboration across government agencies on urban policy by i) ensuring that related recommendations of the Government Council for Sustainable Development are implemented and ii) making responsibilities of ministries, agencies and municipal departments more cross-cutting and clarifying their role in urban development.

**Policy framework**

- Increase sustainability through density by i) adopting the compact, co-ordinated, connected development model, with a holistic approach to urban development; raising awareness on the benefits of a compact city model to achieve sustainability among public, private and non-profit stakeholders; and ii) easing administrative burdens of the building approval process to support urban regeneration and brownfield redevelopment.
- Continue to promote Local Agenda 21 beyond the Healthy Cities platform by developing the use of evaluation tools and disseminating benefits through a dedicated communication strategy.
- Ensure that the Principles of Urban Policy emphasise i) monitoring and evaluation as permanent features of the urban planning system and its programmes; ii) the need for strong political and organisational leadership, long-term vision, and citizen engagement in urban life (based on the experience of Litoměřice in energy efficiency); iii) integrated policies for urban development that link transport solutions to housing and land use policies and facilitate synergy building in various policy domains involving all municipalities in the Functional Urban Area; and iv) building rural-urban partnerships for regional development.

**Policy instruments**

- Review the land use planning system to promote urban sustainable development by: i) making land use planning, including implementation strategies, mandatory; ii) adopting integrated spatial planning to coordinate investments; iii) using fiscal incentives to complement spatial development objectives; iv) encouraging metropolitan spatial planning through fiscal incentives and regulatory frameworks

set by the national government; v) ensuring that cities, particularly Prague, align sector and borough-level plans with the strategic plan; vi) linking urban transport solutions to housing and land use planning to improve mobility and reduce air pollution; and vii) monitoring the impact of spatial development plans in relation to urbanisation, land use, and environmental objectives.

- Adopt a wide set of measures to deal with the housing shortage by i) revising building laws to reduce unnecessary procedures that lead to higher construction costs; ii) establishing a one-stop process for building permits so that the onus is not on the developer to obtain multiple approvals from individual departments; iii) adopting ways for low-income households to gain access to housing (e.g. by developing the rental market); and iv) if needed, increasing the availability of land for new development through land use planning, especially on brownfield sites.
- Promote the development of brownfield sites to help deal with urban environmental challenges and bridge the housing gap. For that purpose: revise fiscal instruments to incentivise brownfield investment and guide land use to a more sustainable path; and ii) facilitate access to affordable, environmentally sound building materials.

**Financing and investment**

- Improve the use of environmental fees and taxes at city (municipal) level to tackle urban air pollution and congestion, considering the cost of the various options (congestion charge, vehicle tax, subsidies, parking charges); revise water and sewage treatment charges to recover the costs of investment, operation and maintenance of water and sanitation infrastructure.
- Remove the demographic criteria for tax sharing, considering population size only when assigning responsibilities to local governments. Thus, larger cities could have responsibility for some services provided by the central government in more sparsely populated regions. This could remove the incentive to compete for population to get more fiscal resources.
- Increase municipalities' capacity to adjust revenue or spending (taxing autonomy, mandatory spending), and increase borrowing (access to credit, fiscal rules), carefully monitored by the national financial authority. Provide financial incentives to support inter-municipal collaboration for service delivery and/or infrastructure projects, through matching grants or co-financing of urban projects by the national government and subnational associations. Specific contractual arrangements could be envisaged to support metropolitan areas.

## Notes

[1] Municipalities of more than 2 000 inhabitants.

[2] The OECD has classified regions as predominantly urban (PU), predominantly rural (PR) and intermediate (IN) to facilitate international comparability (OECD, 2017a).

[3] A functional urban area is an economic unit characterised by a densely inhabited urban core and a hinterland whose labour market is highly integrated with that of the core.

[4] For example, water management responsibilities are set out in the Water Act, and those on spatial planning, construction and urban planning in the Building Act. The Municipalities Act and the Act on District Offices regulate the relationship between local governments and territorial public administration.

[5] Local government in the Czech Republic is based on the principles of decentralisation, deconcentration, delineated competencies, subsidiarity and citizen participation.

[6] The areas include education, welfare, healthcare, public order, environmental protection, management of public greenery and public lighting, municipal waste collection, wastewater management, water supply, urban public transport, air protection (promoting use of environment-friendly thermal energy sources), local road management, forests, housing funds and housing stock, and cultural activities.

[7] The concept of Healthy Cities was inspired and supported by the WHO European Health for All strategy and the Health21 targets. It generally conceives of healthy cities as defined by a process, not an outcome, and sees a healthy city as one that continually creates and improves its physical and social environments and expands community resources that enable people to support each other in performing life function and developing to their maximum potential.

[8] Agricultural land occupies 40% of the city's total area, followed by other land (37%), forest (10%) and built-up areas (10%).

[9] Prague's core, according to the OECD definition, covers the entire area of the city of Prague as well as the nearby municipality of Kladno.

[10] This is a condition to draw EU funds.

[11] These include the New Green Savings programme, the Integrated Regional Operational Programme and the Operational Programme "Environment" 2014–2020.

[12] The 2001 Water Act states that the water management planning system consists of the main river basins plan, river basin districts plans and programmes of measures. It aims to protect surface water and groundwater, improve water quality and reduce the effects of floods and droughts. The water management system seeks to ensure long-term sustainable use of water resources and economic water management. The plans are key to regional land use planning, regional decision making and construction permitting.

[13] Transfers of development rights are market-based incentives for landowners to forfeit development rights in areas targeted for preservation and sell them to buyers who want to increase development density in areas local authorities have designated as growth areas.

[14] In 2015, IPR Prague and the city launched a pilot project to revitalise the housing estates in Vybíralka courtyard and its surroundings. Citizens were a key stakeholder group involved, as the project sought sustainable solutions that fit local needs.

[15] Some 4 000 individuals participated in its development through various outreach efforts (e.g. workshops, conferences, online engagement).

[16] Investment of the public and business sectors (including specialised producers of environmental protection services). Includes investment in air and climate protection, waste and wastewater management, protection and remediation of soil and groundwater, other environmental protection activities (R&D, administration, education) and biodiversity and landscape protection. Excludes investment in water supply.

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