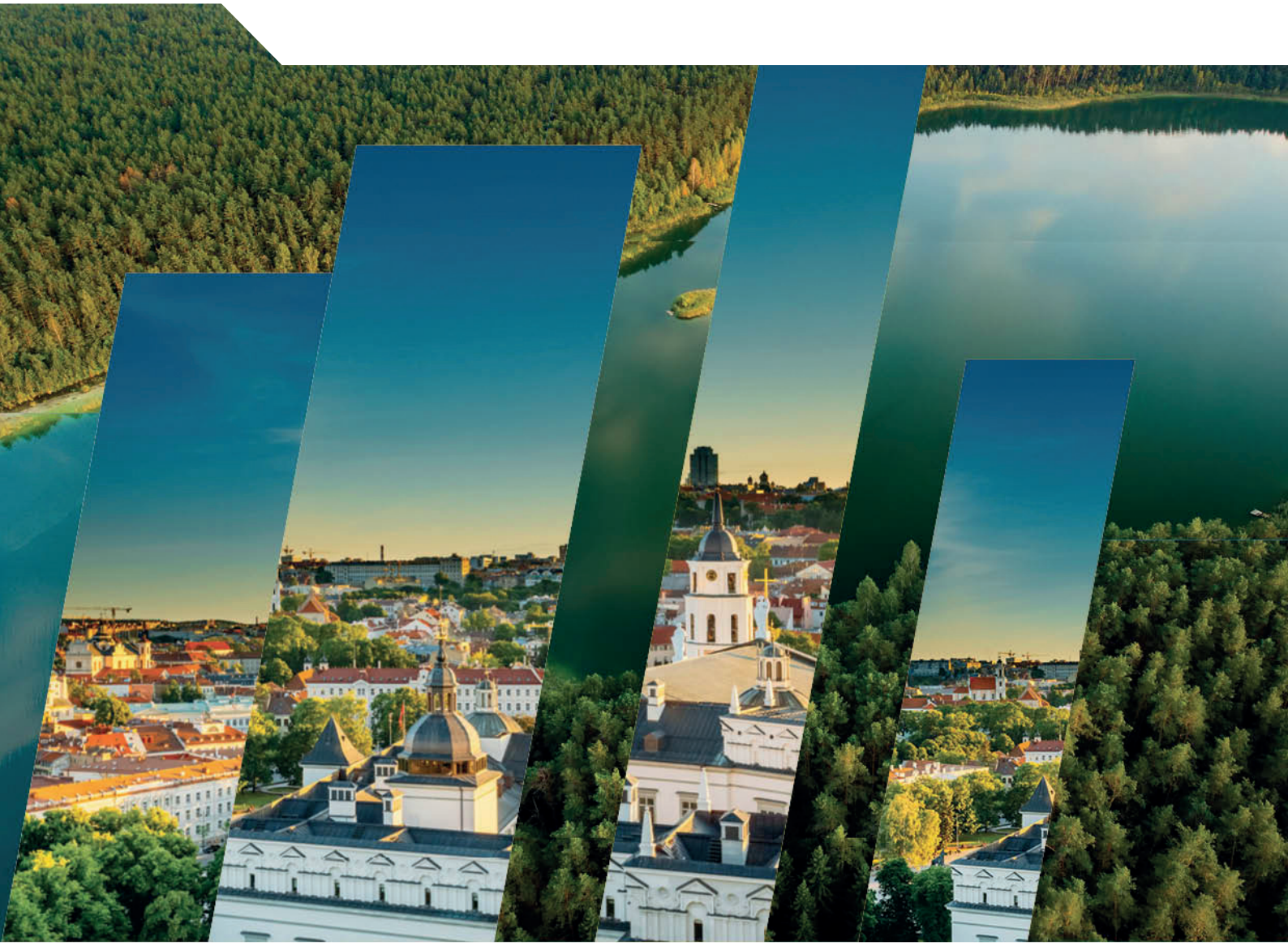
OECD Environmental Performance Reviews

LITHUANIA

2021



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OECD Environmental Performance Reviews: Lithuania 2021

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Foreword

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

- helping countries 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 Lithuania. This is the country's first OECD EPR. Progress in achieving domestic objectives and international commitments provides the basis for assessing Lithuania'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 Lithuania's historical environmental record, present state of the environment, physical endowment in natural resources, economic conditions and demographic trends.

The OECD is grateful to the government of Lithuania for providing information and comments, organising the virtual review mission (26-29 January 2021) and policy mission (20 April 2021), and facilitating contacts with relevant non-governmental organisations.

Thanks are also due to the representatives of the two examining countries, Alda Ozola (Latvia) and Laura Behan (Ireland), for actively participating in the review.

The authors of this report are Nils Axel Braathen, Alexander Mackie, Eugene Mazur (OECD Environment Directorate) and Tatiana Samsonova (International Transport Forum – ITF), under the co-ordination and guidance of Eugene Mazur. Nathalie Girouard provided oversight. Carla Bertuzzi provided statistical support, Shellie Phillips – administrative support. Natasha Cline-Thomas provided communications support. Mark Foss copy-edited the report. Preparation of this report also benefited from inputs and comments from Gérard Bonnis, Guillaume Gruère, Sarah Miet, Sigita Strumskyte and Frédérique Zegel of the OECD Secretariat, Jari Kauppila and Stephen Perkins of the ITF Secretariat and Sylvia Beyer of the International Energy Agency.

The OECD Working Party on Environmental Performance will discuss the draft Environmental Performance Review of Lithuania at its meeting on 30 June 2021 and will approve the Assessment and Recommendations.

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Reader's guide

Signs

The following signs are used in figures and tables:

– : 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, Lithuania, 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, Colombia, Israel*, Japan, Korea, Mexico, New Zealand and the United States. Costa Rica became an OECD member on 25 May 2021 and is not included in the figures and zone aggregates of this review.

This publication presents European Union (EU) data that predate the United Kingdom's withdrawal from the European Union on 1 February 2020. Therefore, the EU aggregate presented here refers to the European Union including the United Kingdom, unless otherwise stated.

Country aggregates may include Secretariat estimates.

Currency

Monetary unit: Euro (EUR)

In 2020, USD 1 = EUR 0.876

In 2019, USD 1 = EUR 0.893

Cut-off date

This report is based on information and data available up to 1 May 2021.

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

AQP	Air quality plan
CAP	Common Agricultural Policy
CNG	Compressed natural gas
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DMC	Domestic material consumption
EAFRD	European Agricultural Fund for Rural Development
EIA	Environmental impact assessment
ELD	Environmental Liability Directive
ERC	Emission reduction commitments
EMFF	European Maritime and Fisheries Fund
EPA	Environment Protection Agency
EPD	Environmental Protection Department
ESIF	European Structural and Investment Funds
ETS	Emissions Trading System
EU	European Union
EV	Electric vehicle
GDP	Gross domestic product
GHG	Greenhouse gas
GPP	Green public procurement
HELCOM	Helsinki Commission
IEA	International Energy Agency
IPPC	Integrated pollution prevention and control
LEZ	Low-emission zone
LNG	Liquefied natural gas
LULUCF	Land use, land-use change and forestry
MoE	Ministry of Environment

MSW	Municipal solid waste
MTC	Ministry of Transport and Communications
NAPCP	National Air Pollution Control Plan
NCCMA	National Climate Change Management Agenda
NECD	National Emission reduction Commitments Directive
NECP	National Energy and Climate Plan
NH_3	Ammonia
NIC	Nutrient input ceilings
NGO	Non-governmental organisation
NMVOC	Non-methane volatile organic compounds
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides
NPP	National Progress Plan
NSSD	National Strategy for Sustainable Development
PET	Polyethylene terephthalate
PM_{10}	Particulate matter smaller than 10 microns in diameter
$PM_{2.5}$	Particulate matter smaller than 2.5 microns in diameter
PTAL	Public Transport Accessibility Level indicator
R&D	Research and development
RBMP	River basin management plan
RDP	Rural Development Programme
RES	Renewable energy sources
RIA	Regulatory impact assessment
SCC	Social cost of carbon
SDG	Sustainable Development Goal
SEA	Strategic environmental assessment
SO_2	Sulphur dioxide
SUMP	Sustainable urban mobility plan
ULEZ	Ultra-Low-Emission Zone
WEM	With existing measures
WAM	With additional measures
WFD	Water Framework Directive
WHO	World Health Organization
WSDP	Water Sector Development Programme

Basic statistics of Lithuania

2019 or latest available year (OECD values in parentheses)[1]

PEOPLE AND SOCIETY					
Population (million)	3		Population density per km^2	42	(36)
Share of population by type of region			Population annual growth rate, latest 5 years	-1.5	(0.6)
Predominantly urban (%)	29	(48)	Income inequality (Gini coefficient)	0.38	(0.32)
Intermediate (%)	63	(28)	Poverty rate (% of pop. with less than 50% med. income)	9	(11)
Rural (%)	8	(24)	Life expectancy	76	(81)
ECONOMY AND EXTERNAL ACCOUNTS					
Total GDP (National currency, billion)	49		Imports of goods and services (% of GDP)	80	(29)
Total GDP (USD billion, current PPPs)	108		Main exports (% of total merchandise exports)		
GDP compound annual real growth rate, latest 5	3.4	(2.2)	Petroleum, petroleum products and related materials	12	
GDP per capita (1 000 USD current PPPs)	39	(47)	Furniture and parts thereof	7	
Value added shares (%)			Road vehicles	5	
Agriculture	4	(2)	Main imports (% of total merchandise imports)		
Industry including construction	28	(25)	Petroleum, petroleum products and related materials	14	
Services	68	(74)	Road vehicles	9	
Exports of goods and services (% of GDP)	82	(29)	Electrical machinery, appliances, n.e.s.	5	
GENERAL GOVERNMENT Percentage of GDP					
Expenditure	35	(40)	Education expenditure	4.5	(5.0)
Revenue	35	(37)	Health expenditure	5.9	(7.7)
Gross financial debt	45	(108)	Environment protection expenditure	0.3	(0.5)
Fiscal balance	0	-(2.9)	Environmental taxes (% of GDP)	1.9	(1.5)
			(% of total tax revenue)	6.4	(5.0)
LABOUR MARKET, SKILLS AND INNOVATION					
Unemployment rate (% of civilian labour force)	6.3	(5.4)	Patents in environment-related technologies (% of all technologies, average of latest 3 years)[2]	12	(12)
Tertiary educational attainment of 25-64 year-olds(%)	43	(38)	Environmental management	15	(4)
Gross expenditure on R&D (% of GDP)	1.0	(2.4)	Water-related adaptation technologies	0	(0.2)
			Climate mitigation technologies	6	(10)
ENVIRONMENT					
Energy intensity – TPES per capita (toe/cap.)	2.8	(3.9)	Road vehicle stock (vehicles/100 inhabitants)	62	(66)
TPES per GDP (toe/1 000 USD 2015 PPPs)	0.08	(0.09)	Water stress (abstraction as % of avail. resources)	1	(9)
Renewables (% of TPES)	20.4	(10.8)	Water abstraction per capita (m^3/cap./year)	102	(696)
Carbon intensity (energy-related CO_2)			Municipal waste per capita (kg/capita)	478	(538)
Emissions per capita (t/cap.)	4.0	(8.3)	Material productivity (GDP/DMC; USD, 2015 PPPs/kg)	1.8	(2.9)
Emissions per GDP (t/1 000 USD 2015 PPPs)	0.11	(0.19)	Land area (1 000 km^2)	63	
GHG intensity[3]			% of arable land and permanent crops	34	(11)
Emissions per capita (t CO_2 eq/cap.)	7	(12)	% of permanent meadows/pastures	13	(23)
Emissions per GDP (t CO_2 eq/1 000 USD 2015 PPPs)	0.21	(0.27)	% of forest area	35	(33)
Mean population exposure to air pollution ($PM_{2.5}$), µg/m^3	10.5	(13.9)	% of other land (built-up/other land)	18	(32)

1. Values earlier than 2014 are not taken into consideration. Where the OECD aggregate is not provided in the source database, a simple OECD average of latest available data is calculated where data exist for a significant number of countries.
2. Patent applications for higher-value inventions that have sought protection in at least two jurisdictions.
3. Excluding emissions/removals from land use, land-use change and forestry.
Source: Calculations based on data extracted from the databases of the following organisations: OECD, Eurostat, International Energy Agency and the World Bank.

Executive summary

The climate ambition should be supported by sectoral policies

The Lithuanian government declared a goal of carbon neutrality by 2050 in its 2021 National Climate Change Management Agenda (NCCMA). The National Energy and Climate Plan (NECP) laid out medium-term (2021-30) mitigation and adaptation measures to support implementation, with a focus on transport and agriculture. However, existing policies will be insufficient to meet climate targets for 2030 and beyond. Greenhouse gas (GHG) emissions have been mostly flat since 2009. Emissions from transport have risen by 50% since 2005, mainly due to an increase in the volume of goods transported by road and greater emissions from passenger cars.

Energy consumption has increased since 2005, driven mainly by demand from transport. Apart from domestic biomass and wind energy resources, the country relies on fossil energy and electricity imports to meet its needs. At the same time, energy supply from renewable sources has more than doubled to around 22% over 2005-18. Lithuania plans to use European Union (EU) funds, notably the recovery funding, to support continued building renovation and upgrade of heating systems, alternative fuels in industry and transport, electric vehicles and rail freight, and renewable energy generation and storage. These efforts need to exploit synergies between climate and sectoral policies. Progress towards climate targets should be closely monitored.

Lithuania needs to build on its waste management progress to steer towards a circular economy

Lithuania has moved from landfilling almost all its waste to recycling and composting most of it in less than a decade. This impressive progress is a result of increased separate waste collection, construction of sorting facilities, improved labelling requirements, near-complete service coverage, education and awareness campaigns, and expansion of deposit-refund schemes to cover glass, plastic and aluminium beverage containers. However, per capita municipal waste generation has been increasing since 2009. The country should now focus on reducing waste generation and improving material productivity by adopting and implementing cross-sectoral circular economy policies.

Nutrient water pollution must be addressed

Water pollution is worsening across the country. More than half of monitored rivers in agricultural areas are not achieving “good” status under the EU Water Framework Directive, while all coastal waters are failing to reach good ecological or chemical status. The main pressure on water bodies is nutrient pollution from diffuse sources. Its most significant driver is the increased use of mineral fertilisers, a result of a shift from mixed crop-livestock farming to intensive crop cultivation. Lithuania should set stricter limits for fertiliser application in targeted areas and promote voluntary approaches, awareness-raising initiatives and training for farmers.

A second important cause of nutrient water pollution is insufficiently treated wastewater. The government plans to increase the share of population connected to public wastewater treatment from 77% in 2019 to 85% in 2025 and to 95% in 2030, as well as build or rehabilitate 12 wastewater treatment plants by 2023. In addition, consolidation of small water utilities into larger ones would help secure necessary investments in adequate water supply and treatment infrastructure.

Biodiversity conservation is improving, but not outside protected areas

Lithuania has expanded its network of protected areas: they cover 17% of the land area and 23% of the country's exclusive economic zone in the sea. The forest area (about 34% of the territory) has been increasing in recent years, promoted through afforestation payments to private landowners and restrictions on converting forest land to other uses. There are fewer threatened species in Lithuania than in other OECD member countries. However, almost four of every five assessed habitats have an unfavourable status.

The country needs to improve planning and implementation of biodiversity protection measures and surveillance of biodiversity status outside protected areas. The government is planning to consolidate numerous regional protected area agencies into a single national agency with more harmonised management. It should also consider introducing payments for ecosystem services and ensure financial sustainability of biodiversity protection programmes. To date, these programmes have relied primarily on project-based financial support from the European Union.

Environmental goals call for a whole-of-government effort

Lithuania has a centralised environmental governance system with a modest role of local authorities. To implement the government's ambitious environmental agenda, inter-institutional working groups collaborate on legislation and strategic documents, as well as on joint initiatives between relevant government stakeholders. For example, a working group on NECP implementation includes vice ministers and other high-level representatives of key ministries. However, better co-ordination is necessary to integrate environmental considerations into sectoral policies and achieve a whole-of-government approach to environmental management. Municipalities should be more proactive in advancing the country's agenda on climate change, circular economy and sustainable mobility.

Regulation suffers from gaps in compliance promotion, monitoring and enforcement

Environmental regulation has been reinforced over the last 20 years through alignment of the country's environmental legislation with EU directives, more recently through increased reliance on electronic processing of documents. It could be further improved by using activity-specific standard environmental requirements (general binding rules) for low-impact installations. This would reduce the regulatory costs for competent authorities and administrative burden for regulated entities.

The adoption of good practices for implementing environmental law has been slow. The share of planned, risk-targeted inspections – slightly over half of the total – is lower than in most OECD member countries, indicating that compliance monitoring is largely reactive. Information on regulated entities is poorly maintained, which may lead to gaps in inspection planning. Guidance to the regulated community on good environmental practices is largely lacking. High non-compliance is not adequately deterred by administrative fines, whose average level and collection rate are too low.

Civic engagement in environmental matters needs to be promoted and facilitated

Despite environmental authorities' outreach to non-governmental actors in drafting high-profile laws and policies, there is no active dialogue with civil society on key environmental policy priorities, particularly at the local level. Environmental awareness of the population is below the EU average, partly due to the lack of a consistent approach to environmental education. Most environmental information is accessible to the public but is fragmented across different authorities' websites, making it more difficult to find and use. Lithuania should consolidate public sources of environmental information and ensure regular reporting on the state of the environment. It should also provide open public access to compliance-related information about individual polluting installations.

The trend of declining public environmental expenditure must be reversed

Public expenditure on environmental protection decreased from 1.3% of gross domestic product (GDP) in 2000 to 0.3% in 2018, well below the EU average of 0.8%. At the same time, investment needs in sustainable energy and climate policies alone are estimated at 3% of GDP annually over the next decade. Lithuania intends to rely on EU funds and other external sources (50%), state funding (21%) and the private sector (29%) to finance these investments. The country needs to improve coherence among different green economy investment programmes and create a concrete plan for mobilising private investment.

Lithuania's research and development (R&D) budget on the environment decreased in the past decade. In 2019, the public budget on energy-related R&D per unit of GDP was in the bottom third among OECD member countries. The government's action plan to strengthen the country's energy innovation lays out more than 50 measures in the areas of infrastructure, human resources, products and services, the regulatory environment, science and technology. Lithuanian businesses and R&D institutions have built up important competences in renewable energy. The government should assess the country's comparative advantages and increase government spending on R&D related to the environment and low-carbon energy transition in the most promising areas.

Some progress on vehicle taxation, but more is needed to green energy taxes

Lithuania is making positive changes to its vehicle taxation policies. It introduced a new tax on passenger car registrations in 2020. The country is also considering an annual tax on motor vehicle ownership, which would vary depending on environmental performance of the vehicle. In addition, the government plans to replace the time-based road use charge for heavy-duty vehicles with a distance-based road use charge differentiated according to the vehicle's Euro class.

At the same time, Lithuania's taxes on energy products do not fully reflect environmental costs of energy use. Effective tax rates on carbon dioxide (CO_2) emissions from energy use are low, especially in the road sector. The country has one of the lowest excise duties on petrol and diesel in the OECD and a much lower tax rate on diesel compared to petrol. The tax rates for both types of fuel should be increased to promote the sales of zero-emission vehicles. The government should also follow through on its plans to link tax rates for all fuels to CO_2 emissions.

Support to fossil fuel consumption rose significantly in the past decade. It is mostly made up of tax preferences for the use of oil products, in particular lower taxation of heating oil and diesel used in agriculture. Lithuania should phase out these fossil fuel subsidies while taking appropriate measures to limit the burden on the most affected firms and households.

Trends in emissions from transport are inconsistent with national climate targets

The transport sector is the largest GHG emitter, accounting for 30% of Lithuania's total in 2018. Transport emissions have increased by 38% over the last decade and are projected to rise steeply until at least 2024 without additional measures. Transport is also the country's principal emission source of nitrogen oxides and fine particulate matter. Lithuania's dispersed settlement pattern and low population density make road transport the dominant transport mode for both passengers and freight. In 2019, an average vehicle was 15 years old and 68% of cars were diesel-powered.

The transport sector is not on a pathway consistent with the gradual decarbonisation envisaged in the NECP and more ambitious new targets of the NCCMA. The country plans to increase the use of alternative fuels and innovative transport technologies, electrify its railways and strengthen relevant tax instruments. The 2021 Law on Alternative Fuels mandates support for biofuels and hydrogen to raise the share of renewable energy sources in the sector's final energy consumption by 2030. However, achieving a carbon-neutral transport system by 2050 will require more stringent targets and additional measures to address the increasing car ownership and incentivise a shift to sustainable transport modes.

Disconnect between transport and spatial planning hampers sustainable mobility

Cities and towns across the country have developed sustainable urban mobility plans (SUMPs) to encourage a shift towards greener transport modes. However, in the vast majority of municipalities, land-use and transport planning remains the responsibility of separate authorities with limited or no co-ordination between them. This means that transport and spatial plans function separately. As a result, many development projects continue being car-centric. Full implementation of actions identified in SUMPs would require tighter planning regulations so that all new developments promote compact settlement and have easy access to transport links, as well as safe walking and cycling routes. Implementation of SUMPs should be monitored nationwide.

Better incentives are needed to steer user behaviour towards sustainable modes

Lithuania should strengthen demand management policies, including implementation of low-emission zones and higher prices for parking in urban areas. Eliminating free parking at workplaces and minimum parking requirements for new developments would reduce hidden subsidies for car use. Road space reallocation to give priority to public transport, cycling and walking, while restricting car traffic in urban streets, is another opportunity to address congestion and air quality.

Reducing reliance on private cars will require additional investment in public transport and non-motorised modes. Limiting road investment to necessary construction and upgrades of gravel roads would free up funds for public transport. Rural public transport, especially buses, will need significant investment to reduce car dependence for local journeys and enhance connectivity with inter-regional transport modes. Earmarking revenues from parking fees for improvements in cycling and walking conditions could complement the necessary reorientation of national funding towards low-carbon transport.

The uptake of electric vehicles (EVs) has so far been low despite significant purchase subsidies. Challenges include limited EV charging infrastructure and EVs' substantial price disadvantage compared to diesel and petrol cars. The absence of a national EV strategy and fragmentation of institutional responsibility for building EV charging infrastructure also hamper EV diffusion. Lithuania plans to continue financial support for the purchase of EVs and installation of charging points. Its long-term cost to the state should be carefully monitored.

Assessment and recommendations

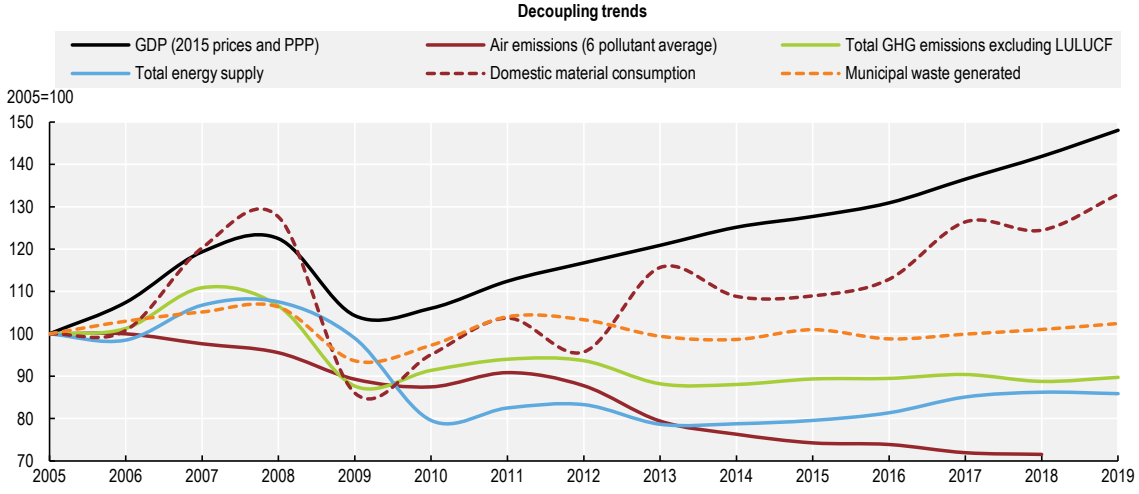
The Assessment and Recommendations present the main findings of the OECD Environmental Performance Review of Lithuania. They identify 43 recommendations to help the country make further progress towards its environmental objectives and international commitments. The OECD Working Party on Environmental Performance discussed and approved the Assessment and Recommendations at its meeting on 30 June 2021.

1.1. Environmental performance: Trends and recent developments

With fewer than 3 million residents, Lithuania is among the least populous OECD member countries. It is a relatively flat country rich in agricultural land and forest resources. Lithuania has many rivers, lakes and wetlands, and a Baltic Sea coastline. It joined the European Union (EU) in 2004, adopted the euro in 2015 and joined the OECD in 2018. Its gross domestic product (GDP) has grown quickly since transitioning to a market economy in the 1990s. GDP per capita is now around 80% of the OECD average.

Since 2005, Lithuania has made progress in decoupling environmental pressures – greenhouse gas (GHG) and other air pollutant emissions; municipal waste generation; energy and material consumption; water abstractions – from economic growth (Figure 1). It has also improved wastewater treatment and expanded the network of protected areas. However, progress remains insufficient to halt biodiversity loss and alleviate pressures from increasingly intensive agriculture. Although Lithuania performs well in economic, employment and educational dimensions of well-being, it ranks poorly in such areas as health, life satisfaction and inequality (OECD, 2020a). Progress towards the 2030 Sustainable Development Goals (SDGs) lags that of neighbouring countries. Any positive environmental outcomes (air quality, GHG emissions) from the COVID-19 crisis are likely to prove temporary. However, the recovery presents an opportunity to improve on the pre-COVID model.

Figure 1. Economic growth has decoupled from environmental pressures



Note: The air emissions index is an equal-weight index of carbon monoxide, nitrogen oxides, non-methane volatile organic compounds, particulates (PM_{10} and $PM_{2.5}$) and sulphur oxides. LULUCF = land use, land-use change and forestry.
Source: EPA (2021), *Lithuania's Greenhouse Gas Inventory Report 2021*; IEA (2021), *IEA World Energy Statistics and Balances* (database); OECD (2020), *OECD National Accounts* (database); OECD (2020), *OECD Environment Statistics* (database).

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Climate ambition is high but is not adequately supported by policies

The government has set a long-term goal of carbon neutrality by 2050 in its National Climate Change Management Agenda. The National Energy and Climate Plan (NECP) for 2021-30 and dedicated plans for energy, climate and air have also set ambitious policy goals as national contributions to the 2030 and 2050 targets of the European Union to reach the goals of the Paris Agreement. Lithuania should maximise integration of climate change mitigation policies across different sectors to meet the new EU 2030 goal of cutting GHG emissions by 55%.

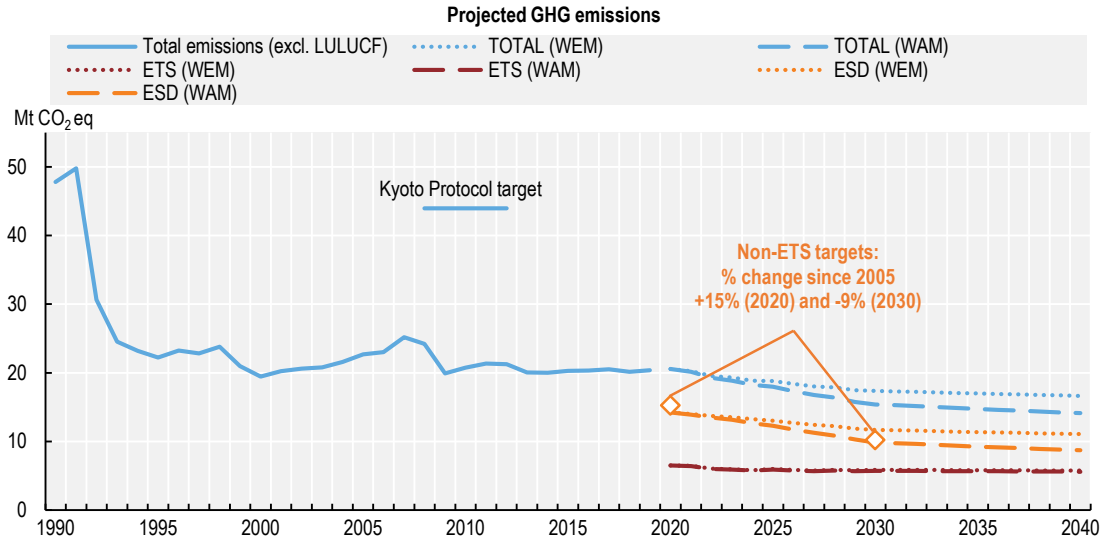
While the economy is less carbon- and energy-intensive than the OECD average, it is modestly more intensive than the OECD European countries' average on both measures. Apart from domestic biomass and wind energy resources, the country relies on fossil energy and electricity imports to meet its needs. This makes energy efficiency and good connectivity strategically important for energy security. Oil dominates the energy mix with a 38% share. Indeed, this share has increased in the last decade to meet the growing demand from transport and to fill (along with natural gas) the energy gap after the country's only nuclear power station closed in 2009. Energy supply from renewable sources has more than doubled from around 10% to over 20% during 2005-19. Renewables (dominated by wood used for heating) accounted for 25% of gross final energy consumption in 2018, achieving the 2020 objective of 23% (and exceeding the EU average).

Energy consumption has increased since 2005, driven mainly by increased demand from transport. The country is not on track to achieve its 2020 target for final energy consumption (IEA, 2021). The NECP expects final energy consumption to be reduced by 15% between 2020 and 2030.

GHG emissions have been mostly flat since 2009. As OECD average per capita GHG emissions have declined since 2005, Lithuania's per capita emissions have been stable but remain lower than both the OECD and the OECD Europe averages. Energy (including transport), agriculture and industry account for two-thirds of total GHG emissions. Emissions from transport have risen remarkably quickly since 2013 and are up by 50% since 2005. This is mainly due to an increase in the volume of goods transported by road and greater emissions from passenger cars (Section 4).

Lithuania is a participant in the EU Emissions Trading System (ETS) for large emitters like power stations, refineries, large factories and aircraft operators. Together, these emitters account for just under a third of the country's emissions. For non-ETS sectors, including transport, Lithuania met the 2020 target of +15% compared to 2005 levels. Lithuania needs to cut emissions for the first time based on its binding non-ETS target of -9% for 2030 and an even more ambitious national target of a 25% reduction. However, existing policies will be insufficient to meet climate targets for 2030 and beyond (Figure 2). For example, they are expected to lead to a 6% increase in emissions from non-ETS sectors, particularly due to transport emissions. Additional measures will be needed, including those to be funded by the European Union's 2021-27 budget funds and its Recovery and Resilience Facility. These resources will support continued building renovation and upgrade of heating systems, alternative fuels in industry and transport, electric vehicles and rail freight, and renewable energy generation and storage.

Figure 2. Progress towards carbon neutrality will require additional measures



Note: GHG = Greenhouse gas emissions excluding land use, land-use change and forestry (LULUCF); ETS = Emissions Trading System. The dotted lines show GHG emission projections with existing measures (WEM). The dashed lines show GHG emission projections with the additional measures (WAM) scenario. The 2020 target has been achieved using the flexibility mechanisms as defined by the EU Effort Sharing Decision (ESD) and Effort Sharing Regulation. The WEM and WAM projections do not include the use of these flexibilities.
Source: EC (2021), "National projections of greenhouse gas emissions and removals", submitted to the European Commission pursuant to Commission Implementing Regulation (EU) No 749/2014 of 30 June 2014; MoE (2021), *Lithuania's Greenhouse Gas Inventory Report 2020*.

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Future air emission ceilings will likely be exceeded for several pollutants

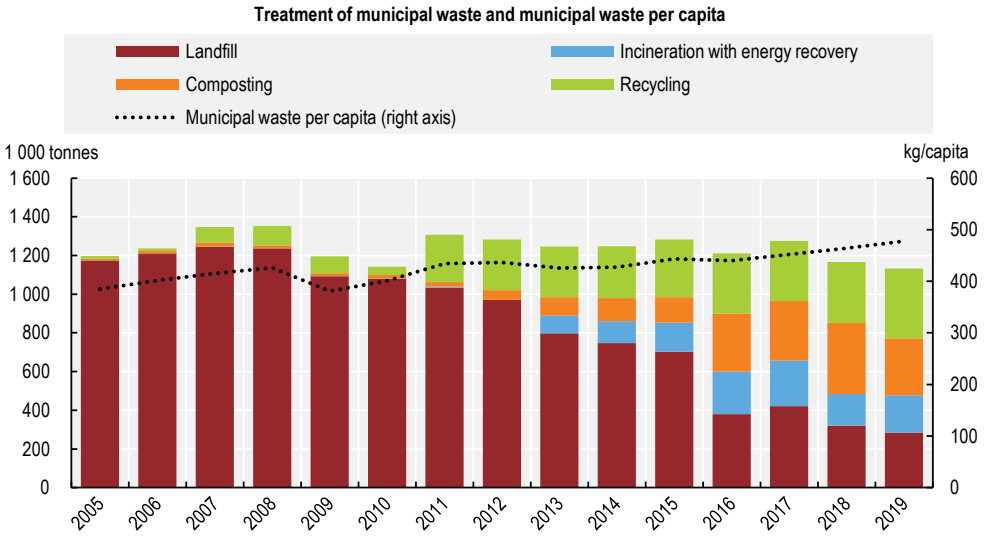
Lithuania has been complying with its national emission ceilings for key pollutants. However, it will likely not achieve its 2020-29 National Emission Ceiling reduction commitments for ammonia, non-methane volatile organic compounds and nitrogen oxides (NO_x). For NO_x (from transport and agriculture), the distance to the target is among the largest in the European Union. Decisive actions to reduce emissions in these sectors are particularly needed.

The decentralised industrial base, absence of large cities and low population density help keep average exposure to air pollution low. Exceedances of chronic or acute air quality threshold values are relatively uncommon, and key EU limit values are attained. The reliance on solid fuel for heating in urban areas may raise risks of locally high concentrations of benzopyrenes and particulate matter in cold weather. Particulate matter concentrations in Vilnius and Klaipeda are within limits but increasing.

Impressive progress in waste management is a first step towards a circular economy

Lithuania has moved from landfilling almost all its waste to recycling and composting most of it in less than a decade (Figure 3). Multiple actions have produced good waste management results. These include implementation of separate waste collection, construction of sorting facilities, improved labelling requirements, near-complete service coverage, education and awareness campaigns, and expansion of deposit-refund schemes to cover glass, plastic and aluminium beverage containers. The Waste Framework Directive's 2020 targets for recycling half of household waste (paper, metal, plastic and glass) and 70% of construction waste seem to have been narrowly achieved.

Figure 3. Waste is increasingly recycled or composted



Note: Excluding marginal quantities of waste incinerated without energy recovery. Data include breaks in time series.
Source: OECD (2021), "Municipal Waste", *OECD Environment Statistics* (database).

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Lithuania plans to shift to a circular economy by 2050. However, the per capita municipal waste generation has been increasing since 2009. It remains slightly below the average OECD level. The country should expand efforts to reduce waste generation and work to divert more of the remaining quarter of municipal waste still going to landfill to other treatment methods.

Lithuania's material productivity (GDP generated per unit of materials used) has not improved in the last ten years unlike in most OECD member countries. This is largely explained by the GDP-matching growth in the use of construction materials.

Agriculture has a major impact on water quality

Monitoring data reveal that nutrients are worsening water pollution across the country. The main reason for increased pollution with nitrogen compounds is that agriculture has intensified and shifted towards more fertiliser-intensive crops without mitigating the related environmental impact. More than half of monitored rivers in agricultural areas have not achieved "good" status under the EU Water Framework Directive in recent years. Nitrogen loads into the Baltic Sea have increased even as several other countries on the Baltic have reduced theirs.

A second important cause of nutrient water pollution is insufficiently treated wastewater, with significant phosphorus loads. There are plans and funding to connect more households to the sewerage network and upgrade the few remaining treatment plants that are not built to modern standards. Historically, these infrastructure upgrades have been successful in improving water quality. However, these measures have been financed primarily with EU funds. In the future, they will have to rely increasingly on self-financing.

The National Progress Plan adopted in 2020 includes longer-term objectives to improve water availability and quality. The government will promote more sustainable use of mineral fertilisers and pesticides and strive to reduce diffuse and point-source water pollution. A reform involving consolidation of small water utilities into larger ones is being considered. This would enable larger utilities to independently raise the funds needed to invest in adequate water supply and treatment infrastructure.

Biodiversity is under pressure from agriculture and forestry

As in much of Europe, biodiversity outcomes are not encouraging. The latest data show that almost four of every five assessed habitats had an unfavourable status. Only a few species and habitats were qualified as improving. Lithuania is located within the boreal biogeographical region and shelters megafauna like the elk, grey wolf, Eurasian lynx and beaver in forest and wetland habitats, and wintering birds and grey seals in its Baltic marine waters. As a welcome step, biodiversity monitoring of habitats and species of community importance has recently improved. However, Lithuania's knowledge of conservation status is the lowest in the European Union (EEA, 2020) due to little surveillance outside of protected areas.

The expansion of more input-intensive arable farming, land abandonment in areas with small-scale farming, and forestry operations are the leading pressures on biodiversity. Both the arable area and the forest area, each accounting for about a third of the total land area, have increased over the last 15 years. Urbanisation pressures are modest by European standards: urban areas account for around 3.5% of the total land area. The land take (new land used for construction) since 2000 as a share of land area is the sixth lowest in the European Union.

Forests also play an important economic role, provide recreational opportunities and capture carbon dioxide. Their importance is recognised by national targets to expand the forest area from 33.7% in 2018 to 35% by 2030. The forest area has indeed been increasing in recent years, promoted through afforestation payments to private landowners and restrictions on converting forest land to other uses.

Protected areas cover 17% of the land area and 23% of the country's exclusive economic zone in the sea. The country meets the Aichi 17% target for terrestrial areas and exceeds the 10% target for marine and coastal areas. However, protected area management is institutionally fragmented. Biodiversity protection efforts largely rely on project-based financial support from the European Union. Lithuania is considering a consolidation of numerous regional protected area agencies into a single national agency with more harmonised management.

Recommendations on climate, air, waste and natural resource management

Mitigating climate change

- Support the ambitious goal of carbon neutrality by identifying and exploiting synergies between climate policies and national priorities in business development, energy security, air and water quality, quality-of-life and housing.
- Optimise the use of EU funds, notably the recovery funding, to accelerate implementation of the NECP and other relevant policies; track progress towards the targets and closely monitor the performance of individual policies.

Improving air quality

- Reduce ammonia emissions by regulating mineral fertiliser application and implementing good farming practices such as integrated livestock manure management.
- Closely monitor air quality in dense urban areas with high levels of domestic solid fuel use for heating; introduce enforceable solid fuel quality requirements as necessary; strengthen control of household heating appliances.

Improving water quality

- Reduce nitrogen loading from agriculture through requirements for planning of, and reporting on, fertiliser consumption, stricter limits for fertiliser application in targeted areas, voluntary approaches, awareness-raising initiatives and training for farmers.
- Complete the upgrades of the wastewater treatment and water supply infrastructure to reduce the impact on water courses.

Transitioning to a circular economy

- Maintain the strong progress in waste reuse and recovery by expanding programmes to encourage behavioural change and incentivise better waste sorting by households.
- Increase focus on reducing waste generation through whole-of-lifecycle design of products and construction materials.

Conserving and sustainably using biodiversity

- Mainstream biodiversity considerations across government policies; improve planning and implementation of biodiversity protection measures and surveillance of biodiversity status outside protected areas.
- Consider introducing payments for ecosystem services and sustainable forest management; ensure financial sustainability of biodiversity protection programmes.

1.2. Environmental governance and management

Lithuania has a centralised environmental governance system with a modest role of local authorities and a relatively low level of civic engagement in decision making compared to many other EU countries. The regulatory framework has been reinforced over the last 20 years through alignment of the country's

environmental legislation with EU directives. However, the adoption of good practices for implementing environmental law has been slow.

Despite formal co-ordination mechanisms, better policy coherence is needed on the environment

The Ministry of Environment (MoE) as a policy-making body and its subordinated institutions with regulatory, compliance assurance and issue-specific management functions are in charge of the entire spectrum of environmental matters. Under the 2021-24 government programme, the MoE has declared an ambitious goal for Lithuania to become a carbon-neutral country with an established circular economy by 2050. Inter-institutional working groups collaborate on legislation and strategic documents, as well as on joint initiatives between relevant government stakeholders. However, the country does not yet have a whole-of-government approach to environmental issues. Better co-ordination is necessary for adequate integration of environmental considerations into sectoral policies.

Municipalities are supported by the state in their environmental efforts. Many have developed sustainable urban mobility plans (SUMPs, Section 4) but do not yet play an active role in other key policy areas, such as climate change mitigation and adaptation and circular economy.

Environmental regulation is becoming more efficient but should be further improved

The permitting process has been streamlined thanks to electronic submission of applications and permit issuance through the Lithuanian e-government gateway. The environmental impact assessment (EIA) and permitting procedures are linked: permit-issuing authorities cannot override a negative EIA decision but do not always incorporate its conditions into the permit.

Installations that are not subject to integrated permitting requirements receive simplified pollution permits with conditions covering specific impacts (waste treatment, air emissions or wastewater discharges). However, the country does not use activity-specific standard environmental requirements for low-impact installations. Applying this good international practice could reduce the regulatory costs for competent authorities and administrative burden for regulated entities.

Regulatory impact assessment covers environmental aspects of draft laws but evaluates them only superficially. A methodology for *ex post* assessment of the impact of laws and regulations is under development. Strategic environmental assessment is carried out at the national and municipal levels for plans and programmes with a potentially significant environmental impact. The quality control over local land-use planning and the integration of environmental considerations into it are not sufficient. For example, there is not enough co-ordination between land-use and transport planning.

High non-compliance calls for proactive inspections and stronger enforcement

Compliance monitoring is partially risk-based: it relies primarily on 12 risk-related criteria, including the operator's compliance record. However, it must conform to the minimum and maximum inspection frequencies defined in the legislation. The share of planned inspections – slightly over half of the total – is lower than in most OECD member countries, indicating that compliance monitoring is largely reactive. The annual number of planned inspections has declined in recent years, while the number of those reacting to incidents and complaints has risen. The information on regulated entities is poorly maintained, which may lead to gaps in inspection planning (NAO, 2020).

Non-compliance is high, with over 60% of inspections on average detecting at least one violation. Despite the 2020 legislative changes to strengthen enforcement tools, administrative fines are still too low to have a deterrent impact, and their annual imposed volume dropped by about half over 2016-20. In addition, only

about two-thirds of the amount of imposed fines is collected, further diminishing the effectiveness of administrative penalties. There are few criminal enforcement cases, only half of which end in conviction.

Environmental damage remediation needs to be strengthened

Lithuanian law requires that the damaged environment be restored to the extent possible through implementation of remediation measures. However, like in the two other Baltic states, the responsible party typically pays a monetary damage compensation to an earmarked budgetary fund instead of clean-up. Such compensation does not reflect real damage to the environment or encourage remediation.

Financial security mechanisms are scarcely used to ensure clean-up of current and historic contamination. This creates a significant burden on the state for environmental remediation in case the responsible party is insolvent. As a result, Lithuania relies almost fully on EU funding in addressing old contaminated sites. A much larger effort is required to clean up about 800 sites that need remediation across the country.

Green practices could be promoted better through guidance and public procurement

Providing guidance and assistance to the regulated community has not traditionally been part of compliance assurance efforts of Lithuanian environmental authorities. This is slowly changing with financial incentives for small and medium-sized enterprises to adopt an environmental management system and conduct environmental audits. However, guidance on good environmental practices is largely lacking. Voluntary agreements with industry aimed at achieving environmental goals have not been widely used.

Green public procurement (GPP) as a tool to promote sustainable products and production practices has also been underused. The government has recently increased the policy profile of GPP. Still, its implementation remains far off targets, and the environmental compliance record of suppliers is not part of procurement criteria. The MoE is planning to review, update and increase the number of GPP criteria, streamline GPP reporting and establish a GPP competence centre to provide direct support to public procurement officers.

Public participation would benefit from enhanced access to information and education

The MoE and its subordinate authorities routinely involve civil society representatives in high-profile law drafting and policy decisions. However, there is no active dialogue with civil society on key environmental policy priorities, particularly at the local level. Public involvement in EIA, permitting and land-use planning is low. Environmental awareness of the population is also below the EU average. Environmental authorities and several non-governmental organisations (NGOs) are active in the field of environmental education, but their efforts are falling short of the need to boost public participation in environmental decision making. There is no consistent approach to environmental education in secondary schools.

Most environmental information is accessible to the public but is fragmented across different authorities' websites, making it more difficult for users to find and navigate. Consolidated state of the environment reporting was discontinued in 2015 due to lack of resources. Compliance monitoring and enforcement information on individual economic entities is not publicly available.

Administrative courts can rule on both procedural and substantive legality of a government action. Administrative court judges undergo regular international and domestic trainings in environmental law. However, NGOs cannot benefit from legal aid, and potentially high litigation costs are a barrier in access to justice.

Recommendations on environmental governance and management

Institutional and regulatory framework

- Promote the whole-of-government approach to environmental management through better integration of environmental issues into sectoral policies, more effective inter-ministerial co-ordination and more efficient use of available resources; empower municipalities to be more proactive in advancing the country's agenda on climate change, circular economy and sustainable mobility.
- Strengthen the environmental aspects of *ex ante* and *ex post* assessment of laws and regulations; ensure better integration of environmental considerations into land-use planning.
- Improve regulatory efficiency by introducing general binding rules based on best available techniques for facilities with low environmental impact in activity sectors with multiple facilities and similar processes.

Compliance assurance

- Increase the number of risk-targeted inspections; expand use of administrative fines for environmental violations and raise their levels to reflect offenders' economic benefit from non-compliance; improve the collection of imposed fines.
- Facilitate full implementation of environmental liability regulations to ensure remediation of damage to the environment at the expense of the responsible party; accelerate the clean-up of old contaminated sites by securing adequate financial resources.
- Enhance the promotion of compliance and green business practices through information-based instruments; include compliance in a streamlined set of GPP criteria and ensure their implementation by all public organisations.

Environmental democracy

- Expand environmental awareness raising and adult education, and engage the general public more actively in environmental decision making at the national and local levels.
- Consolidate public sources of environmental information and ensure regular reporting on the state of the environment; open public access to compliance-related information about individual polluting installations.
- Remove cost barriers in access to justice by requiring the government to cover its share of the litigation costs irrespectively of the eventual court decision; provide access to legal aid for NGOs.

1.3. Towards green growth

Lithuania is a small, open economy that has shown rapid economic development over the last decades, with GDP per capita rapidly converging towards the average of OECD's upper half. However, skill shortages and low productivity in parts of the economy create vulnerabilities. Following a relatively mild contraction in 2020, GDP is projected to grow by around 3% in 2021 and 2022 on average, as confidence strengthens and investment picks up slowly with the rollout of vaccinations (OECD, 2020b). The country's dependence on energy imports (Section 1) is a strong driver for energy transition and green growth more generally.

In response to the COVID-19 pandemic, the government swiftly set up a programme supporting households and firms, representing almost 10% of GDP, and plans new investments to support long-term growth (OECD, 2020c). Measures include wage subsidies that ensure that workers receive at least the minimum wage, a flat benefit for the insured self-employed, increased sickness benefits for employees infected by the virus and an apartment building renovation programme to improve energy efficiency. Special COVID-19 recovery support measures were in place for "green" firms, but these have ended with the economy on a recovery path. More attention is needed on environmental performance of firms receiving help to recover from the crisis.

Better co-ordination of strategic planning is warranted

Every agency in Lithuania is guided by the overarching Progress Strategy "Lithuania 2030". A National Voluntary Review of the implementation of Agenda 2030 found that Lithuania's strategic planning documents reflected most SDGs and their targets (UN, 2018). Although the review assessed progress on all SDGs, it did not identify the environment as a priority. The planned update of Lithuania 2030 in line with Agenda 2030 is ongoing (Blöchliger and Strumskyte, 2021).

The country has prepared a wide range of environmental policy plans over the past few years. In 2019, the government presented its long-term National Climate Change Management Strategy in line with EU regulations, setting a net-zero carbon emission target for 2050. The NECP laid out medium-term (2021-30) mitigation and adaptation measures to support implementation, with a special focus on transport and agriculture. The National Air Pollution Reduction Plan was adopted in 2019. The 2016 National Environmental Protection Strategy put forward a range of principles, objectives and targets until 2030 along four main axes: sustainable use of natural resources and waste management, improvement of environmental quality, maintenance of ecosystem stability, and climate change mitigation and adaptation. Additional green economy measures are expected under the National Progress Plan for 2021-30, the new government programme and the 2021 New Generation Lithuania recovery plan.

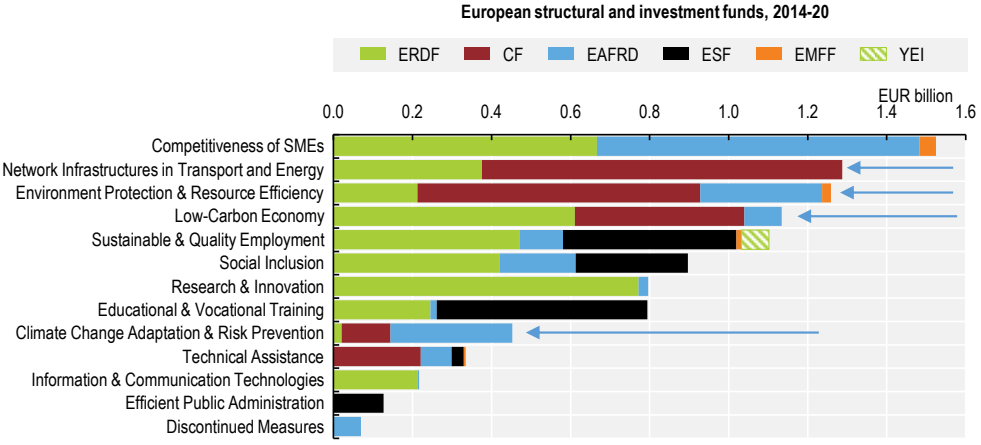
In 2020, the prime minister established a government working group to better co-ordinate NECP implementation and address topics on the European Union's Green Deal agenda. The working group includes vice ministers and other high-level representatives of key ministries in charge of NECP implementation. It co-ordinates, among others, the transfer of NECP measures and indicators into national investment planning documents. Such high-level co-ordination of related policy measures is useful.

Private funding is needed to support large investments in greening the economy

Public (mostly local government) expenditure on environmental protection decreased from 1.3% of GDP in 2000 to 0.3% in 2018, less than half the EU average of 0.8%. A reversion of these trends is needed. For example, according to OECD projections, compliance with EU legislation on water supply and sanitation will require a 40% increase in annual investment by 2030 (OECD, 2020d). To implement the measures laid out in the NECP, Lithuania anticipates a total investment need of EUR 14 billion, most of it coming from public funding.

Lithuania has in the past benefited from major funding from the European Structural and Investment Funds. Over 2014-20, the country received EUR 8.4 billion in a range of policy areas, many of which are of environmental relevance (e.g. environment protection and resource efficiency, low-carbon economy, climate change adaptation and risk prevention) (Figure 4). The EU funding in these theme areas has been complemented by EUR 1.6 billion in national funding.

Figure 4. Environment-related investment in Lithuania has relied largely on EU funds



Note: European Regional Development Fund (ERDF), Cohesion Fund (CF), European Agricultural Fund for Rural Development (EAFRD), European Social Fund (ESF), European Maritime and Fisheries Fund (EMFF) and Youth Employment Initiative (YEI), including national co-financing (EUR 1.6 billion of EUR 10 billion).
Source: EC (2020), *European Structural and Investment Funds* (database), accessed on 20 November 2020.

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Investment needs in sustainable energy and climate policies are estimated at 3% of the 2019 GDP annually over the next decade (EC, 2020). Lithuania intends to rely on EU funds and other external sources (50%), state funding (21%) and the private sector (29%) to finance these investments. The EU Recovery and Resilience Facility requires that use of its funds be consistent with six defined environmental objectives. This will help ensure that investment-related recovery measures by Lithuania contribute to greening the economy. However, there are no clear plans to mobilise the required private funding.

Electricity production from renewable sources is supported through price premiums and priority access to the grid. Private persons and firms can receive financial support for scrapping old, highly polluting cars and purchasing lower-emission vehicles. Support is also available for energy efficiency measures and installation of renewable energy systems in private houses, as well as for replacement of old boilers with heat pumps or eco-design solid biofuel boilers. Such schemes might reduce energy use and reduce air emissions of particulate matter. However, *ex post* assessments of similar subsidy schemes in other countries have rarely found that net benefits to society have exceeded the costs.

Ambitious innovation targets have been set but their achievement is uncertain

The country's eco-innovation performance is modest. The government's research and development (R&D) budget on the environment decreased in the past decade. The public budget on energy-related R&D per unit of GDP is among the tenth-lowest across the IEA member countries (IEA, 2021). In 2019, the public budget on energy-related R&D per unit of GDP was in the bottom third among OECD member countries. Renewable energy sources, mostly solar energy and biofuels, accounted for one-fourth of total spending.

The share of environmental patents in total patenting in Lithuania is broadly in line with such shares in other Baltic states and the OECD average. However, in absolute terms the number of patents is small. There has been a recent increase in patents related to environmental management, but the number of patents related to climate change mitigation and adaptation has decreased.

The National Energy Independence Strategy lists 9 priority areas and presents 11 measures to stimulate export growth and creation of new forms of business. The National Reform Programme has also set a

target to increase substantially the share of renewable energy in the energy mix. Lithuanian businesses and R&D institutions have built up important competences in the fields of solar energy, biomass, geothermal energy and liquefied natural gas (LNG). Although Lithuania also wishes to invest in developing new fields, it may not have sufficient human and financial resources to achieve these ambitions. Systematic application of cost-benefit analysis of potential investments is therefore important.

The Ministry of Energy is implementing a 2020 action plan to strengthen Lithuania's energy innovation. The plan sets out more than 50 measures in the areas of infrastructure, human resources, products and services, the regulatory environment, science and technology. Most measures are planned to be implemented by 2023. In addition, a law on the Innovation Promotion Fund was adopted in June 2020. The Fund will provide loans, guarantees and risk capital for start-ups and R&D projects.

The Smart Specialisation Programme seeks to significantly increase innovation activity in the country. The goal is to increase investment in R&D from 1.04% of GDP in 2015 to 1.9% in 2023 and to double the number of patent applications over the same period. However, R&D investment has not yet recovered from a sharp drop in 2016, so it is unlikely these objectives will be met. An impact assessment of the programme is planned at the end of 2021.

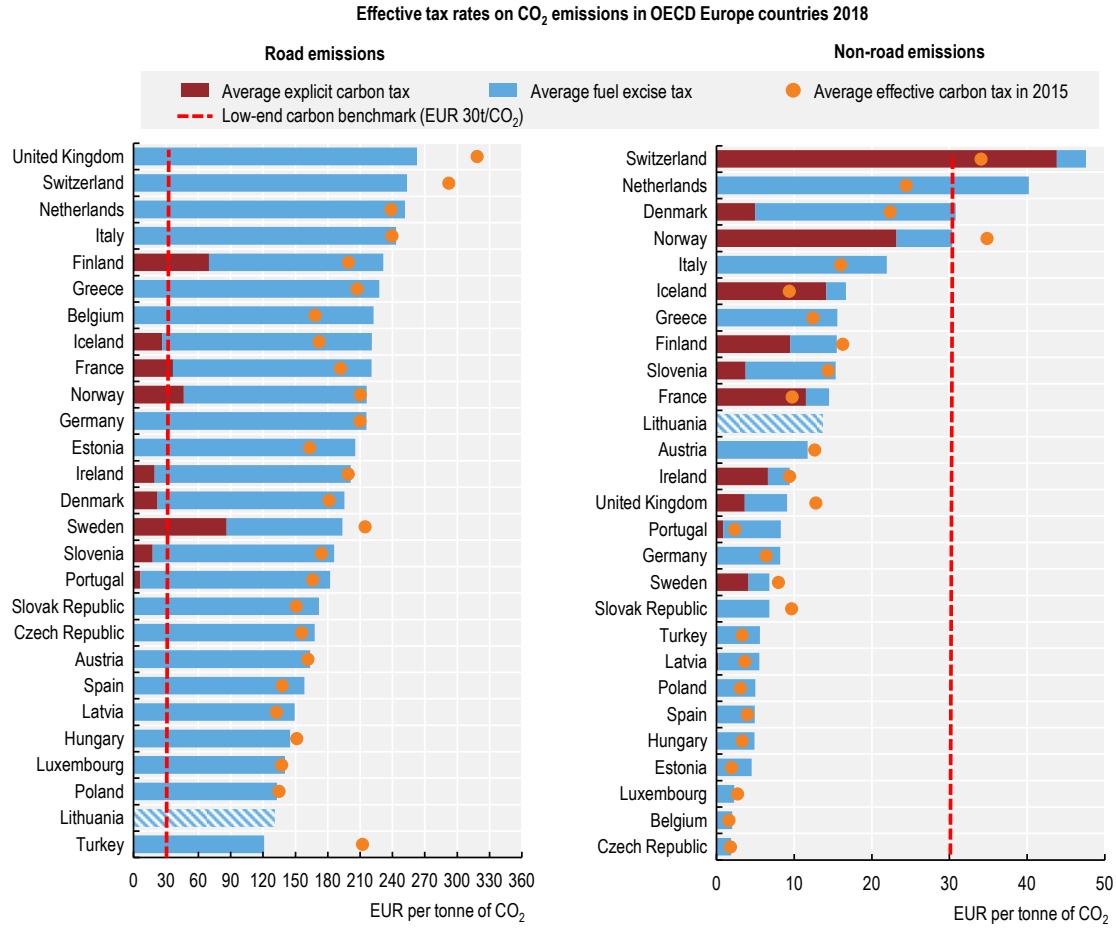
More should be done to green energy taxes

The tax structure is skewed towards labour, which penalises growth and employment. Revenues from the less distortive environmentally related taxes were equal to around 2% of GDP in 2018. This was below the 2000 level and lower than the OECD Europe average of 2.3%. Almost all the revenues (90%) stem from excise duties on oil and oil products, with pollution and natural resource use taxes accounting for the remaining share.

Lithuania has one of the lowest excise duties on petrol and diesel in the OECD. The country also has one of the largest "diesel differentials", i.e. the gap in the tax rate on diesel compared to petrol. The low tax rate on diesel has contributed to a rapid dieselisation of the passenger vehicle fleet over the past decade. This has increased emissions of local air pollutants, with negative impacts on human health. In 2019, 69.2% of all passenger vehicles in Lithuania were diesel-driven, up from only 15.2% in 2010. This makes it the highest diesel share in all EU countries (Section 4). In one positive development, the tax on diesel used in agriculture almost tripled from July 2015 to January 2020.

Taxes on energy products do not fully reflect environmental costs of energy use. Effective tax rates on carbon dioxide (CO_2) emissions from energy use are low, especially in the road sector (Figure 5). Lithuania does not impose an explicit carbon tax. Legislation in 2021 is expected to revise excise duty and value-added tax (VAT) rate reductions for fossil fuels and introduce a CO_2 component in fuel prices, linking tax rates for all fuels to CO_2 emissions.

Figure 5. Relative to many other OECD Europe countries, effective carbon rates are low



Note: Tax rates as applicable on 1 July 2018. CO_2 emissions are calculated based on energy use data for 2018 from IEA (2020), World Energy Statistics and Balances. The average effective carbon tax rate in 2015 is the sum of the average explicit carbon tax rate in 2015 and the average fuel excise tax rate in 2015.
Source: OECD (2019), *Taxing Energy Use 2019: Using Taxes for Climate Action.*

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Support to fossil fuel consumption was equal to 34% of energy tax revenue in 2019. It is mostly made up of tax preferences for the use of oil products, in particular lower taxation of heating oil and diesel used in agriculture. These tax preferences narrow the tax base and undermine carbon prices. Support to fossil fuel consumption rose significantly in the past decade as forgone revenue from tax concessions increased.

Positive changes have been made to motor vehicle taxation but more needs to be done

In a positive development, Lithuania introduced a new tax on passenger car registrations in 2020. Its rates are differentiated according to the vehicle's CO_2-emissions and fuel used. However, the tax only applies to vehicles emitting more than 130 grammes of CO_2 per kilometre (gCO_2/km) driven. The rates for vehicles with higher emissions are relatively low, especially for non-diesel vehicles. In another sign of progress, Lithuania plans to replace the time-based Eurovignette road use charge for heavy-duty vehicles with a distance-based road use charge differentiated according to the vehicle's Euro class. Lithuania is also considering an annual tax on passenger vehicle ownership that would vary depending on environmental performance of the car but not on the distance driven.

In 2015, the gap between the cost and benefits of a company car in Lithuania was among the highest in the European Union (Princen, 2017). Removing the favourable tax treatment of company cars, which is costly and particularly benefits high-income persons, would help internalise environmental and social costs of road transport.

Taxes on air and water pollution are low but cover a large number of pollutants

Lithuania applies taxes on certain air and water pollutants emitted from stationary sources. Tax rates for air emissions and wastewater discharges were last increased in January 2021. For some air pollutants, such as particulate matter, heavy metals and volatile organic compounds, gradual increases in the tax rates are foreseen until 2023. However, even the increased tax rates (e.g. for ammonia) are low compared to both estimates of the social costs of the respective pollutants and the costs of their abatement.

The financial support under the EU Common Agricultural Policy has led to a 20% increase in the area of agricultural land since Lithuania's accession to the European Union in 2004. This has had a negative impact on the environment through increased use of synthetic fertilisers and fossil fuels, and reduced grassland and pasture areas. At the same time, support measures under Lithuania's Rural Development Programmes have encouraged farmers to implement environmentally friendly practices such as organic farming, forest ecosystem services and water quality protection.

In an effort to reduce landfilling of municipal waste, the landfill tax is set to increase by EUR 5 per tonne each year until 2024, when it will reach EUR 25 per tonne of waste. A further tax rate increase, in line with the government's original proposed rate of EUR 50 per tonne, would be appropriate.

Recommendations on green growth

Enhancing policy coherence for sustainable development

- Make sure that measures to promote economic recovery in the aftermath of the COVID-19 pandemic contribute to greening the economy by linking support for businesses and households to meeting environment- and climate-related requirements.

Promoting low-carbon investment and eco-innovation

- Improve coherence among different green economy investment programmes and create a concrete plan for mobilising private investments.
- Assess Lithuania's comparative advantages and increase government spending on R&D related to the environment and low-carbon energy transition in the most promising areas.

Greening the tax and subsidy system

- Gradually increase the tax rate on diesel at least up to the current level of the petrol tax rate, and consider if further increases in both tax rates could be appropriate to promote the sales of zero-emission vehicles.
- Introduce a carbon tax on all fossil fuel uses not covered by the EU ETS, including coal use in households, and increase the tax rates gradually over time, while providing measures to alleviate the burden on the most affected households.
- Extend the new CO_2-differentiated registration tax to all passenger vehicles, including classes with CO_2 emission levels lower than 130 gCO_2/km; increase the tax rates for all vehicles without giving an advantage to diesel-driven ones.
- Introduce an annual motor vehicle tax for passenger vehicles, with tax rates depending on CO_2 and air pollutant emissions of the vehicle; consider adding a distance-based component to this tax.
- Implement the planned kilometre-based road use charge for heavy-duty vehicles and consider possibilities of differentiating the charge rates by the time of the day and week to address road congestion.
- Further increase the rates of the air and water pollution taxes to better reflect social damages of emissions, while creating incentives for shifting to cleaner technologies; focus on a much smaller number of pollutants.
- Phase out all fossil fuel support measures, including the VAT rate reduction for central heating, while taking appropriate measures to limit the burden on the most affected firms and households.
- Establish a multi-stakeholder mechanism to track and support the reform of environmentally related taxes and subsidies; swiftly develop a plan to phase out fossil fuel and other environmentally harmful subsidies.
- Gradually increase the tax on landfilling of municipal waste beyond the levels envisaged at present.

1.4. Sustainable mobility

Lithuania faces challenging 2030 decarbonisation targets for non-ETS sectors. The newly adopted 2030 national target of a 25% GHG emission reduction (compared with 2005) for non-ETS sectors goes beyond the 9% cut mandated by the EU Effort Sharing Regulation (Section 1). The National Climate Change Management Agenda calls for a 14% reduction for the transport sector, the largest emitter. To achieve this target, Lithuania needs to change the trajectory of both urban development and transport. A broad set of

measures will need to be implemented fast to advance sustainable mobility and reduce emissions from road transport in particular. Some measures are part of the NECP, while others have yet to be designed and implemented.

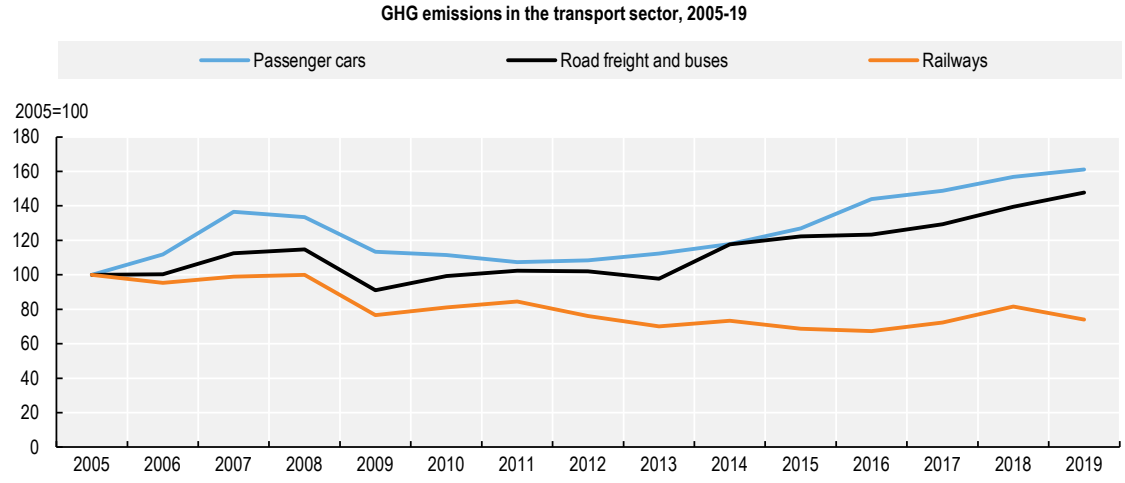
Decarbonising the transport sector is critical for meeting national climate mitigation targets

Transport accounted for 30% of Lithuania's total direct GHG emissions in 2018, making this sector the largest emitter, followed by agriculture (21%). The transport sector's emissions have increased by 38% over the last decade and are projected to rise steeply until at least 2024 without additional measures (Government of Lithuania, 2020). The transport sector is also the principal source of NO_x and fine particulate matter ($PM_{2.5}$), contributing to 71% and 23.5% of their total respective national emissions.

The country's dispersed settlement pattern and low population density make road transport the dominant transport mode for both passengers and freight. As a result, road transport is the most important source of GHGs, contributing 96% of the sector's emissions in 2018. Cars represented 58% of the total transport energy consumption in 2018, followed by trucks (38%), which is a rather high share by international comparison.

Since 2013, Lithuania has seen 26% growth in energy demand in the transport sector and an associated increase in GHG emissions, which are up by 50% since 2005 (Figure 6). Car use has declined since 2005 due to falling demand for long-distance travel. This, in turn, has alleviated the negative impact caused by an ageing vehicle fleet and the increasing share of imported second-hand, highly polluting cars. In 2019, 70% of registered vehicles were diesel cars with an average age of 15 years and average CO_2 emissions of 160-170 g/km (Government of Lithuania, 2020). The high share of diesel cars in the vehicle fleet also raises health concerns associated with urban air pollution.

Figure 6. GHG emissions from transport sector are rapidly increasing



Note: Road freight includes light duty trucks, heavy-duty trucks and buses.
Source: UNFCCC (2021), *GHG Data Interface* (database).

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The growing share of diesel vehicles has largely been a result of tax rates for diesel being historically lower than for petrol. Until July 2020, Lithuania was one of few EU countries that did not levy a registration or an

ownership tax for non-commercial vehicles. Lithuania has recently reviewed its taxation system and introduced a CO_2-based vehicle registration tax on motor vehicles. However, the tax rates remain low compared to other EU countries (Section 3).

Lithuania faces challenging 2030 decarbonisation targets for non-ETS sectors. It is not on a pathway consistent with the gradual decarbonisation envisaged in the NECP. Projections indicate that, compared to 2005, GHG emissions in all transport sub-sectors will increase or remain stable. In the rail sub-sector, the ongoing electrification of railways could reduce fossil fuel consumption by 47% by 2040. However, reducing GHG emissions from the road sub-sector remains problematic. Existing measures may not contribute to significant reductions in the petrol and diesel consumption. By 2040, road transport will account for an estimated 96.6% of GHG emissions in the transport sector. The planned modernisation of the transport fleet will also not be enough to reach the national NO_x emission targets. To meet both national and EU targets, Lithuania will need to move at a faster pace and employ additional measures to reduce emissions from mobility and freight.

A clear strategy with a more ambitious target is needed to ensure progress of the transport sector towards carbon neutrality by 2050

To reach its 2030 GHG emission reduction target for the transport sector, the country plans to increase the use of alternative fuels and innovative transport technologies, electrify its railways and strengthen relevant tax instruments (Section 3). The 2021 Law on Alternative Fuels mandates support of biofuels, biomethane and hydrogen to raise the share of renewable energy sources in the sector's final energy consumption by 2030.

Following the 2021 provisional agreement on the European Climate Law, Lithuania will need to set a more stringent target for the transport sector with a view to the transition to a carbon-neutral transport system by 2050. This revision, discussed under the National Climate Change Framework, will require faster implementation of all measures identified in the NECP. It will also require additional measures to address the increasing car ownership and incentivise a shift to sustainable transport modes.

Improved policy coherence would help mitigate impacts of transport on climate and air quality

In the last decade, Lithuania has developed a variety of national and local medium- and long-term policy documents that declare principles for reducing environmental impacts from different sectors. The NECP is the main medium-term strategic document guiding the country's climate change objectives. To support the plan's implementation, the National Climate Change Management Policy Strategy for 2013-50 sets specific sectoral targets to reduce GHG emissions. The NOx reduction targets for transport are set in the National Progress Plan for 2021-30. Cities and towns across Lithuania have developed SUMPs to foster integration of all transport modes, while encouraging a shift towards more sustainable modes of transport.

Ensuring the consistency of all these strategies remains a challenge. The alignment of policies towards low-carbon mobility is often hindered by lack of co-ordination between institutions in charge of transport and other complementary urban policies (e.g. land use) and between the national and local governments. To date, Lithuania is lacking mechanisms to monitor the performance of cities towards climate change mitigation objectives set out in a variety of national strategic documents.

Lithuania is striving to create better links between national strategic documents and local SUMPs. The Ministry of Transport and Communications (MTC) is planning a national monitoring and evaluation scheme, as well as funding for sustainable mobility measures. It would be valuable to link these national funds to the progress of urban areas towards reducing environmental impacts of mobility and provide guidance for project evaluation.

Lack of integration between land use and transport planning hinders the effectiveness of sustainable urban transport policies

Lithuania's urban sprawl and low-density development have contributed to unsustainable travel patterns and over-reliance on private vehicles. The 2021 Law on Municipal Infrastructure Development is a positive step in counteracting urban sprawl. This law stipulates that by 2023 municipalities need to adjust their general plans to define priority and non-priority infrastructure. Until then, all real estate developers will have to pay higher development fees that will be earmarked towards necessary transport infrastructure improvements.

SUMPs have brought more attention to sustainable transport and urban planning. However, despite the growing endorsement of SUMPs from the national government, the implementation of these plans has been problematic. In the vast majority of cities, land-use and transport planning remains the responsibility of separate authorities with limited or no co-ordination between them. This means that transport and spatial plans function separately. As a result, many development projects continue being car-centric. They are frequently located on the fringes of cities, far from transport links or services, thereby exacerbating car use and associated environmental impacts. Lithuania needs to shift to a more integrated approach to sustainable urban and transport planning based on enhancing people's access to goods, services and activities. Full implementation of actions identified in SUMPs would require tighter planning regulations so that all new developments promote compact settlement and have easy access to transport links, as well as safe walking and cycling routes.

National investment priorities are skewed towards road infrastructure

Policy emphasis on private vehicles has been reflected in the allocation of public investment, with roads receiving the bulk of land transport funding. Investment for transport infrastructure projects comes from EU funds and the national budget. The amount of EU funds allocated to rail and road infrastructure projects is of a similar magnitude. The state investment in the railway sector is expected to increase significantly in 2021-23. To date, however, the budget funding allocated to road infrastructure projects has been dominant. Much of this investment is directed at paving the still widespread gravel roads in the countryside that have a negative impact on road safety.

To avoid "locking in" an emission-intensive development pathway and exacerbating car dependency, Lithuania needs to ensure that investment in public transport and sustainable modes remains a priority. This means limiting road investment to necessary improvements of gravel roads, maintenance and construction, while prioritising high-quality rail and bus links to achieve inter-regional connectivity. Rural public transport, especially buses, will need significant investment to reduce car dependence for local journeys and enhance connectivity with inter-regional transport modes.

Necessary improvements in climate impact and air quality require additional effort to improve public transport and non-motorised modes in urban areas. While SUMPs include plans to improve public transport, walking and cycling conditions, the implementation of these measures remains incomplete due to limited funding. Municipalities have few own tax revenues and rely heavily on transfers from the central government. Earmarking revenues from parking fees for improvement in cycling and walking conditions could be an important additional source of local funding that would complement the necessary reorientation of the national funding towards low-carbon transport modes.

Lithuania needs better incentives to steer user behaviour towards sustainable modes

Starting in 2019, Lithuania has taken positive steps towards reducing environmental damage from mobility. Incentives for choosing lower-emission cars have been introduced, including a motor tax and grants for purchasing low-emission and electric vehicles. The new Law on Alternative Fuels introduces a biofuel blending scheme that increases the overall blending obligations of fuel suppliers to 16.8% in 2030. The

law also requires that all publicly procured passenger cars and buses use alternative fuels from 2029 and that cities establish low-emission zones (LEZs) by no later than 2023. These measures are expected to reduce the number of vehicles powered by internal combustion engines, as well as passenger cars. Yet the transport fuel taxes remain among the lowest in the European Union and do not sufficiently incentivise energy efficiency and lower consumption of fossil fuels (Section 3).

At the same time, the under-pricing of parking results in inefficient use of space and excessive parking demand. Not all car users have to pay for parking at their origin and destination, either because of free on-street parking or because their employer or shop offers them free parking off street. Furthermore, building codes include minimum parking regulations for buildings that mandate the number of parking spaces in a development. This often leads to excessive parking in residential and commercial buildings (ITF, 2021). Ideally, parking pricing structure and road space prioritisation should discourage unnecessary private vehicle use and promote public transport and non-motorised mobility.

Promoting electric vehicles remains a challenge

Increasing the uptake of electric vehicles (EVs) is one of the pillars of Lithuania's strategy to curb GHG emissions from transport. The country has an ambitious target of 230 000 battery EVs by 2030, which represents 15% of the current fleet of passenger vehicles. However, EVs are a relatively new policy priority. Until 2020, Lithuania had only two non-fiscal incentives for choosing an EV: access to dedicated public transport lanes in Vilnius and reduction of parking fees. In 2020, the Climate Change Programme introduced important fiscal incentives for purchasing low-emission vehicles, including a scrappage scheme and a purchase grant. In parallel, Lithuania introduced a registration tax for high-pollution vehicles powered with fossil fuels.

To date, the uptake of electric vehicles has been low, with battery EVs representing only 0.2% of the total fleet, compared to 3.5% (2019) in the European Union (IEA, 2020). Lithuania has faced several issues with encouraging the purchase and use of EVs. One of the obstacles has been the absence of a common EV strategy at the national level, which in turn limits local initiatives.

The government has put in place additional support for buying EVs, including a purchase allowance of EUR 5 000 for a new EV and EUR 2 500 for a second-hand EV less than five years old. The Law on Alternative Fuels mandates financial support for EVs until one of ten light-duty vehicles in the country is electric. However, a substantial purchase price advantage of conventional diesel and petrol cars has been one of the reasons for the low uptake of EVs (Lindberg and Fridstrøm, 2015). Even second-hand EVs are likely to be more expensive than fuel-powered cars.

Lithuania has a limited EV-charging infrastructure, especially for intercity travel. The MTC has initiated development of EV-charging stations along highways and main roads. The Law on Alternative Fuels requires building 6 000 public EV-charging stations by 2030. Additionally, Lithuania plans to install 54 000 private EV charging points in residential and office buildings. Lithuania plans to continue financial support for the purchase of EVs, with additional support for the purchase and installation of charging points. In this context, the cost to the state of maintaining and further increasing the level of EV support could grow significantly and should be monitored in the long term. In addition, as EV financial support tends to benefit the wealthier households, it will also be important to mitigate potential social costs of the EV promotion strategy, for example, through special rebates for low-income car-dependent households.

Decarbonising freight transport is necessary to reduce the environmental and climate impacts of the transport sector

Lithuania relies heavily on road transport for freight activity. In recent years, the country has taken steps to reduce environmental impacts of road freight. The government is planning to replace the time-based road use charge (Eurovignette) for the use of main roads with an e-toll, distance-based system by 2023.

This would be an opportunity to substantially increase revenues from road use charges and reduce losses due to cross-border fuel tourism.

Lithuania is also planning to create a necessary infrastructure to improve efficiency and multi-modality of freight operations. Building intermodal terminals and improving connections between different modes will encourage operators to combine different modes of shipping instead of transporting intermodal units just by road. The aim is to shift 5% of freight to multi-modal transport by 2030. This is projected to reduce GHG emissions by 19% compared to moving freight only by road.

To improve the efficiency of rail operations and reduce GHG emissions, Lithuania is planning to electrify its rail network. Today the share of electrified railways is only 8% – one of the lowest in the European Union. It is envisaged that 25% of the rail infrastructure will be electrified by 2023. The ongoing Rail Baltica project will open a new high-speed railway line for freight transport. After the completion of Rail Baltica and electrification of existing railways, Lithuania would be able to transport as much as 70% of cargo by rail (Government of Lithuania, 2020).

The government is planning an allowance for the purchase of commercial vehicles fuelled by LNG to encourage their uptake as an economically and environmentally friendly alternative to diesel. In parallel, the government is investing in the installation of an LNG distribution system. While LNG is promoted as a transitional measure for its lower carbon content, GHG emissions of LNG trucks are considerably underestimated. This makes the technology potentially incompatible with the country's climate-neutrality goals (Mottschall, Kasten and Rodríguez, 2020). Testing technology developments, while reducing barriers for road freight electrification in the long term, is largely preferable from the perspective of a low-carbon transition.

Given limited resources, road freight decarbonisation also requires implementing low-cost, easy-to-adopt elements that have already shown their efficacy in quickly reducing emissions in the sector. Fuel consumption could be reduced due to changes in driving and intelligent transportation system technologies. Lithuania is already planning to introduce financial incentives for eco-driving in 2021-30. Additional measures, such as standardisation and sharing of logistics data, could accelerate collaboration between organisations and contribute to reducing CO_2 emissions (ITF, 2018). Examples of initiatives that could improve efficiency of logistics are centres that reduce freight traffic circulating within a target area by fostering consolidation of cargo at a terminal.

Recommendations on sustainable mobility

Defining a long-term decarbonisation strategy for the transport sector

- Develop a coherent roadmap for the low-carbon transition that specifies the role of all modes of transport; ensure that policies across modes are aligned with low-carbon mobility objectives and the Law on Alternative Fuels; set more ambitious, time-bound targets to support medium- and long-term decarbonisation targets for the non-ETS sectors.

Ensuring coherence between transport and land-use planning

- Strengthen links between transport planning and land use; tighten planning regulations to ensure that all developments promote compact settlement with easy access to transport links, as well as a network of safe walking and cycling routes.
- Develop a national scheme to monitor and evaluate implementation of SUMPs and overall performance of cities in meeting transport-related climate change mitigation objectives.

Prioritising public transport and active mobility

- Reprioritise national investment programmes towards sustainable mobility, allocating a large share of investment to public transport, walking and cycling.
- Channel local funding towards promoting environmentally friendly transport modes.

Steering user behaviour and promoting sustainable travel

- Promote the use of non-motorised transport by improving walking and cycling conditions; put in place significant investments and time-bound targets to support implementation.
- Follow through with incremental implementation of LEZs in urban areas; carefully monitor the impacts and adjust the levels of charges accordingly; envisage limited, targeted financial support to car-dependent and low-income households.
- Phase out free parking at the workplace; increase parking tariffs for in-street parking in urban areas; consider making public transport and emerging transport services (such as bike-sharing) eligible for workplace benefits; eliminate minimum parking requirements for new residential and commercial buildings.

Promoting electric vehicles

- Increase the taxation of purchase and use of internal combustion engine vehicles with a view to gradually removing the price difference between them and EVs; continue to extend the network of charging stations; carefully monitor potential distributional impacts on low-income, car-dependent households.

Shifting to low-carbon freight transport

- Advance the integration of road, rail and maritime freight, while rebalancing economic incentives in favour of rail freight.
- Improve efficiency of logistics operations by providing incentives for increased collaboration between freight carriers.
- Reassess the economic and environmental benefits of promoting LNG technology in road freight transport.

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Part I Progress towards sustainable development

Chapter 1. Environmental performance: Trends and recent developments

Lithuania has declared an ambitious goal of carbon neutrality by 2050 and plans to build on its recent progress in waste management to transition to a circular economy. However, the country's water resources and biodiversity are under increasing pressure. This chapter reviews Lithuania's progress towards national and international environmental targets in the areas of climate, air, waste and natural resource management. It focuses on the period since 2005, comparing the state of the environment with that of other OECD member countries.

Recommendations on climate, air, waste and natural resource management

Mitigating climate change

- Support the ambitious goal of carbon neutrality by identifying and exploiting synergies between climate policies and national priorities in business development, energy security, air and water quality, quality-of-life and housing.
- Optimise the use of EU funds, notably the recovery funding, to accelerate implementation of the NECP and other relevant policies; track progress towards the targets and closely monitor the performance of individual policies.

Improving air quality

- Reduce ammonia emissions by regulating mineral fertiliser application and implementing good farming practices such as integrated livestock manure management.
- Closely monitor air quality in dense urban areas with high levels of domestic solid fuel use for heating; introduce enforceable solid fuel quality requirements as necessary; strengthen control of household heating appliances.

Improving water quality

- Reduce nitrogen loading from agriculture through requirements for planning of, and reporting on, fertiliser consumption, stricter limits for fertiliser application in targeted areas, voluntary approaches, awareness-raising initiatives and training for farmers.
- Complete the upgrades of the wastewater treatment and water supply infrastructure to reduce the impact on water courses.

Transitioning to a circular economy

- Maintain the strong progress in waste reuse and recovery by expanding programmes to encourage behavioural change and incentivise better waste sorting by households.
- Increase focus on reducing waste generation through whole-of-lifecycle design of products and construction materials.

Conserving and sustainably using biodiversity

- Mainstream biodiversity considerations across government policies; improve planning and implementation of biodiversity protection measures and surveillance of biodiversity status outside protected areas.
- Consider introducing payments for ecosystem services and sustainable forest management; ensure financial sustainability of biodiversity protection programmes.

1.1. Introduction

With fewer than 3 million residents, Lithuania is among the least populous OECD members. It is a relatively flat country with abundant agricultural land, water and forest resources. Since transitioning to a market economy in the 1990s, the country's gross domestic product (GDP) has grown quickly. GDP per capita is now around 80% of the OECD average, a remarkable increase from just 38% in 2000. Lithuania joined the

European Union (EU) in 2004, adopted the euro in 2015 and joined the OECD in 2018. It borders Latvia, Belarus, Poland and the enclave of Kaliningrad in the Russian Federation (hereafter "Russia"). It has a Baltic Sea coastline (Figure 1.1).

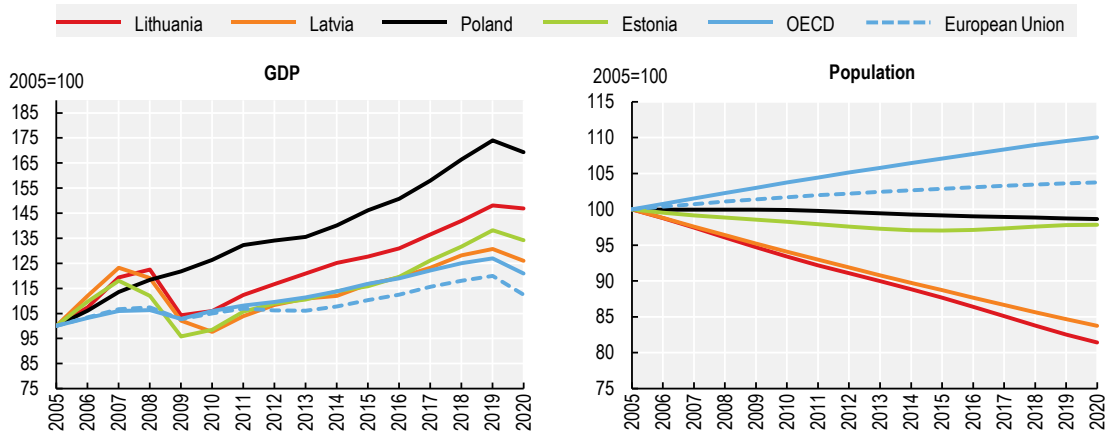
Figure 1.1. Map of Lithuania

1.2. Key economic and social developments

1.2.1. Economic performance

Despite a declining labour force, GDP more than doubled over the past 20 years, driven mainly by increased trade in goods and services. This growth has considerably exceeded the OECD average and matched or exceeded that of its fast-growing neighbours (Figure 1.2). Economic growth has not been without setbacks: the economy suffered in the financial crisis of 2009 as foreign investment stopped abruptly and unemployment reached almost 18%. However, recovery from that crisis was relatively rapid. The economic impact of the coronavirus pandemic has been comparatively mild with only a 2% GDP contraction in 2020, far less than the OECD average. A return to growth is projected for 2021 (OECD, 2020a, 2018a).

Figure 1.2. GDP growth has considerably exceeded that of the OECD despite a sharp decline in population



Note: GDP expressed at 2015 prices and purchasing power parities. European Union shown includes United Kingdom for population but not for GDP. The relative economic performances between countries are sensitive to the choice of start year.
Source: OECD (2021), *National Accounts* (database); UN (2020) *World Population Prospects* (database).

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In common with the other Baltic states and Poland, net migration has long been outward and skewed towards the young. This has resulted in an ageing and declining population – a distinctive social and economic trend in this region. Historically, fewer than half of emigrants return. However, since 2019 net migration has reversed. It is now positive, with more people arriving than leaving (OECD, 2018a; Government of Lithuania, 2020a). Other economic challenges include lower than average labour productivity, high wage inequality and low (but rising) levels of foreign investment (OECD, 2020a). The 2020 National Progress Plan (NPP) highlights a shortage of skilled staff as a particular concern.

Lithuania's financial position is sound, with manageable levels of public debt. The COVID-19 pandemic is not expected to dramatically stress public finances. According to the New Generation Lithuania recovery plan issued in April 2021, the country intends to use the EU Economic Recovery and Resilience Facility grant of over EUR 2.2 billion for green transition (37% of the total funding), digital transformation, health, social affairs, research and innovation, education and public governance. Green transition and digital transformation are priorities of the entire European Union, to which each member state must allocate at least 37% and 20% of the Fund's assistance, respectively. In the field of green transition, Lithuania is expected to focus on support for investments in solar and wind power plants, promotion of electric vehicles and renovating public transport, and energy efficiency retrofitting of multi-apartment buildings. Other priorities identified in the national recovery plan are related to implementation of recommendations of the Council of Europe for Lithuania.

1.3. Structure of the economy, employment and trade

Lithuania has a small and open economy with an increasing need for high-skill labour. Lithuania's trade in goods is diversified, with no particular group or products dominating imports or export. The country's trade links are also well diversified: its largest trading partners in goods are Russia, Latvia, Poland and Germany. Transportation, travel, professional services and information technology constitute the bulk of traded services by value for imports and exports (UN Comtrade, 2020).

There may be opportunities for Lithuania to benefit from the green transition. It could increase trade in environmental goods and services in areas where it has domestic expertise and resources. Examples include biomass heating and generation technologies, wood-based construction technologies and products, and organic produce.

1.3.1. Quality of life and regional disparities

Lithuanian residents report low well-being. The difference between the most and least satisfied responders to well-being surveys is the highest in the OECD. Low life satisfaction is accompanied by a relatively short life expectancy of 75.8 years compared to the OECD average of 80.5 years. Civic engagement as measured by voter turnout is also low, with around half (51%) of registered voters voting compared to 69% across the OECD. More positively, average household incomes are increasing (although household income inequality is high), housing is more affordable than the OECD average and residents generally feel safe (OECD, 2020b).

A notably high proportion of Lithuania's adults (43%) and an even higher one of 25-34 year-old people (55%) have tertiary education, one of the best rates in the world. Those who complete university education can expect much better job prospects and pay. The gap between the employment rate for this group and for those with only secondary education is 16%, one of the largest in the OECD. The earnings gap enjoyed by degree holders exceeds that in most countries (OECD, 2019).

Relatively few people live in urban areas: 51% of people live in cities and 23% live in large cities of more than 500 000 (only Vilnius is this large), compared to 70% and 55%, respectively, for the OECD. The country is organised into ten regions: Alytus, Kaunas, Klaipėda, Marijampolė, Panevėžys, Šiauliai, Tauragė, Telšiai, Utena and Vilnius, which are used for geographically-differentiated statistics (OECD, 2018b).

There are considerable differences in prosperity between regions. Vilnius consistently exceeds other regions in GDP per capita and its growth rate, as well as employment and productivity growth. For example, in 2015, GDP per capita in Vilnius was 2.5 times higher than in the worst performing region, Tauragė, and the unemployment rate was 10% lower. While such regional differences seem sizeable, they are not unusually large: regional economic disparities in Lithuania are close to the OECD median (OECD, 2018b).

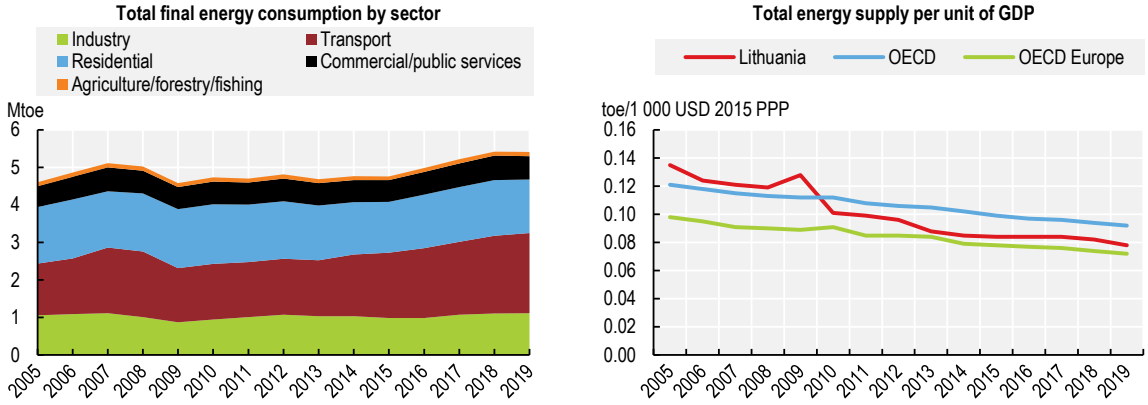
The NPP acknowledged that Lithuania lags behind neighbouring countries in progress towards the 2030 Sustainable Development Goals (SDGs). According to the NPP, the country had made significant progress towards Goal 15 (Life on earth). However, indicators for Goal 10 (Reducing inequalities) and Goal 13 (Mitigating the effects of climate change) had been deteriorating.

1.4. Transition to an energy-efficient and low-carbon economy

1.4.1. Energy intensity and use

Energy intensity per unit of GDP has declined from high levels in the early 2000s to below the OECD average (Figure 1.3). The initial steep decline was caused in part by energy-intensive industries being forced to close or switch to alternative energy sources by restrictions on sulphur-containing fuel oils (Government of Lithuania, 2020b). Around twice as much GDP is generated per unit of energy consumed today as 20 years ago. Total final energy consumption began to rise in 2015, driven by transport whose consumption rose from around 1.4 megatonnes of oil equivalent (Mtoe) in 2005 to around 2.1 Mtoe in 2019. The National Energy and Climate Plan (NECP) sets a target for total final energy consumption of 4.3 Mtoe by 2020 (17% of the 2009 level) and 4.5 Mtoe by 2030. The country has likely missed the 2020 target: in 2019, it stood at 6.62 Mtoe (IEA, 2021).

Figure 1.3. Energy consumption is increasing; energy intensity per unit of GDP remains high



Note: Data in the left panel exclude non-energy use consumption.
Source: IEA (2021), *IEA World Energy Statistics and Balances* (database).

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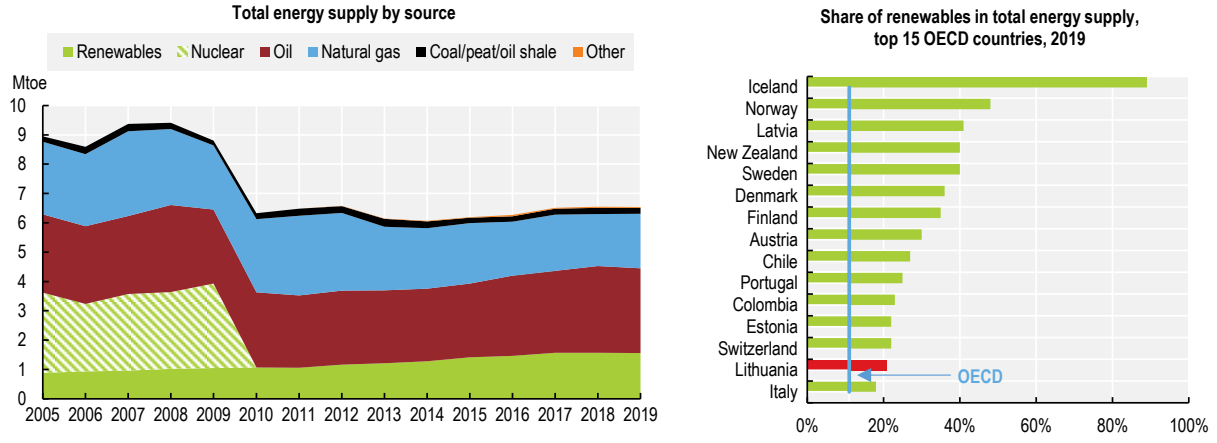
Renewable energy sources (RES), dominated by biomass, contributed 21% of the total primary energy supply in 2019. This places Lithuania among the top 15 OECD member countries on this indicator (Figure 1.4). Half of renewable energy is used to generate electricity and for district heating (Statistics Lithuania, 2019). The RES share in gross final energy consumption reached the 2020 target of 23% in 2014 and was 25% in 2019. The targets for 2030 and 2050 are much more ambitious – 50% and 90%, respectively. Lithuania plans to pursue them by increasing small- and large-scale generation capacity, converting more district heating to renewables, increasing use of alternative fuels and electricity in transport, and demand-side management.

Oil and natural gas filled the energy gap when the Ignalina nuclear power station closed in 2009. However, while the natural gas share has since declined, the oil share of total energy supply has increased to around 40%, an all-time high, driven mainly by increasing consumption in transport. Lithuania hosts the only operating oil refinery in the Baltic States: the Orlen Lietuva refinery complex near Mažeikiai. The refining capacity exceeds domestic demand, leading to significant exports of refined fuel. Crude oil feedstock (mostly from Russia) is imported by tanker via the Būtingė floating oil terminal in the Baltic Sea. Natural gas is also entirely imported (via pipelines and the Klaipėda sea terminal). Although energy interconnectivity is improving, Lithuania relies on energy imports for almost all fossil fuel energy. This means that increasing the domestic renewable energy share will bring both energy security and environmental benefits.

Figure 1.4. Renewables share in total energy supply is increasing, but oil still dominates

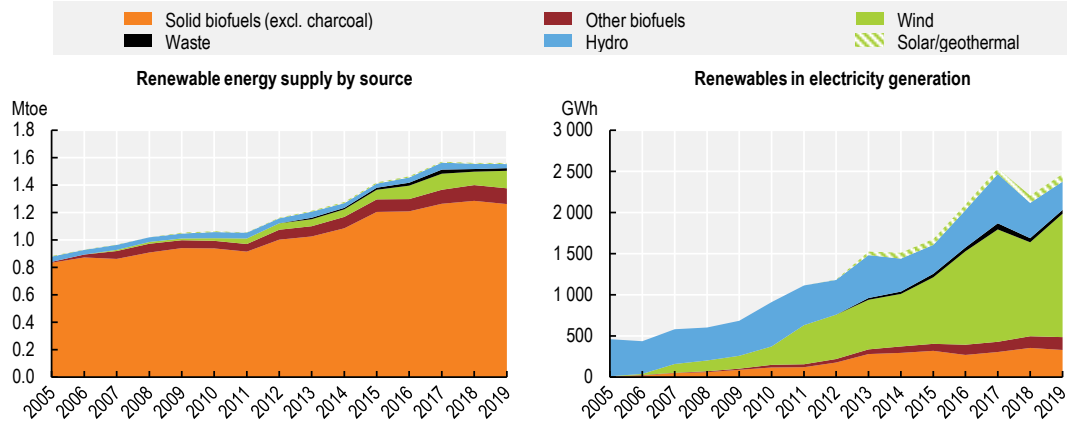


Note: The 2009 shift reflects the closing of the Ignalina nuclear plant (left panel).
Source: IEA (2021), *IEA World Energy Statistics and Balances* (database).

StatLink https://doi.org/10.1787/888934268015

Lithuania imports about three-quarters of its electricity from Latvia, Sweden and Poland (IEA, 2020). The renewable electricity share in total final electricity consumption was almost 19% in 2019. However, domestically generated electricity is mostly renewable (74% in 2019), generated by onshore wind, hydropower (primarily from one large plant near Kaunas) and solid biofuels. Wind contributes most domestic generation: increases in onshore wind power account for almost all new RES capacity added since 2011 (Figure 1.5). Significant offshore wind capacity in the Baltic Sea is expected to generate up to 3TWh per year, comparable with domestic electricity production.

Figure 1.5. Biofuels provide the bulk of total energy supply from renewables; most renewable electricity generation comes from wind



Source: IEA (2021), *IEA World Energy Statistics and Balances: Renewables Information* (database).

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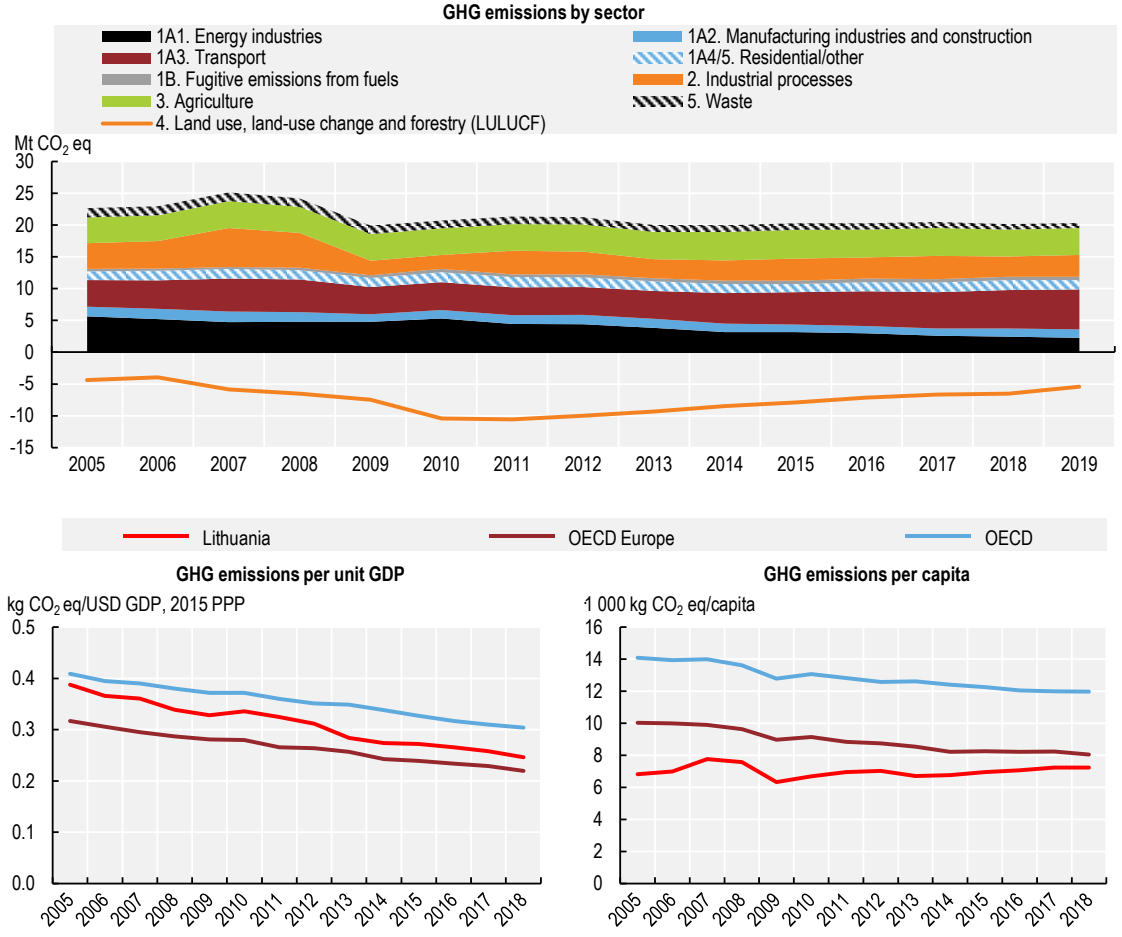
1.4.2. Greenhouse gas emissions

Following a steep decline in the 1990s and a more modest one in 2006-09, total greenhouse gas (GHG) emissions have recently been flat: reduced emissions from energy (and, to a smaller extent, industry) have been offset by increased emissions from transport. However, the GHG productivity of the economy – how much carbon dioxide equivalent (CO_2e) is emitted per each unit of GDP – has steadily improved. It is now about half the level of the early 2000s. GHG emissions per capita have increased in recent years (as could be expected with the rise in GDP per capita). While GHG emissions per capita remain well below the OECD average, this gap could close if recent trends continue. Transport, agriculture and industry account for two-thirds of total GHG emissions (Figure 1.6).

Transport (primarily road transport) is the biggest and fastest growing source of GHG emissions (Chapter 4). Emissions from agriculture have increased by around 3% since 2005. Emissions from livestock are decreasing due to a steady decline of livestock population. Meanwhile, emissions from crops are increasing, mostly due to the growing use of synthetic nitrogen fertilisers.

Figure 1.6. Total GHG emissions have changed little in recent years



Source: MoE (2021), *Lithuania's Greenhouse Gas Inventory Report 2021*; OECD (2020), "Greenhouse gas emissions by source", *OECD Environment Statistics* (database).

StatLink https://doi.org/10.1787/888934268053

Emissions regulated by the EU Emissions Trading System (ETS) must be collectively reduced by 43% compared to 2005 levels by 2030 across all EU member states (2003/87/EC). These are emissions of CO_2, nitrous oxide (N_2O) and perfluorocarbons mainly from combustion power stations, refineries, factories and aircraft. There is no domestic target for ETS-regulated emissions – the market element of the scheme is designed to promote emission reductions where they are most efficient. Lithuania has approximately 90 ETS-regulated installations or operators that collectively account for around 30% of total GHG emissions. Non-ETS sectors such as transport, farms, public sector buildings, smaller district heat suppliers (less than 20 MW) and households account for the remaining 70% of emissions (a large increase from 56% in 2005).

1.4.3. Main policies and measures

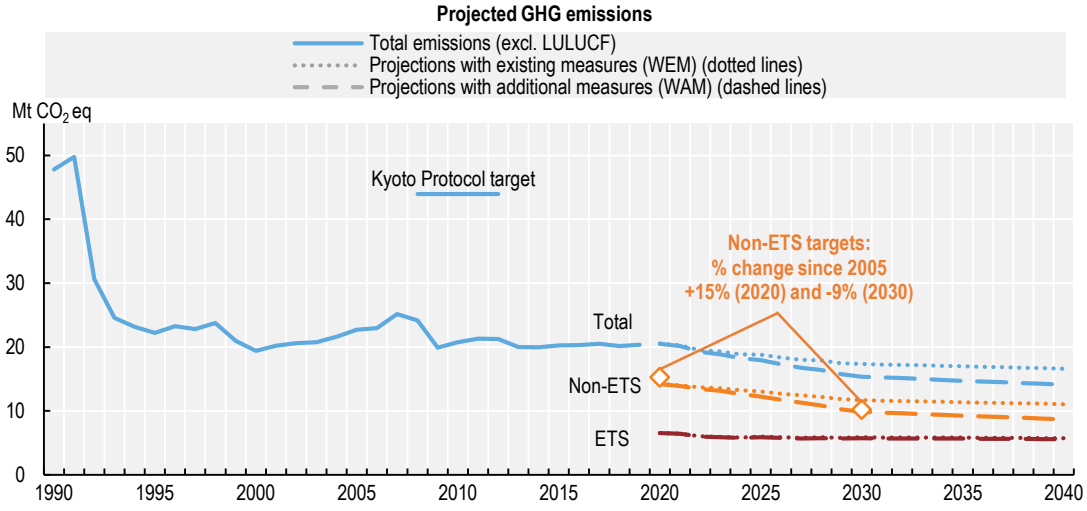
Lithuania affirmed its ambition to achieve carbon neutrality by 2050 in its National Climate Change Management Agenda (NCCMA) for 2021-50 that was adopted in June 2021. This goal would supersede the earlier national target of a 70% reduction of total GHG emissions (compared to the 1990 level) by 2040 and an 80% reduction by 2050. To help reach the overall reduction target, Lithuania will be able to offset 6.5 million tonnes of CO_2e over 2021-30 by using removals from land use, land-use change and forestry.

Lithuania has achieved its 15% increase target (compared to the 2005 level) for non-ETS emissions for 2020. Achieving the binding 9% reduction target (from the same level) for 2030 will require substantial changes to the status quo. Moreover, the 2030 target is likely to be upgraded to a 25% reduction under the NCCMA.

The policy emphasis will remain on sector-specific goals and measures with a focus on non-ETS sectors where national-level policies are particularly important. The NECP details the implemented and proposed sectoral policies and their anticipated impacts. Among more than 100 policies, the greater strategic focus is on increasing renewables in transport and heating, greater electrification and improved energy efficiency. Notable measures in terms of estimated impacts include a long-running national programme for renovation of energy efficiency retrofitting of multi-apartment housing and public buildings, energy saving agreements with private companies, fuel taxation increases and methane recovery from landfills. The NECP also proposes a roadmap for reducing emissions from transport that represents a considerable challenge without additional measures (Chapter 4).

A European Commission (EC) review of the NECP in late 2020 was broadly positive but called for more effort in the area of research, innovation and competitiveness (EC, 2020a). Lithuania plans to revise the NECP by mid-2023 to make it consistent with the country's carbon neutrality goal. GHG emission projections make it clear that additional measures will be needed to achieve the national climate change mitigation targets (Figure 1.7).

Figure 1.7. Additional measures are required to meet targets



Note: GHG = Greenhouse gas emissions excluding land use, land-use change and forestry (LULUCF); ETS = Emissions Trading System. The dotted lines show GHG emission projections with existing measures (WEM). The dashed lines show GHG emission projections with additional measures (WAM) scenario. The 2020 target has been achieved using the flexibility mechanisms as defined by the EU Effort Sharing Decision and Effort Sharing Regulation. The WEM and WAM projections do not include use of these flexibilities.
Source: EC (2021), "National projections of greenhouse gas emissions and removals", submitted to the European Commission pursuant to *Commission Implementing Regulation* (EU) No 749/2014 of 30 June 2014; MoE (2021), *Lithuania's Greenhouse Gas Inventory Report 2020*.

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1.4.4. Climate change adaptation

Lithuania has observed long-term warming of air and soil, increased precipitation and increased incidence of extreme weather events like severe storms. This warming and precipitation increase is expected to continue. Winters in particular are forecast to see the greatest effects. Flooding caused by sea-level rise and sinking terrain in low-level coastal cities is expected to be the most serious climate-related threat. Agriculture, public health, energy, industry, transport and communications, forestry and biodiversity are also sensitive to climate change (Government of Lithuania 2020c, 2020d).

The NECP proposes sector-specific adaptation measures for 2021-30, mostly focused on improvements to monitoring, measuring, forecasting and planning capacity in the transport, infrastructure, forestry, agriculture and water management sectors. The National Strategy for Climate Change Management Policy identifies lack of political will and information (particularly in agriculture and transport) as the main barriers to implementing effective climate adaptation measures.

1.5. Air emissions and air quality

The European Union's approach to improving air quality rests on three pillars. The first pillar comprises ambient air quality standards set out in the Ambient Air Quality Directives for ground-level ozone, particulate matter (PM_{10}), nitrogen oxides (NO_x), dangerous heavy metals and a number of other pollutants (Directives 2004/107/EC and 2008/50/EC). If the limit values are exceeded, member states are required to adopt air quality plans (AQPs) detailing measures to keep the exceedance period as short as possible. Two Lithuanian cities – Kaunas and Šiauliai – have set up an AQP that aims in both cases to reduce nitrogen dioxide (NO_2) and PM_{10} pollution from transport.

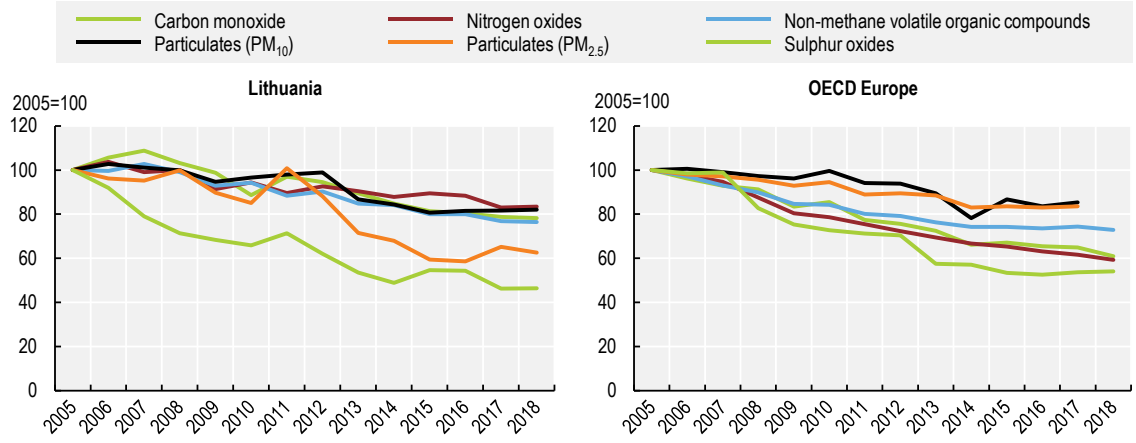
The second pillar consists of national emission reduction commitments (ERCs) set by the National Emission reduction Commitments Directive (NECD) for the most important transboundary air pollutants: sulphur dioxides (SO_2), NO_x, ammonia (NH_3), non-methane volatile organic compounds (NMVOCs) and, since 2017, fine particulate matter ($PM_{2.5}$). The third pillar comprises emission standards for key sources of pollution, laid out in dedicated EU legislation.

First adopted in 2001, the NECD set national emission ceilings to be achieved until the end of 2019. With the entry into force of the new NECD in 2017, the ERCs (percentage reduction compared to 2005) replaced the emission ceilings (annual maximum amount) and a fifth pollutant, $PM_{2.5}$, was added. Two ERCs are set for each pollutant, one for 2020-29 and one for 2030 and beyond.

1.5.1. Air emissions

Emissions of most air pollutants are trending down (Figure 1.8). However, with the exception of SO_2, the decline has been slower than the EU average.

Figure 1.8. Emissions of all key air pollutants have declined in the last decade



Source: OECD (2021), "Air emissions", *OECD Environment Statistics* (database).

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In 2017, Lithuania reported emissions below the respective ceilings set for SO_2, NO_x, NH_3 and NMVOCs (EEA, 2019a). It was one of only a handful of member states to attain the emission ceilings applicable until 2018 across all relevant pollutants. In recent years, emissions of heavy metals and persistent organic pollutants have also been below the ceilings adopted in the two 1998 Aarhus Protocols.

The new NECD requires member states to develop a national air pollution control plan (NAPCP) presenting measures to comply with their 2020-29 and 2030 ERCs. Lithuania submitted its NAPCP to the European Commission in 2019. The NAPCP was then attached to the NECP to foster synergies between air and climate policies (EC, 2020a). According to recent projections (Figure 1.9), Lithuania is likely to meet its 2020-29 and 2030 ERCs for SO_2 and $PM_{2.5}$. However, reducing NMVOC, NO_x and NH_3 emissions to meet these targets would require additional efforts. Compared to 2018 levels, Lithuania is one of only two EU member states to still require a greater than 10% improvement in NH_3 emissions to reach the 2020-29 goal. It is the only country that still needs to reduce NO_x emissions by more than 30% (EEA, 2020c).

Agriculture is the highest contributor to NH_3 emissions (Figure 1.9). According to estimates (Amann et al., 2017), NH_3 emission reductions required to meet the 2030 ERC target could be achieved by improved manure management. This would include extending the grazing period, treatment of exhaust air from pig and poultry houses, covered manure storage, manure injection into the soil and slurry acidification.

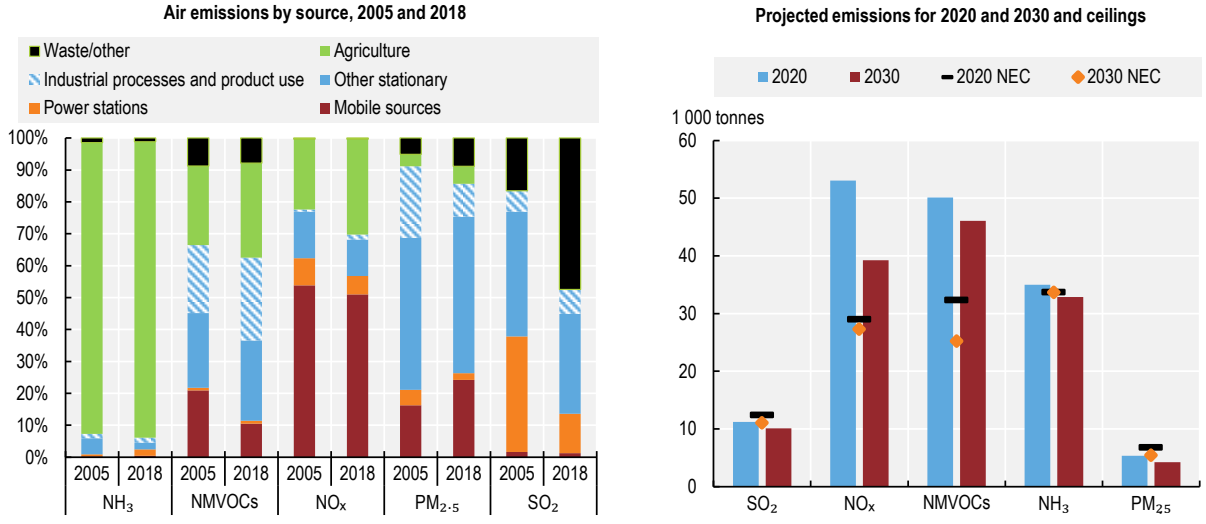
However, side effects of these practices in generating NO_x and nitrates must be considered. For example, injecting manure into the soil increases the risk of nitrate leaching into groundwater.

Road transport is the principal source of NO_x emissions, contributing about half of total emissions in 2019 (Figure 1.9). Road transport emissions have decreased by 12% in 2019 compared to 2005 primarily due to introduction of stringent vehicle standards. However, more wide-ranging policies are required, as discussed in Chapter 4.

Inorganic fertiliser use is the second largest source of NO_x at around 13%. Nitric oxide (NO) from agriculture has been included in the NECD reporting of NO_x emissions since 2017. This should encourage the agricultural sector to move towards integrated nitrogen management to reduce its NH_3, NO and N_2O (a GHG) emissions at the same time.

As in most OECD member countries, SO_2 emission reduction has been remarkable: total emissions decreased by more than half from 2005 to 2019. Public electricity and heat production, petroleum refining and fugitive emissions from petroleum refining and storage are the principal sources of remaining SO_2 emissions, contributing over 70% of the total in 2019.

Figure 1.9. Lithuania is not on track to meet targets for several air pollutants



Note: Right panel: Emission projections under the "with additional measures" scenario and reduction targets under the EU National Emission reduction Commitments (NEC) Directive (2016/2284/EC).
Source: Eionet (2021), National Air Pollutant Emission Inventory under the NEC Directive, 2021 Report; OECD (2021), "Air emissions", *OECD Environment Statistics* (database).

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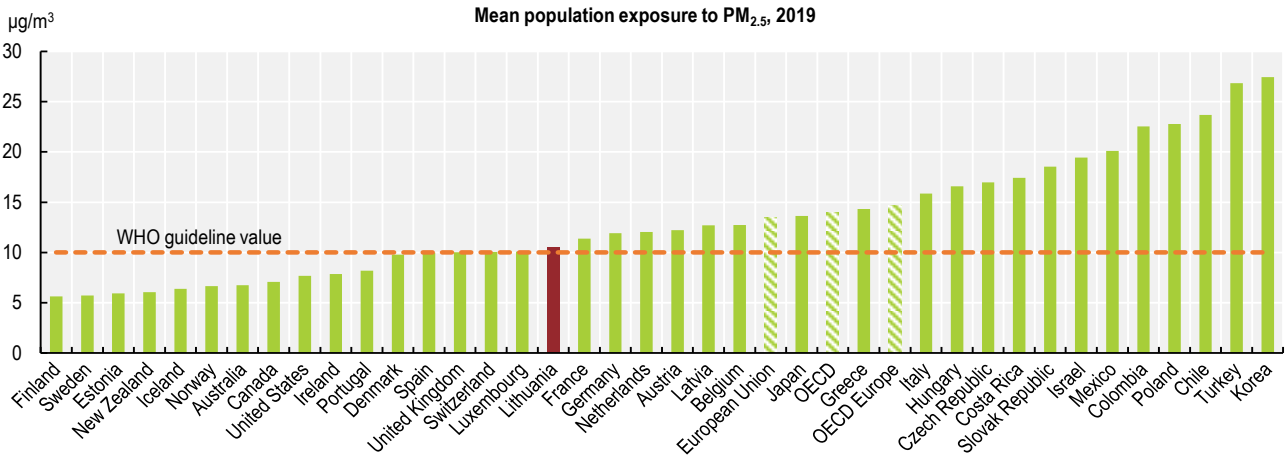
Air quality is generally good. This is partly due to a low population density, modestly sized cities and deconcentrated industry. Lithuania complies with legally binding limits for concentrations of outdoor air pollutants set in EU ambient air quality directives.

Concentrations of particulate matter have been long declining but in Vilnius and Klaipėda are close to thresholds and not improving. $PM_{2.5}$ pollution is a public health concern. The OECD estimates the 2019 population exposure in Lithuania at 10.6 micrograms per cubic metre (µg/m^3) (Figure 1.10). The European Environment Agency puts the 2018 exposure slightly higher, at 12.8 µg/m^3. Both estimates meet the EU limit value of 20 µg/m^3. However, they exceed the World Health Organization (WHO) guideline value of 10 µg/m^3 – the annual exposure at which cardiopulmonary harm can be conclusively shown (WHO, 2018; EEA, 2020a).

Figure 1.10. $PM_{2.5}$ exposure exceeds the WHO guideline value



Note: European Union value shows EU-27 excluding the United Kingdom.
Source: OECD (2021), "Population exposure to $PM_{2.5}$", *OECD Environment Statistics* (database).

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Even at current levels, $PM_{2.5}$ pollution has costly consequences in terms of premature mortality (mostly via heart disease and stroke) and welfare costs of these deaths. EEA (2020a) estimated 2 700 premature deaths in Lithuania attributed to $PM_{2.5}$. The country's mortality burden per 100 000 people is slightly higher than the EU average.[1]

Residential fuel burning (mostly wood) accounts for more than 40% of total $PM_{2.5}$ emissions in Lithuania. Two additional measures would help reduce $PM_{2.5}$ emissions significantly: energy renovation of buildings to reduce domestic heating needs; and dissemination of small-scale combustion facilities (wood chip boilers and wood stoves) with low emissions and high energy efficiency.

Concentrations of NO_2 are often difficult to manage in large cities with dense traffic. In Lithuania, annual mean NO_2 concentrations have been within limits, with no stations exceeding the annual limit value of 40 µg/m³ since 2005. However, concentrations in some areas of Vilnius are persistently close to this limit and show little sign of improvement.

Levels of other air pollutants, including ground-level ozone and heavy metals, are mostly low. One exception is benzo[a]pyrene (BaP) – a carcinogen associated with residential solid fuel burning. Its concentrations have exceeded the EU annual mean target value of 1 nanogramme per cubic metre (ng/m³) in at least one of the last ten years in all cities where it is monitored (EEA, 2020a). Annual average concentrations of BaP are substantially above the WHO "safe" reference level of 0.12 ng/m³, as is often the case in other European countries.

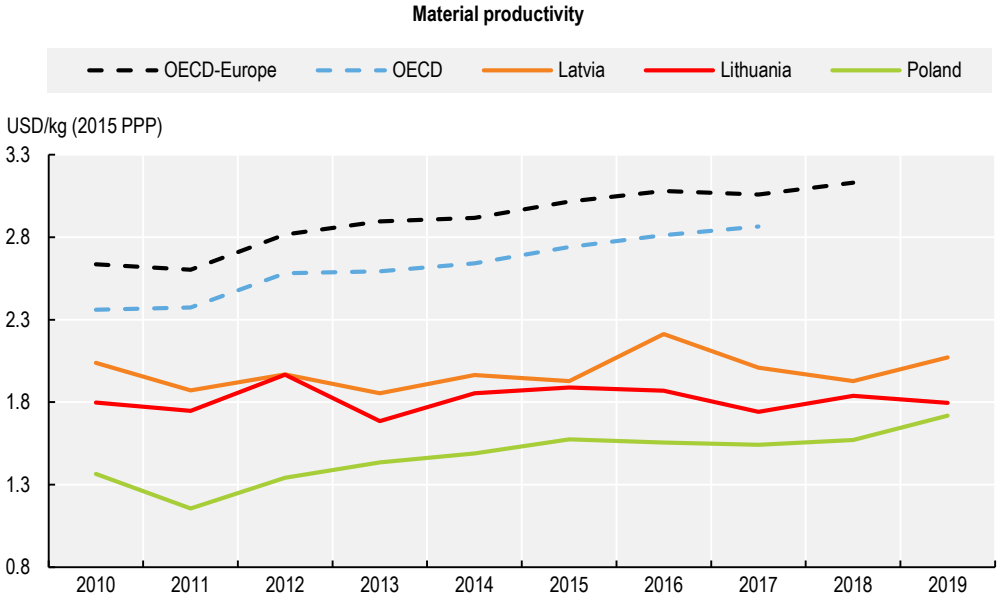
1.6. Transition to a resource-efficient economy

1.6.1. Material consumption

Lithuania's material productivity (GDP generated per kilogramme of materials used) remained largely unchanged over 2010-19 (Figure 1.11). Material consumption increased by 36% from 12.4 to 19.4 tonnes of materials per person over the same period. It is now much higher than the OECD Europe average of around 13 tonnes. This means that productivity rose steadily in line with GDP growth but was not accompanied by improved resource efficiency. The 2011 National Strategy for Sustainable Development

aimed to ensure that growth of natural resource consumption was twice as slow as growth of production and services. However, Lithuania did not achieve this goal.

Figure 1.11. Material productivity remains flat



Source: OECD (2021), "Material resources", *OECD Environment Statistics* (database).

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Material productivity of Lithuania's economy is comparable to that of neighbouring countries. However, it is about 40% lower than the OECD average and has been growing more slowly. The slow growth is partly due to a service sector that is smaller than the OECD average, less material-intensive and focused more on construction and infrastructure projects. Another factor is that GDP and incomes have risen rapidly, leading to greater consumption.

Construction minerals (55%), biomass (33%) and fossil energy carriers (11%) accounted for almost all Lithuania's material consumption in 2019. Consumption of construction minerals grew the fastest over 2010-19 – by more than 50%. Fossil energy carriers dominate material imports, accounting for almost half the total by mass in 2019 and reflecting the country's high reliance on energy imports.

1.6.2. Waste management

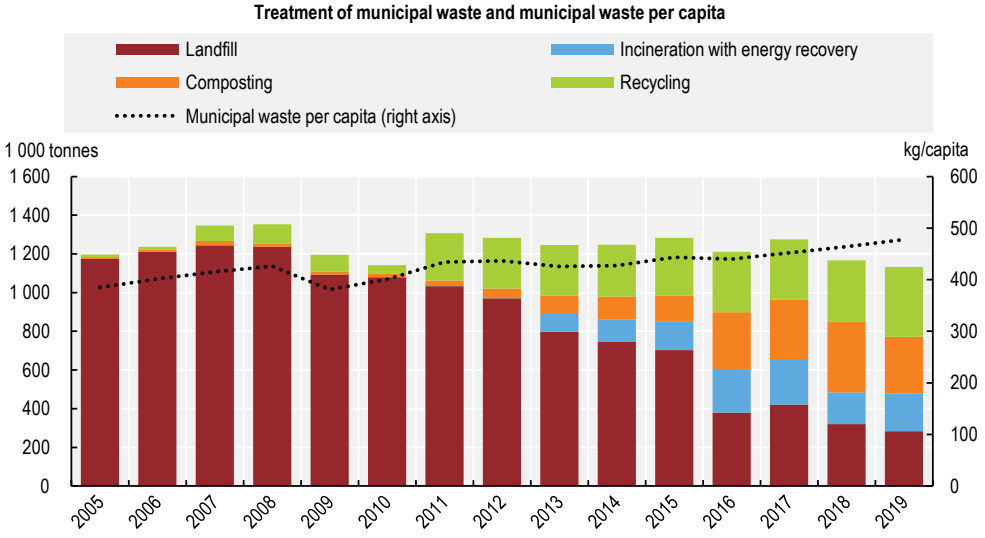
Lithuania generated 6.02 million tonnes of primary waste in 2018, a volume similar to that generated in 2005. This corresponds to around 2 tonnes per capita per year, which is average-to-low among OECD member countries. Chemical and pharmaceutical industries, rubber and plastics production, and mining and quarrying generated the considerable majority of all primary waste.

A relatively small share of generated waste is identified as hazardous (2.8% of total waste compared to 4.7% for the EU-27 average in 2018). Chemical waste, contaminated soil and batteries are among the largest constituents of hazardous waste by mass (Eurostat, 2021a). The government acknowledges under-identification of hazardous waste as a potential reason for its low share. Efforts are underway to better identify and separate hazardous waste.

Generation of municipal solid waste (MSW) was 478 kg per capita in 2019, slightly lower than the OECD average of 538 kg. This indicator increased by 17% compared to 2005, reflecting a population decline, as the total volume of municipal waste remained roughly the same.

In 2005, virtually all MSW (98%) was disposed in landfills. Since then, Lithuania's waste management practices have shifted dramatically in favour of recovery. Recycling and composting have become dominant treatment methods, followed by landfilling and incineration with energy recovery (Figure 1.12). This has been a result of separate waste collection, construction of sorting facilities, improved labelling requirements, education and awareness campaigns, and expanded deposit-refund schemes for beverage containers. Substantial financing from the European Union has enabled improvements to waste management. The country has also achieved near-total coverage of the population by municipal waste management services.

Figure 1.12. Recovery of municipal solid waste has improved significantly



Note: Excluding marginal quantities of waste incinerated without energy recovery. Data include breaks in time series.
Source: OECD (2021), "Municipal waste", *OECD Environment Statistics* (database).

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The government expects to have narrowly achieved the requirements of the EU Waste Framework Directive by 2020. This would entail recycling half of household waste (paper, metal, plastic and glass) and reusing 70% of construction waste. In 2018, Lithuania recycled about 48% of its household waste and reused about 68% of construction materials, with both rates trending up.

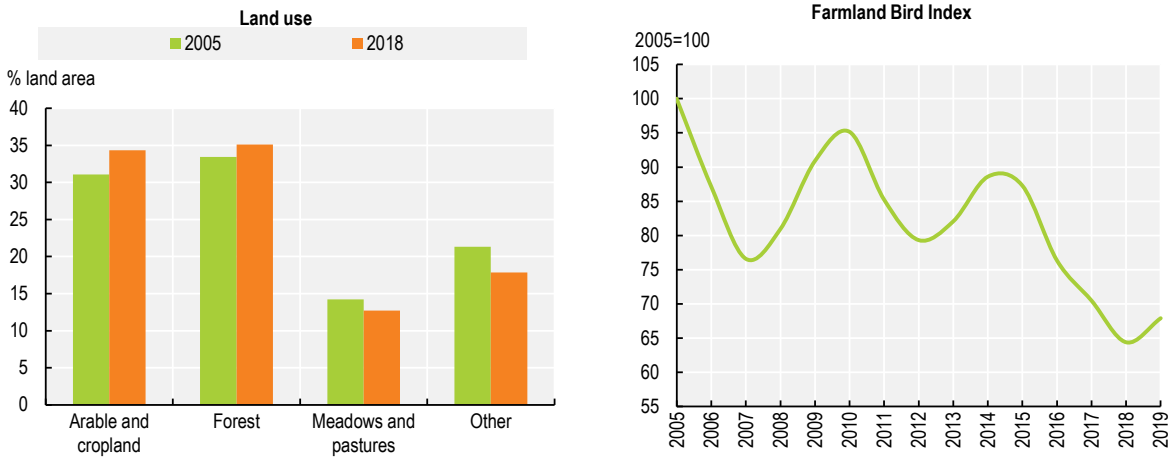
Other national priorities on waste include reducing biodegradable (food) waste through public awareness campaigns to promote behaviour change. The government plans to install food waste sorting and collection infrastructure for households.

1.7. Ecosystems and biodiversity

1.7.1. Biodiversity

Lithuania is a flat and low-lying country with a maximum elevation of just 300 metres above sea level. It is predominantly agricultural with almost 60% of the territory covered by agricultural land, a high proportion compared to EU-27 countries (EC, 2020b). A third of the country is forested. Wetlands and water bodies occupy 3% of the country, which is also high for Europe. Urbanisation pressure ("land take") is modest (EEA, 2019b). Arable area and forest area have increased over the last 15 years, while grassland has declined (Figure 1.13). Lithuania is home to a large number of threatened European species and has an important responsibility to protect them on its territory. It has 3% of the coastline of the Baltic Sea, one of the most polluted seas in the world.[2]

Figure 1.13. The area of land used for crops and forestry has increased



Note: The Farmland Bird Index tracks the abundance of a group of bird species that depend on agricultural land for nesting or breeding.
Source: OECD (2020), "Land use", OECD Environment Statistics (database) (using FAO data); OECD (2021), *Agri-Environmental Indicators* (database).

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The EU biodiversity strategy to 2030, released in 2020, calls for the legal protection of at least 30% of the European Union's land and sea area; 10% of this must be strictly protected, including all remaining primary and old growth forests.[3] The aim is to help increase biodiversity, mitigate and adapt to climate change, and prevent and reduce the impacts of natural disasters. By 2030, as part of its responsibilities to the biodiversity strategy, Lithuania must ensure no further deterioration in any habitats and species listed in the Birds and Habitats directives, and a positive strong trend for at least 30% of those in poor or bad state.

There are fewer threatened species in Lithuania than in other OECD member countries. However, of the 44 non-bird species that are in poor or bad conservation status, more than half have seen their conservation status deteriorate over the past decade. Only 22% of the 54 habitats assessed (12 of 54) have a good conservation status, while the others are ranked as poor or bad (Table 1.1). Regarding habitats, the unknowns on conservation status trends are too high to draw conclusions; Lithuania's knowledge gap in this area is the highest in the European Union (EEA, 2020b). There is little surveillance of biodiversity status outside protected areas.

Table 1.1. Conservation status is better for species than for habitats in Lithuania

Conservation status[1]	% good (favourable)	% poor or bad (unfavourable)			% unknown	Total
		Improving[2]	Decreasing[2]	Stable or unknown trend[2]		
Habitats						
Forests (13)	8	0	23	69	0	100
Grasslands (9)	0	0	0	100	0	100
Wetlands[3] (8)	13	0	13	75	0	100
Freshwater (7)	43	0	0	57	0	100
Coasts and dunes (12)	50	0	0	50	0	100
Other[4] (5)	20	0	0	80	0	100
Total (number of habitats)	12	0	4	38	0	54
Species						
Mammals (24)	46	4	8	8	33	100
Reptiles (3)	33	0	0	67	0	100
Amphibians (11)	36	9	0	18	36	100
Fish (15)	53	0	20	27	0	100
Invertebrates (28)	36	0	36	18	11	100
Vascular plants (13)	8	8	62	8	15	100
Non-vascular plants (4)	25	0	25	25	25	100
Total (number of species)	36	3	24	17	18	98

Notes: 1. Number of habitats/species in brackets; 2. Trend between 2007-12 and 2013-18; 3. Bogs, mires and fens; 4. Heath, scrub and rocky habitats.
Source: EEA (2019), "Conservation status and trends of habitats and species" in *National Summary Dashboards – Habitats Directive – Art. 17*, www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-17-national-summary-dashboards.

Most of the commonly identified anthropogenic threats to biodiversity such as agriculture, development and alien invasive species are also the leading pressures at the European level. Pesticide sales per square kilometre of agricultural land have risen since 2005. However, they remain low by OECD standards (FAO, 2021). Lithuania has made significant efforts to implement the EU directive on sustainable use of pesticides, but more remains to be done (Eurostat, 2021b). Lithuania's Farmland Bird Index, an indicator of the quality of farmed environments, has been reduced by a third since 2005 (Figure 1.13). Lithuania also identifies forestry operations as a pressure on around three-quarters of habitats, reflecting the relatively high forest coverage and forestry use.

Lithuania designates 17% of its land area and 23% of its exclusive economic zone as a protected area. This meets the Aichi 17% target for terrestrial area (Figure 1.14) and exceeds the Aichi and SDG 14.5 10% target for marine and coastal area. The terrestrial network, established in the 1970s, was significantly expanded in the early 1990s. It made further smaller designations in the early 2000s. Changes since 2010 have been relatively minor in terms of total area, but Lithuania plans to expand the terrestrial network of protected areas to 20% of land area by 2024. High-profile and particularly significant protected areas include the oldest national park (Aukštaitija) in the country's northeast, the large Dzūkija National Park in the south and the more recently designated Žuvintas UNESCO Biosphere Reserve. Most protected areas are mixed-use landscapes (common with many European countries) and resource management areas (for sustainable forest management). Strict nature reserves are uncommon (Figure 1.14). Most sites are small because the landscape is relatively heterogeneous and fragmented – large areas of continuous natural habitats are rare.

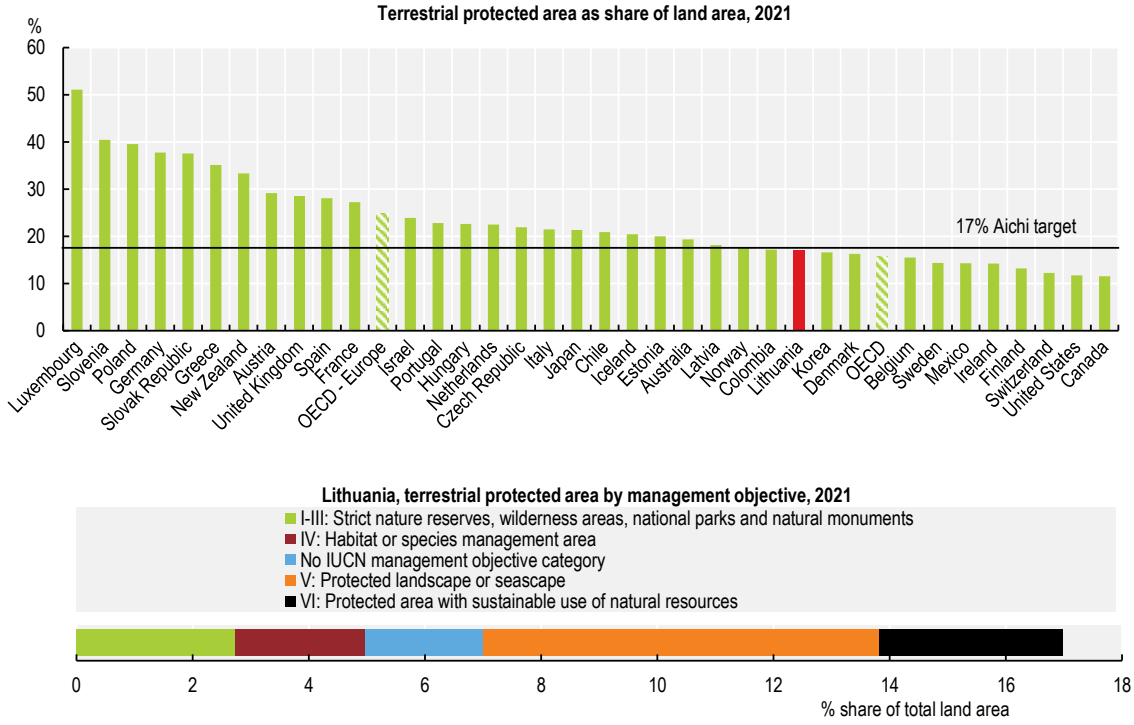
Dunes are relatively well covered by the Natura 2000 network. However, grasslands and forests are less extensively protected: Lithuania's fifth and most recent report to the Convention on Biodiversity singled out the limited protection of grasslands (Government of Lithuania, 2015; EEA, 2020b). Further, none of the grassland habitats of European importance is in a good state of conservation (Table 1.1).

Protected area designation and management plays a dominant role in biodiversity policy. Protected areas are managed by 35 different administrations. Not all such administrations report to the Ministry of Environment; some are the responsibility of the Ministry of Culture or municipalities. This has led to fragmented regulations and difficulty in communicating which activities are permitted in different areas. This results in inconsistencies in nature protection. A harmonisation of protected area management under a single nature protection agency, similar to that in other countries, is under consideration.

Biodiversity protection relies in large part on project-based financial support from the European Union. More should be done to ensure financial sustainability of nature conservation efforts. There is no widespread use of payments for ecosystem services or voluntary agreements with the private sector on biodiversity conservation.

Recent years have seen growing public awareness regarding biodiversity and habitat loss. This is partly due to improved access to nature in protected areas, as well as high-profile media coverage of destruction of urban green spaces and logging in natural forest areas. This has increased awareness and has also led to greater public participation in decision making. However, people in Lithuania are less concerned about threats to biodiversity than on average in the European Union. Only 6% of survey respondents had heard of the Natura 2000 network, compared to an already very low 11% in the European Union as a whole (EC 2019a, 2019b).

Figure 1.14. Protected area coverage reaches the Aichi target; most protected areas are mixed-use landscapes and resource management areas



Source: OECD (2021), "Protected areas", *OECD Environment Statistics* (database) using data from April 2021 release of UNEP-WCMC *World Database on Protected Areas.*

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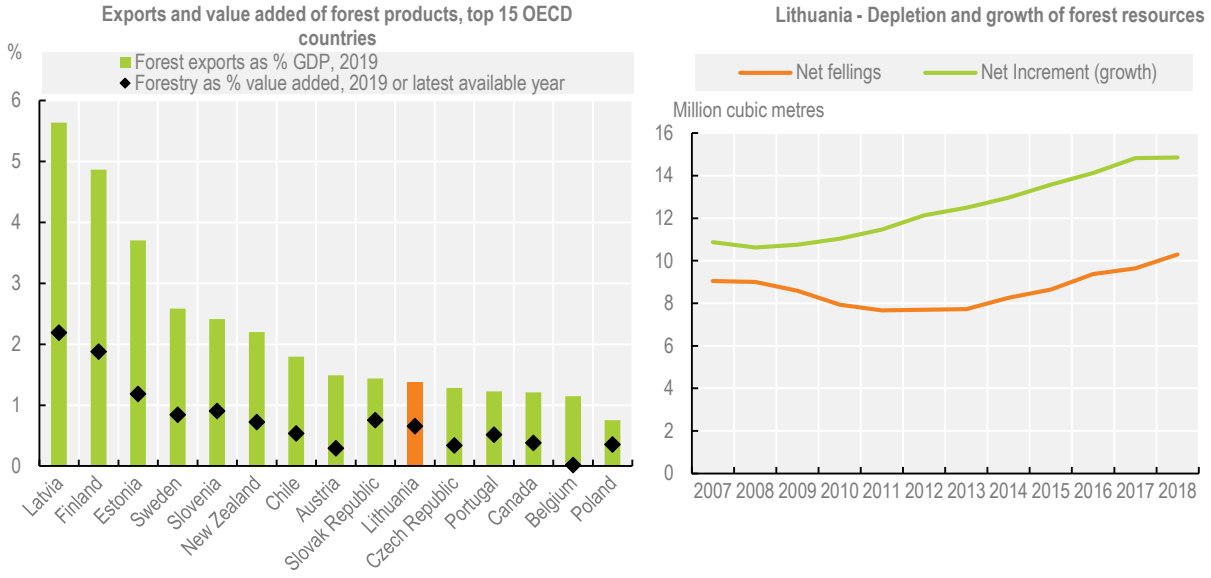
1.7.2. Forests

Forestry and forest products are a significant part of the Lithuanian economy, although they play a relatively smaller role than in other countries in the region like Latvia, Estonia and Finland (Figure 1.15). Forest land covers one-third of Lithuania's territory: a proportion that has slightly increased since 2005 and is expected to continue increasing slowly over coming decades.

Forestry acts as a net GHG sink in Lithuania (Figure 1.6). In recent years, the removals ("negative emissions") from the sector have declined slightly. This decreasing trend is likely to continue until 2035-40 but is then expected to reverse as more stocks in converted forest land approach peak growth.

Figure 1.15. Forest stock, important to Lithuania's economy, is growing



Note: Value added is not available for 2019 for all countries; the last available year is used instead – the oldest data are from 2017 (for New Zealand and Canada).
Source: OECD (2020), "Forest resources", *OECD Environment Statistics* (database); UNSD (2021), *National Accounts* (database).

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National plans recognise the potential of multifunctional forest management to remove CO_2 and protect biodiversity, while providing wood for construction and biomass for energy. In particular, the National Environmental Protection Strategy (adopted in 2015) and the NPP 2021-30 (adopted in 2020) specify forestry-related targets. One target is for forest cover to reach 35% of the total territory by 2030 (from 33.7% in 2018). The plan also seeks to ensure that volume growth in forest stocks exceeds extractions. Forestry legislation aims to prevent reduction of forestland through land-use changes. In areas where forest area is reduced, all forest owners must plant compensatory new forest on their own land or pay compensation, which is used to plant and maintain new forests.

1.7.3. Water

Lithuania has a dense network of rivers that drain into the Baltic Sea directly, via the Curonian Lagoon or the Gulf of Riga. Many of these rivers are shared with neighbouring countries. For example, inflow from Belarus represents 38% of Lithuania's renewable water.

The EU Water Framework Directive (WFD) aims to achieve good ecological status (in terms of aquatic life and hydro-morphology) and good chemical status (regarding priority pollutants) for all waters by 2021, with a possible extension until 2027 under certain conditions. Member states must develop river basin management plans (RBMPs), including measures to achieve good ecological and chemical status. Lithuania has published two RBMPs covering 2009-15 and 2016-21.

The NPP sets targets to improve the share of water bodies achieving good ecological status to 85% by 2025 and to 100% by 2030 (the 2015 level was 53%). The 2017-23 Water Sector Development Programme (WSDP) complements these targets with objectives to reduce pollution from specific sources. For surface water and groundwater, the aim is to reduce the number of water bodies affected by diffuse pollution by 85%.

According to EEA data, almost half of rivers and 60% of lakes have a high or good ecological status. This remains below the national target of 85% by 2025. Transitional and coastal waters are of particular concern: they all have poor or bad ecological status. The good chemical status of rivers and lakes contrasts sharply with the appalling performance of transitional and coastal waters (Table 1.2).

Table 1.2. Lithuanian coastal waters have poor ecological and chemical status

Percentage share

Ecological status	Rivers	Lakes	Transitional waters	Coastal waters	Chemical status	Rivers	Lakes	Transitional waters	Coastal waters
High	9	6	0	0	Good	99.4	99.7	25	0
Good	40	54	0	0	Failing to achieve good	0.6	0.3	75	100
Moderate	35	26	0	0					
Poor	11	12	75	50					
Bad	5	3	25	50					
Unknown	0	0	0	0	Unknown	0	0	0	0
Total	100	100	100	100	Total	100	100	100	100

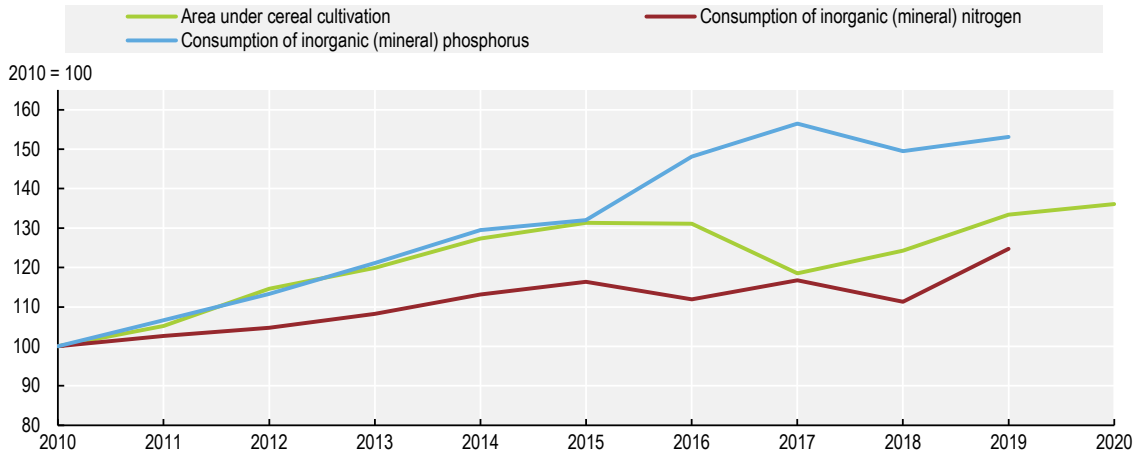
Note: Transitional waters are surface water bodies near the mouths of rivers, partly saline due to their proximity to coastal waters.
Source: EEA (2021), *WISE-WFD* (database).

The main pressure on surface water bodies is nutrient pollution from diffuse sources. River monitoring station data also reveal worsening nitrogen levels across Lithuania: more than half of rivers monitored in agricultural areas have not achieved good status in recent years. The WSDP addresses eutrophication pressure on coastal areas.[4] Lithuania plans to reduce input of nutrients in the Baltic Sea and the Curonian Lagoon by 19% for nitrogen and by 56% for phosphorus compared to the 1997-2003 reference period.

These objectives also contribute to Lithuania's commitments under the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention) for which the Helsinki Commission (HELCOM) provides the secretariat. The HELCOM Baltic Sea Action Plan aims to achieve a Baltic Sea in good environmental status by 2021[5] through a system of allowed nutrient inputs per country and sub-basin, called nutrient input ceilings (NICs). Lithuania is one of the few convention parties to have exceeded its NICs in all sub-basins (Svendsen et al., 2018).

The most significant driver of nutrient pollution in Lithuania is the increased use of mineral fertilisers (Figure 1.16). A shift from mixed crop-livestock farming to intensive crop cultivation may have resulted in nitrogen surpluses at the farm level. To address this issue, Lithuania promotes nutrient-friendly farming practices, such as use of catch crops and precision farming. The whole country has been designated a nitrate vulnerable zone. However, the imposition of strict nitrogen regulations throughout the territory creates a competitive disadvantage for Lithuanian farmers compared to their neighbours. As previously suggested (Section 1.5), an integrated approach to nitrogen management would be more cost-effective. Such an approach would seek synergies between policies related to air (NH_3, NO), water (nitrates) and climate (N_2O).

Figure 1.16. Fertiliser use has increased with expanded cereal cultivation



Note: Units underlying the indices are hectares for cultivated area and tonnes for fertilisers.
Source: Eurostat (2021), *Crop Production* (database); Eurostat (2021), *Consumption of Inorganic Fertilizers* (database).

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The NPP aims to increase the share of the population connected to public water supply from 82% in 2018 (Eurostat, 2021c) to 86% in 2025 and 90% in 2030. The government also plans to increase the share of population connected to public wastewater treatment from 77% in 2019 to 85% in 2025 and to 95% in 2030. Some agglomerations between 2 000 and 10 000 population equivalents do not have secondary treatment of their wastewater, which makes Lithuania non-compliant with the EU Urban Waste Water Treatment Directive. On average, 25% of the drinking water produced by water companies is non-revenue water, reflecting pipe leaks, theft or metering inaccuracies. These two indicators highlight the need for Lithuania to invest in water supply and sanitation infrastructure. The WSDP plans to build or rehabilitate 12 wastewater treatment plants by 2023 to comply with the directive.

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Notes

[1] Demographics and differing incidences of other diseases play a dominant role in attributing mortalities. Therefore, it is not unusual for countries with lower than average exposure to have greater attributed mortality.

[2] 97% of the Baltic Sea suffers from eutrophication (HELCOM, 2018).

[3] The European Commission will put forward a proposal for legally binding EU nature restoration targets in 2021.

[4] The Baltic Sea is considered the marine water body most severely affected by eutrophication within Europe. Due to its limited water exchange, nutrients have a particularly long residence time in the sea.

[5] The action plan is being updated as the Baltic Sea will not have achieved good environmental status by 2021.

Chapter 2. Environmental governance and management

Lithuania is a small unitary state with a strong central government. It has been improving its practices in environmental regulation, compliance monitoring and environmental democracy. However, non-compliance remains a challenge, and compliance promotion and enforcement tools are underused. This chapter analyses the institutional and regulatory framework for environmental management, the setting and enforcement of environmental requirements, and mechanisms of public participation in decision making, as well as access to environmental information, education and justice.

Recommendations on environmental governance and management

Institutional and regulatory framework

- Promote the whole-of-government approach to environmental management through better integration of environmental issues into sectoral policies, more effective inter-ministerial co-ordination and more efficient use of available resources; empower municipalities to be more proactive in advancing the country's agenda on climate change, circular economy and sustainable mobility.
- Strengthen the environmental aspects of *ex ante* and *ex post* assessment of laws and regulations; ensure better integration of environmental considerations into land-use planning.
- Improve regulatory efficiency by introducing general binding rules based on best available techniques for facilities with low environmental impact in activity sectors with multiple facilities and similar processes.

Compliance assurance

- Increase the number of risk-targeted inspections; expand use of administrative fines for environmental violations and raise their levels to reflect offenders' economic benefit from non-compliance; improve the collection of imposed fines.
- Facilitate full implementation of environmental liability regulations to ensure remediation of damage to the environment at the expense of the responsible party; accelerate the clean-up of old contaminated sites by securing adequate financial resources.
- Enhance the promotion of compliance and green business practices through information-based instruments; include compliance in a streamlined set of GPP criteria and ensure their implementation by all public organisations.

Environmental democracy

- Expand environmental awareness raising and adult education, and engage the general public more actively in environmental decision making at the national and local levels.
- Consolidate public sources of environmental information and ensure regular reporting on the state of the environment; open public access to compliance-related information about individual polluting installations.
- Remove cost barriers in access to justice by requiring the government to cover its share of the litigation costs irrespectively of the eventual court decision; provide access to legal aid for NGOs.

2.1. Introduction

Lithuania has come a long way since its independence in 1991 and membership in the European Union (EU) in 2004 in improving its regulatory framework and governance practices. In the last decade, the country improved substantially its government effectiveness, rule of law and accountability, which has had positive implications on environmental management. However, it remains below the OECD average on all these indicators (World Bank, 2019).

2.2. Institutional framework for environmental governance

Lithuania is a small unitary state with the territory divided into 60 municipalities. Lithuania is highly centralised: local governments have little capacity to develop and implement their own policies. *De jure* municipalities are given numerous autonomous functions, but *de facto* local governments have few tax revenues of their own and rely heavily on transfers from the central government. The regional administrative level (ten counties) was abolished in 2010. Regional Development Councils as platforms for inter-municipal co-operation were established in 2020.They co-ordinate implementation of economic development policies and provision of public services in the region.

2.2.1. Central government and horizontal co-ordination

The Ministry of Environment (MoE) is responsible for policy making and regulation on the entire spectrum of environmental matters. Its institutional capacity, including staff competency, has grown over the last decade. Under the 2021-24 government programme, the MoE has declared an ambitious goal for Lithuania to become a carbon-neutral country with an established circular economy by 2050. The ministry has a large number of subordinated institutions with regulatory, compliance assurance and issue-specific management functions:

- The Environmental Protection Agency (EPA) is the main authority for environmental impact assessment (EIA) and environmental permitting. The EPA monitors air quality, status of surface water bodies, wildlife and ecosystems. It also collects, maintains and provides information on the state of the environment and pollution releases.
- The Environmental Protection Department (EPD) under the MoE carries out compliance assurance functions with regard to environmental regulations. It was created as a result of a 2018 merger of eight regional EPDs into a central department. The EPD has four territorial environmental quality control divisions and four territorial accounting and tax control divisions. As of July 2021, the EPD expanded its remit to cover forests and protected areas.
- The State Territorial Planning and Construction Inspectorate verifies compliance with spatial plans.
- The State Service for Protected Areas manages national and regional parks and reserves.
- The State Forest Service implements state policy on forest management and protection but does not have enforcement functions. The ministry also oversees the State Forest Enterprise, which manages the country's state-owned forests.

These subordinated institutions often suffer from a shortage of qualified, experienced staff. Furthermore, the funding for the central government's environmental activities was 8% lower in 2019 than in 2015. Furthermore, the share of used budget allocation is declining: in 2019, only 60% of appropriations were used, 32% less than in 2015. One of the main reasons for the accumulation of unused funds of targeted programmes (EUR 191.5 million in early 2020) was a delay in defining their policy objectives (NAO, 2020). Most of the funding is project-based, which does not always ensure the continuity of programmatic efforts.

Several other ministries have environment-related responsibilities. Environmental measures are incorporated into strategic sectoral development documents drawn up by the Ministries of Energy; Economy and Innovation; Agriculture; Transport and Communications; Health; and Education, Science and Sport. The Ministry of Energy has a dedicated Climate Change Management Policy Group; the Ministry of Transport and Communications – a Future Mobility Policy Group.

To ensure co-ordination between these ministries on environment-related matters, Lithuania has established a consultative National Commission on Sustainable Development chaired by the prime minister. Members of the Commission are high-level representatives of the Ministries of Environment; Economy and Innovation; Finance; Social Security and Labour; Energy; Agriculture; Education, Science and Sport; Transport and Communications; Interior; Culture; Health; Foreign Affairs; the Statistics

Department; the Association of Local Authorities; scientists; and representatives of non-governmental organisations (NGOs) and business associations. In addition, the National Committee on Climate Change was set up in 2001 and renewed in 2018. It also includes representatives of relevant ministries, municipalities, NGOs and academia.

Inter-institutional working groups collaborate on legislation and strategic documents (e.g. a working group to prepare an Environment Protection and Climate Change Management Plan), as well as on joint initiatives such as the National Plan for Decreasing Ambient Air Pollution and the State Plan for Waste Management. One such working group has been set up at the level of vice ministers. In 2020, the prime minister established a government working group to better co-ordinate the implementation of the National Energy and Climate Plan and address topics on the EU's Green Deal agenda (Chapter 3). In addition, there are many inter-institutional advisory expert groups, including the Co-ordination Council for Forest Sanitary Protection, the Fisheries Board, the Hunting Advisory Board and the working group on food waste.

However, these co-ordination bodies do not ensure a whole-of-government approach to environmental protection and sustainable development. In the new government's programme, the chapter on the Lithuanian Green Deal is not closely linked to the chapter on economic development. There are some positive examples of nascent inter-ministerial collaboration on issues such as climate change and sustainable mobility. However, the lack of policy co-ordination between the environment and agriculture ministries is of particular concern.

2.2.2. Local government and vertical co-ordination

Municipalities are in charge of waste management and operation of water supply and wastewater management infrastructure. They also adopt and implement long- and short-term municipal environmental protection programmes; set up and manage local protected areas; monitor air quality, surface water and groundwater, noise and biodiversity; and develop and implement land-use plans. Upon agreement from the national government, municipalities may adopt stricter environmental standards than those of the state, but this does not happen in practice. Environmental expenditures account on average for only 5% of the municipality's total budget. Several cities and towns have developed Sustainable Urban Mobility Plans (Chapter 4). However, municipalities are rarely proactive in key environmental policy areas such as climate change mitigation and adaptation, and circular economy.

The central government uses the Special Programme to Support the Protection of the Environment by Municipalities and other mechanisms to fund selected local initiatives under the MoE's supervision. However, this funding is relatively small (EUR 13 million in 2020, which amounted to 8% of the total municipal environmental expenditure). Moreover, the funding is most often not associated with measurable targets.

2.3. Setting of regulatory requirements

Lithuania's legislation has been significantly strengthened through the transposition of EU directives, particularly in the areas of waste management and nature protection. Lithuania had 9 open infringements against EU directives in 2020 (mostly related to waste and wastewater management), significantly below the average of 16 (EC, 2021). However, more can be done to strengthen environmental assessment of non-environmental laws, regulations, plans and programmes.

2.3.1. Regulatory and policy evaluation

Impacts of any legislative draft are required to be assessed in line with a 2003 regulatory impact assessment (RIA) methodology. However, RIA largely remains a formal exercise to justify choices already made. It is rarely based on data or analysis of alternative options. Environmental aspects are included in

the RIA "explanatory note", but the focus is usually on reducing the administrative burden for businesses (OECD, 2018).

In April 2020, amendments to the Law on Legislative Framework introduced *ex post* assessment of the impact of existing laws and regulations. An *ex post* assessment will be conducted only for regulatory acts that have been in force for at least two years without substantial changes. A methodology for such assessment is under development.

Lithuania has established a general framework for evaluating strategic plans and programmes. The 2011 Methodology on Programme Evaluation establishes criteria and indicators for the identification and evaluation of impacts and requires detailed reporting of evaluation results. The methodology can be used for both *ex ante* and *ex post* evaluations. It does not, however, include elements of cost-benefit analysis. Before approving a new policy, the government carries out an *ex post* evaluation of the impact of the previous one.

Strategic environmental assessment (SEA) is carried out for plans and programmes prepared by governmental or municipal institutions that are likely to have a significant impact on the environment. Recent SEAs at the national level include those of the National Air Pollution Reduction Plan in 2019 and of the National Comprehensive Plan of the Territory of Lithuania in 2019-20.

Pursuant to the Law on Territorial Planning, there is a complex set of obligatory plans: the national Comprehensive Plan, which covers both terrestrial and maritime territories; regional comprehensive plans, municipal comprehensive plans and detailed local plans. Comprehensive spatial plans are binding for all sector-specific planning. All of them are subject to SEA. Detailed local spatial plans for areas under 10 square kilometres undergo SEA screening and are assessed only if they have clear significant environmental implications.

There is not enough control over the quality of spatial planning to ensure it adequately integrates environmental considerations. The State Territorial Planning and Construction Inspectorate must check territorial planning documents. MoE and municipalities are required to monitor implementation of spatial plans. However, both the control and the monitoring rarely happen in practice (NAO, 2019). Co-ordination between transport and land-use planning must also be improved (Chapter 4).

2.3.2. Environmental impact assessment and permitting

The EPA co-ordinates the EIA process, screens projects for potential significant environmental impact (that requires an EIA), evaluates EIA reports and makes decisions on the feasibility of the proposed economic activity. State institutions in charge of health care, fire protection and protection of cultural properties, as well as municipal institutions, participate in the EIA, examine EIA reports and submit conclusions to the EPA. The MoE co-ordinates transboundary EIA procedures.

An EIA decision is mandatory before institutions can issue permits to applicants for activities such as construction, exploration or exploitation. Competent authorities issuing permits must consider and follow the conditions defined in the EIA decision. However, not all restrictions of activities and specific mitigating measures established during the EIA are transferred into permits (NAO, 2020). The link between EIA and permitting was strengthened in 2021, when EIA-determined mitigation measures were required to have concrete timeframes. This made it easier to translate them into pre-operational, operational and post-operational (decommissioning) permit conditions.

The EPA also issues integrated pollution prevention and control (IPPC) permits and simplified permits that set limits for specific pollution impacts of non-IPPC installations. In addition, it issues other environment-related authorisations: licences for hazardous waste management, permits for import and export of protected species of flora and fauna, permits for special and commercial fishing, etc.

The permitting process has become more efficient thanks to electronic submission of applications and permit issuance through the Lithuanian e-government gateway. However, Lithuania does not have activity-specific standard requirements (general binding rules) for installations with low environmental impact. Such requirements, similar to those used in neighbouring Latvia (OECD, 2019), would further improve regulatory efficiency and reduce the administrative burden on small businesses. As another way to optimise the permitting regime, Lithuania could allow registration or notification instead of permitting for the least significant polluters. Several OECD member countries such as Finland and France have adopted this practice.

2.4. Compliance assurance

The 2018 merger of eight regional EPDs has improved the efficiency and co-ordination of environmental policy implementation. This reform also harmonised the interpretation of regulatory requirements across the country and established common competence standards for compliance monitoring and enforcement, reducing the administrative burden for businesses.

2.4.1. Environmental inspections

EPD staff carry out inspections; if necessary, they work with other authorities. In May 2020, the EPD and the Police Department signed a mutual co-operation agreement for several areas. These comprise investigating administrative misconduct and criminal offences in the environmental field, organising joint educational seminars to promote compliance and conducting training courses for respective staff. In December 2020, a similar agreement between the EPD and the State Border Guard Service established a joint action plan to combat criminal activities related to waste and trade of protected species. Vilnius and several other municipalities have co-operation agreements with local police units on fighting environmental crime (Kazakevicius, 2019).

Prior to the reorganisation, each regional EPD drew up its own inspection plan. Since 2019, the central EPD elaborates a single annual inspection plan. The planning is based on 12 risk-related criteria, including the operator's compliance record and implementation of an environmental management system (EMS). However, risk-based planning must conform to the minimum and maximum inspection frequencies defined in the legislation. Lowest-risk installations must be inspected at least once every three years, and highest-risk activities every year. However, no operator can have more than two planned inspections per year. Although unannounced inspections are allowed under certain circumstances (e.g. in case an offence is suspected), all planned inspections must be announced to the operator at least ten days in advance. This policy makes it more difficult to for planned inspections to detect non-compliance. In addition, the information on regulated entities is poorly maintained, which may lead to gaps in inspection planning (NAO, 2020).

In 2014-20, 14 000 inspections were carried out, on average, annually. Of these, about 53% were planned, with the rest responding to incidents and complaints. This share of planned inspections can be considered low compared with best practices in OECD member countries, indicating that compliance monitoring is largely reactive. The annual number of inspections declined after the EPD reorganisation. It dropped even further in 2020 due to COVID-19 pandemic-related restrictions.

Public complaints are managed by the Notification Division of the EPD and its territorial units. The number of complaints is increasing every year: at almost 18 000, it was 46% higher in 2019 than in 2015. Most complaints concern industrial activities, forestry and nature protection. Almost 40% of complaints are addressed through EPD inspections (drawing resources away from planned site visits); the rest are referred to other competent authorities. The MoE website includes a special hotline that explains how to submit a complaint about an environmental nuisance or environmental damage.

The EPD online reports of annual inspection plans and quarterly inspection have limited information. Most inspection reports indicate only the number of inspections but offer no details on follow-up actions and penalties (Kazakevicius, 2019). Individual inspection reports, even for IPPC installations, are not available to the public. This is contrary to the practice of several OECD member countries, such as Finland, where summaries of inspection reports for high-risk installations are available to the public on line and full reports can be accessed upon request.

2.4.2. Enforcement

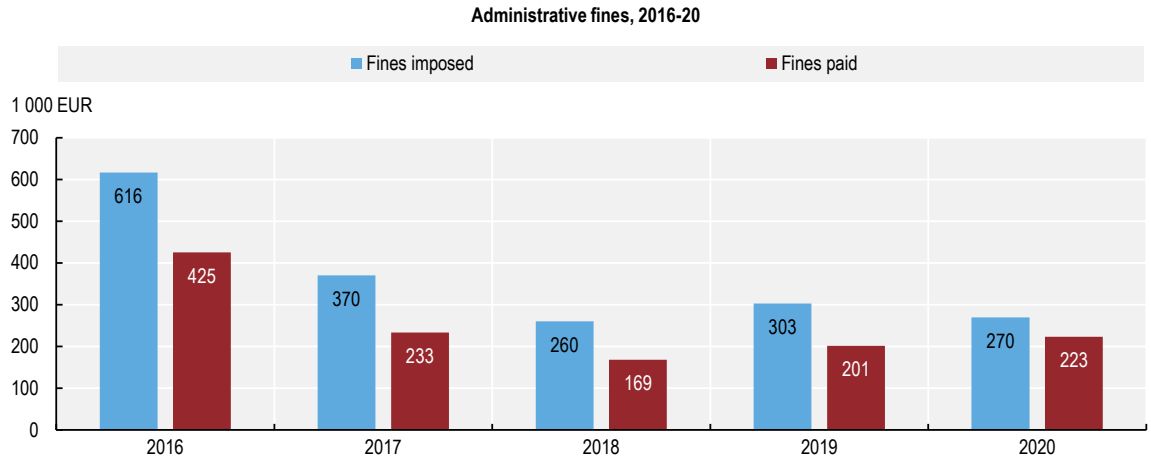
In 2016-20, an average of 63% of environmental inspections detected at least one violation – a high level of non-compliance. An average of 35% of these infringements were committed in the field of nature protection; 22% were related to waste management. Around 5% of the detected infringements resulted in environmental damage.

Parliament adopted new legislation in response to several high-profile industrial pollution scandals, including the release of untreated wastewater from a cardboard plant into the Curonian Lagoon near the city of Klaipėda. The so-called Klaipėda package of legislative changes, adopted in early 2020 and entering into force in August 2021, is designed to strengthen compliance monitoring and enforcement. In one of the changes, EPA laboratory specialists will be allowed to take samples on the operator's property. The regulatory amendments strengthened enforcement by allowing inspectors to ask for a court injunction if the operator does not comply with an administrative corrective action order. The amendments also make it easier for enforcement authorities to revoke an environmental permit if its conditions are repeatedly violated. The EPD and EPA will have to ensure all permit conditions are respected before a new activity can start.

Chapter 18 of the Code of Administrative Offences contains about 100 articles providing for administrative sanctions for environmental misconduct by physical persons; the Law on Environmental Protection sets penalties for legal persons. Most of these sanctions are fines. The maximum fine for environmental infringements by companies is more than EUR 200 000, but the average fine in 2020 was only EUR 1 045[1]; this is too low to have a deterrent impact. As in most OECD countries, fines do not reflect the economic benefit the offender receives from non-compliance behaviour.

The annual volume of imposed administrative fines dropped by more than half over 2016-20. Moreover, only about two-thirds of the amount of imposed fines was collected in 2016-19; this share was up to 83% in 2020 (Figure 2.1). Most of the 200-300 cases concerning environmental violations heard in the country's administrative courts are initiated by operators contesting the inspector-imposed sanctions. Operators are often successful in reducing the already low fines due to the poor preparation of EPD cases before the courts. This diminishes the effectiveness of administrative fines even further.

Figure 2.1. The use of administrative fines has declined



Source: Country submission.

StatLink https://doi.org/10.1787/888934268262

Revenues from administrative (as well as criminal) fines are channelled to the state treasury but are earmarked to the Environmental Protection Support Programme administered by the MoE.[2] In principle, earmarking revenues from fines to a fund run by an environmental authority is not consistent with good international practice. The policy creates a perverse incentive for the authority to increase revenue by imposing more and larger fines. This is not an immediate concern with such extremely low fines. However, should the volume of fines increase, it may be advisable to stop this earmarking practice and channel the revenues to the general budget.

Several articles of the Criminal Code establish penalties for environmental crimes, including fines and imprisonment. Among others, violations that entail serious damage to the environment are punishable by up to six years in prison. Almost all criminal environmental cases referred by the EPD to the Public Prosecutor's Office are pursued in court. However, such cases are not many. In 2015-19, the regular courts heard an average of 18 criminal environmental cases, with roughly half of them resulting in convictions.

2.4.3. Environmental liability

Lithuania transposed the EU Environmental Liability Directive (ELD, 2004/35/EC) to the Law on Environmental Protection in 2010. However, this law defines environmental damage as adverse change to all elements of the environment, including air. Such a definition is broader than the one in the ELD.

Lithuanian law handles environmental damage remediation and compensation in two different ways. If the damage is ascertained as significant (which rarely happens), the damaged environment must be restored to the baseline condition through remediation measures. The country reported only seven cases of significant damage to protected species and natural habitats, water or land under the ELD over 2004-17 (Milieu, 2019). In these seven cases, the full monetary value of the damage was calculated after the remedial measures were implemented.

If no measures are implemented to restore the environment, or the measures are insufficient to restore the baseline condition, the value of environmental damage is calculated according to methodologies approved by the MoE. The calculated compensation depends on the type of pollutants released, their quantity, indices and rates for the pollutants concerned, etc. The damage compensation is channelled to the budgetary Environmental Protection Support Programme (Section 2.4.2), which is rarely used for

remediation. The vast majority of the 267 cases of environmental damage reported by inspectors in 2019 alone were handled in this way. Monetary compensation to the state for environmental damage is a regulatory tradition in many East European countries, including Estonia and Latvia (OECD, 2019, 2017). However, it does not reflect real damage to the environment or encourage remediation. Rather, it creates a perverse incentive for environmental authorities to prefer a monetary compensation to clean-up on the ground. At the same time, operators responsible for the damage can pay less than they would for remediation.

Financial security (insurance or a bank guarantee) is required as a precondition for a permit to extract hydrocarbon resources at sea; manage hazardous waste; manage waste electric and electronic equipment, end-of-life vehicles, oils, batteries and accumulators; or conduct solid waste recovery, shipment or disposal activities. The financial security amount is calculated based on an MoE methodology. However, there are no similar requirements for other industrial activities. There is no market for voluntary environmental liability insurance given that remediation is hardly enforced, and the commonly used monetary compensation for damage is relatively low.

Contaminated sites

Over 12 500 potentially contaminated sites have been identified in the country. According to preliminary risk assessment, about 10% of these were classified as highest-risk, while over 25% were considered high-risk sites. Studies have shown that about 800 sites need remediation, but this is occurring at only 92 sites due to funding constraints.

The Lithuanian Geological Survey, under the MoE, collects information about contaminated sites and maintains a state register of potentially contaminated sites. Clean-up can be compulsory depending on the intended future activity and land use. There are specific requirements to remediate sites contaminated with certain chemical substances and to clean up soil and groundwater contamination with oil products. If a contaminated orphan site (where no responsible party can be identified) is on state land, the municipality is responsible for investigation and remediation. However, if historic contamination is identified on private land, the state does not have a budget to deal with it.

The government has estimated the cost of remediating high- and highest-risk sites at about EUR 1 300 million. In 2013-20, the EU Cohesion Funds designated EUR 19 million for treatment of the 36 historic contaminated sites on state-owned land. This accounted for 95% of the total clean-up expenditure (the rest came from private- and public-sector land developers). The national contaminated sites management plan for 2013-23 set a goal to remediate 89 highest-risk sites with historic contamination. However, the achievement of this target depends almost entirely on the availability of EU funds.

2.4.4. Promotion of compliance and green practices

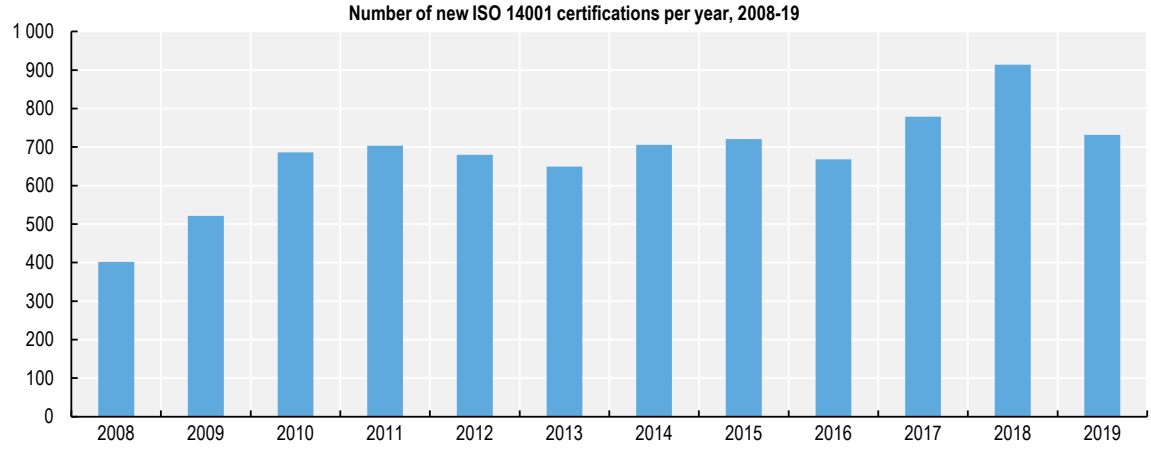
Lithuania increasingly recognises the need to provide consultation and advisory support to operators to increase voluntary compliance. There are some financial measures under the Eco-Innovation LT programme to encourage small and medium-sized enterprises to adopt an EMS, carry out production technology and environmental audits or install eco-innovative technology. However, guidance on good environmental practices is largely lacking.

Voluntary agreements with industry aimed at achieving environmental goals have not been widely used in Lithuania. Still, several recent initiatives to reduce single-use plastic packaging, including EU-wide ones, have involved collaboration with the private sector. For example, as part of a campaign to reduce the amount of lightweight carrier bags, the MoE and the Lithuanian Trade Companies Association worked together to produce video and audio advertising that was broadcast in supermarkets free of charge.

Environmental management system certifications

The annual number of new certifications to the ISO 14001 EMS standard more than doubled over 2008-18 (Figure 2.2). The increase was primarily due to the country's integration into the European economic space, which encourages better environmental practices. Lithuanian environmental authorities also promote EMS certification by considering it in determining the inspection frequency (Section 2.4.1). In 2019, 732 Lithuanian companies with over 1 000 sites were certified with ISO 14001.

Figure 2.2. The number of ISO 14001 certifications more than doubled in a decade



Source: ISO (2020), *ISO Survey 2019*, International Organization for Standardization.

StatLink https://doi.org/10.1787/888934268281

The MoE and the EPA organise seminars and training to promote adoption of the EU Eco-Management and Audit Scheme (EMAS) in public and private organisations and provide consultations by e-mail and telephone. In 2011, the MoE implemented EMAS in its day-to-day operations to set an example of an environmentally friendly government institution. However, only four organisations with six sites in the country have been certified to EMAS (EC, 2020).

The MoE encourages enterprises' environmental achievements by handing out annual awards for the "promotion of civil environmental initiatives" and participating in environmental nominations for the National Responsible Business awards. The Ministries of Agriculture and Health oversee the implementation of the national Ecoagros certification standard for organic agriculture.

Greening public procurement

Lithuania has been slow to implement green public procurement (GPP) and use it to promote sustainable products and production practices. The Law on Public Procurement (last amended in 2020) requires all contracting authorities to apply environmental criteria when such criteria are defined in appropriate implementing regulations. The MoE order of 2011 defined a list of 30 categories of products and services subject to GPP, as well as environmental criteria for all of them (such as electronic equipment). In 2021, the MoE order was amended to increase the number of GPP criteria, promote eco-labels and EMSs, update and simplify environmental criteria for transport and food, and streamline GPP reporting. The Public Procurement Office monitors GPP implementation.

A 2016 government resolution set a 50% target for the share of GPP (in both the number and monetary value) in procurement categories with set environmental criteria for 2019. The same year, the MoE

approved GPP implementation measures for 2016-20. In 2017, however, the share of GPP contracts in procurement categories that had environmental criteria was 11.3% in terms of monetary value (compared to 14.7% in 2015) and 19.1% in terms of the number of contracts (EC, 2019a). In 2019, these numbers fell even further – to 5.8% and 7.2%, respectively.

The government has recently increased the policy profile of GPP. The National Climate and Energy Plan calls for amending the country's legislation to ensure that municipalities and public bodies carry out only green procurement. The National Progress Plan adopted by the government in September 2020 set a target of 50% GPP by monetary value and number of contracts by 2025 and a target of 55% GPP by 2030. The 2021-24 government programme raised the ambition even further, calling for all public procurement to become green by 2023.

Reaching these targets will require a drastic change in the way public bodies carry out public procurement. Together with the EPA, the ministry has been providing training and methodological support for contracting authorities and suppliers since 2018. The MoE intends to establish a GPP competence centre to provide direct support to public procurement officers, including trainings, guidelines, consultations with market representatives and a GPP officers' network.

2.5. Promoting environmental democracy

Lithuania ranked first on the 70-country Environmental Democracy Index in 2015 in recognition of the country's well-developed regulatory framework for access to information, public participation in decision making and access to justice in environmental matters. It has been party to the Aarhus Convention since 2002. However, to improve civic engagement, Lithuania needs to move beyond formal compliance with legal requirements and procedures, and focus instead on achieving genuine impact (OECD, 2015).

2.5.1. Public participation in environmental decision making

In 2018, the government issued a methodology for public consultation with the aim of expanding public engagement. The MoE routinely provides drafts of new or amended legislation for comment to relevant government stakeholders, social and economic partners, associations and the public. In every round of consultation, the draft project is published on the electronic information system where interested institutions and the public can provide comments. After every consultation period, the ministry usually arranges a meeting to discuss comments but is not required to do so. The MoE has established an advisory panel in which ministry officials, environmental NGOs, and science and education institutions participate equally. The National Commission on Sustainable Development and the National Committee on Climate Change also include NGO representatives (Section 2.2.1).

However, actual public involvement in the environmental law and policy making is low (EC, 2019a). There is no active dialogue with civil society on key environmental policy priorities, particularly at the local level. Often NGOs learn about regulatory initiatives belatedly, or may only be allowed to submit comments in writing, without a discussion.

The same is true for public consultation on specific projects. Information about IPPC permit applications is provided in the local, regional or national press. The EPA considers proposals from the public when preparing an IPPC permit and informs the public about decisions. Public hearings are supposed to be part of every EIA process. Usually, however, few comments are received during the EIA process: out of 20 EIA reports submitted in 2017, only 4 reported having received comments, questions or suggestions from the public (Kazakevicius, 2019). Over 70% of surveyed communities indicated that the legal deadlines for accessing EIA documents are too short (NAO, 2020).

There are also significant problems with public participation in land-use planning. All spatial planning documents must also undergo public consultation, but it is often superficial: 79% of complaints received

by the State Territorial Planning and Construction Inspectorate concern public announcement rules (NAO, 2019).

2.5.2. Access to environmental information

Statistics Lithuania and other producers of official environment-related statistics (the EPA and the State Forest Service) publish their information through the official statistics portal. The environmental quality and pollution release data collected and managed by the EPA can also be accessed through the agency's main webpage. There has been good progress with regard to data management and sharing as part of the implementation of the INSPIRE Directive (EC, 2019a). The National Land Service under the Ministry of Agriculture manages the state spatial datasets accessible through the Lithuanian spatial information portal.

The EPA's annual indicator-based assessment "State of the Environment. Only Facts" was last published in 2014, and the last in-depth state of the environment report came out in 2013. Subsequently, these publications were discontinued, largely due to a lack of resources. Since 2015, environmental information has been published exclusively on the relevant authorities' websites. A catalogue of references to environmental information maintained by different institutions is available on the MoE website. However, this fragmentation makes it more difficult for users to find and navigate environmental data.

Environmental information not available on line is provided to the public upon request within two weeks, in most cases free of charge.[3] For example, environmental permits can be obtained, but their specific conditions are often redacted under the pretext of commercial confidentiality. However, compliance monitoring and enforcement information on individual economic entities is not publicly available (Section 2.4.1). Applicants who consider their requests for information have been ignored, wrongfully refused or inadequately answered have access to a review procedure before an administrative disputes commission. Subsequently, they can appeal to an administrative court.

2.5.3. Access to justice

There are no specific rules concerning proceedings or litigation costs in environmental matters. Only the Administrative Dispute Commission and administrative courts can review administrative actions, including environmental ones such as EIA and permitting decisions.[4] The Commission and its territorial divisions conduct pre-trial examination and investigation of complaints about administrative actions (or lack thereof). Several legal acts (e.g. the Law on Territorial Planning) prescribe such an administrative review as a prerequisite for court action.

The review and the administrative court's jurisdiction cover procedural and substantive legality of an action. This is an important good practice that is not universal among OECD member countries: in Estonia, for example, an administrative court cannot overturn a decision on substantive grounds only (OECD, 2017). Decisions of regional administrative courts (in Vilnius, Kaunas, Klaipėda, Šiauliai and Panevėžys) can be appealed to the Supreme Administrative Court. Administrative court judges undergo regular international and domestic trainings in environmental law.

The Supreme Administrative Court has confirmed the right of community-based organisations to sue in the environmental domain, including actions or omissions by public authorities. However, there is a lack of clarity on whether NGOs have a right to contest regulatory provisions (e.g. a ministerial order) in court (Kazakevicius, 2019).

Another recourse for public complaints on environmental issues is the Seimas (parliamentary) Ombudsman's Office. This office deals with complaints about misconduct in public administration, including public authorities' failure to fulfil their environmental duties. About 10% of such complaints refer to environmental issues (Kazakevicius, 2019).

There are two types of legal aid available to the public: primary (legal information and legal consultations outside the judicial procedure) and secondary (preparation of procedural documents, representation in courts). Two “legal clinics”, at Vilnius University and Mykolas Romeris University, provide primary legal aid (European e-Justice Portal, 2020). People have the right to approach a municipality for additional information on the administrative and judicial procedures (according to their declared place of residence), and the municipality must provide legal assistance free of charge. However, the information on access to justice is not readily available on line (EC, 2019a). The secondary legal aid is granted through five special services (in Vilnius, Kaunas, Klaipėda, Panevėžys and Šiauliai), which are accountable to the Ministry of Justice (European e-Justice Portal, 2020). However, no legal aid is available to NGOs.

Initial court fees are low, but the losing party must cover all costs incurred by the winning party, which can be significant. This may deter citizens and NGOs from going to court. Several other OECD member countries have taken actions to remove high litigation costs as a barrier in access to justice. For example, Ireland’s Court of Justice ruled in 2016 that environment-related litigation should not be prohibitively expensive. In civil proceedings related to ensuring compliance with a statute, licence or permit, the Irish government must cover its share of litigation costs irrespective of the eventual court decision.

2.5.4. Environmental education

Environmental awareness in Lithuania is lower than the EU average: only 40% of its citizens consider protecting the environment to be “very important” (53% across the European Union). The growing levels of waste generation and air pollution are key issues of concern for Lithuanians. For respondents, the main solutions are changing consumption patterns (35%), providing more information and education (30%), changing production patterns (30%) and improving enforcement (29%) (EC, 2019b). Awareness of biodiversity and the need to protect it have risen in the last five years (EC, 2018).

Environmental education is a priority in the National Sustainable Development Strategy (2011). The MoE promotes environmental education activities with support of EU structural funds; raising public awareness of the environment was one of its 2014-20 priorities. Under the NECP, the education ministry is obliged to integrate climate change issues into primary and secondary education curricula. Environmental education in secondary schools relies mostly on integration of sustainable development aspects into natural science courses, but there is no consistent approach to teaching these subjects.

Several Lithuanian NGOs are active in environmental education, complementing government efforts:

- The Lithuanian Fund for Nature, which is the Lithuanian partner of the World Wide Fund for Nature, conducts thematic projects and organises various events and educational trips promoting environmental protection.
- The Lithuanian Green Movement has been implementing the international programme of Nature Protection Schools in the country since 2004. The programme covers 83 kindergartens and schools.
- The Lithuanian Children and Youth Centre's Sustainable Schools programme began in 2013 to promote and create awareness about sustainable development. The programme works through the formation of “green teams” of ten people in educational establishments, which can include everyone from teachers, students and parents to administrative staff. The Sustainable Schools programme was among nominees for the 2018 UNESCO-Japan Prize on Education for Sustainable Development.

Despite these efforts, education and awareness-raising efforts are clearly falling short of the need to boost public participation in environmental decision making. More emphasis should be placed on reaching out to adults through vocational training and campaigns to promote environmentally friendly behavioural patterns.

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Notes

[1] The highest fine in 2020, EUR 28 000, was imposed in the Klaipėda region.

[2] This fund consists largely of revenues from fines for environmental violations, pollution charges for exceedance of permitted emission and effluent limits, infringements of building regulations, compensation for environmental damage, etc.

[3] For some specific hydrological and meteorological information there is a small charge for NGOs and academic institutions. The government plans to eliminate these charges in the near future.

[4] District courts of general jurisdiction deal with cases of environmental damage to health and welfare under civil law, as well as with criminal violations.

Chapter 3. Towards green growth

This chapter analyses Lithuania's progress towards achieving a greener and more inclusive economy, including the impact of economic downturns and the COVID-19 pandemic. The chapter reviews steps taken to pursue environmental objectives through carbon pricing and taxes on energy use, air and water pollution, and water abstraction, among others. It also looks at the country's efforts to remove environmentally harmful subsidies in areas such as transport, fossil fuels and agriculture. The chapter continues with an analysis of environment-related expenditure and investment, as well as of eco-innovation. It ends with reflections on the social consequences of the transition towards green growth and of the COVID-19 recovery.

Recommendations on green growth

Enhancing policy coherence for sustainable development

- Make sure that measures to promote economic recovery in the aftermath of the COVID-19 pandemic contribute to greening the economy by linking support for businesses and households to meeting environment- and climate-related requirements.

Promoting low-carbon investment and eco-innovation

- Improve coherence among different green economy investment programmes and create a concrete plan for mobilising private investments.
- Assess Lithuania's comparative advantages and increase government spending on R&D related to the environment and low-carbon energy transition in the most promising areas.

Greening the tax and subsidy system

- Gradually increase the tax rate on diesel at least up to the current level of the petrol tax rate, and consider if further increases in both tax rates could be appropriate to promote the sales of zero-emission vehicles.
- Introduce a carbon tax on all fossil fuel uses not covered by the EU ETS, including coal use in households, and increase the tax rates gradually over time, while providing measures to alleviate the burden on the most affected households.
- Extend the new CO_2-differentiated registration tax to all passenger vehicles, including classes with CO_2 emission levels lower than 130 gCO_2/km; increase the tax rates for all vehicles without giving an advantage to diesel-driven ones.
- Introduce an annual motor vehicle tax for passenger vehicles, with tax rates depending on CO_2 and air pollutant emissions of the vehicle; consider adding a distance-based component to this tax.
- Implement the planned kilometre-based road use charge for heavy-duty vehicles and consider possibilities of differentiating the charge rates by the time of the day and week to address road congestion.
- Further increase the rates of the air and water pollution taxes to better reflect social damages of emissions, while creating incentives for shifting to cleaner technologies; focus on a much smaller number of pollutants.
- Phase out all fossil fuel support measures, including the VAT rate reduction for central heating, while taking appropriate measures to limit the burden on the most affected firms and households.
- Establish a multi-stakeholder mechanism to track and support the reform of environmentally related taxes and subsidies; swiftly develop a plan to phase out fossil fuel and other environmentally harmful subsidies.
- Gradually increase the tax on landfilling of municipal waste beyond the levels envisaged at present.

3.1. Introduction

Lithuania's economy grew relatively strongly over the decade prior to the COVID-19 pandemic. Gross domestic product (GDP) per capita in the country converged rapidly towards levels in the upper half of OECD member countries. While GDP per capita was around 60% of this upper half in 2010, it rose to more than 80% in 2020 (OECD, 2020a). This rise was due both to strong growth in GDP and a significant decline in total population over this period.[1]

A comprehensive package of fiscal and financial measures averted a sharp GDP contraction in 2020. The government announced an overall package of EUR 5 billion (10% of GDP) in March 2020 (OECD, 2020a). Initiatives under the package and subsequent measures provide funds for the health-care system and emergency management. They also introduce measures to preserve jobs and incomes, maintain business liquidity and stimulate the economy. Measures include short-time wage subsidies that ensure workers receive at least the minimum wage; a flat benefit (EUR 257 per month) for the insured self-employed; and increased sickness benefits for employees infected by the virus. There are also loan and tax payment deferrals, soft loans to eligible small and medium-sized enterprises (SMEs) and temporary rental subsidies to businesses.

The pandemic markedly affected private consumption. Most retail shops and the catering sector were closed during the lockdown in the spring of 2020. These closures combined with uncertainty about labour income to reduce private consumption. Meanwhile, a drop in investments was recorded in the fourth quarter of 2019.

Exports, including of transportation services, have been an important growth factor for Lithuania's economy in recent years. However, the fragile situation in international trade and requirements stemming from reforms in the road transport sector in the European Union (EU) were expected to cool this trend. On the other hand, accelerated EU investment and additional government projects in response to the COVID-19 crisis are projected to drive increases in overall gross capital formation.

In June 2020, the government adopted its DNA of the Future Economy Plan that aimed to move the country to a sustainable, innovative and high value-added economy (JSC ESTEP Vilnius, 2020). It includes short- and long-term investment projects in five priority areas: human capital; digital economy and business; innovation and research; economic infrastructure; and climate change and energy. A total of EUR 6.3 billion in investment was planned between July 2020 and December 2021, of which 25% will be dedicated to environmental and climate change issues, resource and energy efficiency.

In early 2021, this plan was abolished but will be partially implemented through other policies. These include the National Progress Plan (NPP) for 2021-30, the Plan on the implementation of the Government programme (under preparation), the National Energy and Climate Plan (NECP), the 2021-27 EU Investment Programme and the 2021-26 New Generation Lithuania recovery plan. The recovery plan includes a large number of measures to implement the NECP, including development of renewable energy sources, green transformation in transport and greening the buildings sector (Chapter 1).

3.2. Sustainable development and green growth policy framework

Lithuania approved the National Strategy for Sustainable Development (NSSD) in 2003. It was updated in 2009, in line with the EU Sustainable Development Strategy (Government of Lithuania, 2018). The government established the National Commission for Sustainable Development in 2000 to assess progress in implementation. The Commission, headed by the Prime Minister, includes ministers and representatives of non-governmental organisations, business associations and research institutions. In 2018, the country presented its progress towards sustainable development in a voluntary national review on implementation of the 2030 Agenda (Government of Lithuania, 2018).

In 2020, the government adopted the NPP, the overarching framework to implement Agenda 2030 (Government of Lithuania, 2020). The NPP sets three horizontal principles: sustainable development, innovation and equal opportunities for all, as well as ten strategic goals (Table 3.1). With respect to the Sustainable Development Goals (SDGs), it recognises progress on SDG 15 (Life on land) but highlights challenges to SDG 10 (Reduced inequalities) and 13 (Climate action). Lithuania is on track to meet its climate change objectives for 2020 but risks missing its 2030 climate change targets (EC, 2020b). Achieving climate goals will be challenging as Lithuania will have to update the NECP and the NPP (which

reiterates NECP objectives) to reflect the more stringent targets adopted by the European Union for 2030 to achieve carbon neutrality by 2050 (Chapter 1). Lithuania anticipates investment needs of EUR 14 billion to implement NECP measures, most of it coming from public funding.

The sheer number of concurrent strategies related to the environment in Lithuania is problematic. There are over 200 strategic planning documents with various time spans (Blöchliger and Strumskyte, 2021). Ensuring the consistency of all these strategies is a challenge. In principle, every agency is guided by overarching strategies, in particular by the NSSD and the Progress Strategy "Lithuania 2030". However, the last update of the NSSD dates from 2011, i.e. before the UN Agenda 2030 was established in 2015. The voluntary national review on the implementation of the Agenda 2030 found that Lithuania's strategic planning documents reflected most SDGs and their targets (UN, 2018). Although the review assessed progress on all SDGs, it did not identify the environment as a priority. Finally, the compatibility between the NSSD and Lithuania 2030 is unclear. In 2018, the government announced it would update Lithuania 2030 in line with Agenda 2030, but this work is still ongoing (Blöchliger and Strumskyte, 2021).

In 2020, the prime minister established a government working group to better co-ordinate the implementation of the NECP for 2021-30 and address topics on the EU's Green Deal agenda. The working group includes vice ministers and other high-level representatives of key ministries in charge of NECP implementation. It usefully co-ordinates, among others, the transfer of NECP measures and indicators into national investment planning documents.

Table 3.1. The National Progress Plan sets ten strategic goals to implement Agenda 2030

NPP strategic objective	"*Lithuania 2030*" progress directions			UN SDGs
	Smart society	Smart economy	Smart governance	
1. Move towards sustainable economic development based on scientific knowledge, advanced technologies and innovation, and increase the country's international competitiveness				
2. Increase the social well-being and inclusion of the population, strengthen health and improve the demographic situation in Lithuania				
3. Increase the inclusion and effectiveness of education to meet the needs of the individual and society				
4. Strengthen national and civic identity, increase cultural penetration and societal creativity				
5. Improve transport, energy and digital, and internal and external connectivity				
6. Ensure good quality of the environment and sustainability of use of natural resources, protect biodiversity, mitigate Lithuania's impact on climate change and increase resilience to its impact				
7. Ensure sustainable and balanced development of the territory of Lithuania and reduction of regional exclusion				
8. Increase efficiency of the legal system and public administration				
9. Strengthen Lithuania's influence in the world and relations with the diaspora				
10. Strengthen national security				

Source: Government of Lithuania (2020).

3.3. Greening the system of taxes and charges

Total tax revenue equalled around 30% of GDP in 2019, well below the OECD average of around 34% the same year. Among European OECD countries, only Ireland, Switzerland and Turkey raised a lower amount of tax revenue compared to GDP in that year. The tax share compared to GDP has varied somewhat over the last decade. It was equal to the 2018 level between 2006 and 2009 but decreased to 27% compared to GDP in 2011-13. Since then, it has been gradually increasing again.

Revenues from environmentally related taxes (1.9% of GDP in 2019), mainly energy taxes, remain significantly below the OECD Europe average (2.3% of GDP) (OECD, 2021a). Taxes on transport are low and did not consider the environmental performance of vehicles until recently (EC, 2020a). The 2019 law on Motor Vehicle Registration Tax linked the rates to carbon dioxide (CO_2) emissions and fuel type. However, these rates still do not provide a sufficient incentive to buy less-polluting cars, drive less or use public transport.

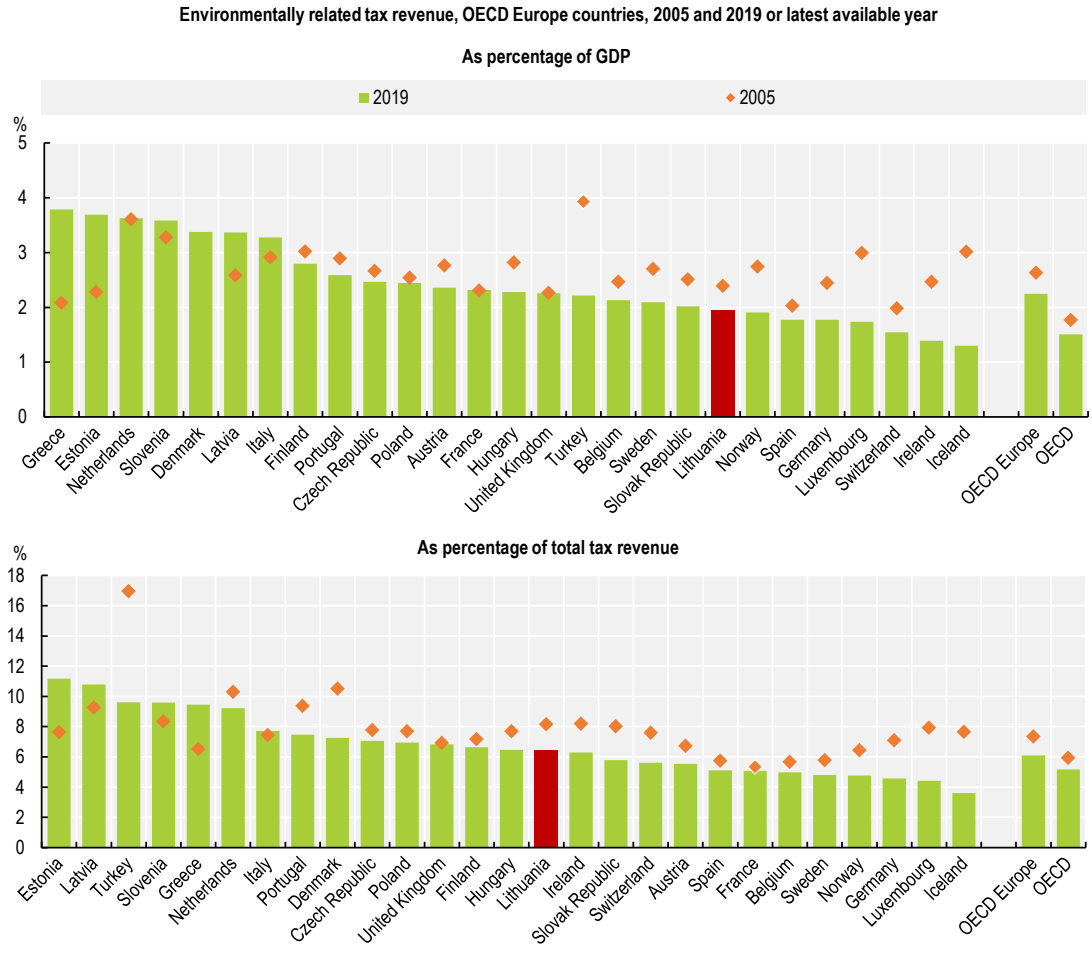
Excise duties for fuels have been increased; however, the difference between diesel and petrol remains high. The largest part of the transport fleet consists of almost 1.5 million passenger cars, 69% of which are diesel cars, with an average age of 16 years and average CO_2 emissions of 160-170 g/km. (Government of Lithuania, 2019).

Lithuania also applies broad-based taxes on air and water pollution, covering a large number of pollutants. However, the tax rates applied are low compared to estimates of the social damages caused by the pollution. The system resembles the pollution taxes applied in the two other Baltic states, Estonia and Latvia, where the pollution taxes also provide limited incentives to reduce pollution levels and serve more to raise revenue.

3.3.1. Environmentally related taxes

The low overall tax share compared to GDP partly explains the relationship of revenues from environmentally related taxes and GDP. These revenues in Lithuania are lower compared to GDP than the average for OECD Europe. However, they are slightly higher than the average in these countries when compared to total tax revenues (Figure 3.1). As in most other OECD member countries, energy products – especially motor vehicle fuels – generate most of the revenues.

Figure 3.1. Revenues from environmentally related taxes are low compared to GDP and as a share of total tax revenues



Note: Data for 2019 are preliminary and may include partial data.
Source: OECD (2021), "Environmental policy: Environmental policy instruments", *OECD Environment Statistics* (database).

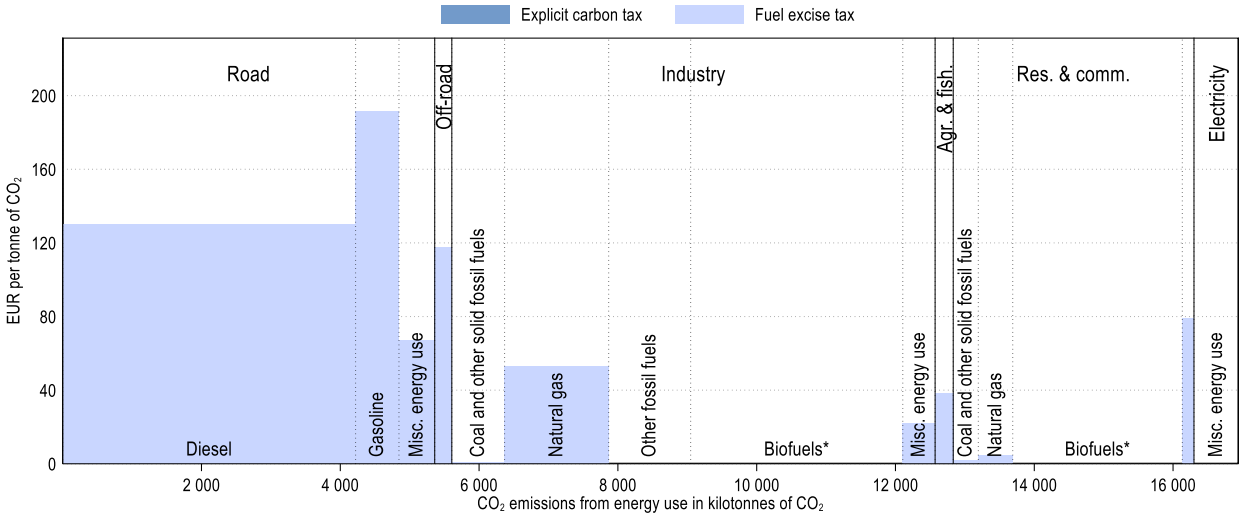
StatLink https://doi.org/10.1787/888934268300

Taxes on energy use and carbon pricing

Like all EU member states, Lithuania levies taxes on motor vehicle fuels and other energy products, as required by the EU's Energy Tax Directive (Official Journal of the European Union, 2003). Also, like in most other countries, the tax rate applied to diesel is much lower than the rate applied to petrol. For a long time, the tax rate on diesel equalled the minimum rate according to this directive of EUR 0.330 per litre. Conversely, the tax on unleaded petrol exceeded the somewhat higher minimum rate of EUR 0.359 per litre on this fuel. However, from 1 January 2018, the diesel tax rate was increased to EUR 0.347 per litre. Two years later, both tax rates were increased, reaching EUR 0.372 and EUR 0.466 per litre of fuel, respectively. In spite of these increases, the diesel tax rate remains significantly below the tax rate on petrol. This is detrimental to the environment because diesel combustion causes higher emissions of CO_2 and local air pollutants per litre than petrol combustion. In one positive development, the tax rate on diesel in the agriculture sector almost tripled from 1 July 2015 to 1 January 2020, reaching EUR 0.06 per litre, still relatively low.

The country does not apply an explicit carbon tax. As illustrated in Figure 3.2, the effective carbon tax rates applied to energy products used for non-transport purposes are much lower than the tax rates applied in the transport sector. Taxes on transport fuels can also be used to (partly) address externalities to which non-transport fuel uses are not contributing (traffic accidents, road wear and tear, congestion, etc.). However, such considerations cannot explain the large differences in the effective carbon tax rates applied. This is particularly the case regarding coal, coke and lignite, for which tax rates have not increased in nominal terms since 1 January 2007.

Figure 3.2. Effective tax rates vary strongly between different sectors and energy categories

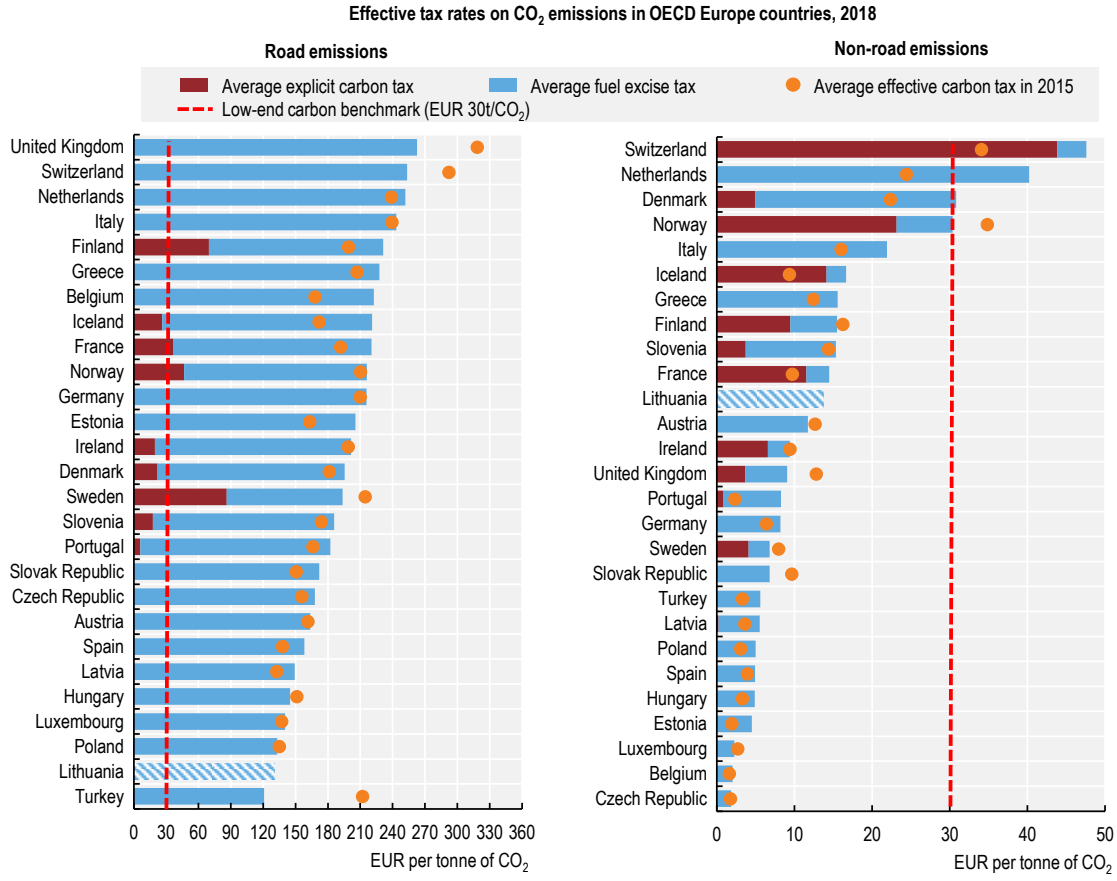


Note: Tax rates applicable on 1 July 2018. CO_2 emissions are calculated based on energy use data for 2016 from IEA (2018), *World Energy Statistics and Balances*. The figure groups energy categories that represent less than 2% of the horizontal axis into "miscellaneous energy use", which is not always labelled. Biofuels are marked with an asterisk as under the IPCC Guidelines for emissions from energy use. Emissions from the combustion of biofuels are not included in the national total. The category "Gasoline" represents petrol.
Source: OECD (2019), *Taxing Energy Use 2019: Using Taxes for Climate Action*.

The EU Emissions Trading System (ETS) covers use of energy products in large industry. In March 2021, the allowance price under the EU ETS equalled around EUR 35 per tonne of CO_2 emitted.[2] However, an increase in energy taxes would seem appropriate for non-transport uses not covered by the EU ETS. This is the case even if Figure 3.3 indicates that effective carbon taxes outside the transport sector are higher than in most other OECD members in Europe.

Lithuania also applies an excise duty on electricity, with a tax rate of EUR 0.52 per MWh for business uses and EUR 1.01 per MWh for non-business uses. These rates are just above the minimum tax rates set in the EU's Energy Tax Directive. Given the EU ETS covers electricity generation, an increase in taxes on electricity use would only help reduce EU-wide CO_2 emissions to a limited extent. Primarily it would shift emissions to elsewhere in this system.

Figure 3.3. Effective carbon rates are relatively low, especially in the road sector



Note: Tax rates as applicable on 1 July 2018. CO_2 emissions are calculated based on energy use data for 2018 from IEA (2020), *World Energy Statistics and Balances*. The average effective carbon tax rate in 2015 is the sum of the average explicit carbon tax rate in 2015 and the average fuel excise tax rate in 2015.
Source: OECD (2019), *Taxing Energy Use 2019: Using Taxes for Climate Action*.

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The low tax rate for diesel compared to petrol has contributed to a rapid dieselisation of the vehicle fleet over the past decade. This, in turn, has a strong negative impact on emissions of local air pollutants, with negative consequences for human health. Between 2010 and 2019, the share of diesel-fuelled passenger vehicles jumped from 15.2% to 69.2% – the highest diesel share in all EU countries (Chapter 4) (EEA, 2019). Hence, despite its lower tax rate per litre, use of diesel raised more than four times as much revenue as petrol in 2019.

Lithuania is planning to eliminate the preferential excise tax rates on fossil fuels and to introduce a CO_2 element into the excise tax (for non-ETS sectors) as of 2024 or 2025. The government also proposes to increase the excise tax rate for diesel fuel so that it exceeds the rate for petrol, as well as to significantly reduce the allowances for farmers to acquire diesel fuel at a preferential price. These would all be steps in the right direction.

As the road transport sector decarbonises over the medium to long term, revenues from motor vehicle fuels will decrease. A gradual shift from an energy-based approach towards distance-based transport taxes in Lithuania could establish a stable tax base in the road transport sector in the long run. A distance-based

tax system could apply different tax rates depending on several key factors. These are where and when the driving takes place; the type of vehicle being driven; and different externalities (air pollution, road wear and tear, accidents, etc.) (Van Dender, 2019).

Transport-related taxes and charges

3.3.2. Vehicle taxes

On 1 July 2020, the government introduced a new tax on the registration of passenger and light-duty vehicles. The tax rates are differentiated according to the vehicle's CO_2 emissions and type of fuel used. The tax only applies to vehicles that emit more than 130 grammes of CO_2 per kilometre driven (g CO_2/km). For vehicles with higher emissions, the tax rate increases in steps for each additional 10 g CO_2/km. In each of the steps, the tax rate applied is twice as high for diesel vehicles as for petrol vehicles. The tax rate applied to vehicles driven by various forms of natural gas is 10% lower than the rates that apply to petrol vehicles.

The tax aims to encourage the purchase of vehicles with lower CO_2 emissions within each fuel category without stimulating a shift from petrol to diesel vehicles (which would generate unwanted local air pollutants). Applying this tax to vehicles with CO_2 emissions lower than 130 g CO_2/km might make the policy more effective.

The tax rates applied are relatively low, especially for non-diesel vehicles. For diesel and petrol vehicles, the tax rate increases between each step by EUR 30 and EUR 15, respectively. If a new vehicle is driven 200 000 km over its lifetime, each step represents an increase of 2 tonnes in lifetime CO_2 emissions. Thus, each additional tonne of CO_2 emitted by diesel and petrol vehicles over their lifetimes is taxed at EUR 15 and EUR 7.50, respectively. These tax rates are low compared both to the prices for emission allowances in the EU ETS[3] and to estimates of social costs of CO_2 emissions.

Most passenger vehicles registered for the first time in Lithuania are second-hand cars, which might not be driven as much as 200 000 km on Lithuanian roads. If they are driven 100 000 km in Lithuania, each tonne of CO_2 emitted over their remaining lifetime would be taxed twice as much as indicated above. This rate would be more or less on par with the current price of allowances in the EU ETS for diesel vehicles. However**,** according to the High-Level Commission on Carbon Pricing (2017), EUR 60 per tonne of CO_2 is a midpoint estimate for the social cost of carbon (SCC) in 2020. More recently, Carleton and Greenstone (2021) indicate an SCC in 2020 of USD 125, or around EUR 100, per tonne of CO_2 emitted. Hence, an increase in the tax rates from EUR 30 and EUR 15, respectively, could still be warranted.

The registration tax is applied to the first registration in Lithuania of each new or second-hand passenger car, as well as each time the vehicle changes hands. The latter provision is likely to be abandoned under the government's tax reform proposal. Lithuania does not apply an annual tax on motor vehicle ownership but is considering such a tax for passenger cars. The annual tax rates would depend on the same factors as the registration tax and be calculated as a fraction of it. Ideally, they should also be a function of the distance driven each year.

3.3.3. Road pricing for heavy-duty vehicles

Since 2000, Lithuania has also applied a "Eurovignette" system for heavy-duty vehicles. Rates depend on the vehicle type, the "Euro" class of the vehicle and the period of road use (a week, a month or a year). This system does partially address the externalities caused by the vehicles, but the rates do not vary with the number of kilometres driven.

Lithuania is preparing a new road charging system that will depend on the distance driven and on the Euro class of the vehicle. Testing is expected to begin in 2022 with implementation to follow a year later. The

charges will apply only to motorways and highways, covering 1 700 km of roads. Charges will not vary with the time of day of driving, which would have helped reduce congestion and traffic accidents.

3.3.4. Tax treatment of company cars and commuting allowances

Income tax treatment of the benefits an employee receives from using a company-owned car for private purposes can have important impacts on the environment, congestion and road accidents (Harding, 2014; Roy, 2014). In Lithuania, in accordance with the provisions of the Law on Personal Income Tax, such benefits are considered to be the employee's taxable income in kind. The in-kind benefits can be calculated in two ways:

- Actual market price of a rented car. In this case, the benefits are assessed based on the period that the car is used for private purposes. When this period is less than a month, benefits are calculated in proportion to the period of use.
- Actual market price of the car. In this case, there is no need to determine the amount of personal use as the employee's in-kind benefits are calculated as a percentage of the price of the car. This percentage is 0.75 when the employer covers some or all fuel costs related to personal use. It is 0.70 when the employer does not cover any fuel costs related to personal use.

Thus, the taxation does not depend on the distance driven by the employee for private use. Moreover, the estimated benefits do not consider whether the employer covers other operating expenses than fuel. For the employee, the marginal cost of driving an additional kilometre with the car is therefore zero.[4]

The percentage gap between cost and benefit of a company car in Lithuania was among the highest in EU member states in 2015 (Princen, 2017). Therefore, Lithuania could consider an increase in taxation of such in-kind benefits.

The Law on Personal Income Tax provides some tax relief for commuting expenses. The employer may buy public transport tickets for employees directly from the transport company or offer compensation to employees. These tickets could be used for transport to or from work. The benefit received by the employee is not treated as taxable income, but employees have no way to deduct commuting expenses from their taxable income. The fact that commuting expenses are not deductible can help limit urban sprawl and does not discriminate against active modes of commuting, but a deduction for expenses related to public transport could be a possibility.

Taxation of employees' free parking spaces depends on the circumstances. If a company pays for parking spaces for the use of specific employees, such in-kind benefits are treated as taxable employment income. However, if parking spaces rented by a company are used by employees randomly, such benefits will not usually be taxable.

3.3.5. Taxes related to air and water pollution

Lithuania applies taxes on a wide range of air and water pollutants emitted from stationary sources by entities that must obtain a single-medium pollution permit or an integrated pollution prevention and control permit (Chapter 2). The air pollution tax covers around 300 different pollutants. Most are placed in four groups, with tax rates inversely proportionate to ambient air quality standards (concentration limits) for respective pollutants.

The tax rate for each group was increased significantly from 2020 to 2021. For some pollutants, such as particulate matter, heavy metals and volatile organic compounds, gradual increases in the tax rates are foreseen until 2023.

However, even the expected tax increases are low compared to the estimated social costs of different pollutants. Tax rates for SO_2 and NO_x emissions from stationary sources are set to remain stable at EUR

0.136 and EUR 0.256 per kg of pollutant, respectively. However, van Essen et al. (2019) indicate that the damage costs of these pollutants were EUR 6.4 and EUR 7.1 per kg emitted,[5] respectively. Damage costs include health effects, crop loss, biodiversity loss and material damage from transport emissions of different air pollutants.

For ammonia emissions, the tax rate of EUR 0.004 per kg increased to EUR 0.02 per kg as of 2021. However, van Essen et al. (2019) suggest the damage costs of such emissions (from the transport sector) in Lithuania were EUR 7.9 per kg emitted. For particulate matter emitted from combustion, the tax rate of EUR 0.25 per kg emitted will increase gradually to EUR 0.45 per kg until 2023. For $PM_{2.5}$, the cost of transport emissions in rural areas is EUR 38 per kg.[6,7]

The tax rates for water pollutants are set per tonne of the discharged pollutant, but an individual tax rate is set only for the main five pollutants: biological oxygen demand (BOD_7), total nitrogen, total phosphorus, suspended matter, sulphates and chlorides. All other pollutants are included in a list of taxable substances, which is divided into five groups with a tax rate set for each group. The pollutants are allocated to these groups according to the harmfulness of the substance. The last amendments of these tax rates came into effect in January 2021. These changes increased rates for all the main pollutants except suspended matter; the increases were significant for chlorides and sulphates.

The tax includes possible relief for certain natural and legal persons. Such persons could receive a tax benefit if they pay out of their own funds to reduce the amount of pollutants discharged by at least 5% below the set maximum allowable pollution limits. However, the tax reduction is limited to the period of implementation of abatement measures, not to exceed three years.

Lithuania could consider reducing the number of pollutants covered for both air and water pollution taxes. At the same time, it could increase tax rates to better reflect the environmental damages of emissions or effluents.

3.3.6. Tax on water abstraction

Lithuania imposes taxes on surface water and groundwater extraction by households and businesses. The tax rates vary according to the intended use of water resources. This tax aims primarily to promote sustainable water use and cost recovery of water services. Water users extracting 10 m^3 or more of groundwater per day, or using it for commercial purposes, are obliged to pay the tax. Since July 2020, a permit has been required for groundwater resources used in agriculture when the extracted amount reaches 100 m^3 per day. Surface water use is taxed if the extracted amount is 100 m^3 or more per day from a single surface water body. Lithuania plans to lower the tax exemption to the first 10 m^3 of groundwater or surface water abstracted for commercial purposes (including agriculture) in 2024 and eliminate it completely in 2028.

The tax rate for groundwater used in households is EUR 0.03 per m^3. The same rate applies in agricultural uses that exceed 100 m^3 per day (there is no tax on smaller abstractions). When the groundwater is used for manufacturing purposes, the tax rate is EUR 0.1 per m^3. Revenues from the tax have gradually increased, reaching around EUR 9 million in 2017. They go mostly to the national budget, but a small part is allocated to municipalities where resources are extracted.

3.3.7. Subsidies

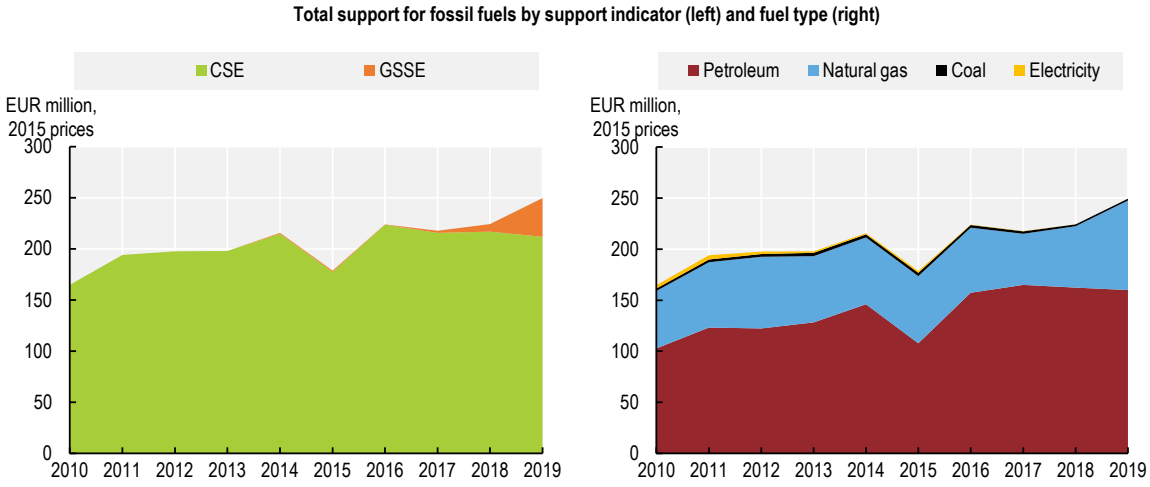
Fossil fuel support

Support to fossil fuels increased in the past decade (Figure 3.4) through exemptions from excise duties and reduced rates for specific fuels and usages. This support was equal to 34% of energy tax revenue in 2019. There are reductions in excise duties applicable for fuels used for business purposes and heating, and exemptions for air and water navigations, and some other uses. In 2015, exemptions for fuels used in

agriculture and fishing were converted into reductions in the excise duty. Reduced excise duties on petroleum products used in agriculture and fisheries make the largest share of support to fossil fuels (29% in 2019), followed by exemptions for international aviation and shipping (27% in 2019). The government introduced a reduced excise duty tax rate for natural gas used as motor fuel in 2018.

At the end of 2019, the government approved EUR 275 million worth of state guarantees for a loan for the Klaipėda liquefied natural gas (LNG) terminal. This loan allowed purchase of an LNG ship-storage facility and the restructuring of the LNG terminal's maintenance costs. Support for fossil fuels continues as Lithuania tries to ensure energy independence while reducing the spending of households on energy consumption. Additional support measures have been reported in the production and transportation sectors (OECD, 2020a).

Figure 3.4. Support to fossil fuels increased in the past decade



Note: Data need to be interpreted with caution. Fossil fuel subsidy data may be partial and data record tax expenditure as an estimate of forgone revenue due to the tax system that reduces or postpones tax relative to a jurisdiction's benchmark tax system, to the benefit of fossil fuels. Hence, tax expenditure estimates could increase due either to greater concessions relative to the benchmark treatment or to a raise in the benchmark itself. Definitions of tax expenditure, and the benchmarks used to estimate the size of the expenditure, are nationally determined and may hamper international comparisons. Data for 2019 are provisional. CSE = Consumer Support Estimate; GSSE = General Services Support Estimate.
Source: OECD (2020), *OECD Inventory of Support Measures for Fossil Fuels* (database).

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Lithuania has committed to rationalise inefficient fossil fuel subsidies as part of SDG 12, which calls for ensuring sustainable consumption and production patterns. The NECP lists energy subsidies (although not related amounts) and envisages phasing out distortive tax incentives for fossil fuels by 2025, (Table 3.2). The government eliminated pollution tax reductions for operators engaged in several activities, including agriculture, from 2021. Other phase-outs should be implemented as planned.

Table 3.2. Lithuania plans to phase out several fossil fuel subsidies by 2025

Subsidy	Amount in 2019 (thousand EUR)	Restriction of subsidy	Implementation period
Reduced rate of excise duty on marked diesel used in agriculture	83 923	Gradual reduction of the quota and concession	By 2025
Reduced rate of excise duty on heating gas oils	18 069	Phasing out	From 2022
Reduced rate of excise duty on coal, coke and lignite used for business purposes	703	Phasing out	From 2024
Reduced rate of excise duty on natural gas used as heating fuel by businesses	3 210	Phasing out	From 2025

Source: Government of Lithuania (2019).

Incentives for environmentally friendly behaviour

Parliament adopted a law on the Innovation Promotion Fund in June 2020. The Fund will provide loans, guarantees and risk capital for start-ups and research and development (R&D) projects. The maximum subsidy per applicant is EUR 200 000, but the amount of the subsidy for a project may not exceed 70% of total eligible costs. The funding guidelines may set a lower amount.

Price premiums and priority access to the grid are in place for producers of electricity based on renewable sources. These incentives only apply where a producer participates in a technology-neutral auction and, if successful, offers the lowest price premium. The Law on Energy from Renewable Sources sets a target of at least 5 TWh of electricity generated from renewable sources in 2025. If the target is reached before 2025, with power plants constructed without support, further auctions will not be organised and the need for continued support will be assessed.

Private persons and firms can receive up to EUR 1 000 if they scrap old, highly polluting cars. Firms can only receive the support to help finance the purchase of electric vehicles (EVs). Private persons can use the grant to buy a more environmentally friendly vehicle than the one they scrap (electric or other non-diesel car first registered in 2013 or later, with CO_2 emissions not higher than 130 g/km); to buy e-scooters; or to pay for alternative transport (bicycles, public transport). As of January 2021, more than 15 000 old vehicles had been scrapped.

In addition, households and firms can get a subsidy of EUR 5 000 for the purchase of a new EV. Households can also get a grant of EUR 2 500 to buy a second-hand EV. While such subsidies can help promote the sales of EVs, it would be costly to achieve a high share of such cars in the total vehicle fleet by almost exclusively relying on subsidies for the purchase and use of EVs.

Support is also available for renovation of private houses and for installation of renewable energy systems in such buildings. Such projects can receive grants of up to EUR 14 500; EUR 14.3 million was provided in 2020. There are also subsidies available to help replace old and polluting boilers in households with heat pumps or eco-design solid biofuel boilers. Such schemes could reduce energy use and improve the comfort of the houses covered. However, the promotion of solid biofuel boilers can have negative local air pollution impacts. In addition, *ex post* assessments of renovation support schemes in other countries have rarely found that net benefits to society have exceeded the costs due to unexpected changes in households' behaviour and support for projects that would have been carried out anyway (so-called free-riding) (Nauleau, 2014; Alberini, Gans and Towe, 2016; Alberini, Bigano and Boeri, 2013).

Support is available in the Rural Development Programme (RDP) for farmers and agricultural firms with a view to maintain or restore biodiversity on agricultural land. Land users are supported under two conditions: they restore degraded habitats of protected species in their holdings; or they need to protect domestic animals against wolves.

Lithuania promotes connection to centralised wastewater networks to encourage environmentally friendly behaviour of companies and households. Funding, provided partially by the Environmental Investment Fund, is allocated to municipalities that connect the households to the infrastructure. Funding to develop centralised wastewater infrastructure is provided by the Water Management Fund as well.

Agricultural support

The support under the EU's Common Agricultural Policy (CAP) has led to a 20% increase in the area of agricultural land compared to the years since Lithuania's accession to the European Union in 2004. Direct support for crop production has had the greatest negative impact on the achievement of climate goals. Support linked to the declared crop area has led to cultivation of organic soils; increased use of synthetic fertilisers and fossil fuels; and reduced grassland and pasture area. EU payments for farming in less favourable agriculture areas should be linked to key environmental targets that promote sustainable agriculture. These include targets that relate to soil, landscape and biodiversity concerns. Compensation with public funds for crop farms in cases of drought, rain and frost has discouraged crop farms from adopting their own mitigation and adaptation strategies related to climate change.

At the same time, farmers receive "green payments" of EUR 50/ha under the CAP (EUR 155 million/year) if they comply with three practices that go beyond statutory management requirements and good "agricultural and environmental condition of land" standards: crop diversification (to make the soil more resilient), conservation of permanent grassland (to support carbon sequestration and protect biodiversity) and delineation of ecological focus areas (to create habitats for biodiversity).

Many agricultural support measures were implemented under the 2014-20 and earlier RDPs, which Lithuanian authorities deem to have had a positive environmental impact. Lithuania devoted 37% of its RDP budget to the environment and climate, exceeding the 30% share imposed by the CAP. The main measures aimed at improving biodiversity, water and soil (EUR 100 million/year), sequestering carbon (EUR 6.4 million/year) and reducing GHG and ammonia emissions (EUR 1.3 million/year). In particular, the RDP promotes organic farming (EUR 32.7 million/year), "agri-environment-climate measures" (EUR 9.1 million/year), forest ecosystem services, including carbon sequestration (EUR 6 million/year), development of the Natura 2000 network and improvement of water quality (EUR 3 million/year). In addition, more than half of the environment and climate budget of the RDP concerns "areas facing natural constraints", mainly wetlands (EUR 61 million/year).

RDP payments encourage farmers to implement environmentally friendly practices beyond those imposed by the CAP. The RDP approach is based on adoption of an agricultural practice known as design-based policy. According to Lithuanian authorities, the most positive policies for nature conservation are support to manage natural meadows and pastures. Conversely, policies that have a negative effect on nature conservation include support to renovate drainage systems in areas less favourable for intensive agriculture. In these latter cases, farmers would have been better off adapting to local natural conditions and applying nature-based solutions as much as possible (Science for Environment Policy, 2021). The financial support schemes have, among other things, led to extensive use of restored wetlands as hay meadows or pastures. Achieving cost-effectiveness in design-based policies requires knowledge of good practices specific to each environmental objective (climate, air, water, soil, biodiversity), precise targeting of local practices and information on abatement costs of each farm.

Most groundwater users must pay a water abstraction tax for any uses exceeding 10 m^3 per day. However, farmers are only subject to the tax if they abstract more than 100 m^3 per day (Section 3.3.6). This provision can cause higher water abstractions than what would be optimal from a social point of view. It is scheduled to be phased out gradually by 2028.

3.3.8. Other economic instruments

Emissions Trading System

Stationary installations in Lithuania have been participating in the EU ETS since its establishment in 2005. Since 2012, EU ETS has included aircraft operators (Directive 2003/87/EC); it covers 87 installations and 2 aircraft operators in the country. Installations under the EU ETS need a greenhouse gas (GHG) emissions permit from the Environmental Protection Agency.

Lithuanian EU ETS operators emit about 30% of national GHG emissions. Most gases are emitted from three installations that produce ammonia and nitric acid, refined petroleum and cement. All operators of stationary installations and aircraft operators in the EU ETS must monitor and report their annual emissions in accordance with Commission Regulation (EU) No 601/2012. Third-party verifiers accredited by a national body must verify reported emissions. In Lithuania, foreign accreditation bodies report on emissions as the country has no verifiers accredited domestically.

As noted in Section 3.3.1, the price of emission allowances in the EU ETS was around EUR 35 per tonne of CO_2 emitted in March 2021. As indicated**,** according to the High-Level Commission on Carbon Pricing (2017), EUR 60 per tonne of CO_2 would be a midpoint estimate for the SCC in 2020. According to the Commission, EUR 60 would be a low-end estimate for the SCC in 2030. Carleton and Greenstone (2021) indicate the SCC was already around EUR 100 in 2020. Lithuania could consider gradually introducing a minimum ("floor") carbon price to give firms more certainty about future costs of emitting GHGs. This, in turn, would stimulate innovation and adaptation. To that end, it could follow the example of the Netherlands (Box 3.1).

Box 3.1. The Dutch carbon price floor for industrial emissions is slated for a gradual increase

As of 1 January 2021, the Netherlands introduced a new carbon levy for industry. The levy aims to achieve additional emission reductions in industry, where abatement costs are relatively low compared to other sectors of the economy.

The new carbon levy complements the carbon price that results from the EU Emissions Trading System (ETS). It implements a domestic floor price for Dutch industrial emissions that consists of a floating contribution on top of the price for emission allowances in the EU ETS. If the price of emissions allowances exceeds the floor price, the floating contribution becomes zero. The price floor will increase from EUR 30 per tonne of CO_2 in 2020 to EUR 125 per tonne of CO_2 in 2030.

Industrial facilities initially receive tax allowances based on EU ETS emissions benchmarks that are phased out over time. While the tax allowances further ease the adjustment for emission-intensive facilities, they also lower the incentives to invest in clean assets.

The revenue from the carbon levy is earmarked to support low-carbon investment by industry, for example, in renewable energy, hydrogen, carbon capture and storage, and increased use of residual heat.

Source: Anderson et al. (2021).

Water user charges

Local authorities apply user charges to water supply and sewage treatment, pursuant to the provisions of the Law on Drinking Water Supply and Waste Water Management. According to this law, water service prices should be non-discriminatory and comply with the polluter-pays principle.

The methodology for setting the prices of drinking water supply and wastewater treatment services provides for full cost recovery. For example, the price of water must include the following elements: materials, maintenance and consumables, fuel, electricity, heating, depreciation of fixed assets, wages, services and other contract work, the social security tax, the land tax, land rent, the real estate property tax, the natural resource tax, pollution taxes, payments to the guarantee fund and other expenses.

Waste collection charges

Waste management is subject to the polluter-pays principle. To that end, three parties could be responsible for waste management costs: by the original waste producer; the current or previous waste holders; or the producer or importer of the products from which the waste came. Municipalities organise municipal waste management systems and proper waste management services.

Cost recovery is one of the principles of municipal waste management pricing in Lithuania. This means that revenue generated from residents should cover the costs of the service. Payments for waste management services, required in all municipalities, consist of a fixed and a variable component. The fixed part covers all the necessary costs related to municipal waste management. This includes all administrative and long-term operation of infrastructure and the costs of renewal. The variable part can be set according to the number and size of mixed municipal waste containers used; the frequency of emptying them; or the weight of mixed municipal waste generated.

In addition, EU funds and the Waste Management Programme finance new waste collection measures, recycling infrastructure and its development to help municipalities to collect and recycle more waste. The programme is funded from revenues of the tax on environmentally harmful products and packaging (paid by producers and importers) and of the landfill tax. The funds finance the setting up, operation and development of waste management schemes, including investment projects. The programme also supports training, education and provision of information to the public and municipal staff related to waste management. It can also provide grants to municipalities and subsidies to economic entities to operate and develop waste management schemes.

Municipalities set charges for municipal waste services within limits established by the government. The draft Waste Management Law would cap charges for municipal waste collection services for each region. The charge promotes sorting of municipal waste at the source and reduction in waste sent to landfills. The draft National Waste Management Plan for 2021-27 requires municipalities to sort biodegradable municipal waste (green and food waste) and to collect it separately. This is in line with the EU requirement to collect bio-waste separately beginning in 2024. Municipalities in the Alytus region have started separate food waste collection, including collection from flats. According to regional authorities, the cost of municipal waste management did not increase as a result of these measures. Municipalities in other regions are still implementing this requirement.

Landfill tax

Lithuania appears to have met its 2020 target of 50% for municipal waste recycling and preparation for reuse, but recycling of specific municipal waste streams remains a challenge (EC, 2020b). It introduced a landfill tax in 2016, with tax rates varying across different waste categories but has postponed planned increases of the tax multiple times. In 2020, the rate for non-hazardous waste remained at EUR 5 per tonne. This rate was not enough to divert waste from landfilling and reach post-2020 recycling and reuse and landfill reduction targets.

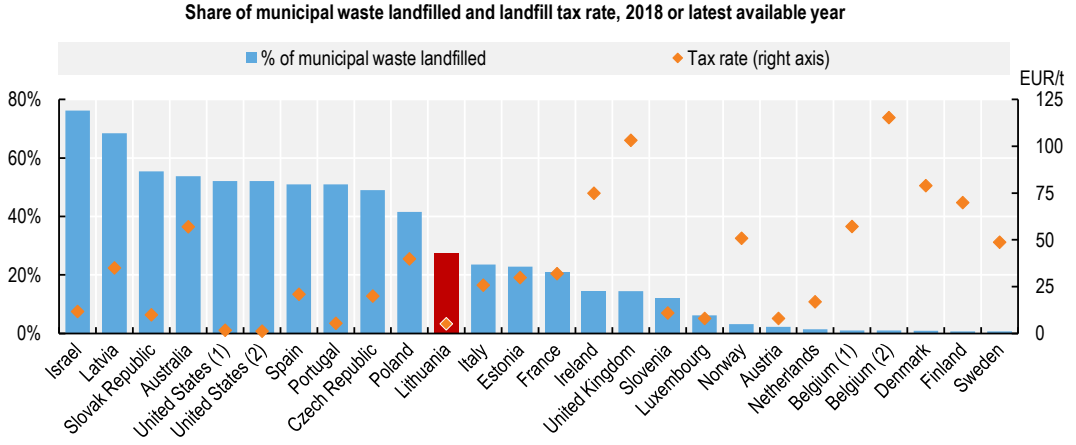
The rate is set to increase by EUR 5 per tonne each year starting from 2021 until it reaches EUR 25 per tonne in 2024. However, the government had proposed increasing the rate to EUR 50 per tonne. Even this rate would still be among the lowest in the European Union. In addition to discouraging recycling, such a low rate contributes to a relatively high share of waste sent to landfill (Figure 3.5) despite major improvements in the recycling rates over the last decade (see Chapter 1).

Lithuania reduced the tax rate for hazardous waste in 2021 from EUR 70.96 per tonne to EUR 50 per tonne of waste. The reduction intended to prevent hazardous waste from being declared as non-hazardous waste

and landfilled at a lower tax rate. As the rate for hazardous waste will remain higher than for non-hazardous waste, such illegal behaviour could still take place.

Lithuania could consider a tax on incineration of waste to further promote reuse and recycling. The government, however, is concerned about incineration becoming too expensive an option compared to landfilling. It would rather subject incineration to price regulation while using other measures to encourage waste recovery.

Figure 3.5. A relatively high share of municipal waste still goes to landfill



Note: Subnational data (local taxes) are used for: Spain (Catalonia), United States (1) (North Carolina) and (2) (California), Australia (Western Australia), Belgium (1) (Flanders) and (2) Wallonia (tax rate for combustible waste; tax rate for non-combustible waste amounts to 63.5 EUR/t). Caution must be exercised in interpreting these data due to (a) the lag between application of a tax rate and its effects on the landfill rate, and (b) the relationship between local tax rates and nationwide landfill rates.
Source: Country submission; CEWEP (2017), *Landfill Taxes and Bans Overview*; OECD (2021) "Environmental policy: Environmental policy instruments", *OECD Environment Statistics* (database).

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Taxes on packaging and goods that are harmful to the environment

Lithuania applies taxes on packaging that vary according to weight and materials. In 2021, for example, the tax rate is EUR 125 per tonne of paper and cardboard packaging, EUR 225 per tonne of glass packaging and EUR 618 per tonne of plastic and polyethylene terephthalate (PET) packaging. A higher rate of EUR 900 per tonne applies to composite packaging materials.

As of 2022, a new tax system that differentiates between recyclable and non-recyclable packaging will help further promote recycling. The tax rates for both categories in 2021 will be maintained or increased slightly for reusable packaging and recyclable one-way packaging. Conversely, the rate for non-recyclable one-way packaging will increase from 2022 to EUR 875 per tonne for plastic and PET, and to EUR 188 per tonne for paper and cardboard.

The country also applies taxes on certain products that harm the environment (e.g. in relation to waste handling). For example, in 2021, the tax rate for car and motorcycle tyres is EUR 300 per tonne; EUR 600 per tonne for other tyres weighing more than 3 kg; EUR 4 469 per tonne for batteries; and EUR 714 per tonne for oil and air filters for cars.

Deposit-refund system for beverage packaging

In 2016, Lithuania introduced a deposit-refund system for disposable beverage packaging. Producers and importers that supply alcoholic or alcohol-free beverages in disposable glass, plastic or metal containers

that hold between 100 millilitres and 3 litres must participate in the system. Individuals who buy such beverage containers marked with the deposit symbol pay the deposit (EUR 0.10) at the point of sale. They can collect a refund after delivering the packaging to a reverse vending machine. In 2019, the system contributed to the collection of 92% of applicable packaging. While setting up such a system can be expensive, it can help reduce littering and contribute to reuse of containers or to recycling of the materials they contain.

Other resource-related taxes

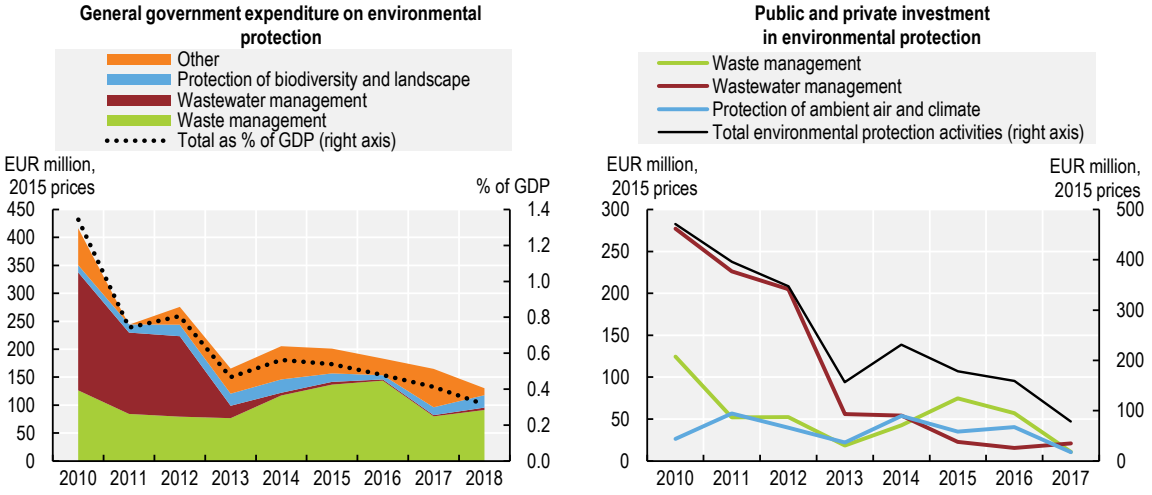
A tax on the sale of timber is levied on state forest holders, and since 2015, on private forest holders. Further, there is a tax on the extraction of a number of mineral resources, including sand, peat, anhydrite, dolomite and amber. Recreational fishing has also been taxed since 2012. Fishing is, however, free for persons under 16 years of age.

3.4. Environment-related expenditure and investment

3.4.1. Expenditure for environmental protection

Over the past decade, public (mostly local government) expenditure on environmental protection (current expenditure and investment) decreased from 1.3% of GDP in 2010 to 0.3% in 2018 (Figure 3.6). This amount was less than half the EU average of 0.8% (Eurostat, 2020). Government investment in wastewater infrastructure fell drastically, while investment in waste infrastructure has varied over the years. Ancillary producers' investment in air and climate protection has also fluctuated.

Figure 3.6. Expenditure on environmental protection is low and decreasing



Note: Environmental protection investments of general government, corporations as specialist and secondary producers, and corporations as ancillary producers.
Source: Eurostat (2021), *Environmental Protection Expenditure Accounts* (database); OECD (2021), *OECD National Accounts* (database).

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Despite progress, the share of population connected to public sewage treatment plants remains below the OECD average. Early in 2017, 54 agglomerations were in breach of several provisions of the Urban Waste Water Treatment Directive (EC, 2019). According to OECD projections, compliance with EU legislation on water supply and sanitation will require a 40% increase in annual investment by 2030 (OECD, 2020b).

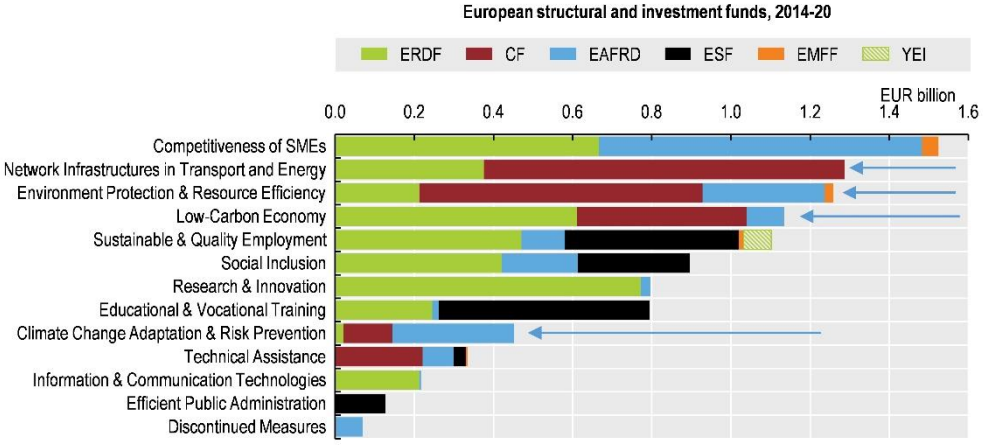
Revenues from tariffs cover 70% of the costs of providing water services; the public budget subsidises about 30%.

The country is projected to face difficulties meeting financing requirements due to affordability issues and limited access to private funding (OECD, 2020b). For this reason, the following actions are needed:

- Make the best use of assets and financial resources by further consolidating municipal and local services to improve operational efficiency and financial sustainability through economies of scale. As water users are reluctant to connect to central water supply and sanitation infrastructure, connection could be encouraged through charges.
- Minimise future financing needs by ensuring that tariffs reflect the costs of service provision, with social measures to address affordability.
- Harness additional sources of finance by, for example, tasking the Lithuanian Public Investment Development Agency to attract private investment.

Lithuania was allocated EUR 10 billion from the European Structural and Investment Funds (ESIF)[8] for 2014-20, equivalent to 3.4% of annual GDP (Figure 3.7). By mid-2020, 94% of the total amount planned was allocated to specific projects. In all, 55% was spent, above the EU average of 47%. About 30% of the ESIF target environmental protection, resource efficiency and climate-related objectives, including in agriculture and fishing.

Figure 3.7. Environment-related investment relies heavily on EU funds



Note: CF = Cohesion Fund; EAFRD = European Agricultural Fund for Rural Development; EMFF = European Maritime and Fisheries Fund; ERDF = European Regional Development Fund; ESF = European Social Fund; SMEs = Small and medium-sized enterprises; and YEI = Youth Employment Initiative, including national co-financing (EUR 1.6 billion out of EUR 10 billion).
Source: EC (2020), *European Structural and Investment Funds* (database).

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3.4.2. Promoting investment in sustainable energy and transport

Investment needs in sustainable energy and climate policies are estimated at 3% of 2019 GDP annually over the next decade (EC, 2020a, Table 3.3). Lithuania has identified EU funds and other external sources (50%), state funding (21%) and the private sector (29%) as sources of funding. However, it can be challenging to mobilise private funding.

Table 3.3. Investment needs in energy and climate policies are high

Funding needs for planned policies and measures, 2021-30

Sector	Total need for funds, EUR million	Need for public funds, EUR million
Energy: Energy efficiency	2 605	976
Energy: RES development	2 304	1 428
Transport	4 138	2 977
Agriculture and forestry	868	729
Industry (including the ETS sector)	876	342
Waste management	5	5
Total: GHG reduction measures	**10 795**	**6 456**
Adaptation to climate change	3 303	3 303
Total	**14 098**	**9 759**

Source: Government of Lithuania (2019).

Investment in clean energy

Lithuania aims for a 45% share of renewables in gross final energy consumption in 2030 (compared to 25.5% in 2019). This is significantly higher than the minimum share of 34% mandated by the European Union as part of its renewable energy target (EC, 2020b). The country intends to achieve this high share by organising technology-neutral auctions and through widespread deployment of small-scale renewable energy installations owned by individual energy consumers and communities. Regarding electricity generation, Lithuania aims to cover 45% of its electricity consumption from renewable energy sources, mostly from wind, by 2030. It also projects that at least 30% of consumers will generate electricity for their own use. In heating, the share of renewables is planned to rise from 47% to above 67% by 2030. The share of planned renewables in district heating for 2030 is 90%; district heating covers 53% of the country's heat demand, rising to 76% in cities. In transport, Lithuania aims to reach a 15% share of renewables (EC, 2020b).

Government of Lithuania (2019) describes investment needs for the planned policies and measures but does not explain the methodology for assessing these needs (EC, 2020b). The overall investment figures add up to EUR 14.1 billion from 2021 to 2030. The European Commission estimates that investment needs correspond to average annual investments of around 3% of GDP (EC, 2020b). The need for public funding is estimated at EUR 9.8 billion from 2021 to 2030. National and municipal budgets, along with electricity and heat tariffs, are expected to cover about 21% of this funding. Meanwhile, EU funds, including the European Regional Development Fund, Cohesion Fund and Modernisation Fund, cover 50%. The difference between the total investment need and the estimated public funding is meant to be covered by private funds.

3.5. Eco-innovation and the environmental goods and services sector

3.5.1. Innovation performance

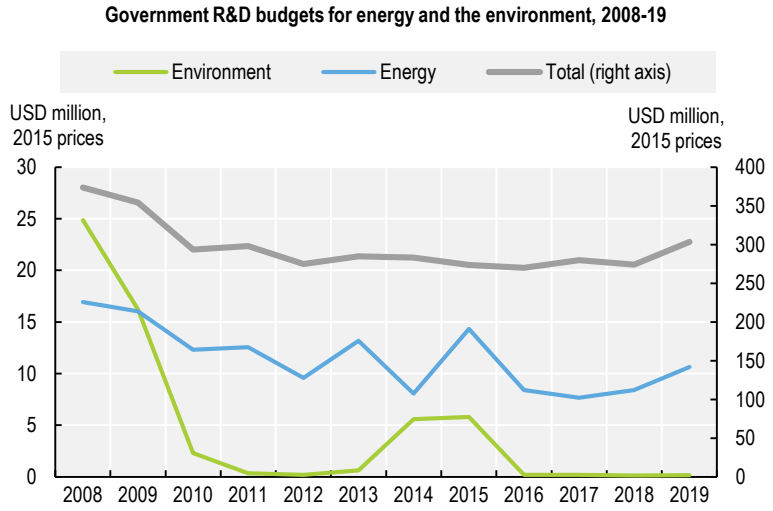
Lithuania's innovation performance has improved but remains weak by EU standards (EC, 2020b). Investment in R&D is at 0.88% of GDP, well below the EU average. It has not yet recovered from a sharp drop in 2016. This is mostly because of the fall in public R&D intensity due to diminishing rates of investment from ESI Funds. Public R&D intensity went from 0.75% in 2015 to 0.57% in 2019. By contrast, business R&D expenditure has been growing steadily since the 2008 economic crisis, reaching 0.43% of GDP in 2019. The government's goal of a 1.9% R&D intensity by 2020 will not be reached.

Removing barriers to innovation and to doing business will speed up the technological upgrading of the economy (EC, 2020b). Institutional constraints are limiting the growth of companies and inhibiting innovation. The predominant type of business in Lithuania is microenterprise, which is generally less innovative and productive than other firms. At the same time, R&D intensity is relatively low and spending remains inefficient and overly reliant on European funds. Likewise, public research and innovation are held back by a cumbersome institutional network and a shortage of qualified researchers. Businesses face difficulties accessing finance and international markets. In some sectors, notably energy, regulatory barriers hamper firm entry and competition. Another persistent obstacle to doing business is the insolvency framework, although the new insolvency law may improve the situation. Therefore, more action is required to stimulate productivity growth by improving the efficiency of public investment. Further action is also needed to improve the coherence of policies to support science-business co-operation and to consolidate research and innovation implementing agencies.

3.5.2. Eco-innovation performance

Lithuania is catching up with eco-innovation, ranking 18th among the 28 EU countries in 2019 (EC, 2020b). The government's R&D budget on energy and environment decreased (Figure 3.8). The number of patent applications for environment-related technology remains extremely modest (OECD, 2021b) (Figure 3.9). Lithuania still lacks specific policies targeting eco-innovation despite recent progress in promoting circular economy (EC, 2020b).

Figure 3.8. The government's environmental R&D budget has collapsed



Note: At 2015 prices and purchasing power parities.
Source: OECD (2021), *OECD Science, Technology and R&D Statistics* (database).

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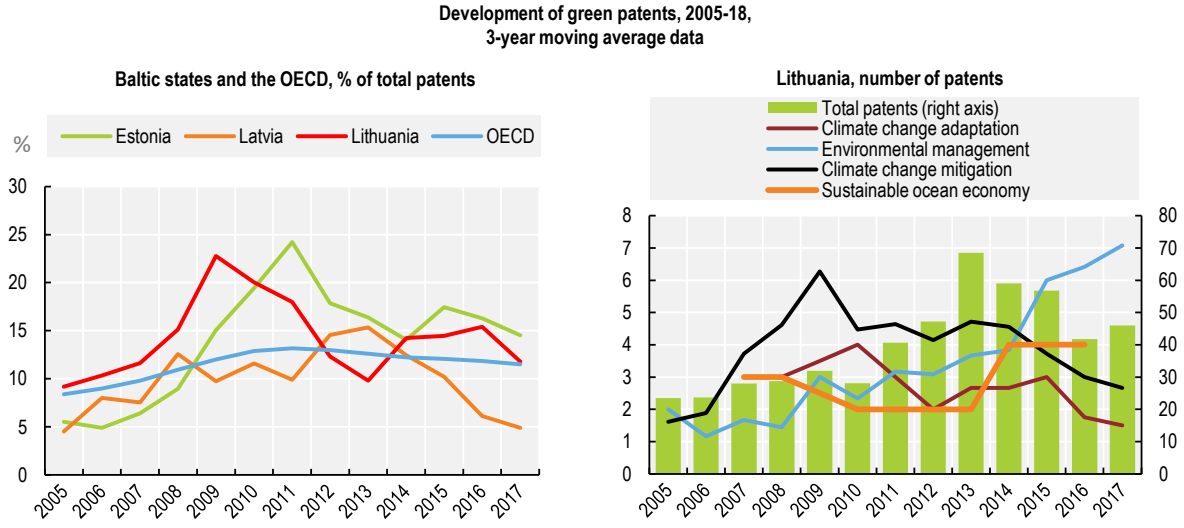
The NECP presents a number of interventions under different programmes relevant for energy research and innovation (EC, 2020b). The cumulative budget of these programmes adds up to more than EUR 1 billion for 2018-23, including both national and EU public resources. Overall, the measures are fairly specific and the budget is considerable. However, they spread across many different "intervention areas", which may reduce overall impact in the energy sector. The programmes and measures presented are consistent with the objectives of EU energy and climate policy (EC, 2020b). According to the NECP, Lithuania considers hydrogen as a promising area for energy innovation and an opportunity for acquiring new energy competences. It suggests that energy storage followed by hydrogen-based solutions could cover the increasing need for flexibility.

Figure 3.9. The share of environmental patents in total patenting is in line with the OECD average



Note: 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. Environment-related technologies cover all domains related to environmental management, climate change mitigation and adaptation and sustainable ocean economy.
Source: OECD (2021), "Patents", *OECD Environment Statistics* (database).

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In September 2020, the Ministry of Energy adopted an action plan for strengthening the Lithuanian energy innovation ecosystem. The plan presents a comprehensive strategy for the energy sector innovation. It details actions to improve availability of funding, preparation of energy projects, investments in human resources in the private and public sector. It also boosts collaborative activities, including at EU level under the EU research frameworks (IEA, 2021).

Lithuania only partially addressed recommendations from the European Commission to clarify the national objectives and funding targets regarding research, innovation and competitiveness in the final NECP (EC, 2020b). The timeline and policies and support measures post-2023 remain to be developed.

3.6. The social consequences of the transition towards green growth and of the COVID-19 recovery

Gross value added in the Lithuanian environmental goods and services sector increased by 69% in real terms between 2010 and 2018, while total employment in the sector increased by 56% (Eurostat, 2021). This means that gross value added per person employed increased considerably over this period. Lithuania anticipates the climate transition will have a positive employment impact, with a 1.56% annual increase in overall employment between 2020 and 2030 (EC, 2020b).

Just and fair transition aspects are well integrated into the NECP, which considers the circular economy's social impact (by tackling energy poverty) and its effect on employment (EC, 2020b). However, the plan could still benefit from having a more specific list of measures and a timeline for their implementation.

Lithuania was less affected by the COVID-19 pandemic than most other OECD member countries. However, employment and incomes have been negatively affected. The government tries to stimulate the

incomes of firms and households, and to promote new employment opportunities. In 2020, “green” firms could get higher support than other firms, but this measure has ended. While it can be “fair” to support the incomes of all those negatively affected by the pandemic, recovery measures could also promote a greener economy.

Lithuania does not have many highly polluting firms. However, the few exceptions are important cornerstones in their local communities. They could find it difficult to survive when, for example, carbon prices increase. Experiences from other countries indicate it can be difficult for such communities to establish alternative activities until the closure or restructuring of an unviable firm has been announced.

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Notes

[1] Between 2010 and 2018, total population in Lithuania decreased by around 10%, from 3.1 million to 2.8 million, cf. www.oecd.org/els/emp/MD_POPHIST.xlsx.

[2] The allowance prices are not shown in Figure 3.2.

[3] In March 2021, the allowance price was around EUR 35.

[4] If an employee uses a car only to reach the place of work or to come home from the working place, such use of the car is not considered to be private purposes.

[5] For NO_x, this is the estimate van Essen et al. (2019) presents for transport emissions that occur in rural areas. Estimates for damage costs of NO_x emissions from transport occurring in cities are almost twice as high.

[6] For $PM_{2.5}$ emissions from the transport sector in metropole areas, van Essen et al. (2019) estimate the damage costs to be EUR 300 per kg emitted.

[7] An earlier paper, Štreimikienė and Ališauskaitė-Šeškienė (2016), presents estimates of the social cost of emissions from the energy sector, based on the so-called ExternE project of the European Commission. Among other areas, that paper indicates that human health-related external costs of $PM_{2.5}$ and NO_x emissions from the energy sector in Lithuania were around EUR 11 and EUR 4 per kg of emission in 2010, respectively.

[8] European Regional Development Fund, Cohesion Fund, European Agricultural Fund for Rural Development, European Social Fund, European Maritime and Fisheries Fund and Youth Employment Initiative, including national co-financing.

Part II Progress towards selected environmental objectives

Chapter 4. Sustainable mobility

This chapter reviews progress in promoting sustainable mobility in Lithuania. It discusses mobility trends in passenger transport and freight and examines their impact on air pollution, greenhouse gas emissions, noise, congestion and traffic safety. The chapter provides an overview of governance arrangements and the country's various policy visions for mobility. This includes several strategic policy documents, laws and guidelines aimed at reducing the environmental impact from transport. Finally, it assesses the policy instruments to promote sustainable mobility and examines their performance in achieving the country's objectives. This includes schemes to support biofuels; low-emission zones to reduce air pollution from urban transport; and parking policy.

Recommendations on sustainable mobility

Defining a long-term decarbonisation strategy for the transport sector

- Develop a coherent roadmap for the low-carbon transition that specifies the role of all modes of transport; ensure that policies across modes are aligned with low-carbon mobility objectives and the Law on Alternative Fuels; set more ambitious, time-bound targets to support medium- and long-term decarbonisation targets for the non-ETS sectors.

Ensuring coherence between transport and land-use planning

- Strengthen links between transport planning and land use; tighten planning regulations to ensure that all developments promote compact settlement with easy access to transport links, as well as a network of safe walking and cycling routes.
- Develop a national scheme to monitor and evaluate implementation of SUMPs and overall performance of cities in meeting transport-related climate change mitigation objectives.

Prioritising public transport and active mobility

- Reprioritise national investment programmes towards sustainable mobility, allocating a large share of investment to public transport, walking and cycling.
- Channel local funding towards promoting environmentally friendly transport modes.

Steering user behaviour and promoting sustainable travel

- Promote the use of non-motorised transport by improving walking and cycling conditions; put in place significant investments and time-bound targets to support implementation.
- Follow through with incremental implementation of LEZs in urban areas; carefully monitor the impacts and adjust the levels of charges accordingly; envisage limited, targeted financial support to car-dependent and low-income households.
- Phase out free parking at the workplace; increase parking tariffs for in-street parking in urban areas; consider making public transport and emerging transport services (such as bike-sharing) eligible for workplace benefits; eliminate minimum parking requirements for new residential and commercial buildings.

Promoting electric vehicles

- Increase the taxation of purchase and use of internal combustion engine vehicles with a view to gradually removing the price difference between them and EVs; continue to extend the network of charging stations; carefully monitor potential distributional impacts on low-income, car-dependent households.

Shifting to low-carbon freight transport

- Advance the integration of road, rail and maritime freight, while rebalancing economic incentives in favour of rail freight.
- Improve efficiency of logistics operations by providing incentives for increased collaboration between freight carriers.
- Reassess the economic and environmental benefits of promoting LNG technology in road freight transport.

4.1. Introduction

Sustainable transport is critical for mitigating climate change, reducing air pollution and other environmental damages. The benefits of sustainable transport extend beyond the environment, delivering improvements in productivity, health and well-being. Advancing sustainable mobility requires redesigning mobility systems to ensure that people can have easy access to jobs, opportunities, and goods and services. Generating adequate and equitable access also implies increasing proximity between people and places. This, in turn, can support governments in accelerating climate action, while also delivering on broader well-being and sustainable development objectives (OECD, 2019).

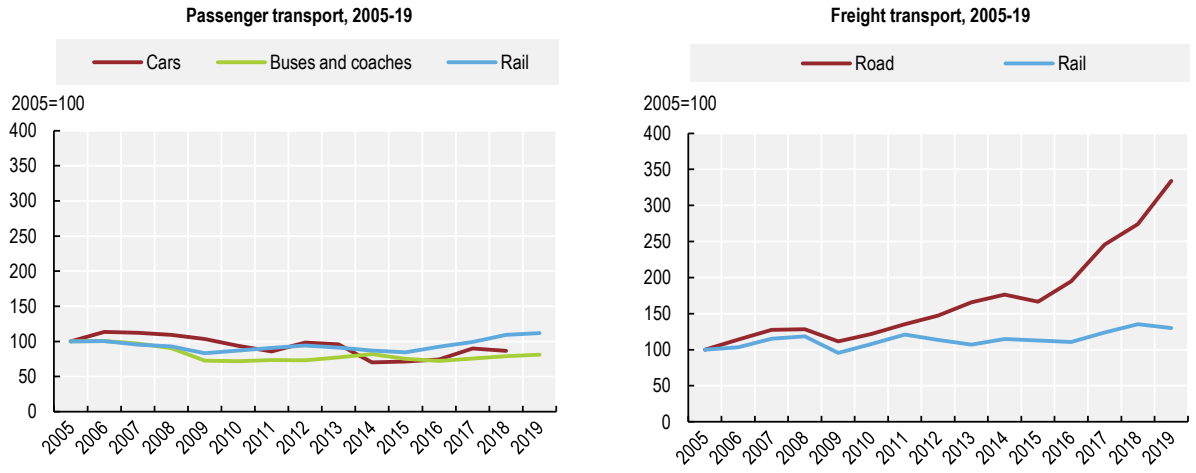
Lithuania is facing a number of pressing environmental challenges associated with mobility policies. Urban areas are dominated by individual motorised transport with associated problems of greenhouse gas (GHG) emissions and air pollution, noise, traffic injuries and congestion. Urban sprawl characterised by increasing low-density development has helped make people more dependent on cars. It has led to significant costs of providing public services and transport infrastructure. The generous tax treatment of fossil fuels, particularly diesel, along with the low vehicle taxation, has spurred car ownership and use (Chapter 3).

Coherent policy action will be needed from different levels of government to steer urban development and transport towards more sustainable pathways. Lithuania needs a clear strategy with intermediate GHG reduction targets for the transport sector to ensure progress towards the 2050 carbon neutrality goal. Co-ordinating land-use and transport planning will be essential for curbing urban sprawl and reducing the need to travel at excessively long distances. Fiscal policy instruments, in particular fuel and vehicle taxes, will need to be adjusted to correct policy biases that favour automobile travel over more sustainable and affordable modes. Promoting a modal shift in urban transport from cars towards walking, cycling, public transport and other forms of shared mobility is vital for a low-carbon transport future. Moving to alternative vehicle fuels and electric vehicles (EVs) are equally important elements of change.

4.2. Trends in passenger and freight transport

Transport demand has been strongly correlated with economic activity. Accession to the European Union (EU) in 2004 fuelled Lithuania's economic growth until 2008, which drove transport demand for both passenger transport and freight activity. Since 2008, public transport and car use have been declining. Despite reductions in passenger-kilometres travelled, Lithuania saw a 26% increase in energy demand in the transport sector. This was associated with a rapid increase in road freight activity; ageing of the vehicle fleet and an increasing share of imported second-hand, highly polluting cars. Figure 4.1 illustrates these trends. Both passenger and freight transport activity declined in 2020 as a consequence of measures to contain the COVID-19 pandemic.

Figure 4.1. Passenger transport is slowly declining, while road freight activity is rapidly increasing



Note: Based on data expressed in passenger-kilometre and tonne-kilometre.
Source: OECD-ITF (2021), *Transport Statistics* (database).

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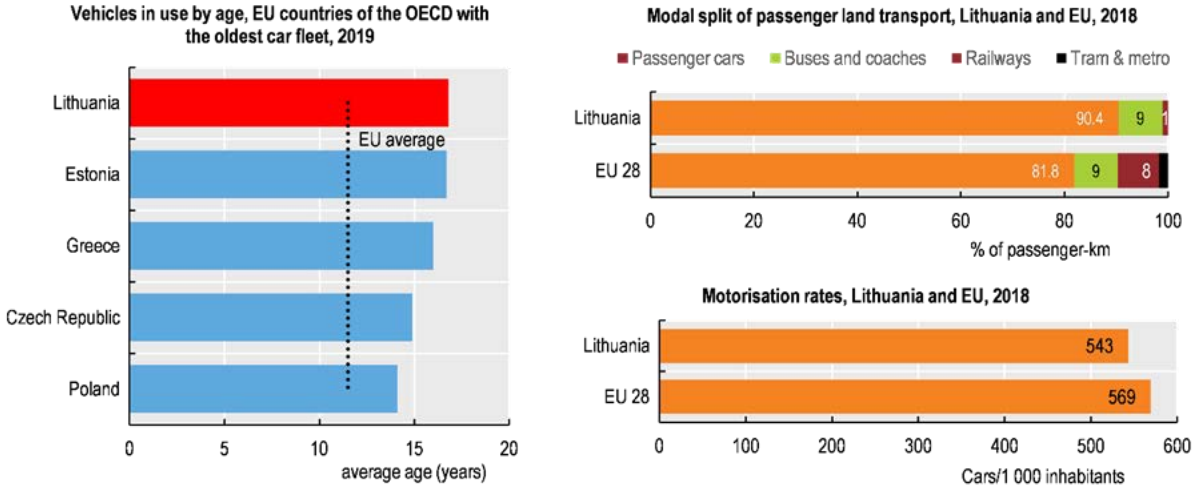
4.2.1. Trends in passenger transport

Private car is the dominant mode of transport in Lithuania. In 2018, cars accounted for 90% of all passenger transport movement. This category was followed by buses with a share of 8.5% (Figure 4.2). In urban areas, car use tends to be lower, although it remains the main mode of transport. In Vilnius, for instance, car use represents 48% of the modal split. Despite a well-established bus network, the modal share of public transport is 25%, which is low compared to other EU countries. Over the past decade, both passenger transport and passenger-kilometres were declining. The decrease of car use was largely due to strong population decline, falling demand for long-distance travel and development of local urban centres.

Figure 4.2. Cars dominate transport in one of the oldest vehicle fleets in the European Union



Source: Acea (2021), *Vehicles in Use Europe*; EC (2020) *Transport in Figures 2020*.

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With about 512 cars for every 1 000 inhabitants, Lithuania's motorisation rate is below the EU average (Figure 4.2). Between 1990 and 2018, motorisation grew close to fourfold from only 133 cars per 1 000 inhabitants. Starting in 2014, the number of new cars in the market has stabilised at around 1 200 new cars per year (Statistics Lithuania, 2021). However, the number of used cars in the overall vehicle fleet has been increasing. Over three recent years, second-hand vehicles accounted for 77% of the total vehicle fleet. Over 60% of cars are 10-20 years old; another almost 20% are over 20 years old (Government of Lithuania, 2020a). The increasing share of older cars has obvious environmental implications, as older cars tend to have poorer fuel economy and higher emissions.

In 2019, diesel cars accounted for 68% of registered cars, while petrol cars accounted for 23%. Hybrid, electric and plug-in hybrid electric cars accounted for less than 2% of the fleet in 2019 (Table 4.1). Lithuania's vehicle fleet is among the oldest in the European Union, with an average age of 15 years and average carbon dioxide (CO_2) emissions of 160-170 g/km. As in many other European countries, a growing share of diesel vehicles in the overall vehicle fleet has raised concerns over increasing urban air pollution. The number of petrol cars decreased and, as a result, petrol fuel consumption dropped between 1990 and 2019. Over the same period, the number of diesel engines increased significantly from 116 000 to more than 1 million (Government of Lithuania, 2020a).

Table 4.1. The share of diesel cars in the vehicle fleet is steadily increasing

	2015		2017		2019	
	Number (1 000)	Percentage	Number (1 000)	Percentage	Number (1 000)	Percentage
Petrol	321	25.8	319	23.5	346	23.0
Diesel	784	63.0	907	66.9	1 016	67.8
Electric	0	0.0	1	0.0	1	0.1
Plug-in hybrid petrol electric	4	0.3	9	0.6	21	1.4
Alternative energy	135	10.8	121	8.9	115	7.7
Other/unknown						
Total	1 244	100.0	1 357	100.0	1 499	100.0

Source: Eurostat (2021), *"Passenger cars, by type of motor energy", Transport Statistics* (database).

Lithuania's transport fuel taxes are among the lowest in the European Union. The growing share of diesel vehicles has largely been the result of tax rates for diesel being historically much lower than for petrol, thus not reflecting CO_2 and air pollutant emissions appropriately. Rectifying this distortion is part of the government's 2021 green tax reform proposal (Chapter 3). In July 2020, Lithuania introduced a motor vehicle registration tax that is based on vehicles' CO_2 emissions and fuel used, with different amounts levied on diesel-, petrol- and gas-powered vehicles. The new tax is a step towards renewal of the car fleet with more fuel-efficient or electric vehicles, which is projected to reduce CO_2 emissions and air pollution. However, the tax rates remain low compared to other EU countries (Chapter 3).

In 2018, passenger car use was approximately 30 billion passenger-kilometres. Over 2006-18, it oscillated between the high of more than 39.4 billion passenger-kilometres in 2006 and the low of nearly 24.3 billion passenger-kilometres in 2014 (Statistics Lithuania, 2021). The declining demand for long-distance travel and the development of local urban centres played a role in decreased car use in the country.

The use of public transport across the country declined from 6.4 million passenger-kilometres in 2000 to 4.1 million in 2011. It then increased to 5.5 million in 2018 before dropping again to 4.9 million in 2019. COVID-19 had adverse effects on public transport use: passenger numbers across all public transport modes fell from 827 000 to under 350 000 from the first to the second quarter of 2020 (Statistics Lithuania, 2021).

Buses and trolleybuses but also cycling, walking and different forms of micromobility have emerged as alternatives to the private car over the last decade. Yet, in terms of modal split, cities in Lithuania still have low use of active transport, particularly cycling. Vilnius, for instance, has the third largest proportion of walking as a mode of transport in the modal split with 24%. However, only 1.5% of residents cycle. This is largely due to the limited cycling network and generally low level of services such as the number and density of bike stands and number of bike-sharing operators. The length of cycle paths in the capital region grew from a low base of 140 km in 2015 to only 204 km in 2019 (Statistics Lithuania, 2021). This is small compared to other European cities, such as Paris, where cycle paths grew from 700 km to 1 000 km over 2015-20 (ITF, 2021).

4.2.2. Trends in freight transport

The volume of freight transport has been increasing rapidly every year since 2010, with road playing an increasingly important role. More than half of all goods are transported by road. However, the proportion of road transport in Lithuania is far below the EU average. Railways' share in freight is far above the EU average.

Between 2011 and 2014, the Russian Federation (hereafter "Russia") was the largest market for exporters of goods transported by road, accounting for 26-32% of the export value of transport services annually. However, the Russian economy experienced a downturn beginning in 2014. This led to a decline in the export value of goods transported by road to the country by as much as 71% between 2014 and 2016. Lithuanian road freight transport companies have rapidly and successfully reoriented the export flows of goods, achieving a 12.6% annual growth of export value already in 2016. These goods have flowed primarily to Western European markets.

The freight volume carried by rail increased from 14 million tonnes-kilometre in 2015 to 16 million in 2019. One main factor hindering further increase of rail freight is the lack of appropriate railway infrastructure on Lithuania's south-north axis. This problem is expected to be solved by the Rail Baltica project, which has the potential to offer an attractive rail connection.

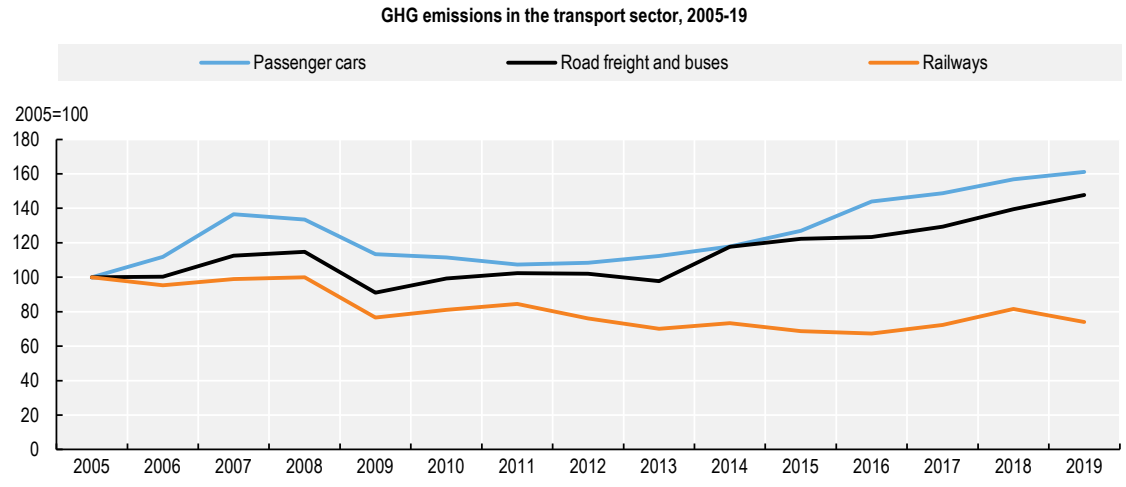
4.3. Environmental and social impacts of mobility

Increasing car ownership and use, along with growing road freight activity, give rise to negative environmental effects (GHG emissions, air pollution and noise), as well as increasing congestion and safety risks. Cars represented 58% of Lithuania's total transport energy consumption in 2018, followed by trucks (38%), which are high shares by international comparison. Emissions from transport have been increasing and are projected to rise steeply until the end of this decade. This is problematic as the country faces challenging decarbonisation targets for 2030 for sectors not included in the Emissions Trading System (ETS), transport in particular (Section 4.5).

4.3.1. Greenhouse gas emissions

Transport accounted for 30% of Lithuania's total direct GHG emissions (or 54% of total energy-related CO_2 emissions) in 2018, making this sector the largest emitter, followed by agriculture (21%). While emissions from agriculture remained relatively stable, the transport sector saw high growth (39%) during 2013-18. In 2018, road transport accounted for 96% of GHG emissions from passenger cars and heavy-duty vehicles and 28% of the total national GHG emissions. GHG emissions from both passenger cars and road freight transport are growing (Figure 4.3). Lithuania's railway system is mainly driven by diesel oil, which represents 3% of the total fuel consumption in the transport sector (Government of Lithuania, 2020a).

Figure 4.3. Greenhouse gas emissions in transport sector are steadily increasing



Note: Road freight includes light-duty trucks, heavy-duty trucks and buses.
Source: UNFCCC (2021), *GHG Data Interface* (database).

StatLink https://doi.org/10.1787/888934268490

Over 1990-2018, the transport sector's energy consumption significantly increased. In 1990, the transport sector accounted for 17.6% of the total GHG emissions caused by energy use, whereas in 2018 it surged to 51.3%. Transport emissions have been growing by approximately 3.6% annually. This growth is influenced by the rapid expansion of the road network and increase in the number of road vehicles. In 2018, GHG emissions from road transport increased by 6.4%. This is primarily due to a 7% increase in diesel consumption and 9% in gasoline consumption by road transport (Government of Lithuania, 2020a). International freight plays an important role in the recent surge in the sector's energy consumption. Given that fuel prices, particularly for diesel, are lower than in neighbouring countries, the scale of fuel tourism is high. Transiting freight trucks are filling up in Lithuania and thus adding some 20% to the country's diesel demand.

According to projections (Government of Lithuania, 2020b), under the "with existing measures" scenario, the total number of internal combustion engine (ICE) vehicles is projected to grow by 2.9% per year until 2023. After that, growth is expected to slow to 0.5% per year until 2030 as a result of implementation of sustainable urban mobility plans (SUMPs).

With Lithuania's population decline, the number of ICE vehicles is projected to further decrease by 0.5% per year between 2030 and 2040 (from 1.81 million to 1.71 million vehicles). However, even in this scenario, GHG emissions in all but one transport sub-sector would increase or remain stable. One exception will be the railway sector, where electrification is projected to reduce fossil fuel consumption by 30% by 2030 and by 47% by 2040 compared to 1990, leading to lower GHG emissions.

Road transport is projected to remain the only consumer of gasoline and diesel in the sector. According to forecasts, the gasoline consumption will increase by 38% while diesel consumption will decrease by 5% by 2040. As a result, road vehicles will account for 96% of GHG emissions in the transport sector in 2040. In 2023, GHG emissions from the transport sector are expected to be 10% higher than in 2017. They will then decline over 17 years, almost reaching the 2017 value in 2040 (Government of Lithuania, 2020b). The current increase is driven by the growing fossil fuel demand in road transport. The later decrease is expected due to the declining population and implementation of SUMPs in Lithuanian urban areas.

Railways will remain the second largest GHG emissions source in the transport sector. Civil aviation will be a minor contributor, even though its GHG emissions are projected to increase by 50%: only eight aircraft companies operate in the country, and most flights are international.

Under the "with additional measures" (WAM) scenario, GHG emissions from the transport sector would decrease by 37% in 2030, compared to 2017. The WAM scenario is based on additional measures planned by the ministries of Environment; Transport and Communications; Energy; and Agriculture. The planned policies and measures in the transport sector for 2020-30 would promote use of EVs, introduce vehicle pollution taxes and increase the efficiency of passenger and freight transport (Section 4.5). Measures related to vehicle pollution taxes (annual car pollution tax and differentiation of the vehicle registration fee by level of pollution) are projected to have the greatest impact on reducing GHG emissions.

All additional measures would continue in 2031-40. This would cause GHG emissions from the transport sector to decrease by 35% in 2040 compared to 2005 (by 52% compared to 1990). The effect of the planned additional measures would increase gradually and intensify after 2024 (Government of Lithuania, 2019). This would help the country reach the target 9% reduction by 2030 (compared to 2005 level) for non-ETS sectors that is defined based on the EU Effort Sharing Regulation. The European Commission estimates that without additional measures Lithuania may miss the target by 15 percentage points, provided there is no debit in the land use, land-use change and forestry (LULUCF) sectors (EC, 2020).

4.3.2. Air pollution

The transport sector is the principal source of two main local air pollutants – nitrogen oxides (NO_x) and fine particulate matter ($PM_{2.5}$). These contribute 71% and 23.5%, respectively, of the total national emissions according to the national emission inventory data for 2018. According to emission estimates, most transport NO_x emissions are generated by road travel. Heavy-duty vehicles emit the largest share, representing 78.5% of all road transport emissions in 2018.

Despite more transport fuel consumption, vehicle fleet modernisation resulted in a decrease of NO_x emissions over 2005-18. In 2018, NO_x emissions decreased slowly by 12% in the road transport sector compared to the 2005 level. In this context, achieving national pollution reduction targets in the transport sector remains one of the main air pollution challenges in Lithuania. With the projected further increase of fuel consumption in transport, modernisation of the fleet will not be enough to reduce NO_x emissions to reach the national targets.

Road transport is also the main source (91% in 2018) of the sector's $PM_{2.5}$ emissions. Total $PM_{2.5}$ emissions from transport decreased by 7% over 2005-18. As with NO_x emissions, the main factors affecting $PM_{2.5}$ emissions are fuel consumption and vehicle efficiency. The steady introduction of cleaner vehicles is projected to bring $PM_{2.5}$ emissions down in the coming years.

Five air quality monitoring sites in Vilnius, Kaunas, Klaipėda (two) and Šiauliai track the impact of traffic on air quality. According to monitoring data from these sites, road transport has a significant impact on pollution with particulate matter. Over 2005-19, the allowable daily limit value was exceeded at least once at each of these sites. Most such exceedances were registered in Vilnius (seven times) and Kaunas (six times). No cases of exceedance of ambient standards for NO_x were recorded in 2005-19. The highest NO_x concentrations are usually observed in Vilnius due to its intense traffic.

4.3.3. Noise

The biggest sources of noise pollution in Lithuanian cities are from traffic (road, rail and air) and large industrial activities. Following the 2006 EU Environmental Noise Directive, cities with population of over 100 000 have been obliged to produce noise maps. Local traffic, rather than motorways or rail services, is the main cause of noise pollution (EEA, 2019). In 2019, 61% of the population of Vilnius was exposed to

high noise levels – more than 55 decibels (A) – from road traffic. This share is even higher for urban areas of Šiauliai and Klaipėda: 78.8% and 76.9%, respectively (EEA, 2019).

4.3.4. Congestion

Vilnius has a traffic congestion level of 22% (TomTom, 2019). This means that, on average, a 30-minute trip will take 28% longer than during baseline uncongested conditions. Many social and environmental issues are to some extent related to traffic congestion, especially air quality and noise. Longer commutes have real economic costs. According to some estimates, the cost of time lost due to aggravated congestion in Vilnius equals EUR 480 million annually (Mačiulis, 2016). These costs, however, consider only the value of time lost due to congestion. Other non-financial implications include journey quality or travelling in more crowded public transport; increased fuel consumption and other vehicle operating costs; increases in vehicle emissions; or other intangible factors that make the area generally less desirable.

4.3.5. Traffic safety

Road fatalities in Lithuania are above the EU average (67 dead per million inhabitants in 2017). However, Lithuania is one of the EU countries with the strongest reduction in the number of road deaths in recent years. Since 2000, road deaths have decreased by 70%. In 2017, the mortality rate was 6.7 road deaths per 100 000 population and was approaching the EU average. A new road safety strategy in preparation will be based on a vision of zero killed and seriously injured in traffic.

Analysis by road user group shows that more than half of road deaths are vulnerable road users.[1] In 2017, car occupants accounted for the largest share of road deaths, with 51% of the total. They were followed by pedestrians (35%), motorised two wheelers (7%) and cyclists (7%). Compared to other EU countries, the share of pedestrians among road deaths is high. Since 2010, all road users have benefited from the improvement in road safety. The largest decrease was registered among cyclists (-43.5%), pedestrians (-37%) and motorcyclists (-33%). According to police data, inappropriate speed is the main cause of traffic crashes in Lithuania, especially on rural roads where a large majority of fatalities occur (57% in 2017) (ITF, 2018a).

4.4. Institutional arrangements and transport governance

The Ministry of Transport and Communications (MTC) is responsible for national transport policy. The MTC oversees all modes of transport (road passenger/freight transport, rail, sea, inland waterways and air), as well as safety and logistics. It implements Lithuania's targets on energy efficiency in transport, as set under the Law of Energy Efficiency. The MTC's Strategic Planning Division considers European transport policy, forms national strategy of transport and communications, and integrates main provisions from European documents into national ones. The Traffic Safety Division takes part in assuring safe traffic and defining the priorities in safety improvements.

The Transport and Road Research Institute analyses conditions of road infrastructure, studies traffic flows on Lithuanian roads, and prepares transport development programmes and normative documents for road and bridge maintenance. The Lithuanian Road Administration organises and co-ordinates the construction, maintenance and development of roads of national significance.

In addition, several policy divisions of the Ministry of Environment work on transport-related issues. The Territorial Planning, Urban Development and Architecture Department is responsible for sustainable urban planning. Horizontal co-ordination, however, remains limited. More collaboration, both internally and externally, is needed between the MTC and other ministries, agencies and stakeholders. This is especially important when it comes to decisions related to land-use planning and location of basic services.

Municipalities develop local strategic planning documents, and organise and manage the local transport network. The MTC provides guidance and support to develop local planning documents, particularly SUMPs (Section 4.5.2), by channelling EU funding and preparing the necessary guidelines and technical documents. Yet city administrations often have autonomy to decide how and when to implement different projects. This means that decision makers at the national level only provide guidelines and directives but ultimately cannot enforce them in municipalities. Lithuania is lacking clear mechanisms to monitor the performance of cities in meeting climate change mitigation objectives set in a variety of national strategic documents. This may be hindering the effectiveness of national policies and strategies for moving towards low-carbon transport system.

4.5. Targets and strategic policies for reducing environmental impacts from the transport sector

In the past decade, Lithuania has developed several strategic policy documents, laws and guidelines aimed at reducing the environmental impact from different sectors. Decarbonising the transport sector has been highlighted as critical for meeting national climate change mitigation objectives. Several policies, laws and guidelines highlight the importance of reducing transport-related GHG emissions, encouraging travel by non-motorised modes and improving fuel efficiency.

4.5.1. National strategies for mitigating climate and air quality impacts

Under the 2030 EU Climate Target Plan, the European Union's ambition is to reinforce effort-sharing targets to achieve at least a 55% GHG emission reduction below 1990 levels by 2030. To deliver on this new commitment, Lithuania's NCCMA for 2021-50 sets more ambitious national targets in all sectors. The new target for non-ETS sectors is to reduce GHG emissions by 25% by 2030, compared with 2005, superseding the previous 9% reduction target.

Lithuania aims to cut GHG emissions from transport, the most challenging sector, by 14% compared with 2005, which corresponds to a 42% decrease compared with 2019. The NECP for 2021-30 lays out sector-specific measures, including those for transport, that contribute to 2030 climate targets. However, it will be updated by 2023 to be fully aligned with goals and targets of the NCCMA.

The NCCMA defines several objectives that would support achieving the national emission targets for the transport sector:

- Achieve a 50% share of annual purchases of electric vehicles (EVs) and low-emission vehicles and reduce the number of cars powered by conventional fuels (petrol and diesel) in cities by 50% by 2030.
- Reduce the use of fossil fuels in passenger cars by 40% by 2030 compared to 2017.
- Reach a 15% share of renewable energy sources (RES) in the transport sector's energy consumption by 2030 and 90% (including 100% for rail) by 2050.
- Increase the use of second-generation biofuels to 3.5% of the sector's energy consumption.

The 2021 Law on Alternative Fuels presents a framework for achieving the 15% share of renewable energy by introducing various measures, such as vehicle taxes and low-emission zones (LEZs) in urban areas. It will put additional focus on use of advanced liquid and gaseous second-generation biofuels, electrification of the vehicle fleet and the rail system. However, even with these planned policies, transport emissions are projected to increase by 2030. If needed, Lithuania has an opportunity to compensate up to 6.5 million tonnes of CO_2 equivalent (t CO_2 eq.) of the needed reduction in all non-ETS sectors with credits from the LULUCF sector (EC, 2020).

The NO_x reduction targets for transport are set in the National Progress Plan for 2021-30. The plan includes fiscal and regulatory incentives targeting NO_x and $PM_{2.5}$ emissions: switching to less-polluting individual and public transport modes, including electrification of the railways. As some measures are needed at the local level, their success will depend on the willingness and capacity of municipalities. In addition, none of the measures target heavy-duty vehicles, which contribute the largest share of road transport's NO_x emissions (78.5% in 2018) (Government of Lithuania, 2020a). More consideration is needed to reduce air pollution impacts of road freight (EC, 2020).

Another initiative, the National Programme on the Development of Transport and Communications for 2014-22, is a medium-term strategic planning document for the transport sector. This programme is intended to support national policies by developing a sustainable transportation system and increasing the sector's competitiveness, while managing resources and EU funding effectively. The programme aims to increase the mobility of goods and passengers, and improve the corridors of the EU Trans-European Transport Networks and their connections with national and local transport networks. Additional objectives are to increase the energy efficiency of transport, reduce the adverse impact of transport on the environment and improve traffic safety. The programme also identifies key targets for the development of infrastructure for alternative energy sources in transport, including electricity and liquefied natural gas (LNG).

Ensuring consistency among all the strategies remains a challenge. For instance, the national transport programme foresees advancing construction and planning of new motorways. This risks locking in an emission-intensive development pathway and exacerbating car dependency, with consequences for the environment.

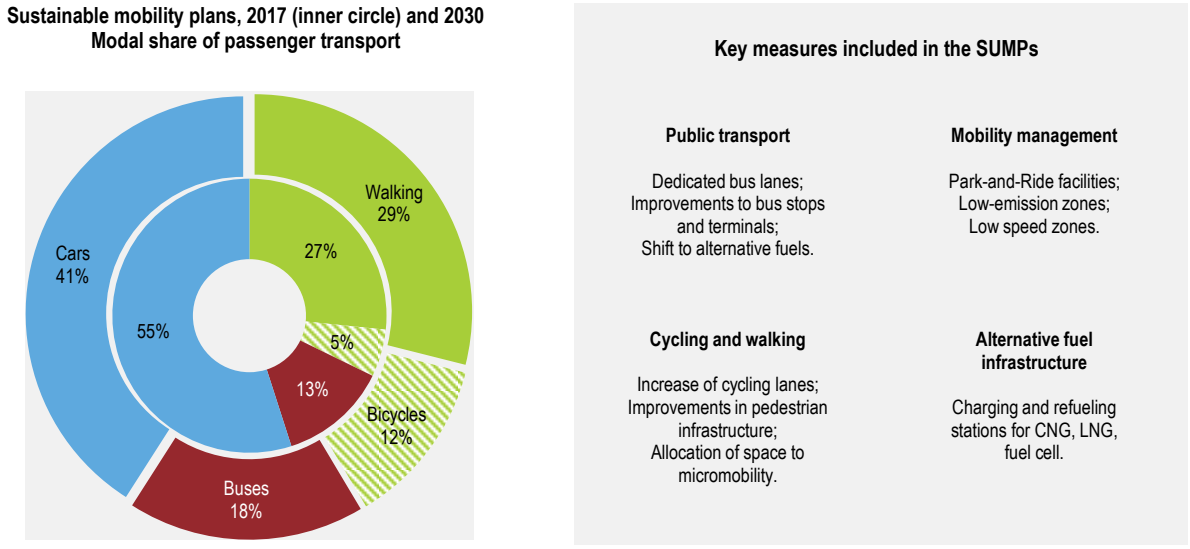
All aforementioned policy documents focus on a gradual shift towards cleaner fuels and electricity in the transport sector to achieve decarbonisation targets. Yet Lithuania is struggling to achieve existing targets. For instance, a commitment to achieve a 10% RES share in transport by 2020 has not been met (this share is around 5%). The focus on improving vehicle technologies may not deliver the degree of decarbonisation required to achieve the new 2030 target of cutting GHG emissions from transport by 14% compared with 2005. It is essential to transform the old car fleet into a newer and more efficient one. At the same time, a shift to less carbon- and space-intensive modes and less distance between people and places warrant additional incentives.

4.5.2. Sustainable urban mobility planning

Since 2015, cities and towns across Lithuania have developed their local strategic planning documents – SUMPs. The objective of SUMPs is to foster integration of all transport modes while encouraging a shift towards sustainable travel. The European Commission has emphasised the relevance of SUMPs in several policy documents and provides funding for the development of such plans. The MTC played an important role in supporting the development of SUMPs by channelling EU funding and preparing the necessary guidelines and technical documents. Although several ministries helped develop guidelines, it has been predominantly a transport-led process. There has been little reference to other important elements affecting sustainable mobility, such as land-use planning (Section 4.6.1).

The measures envisaged in SUMPs are projected to help achieve national GHG reduction targets by promoting use of sustainable transport (Figure 4.4). They identified improving public transport through dedicated bus lanes and shifting the fleet to alternative fuels as key to reducing environmental impacts from mobility. Municipalities also plan to invest more in improving conditions for cycling and walking. SUMPs include provisions for implementing LEZs in cities and lowering speed limits. Additionally, charging and refuelling stations for LNG and compressed natural gas (CNG) are planned to reduce the environmental impact of freight.

Figure 4.4. Implementation of SUMP measures would contribute to a shift to sustainable mode



Source: Country submission.

The adoption of SUMPs offers Lithuanian cities an opportunity to have a long-term vision for sustainable mobility actions. It also increases chances to access EU funds. In this context, the developed SUMPs focus on measures to be funded by EU investments and much less on measures that should be funded by national or local budgets. Additional support from the national government will be needed for implementation.

The MTC is developing funding programmes (using EU investments or other financial sources) to implement sustainable mobility measures. To monitor the efficiency of local SUMPs, the MTC is planning to develop a national monitoring and evaluation scheme. It will be also valuable to link national funds to the progress of urban areas towards reducing environmental impacts of mobility. Additionally, providing guidance for project evaluation and improving co-ordination between national investment and implementation of local actions will be useful for prioritising low-carbon mobility in urban areas.

4.6. Policy instruments for sustainable mobility

Lithuania has taken positive steps towards reducing environmental damage from mobility. To accelerate penetration of fuel-efficient vehicles, Lithuania has recently reviewed its taxation system and introduced a CO_2-based vehicle registration tax on motor vehicles (Chapter 3). To increase the pace of EV uptake, Lithuania has put in place additional financial support for purchasing low-carbon vehicles. With support of the European Union, the government is planning major infrastructure projects, such as Rail Baltica; increased capacity on rail services; and a phased transition of the public transport fleet to lower-emission fuels. Additionally, Lithuania is introducing new support schemes for biofuels, biomethane and hydrogen to reach a 15% share of RES in final energy consumption in transport by 2030. At the local level, municipalities have developed their SUMPs to encourage a shift towards sustainable travel and improve co-ordination between land use and transport planning.

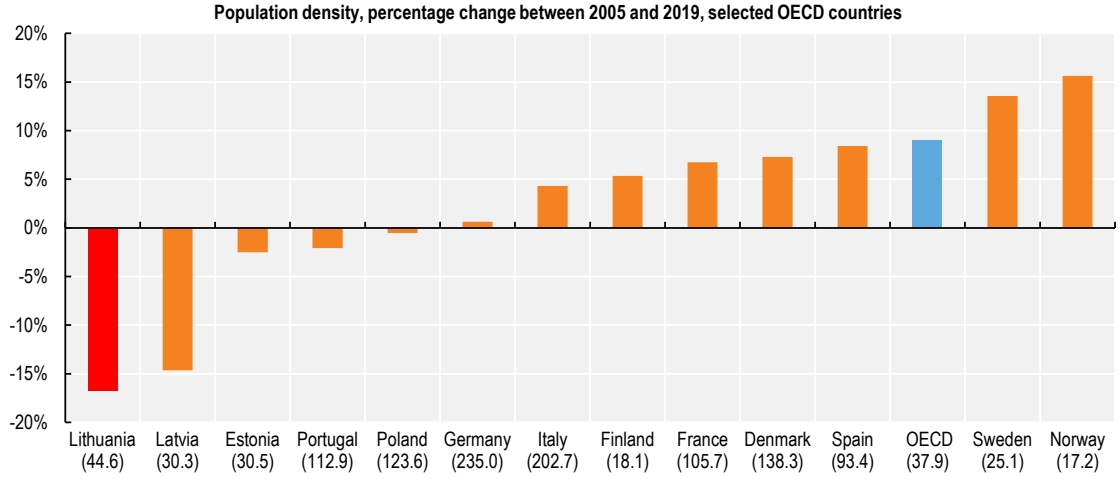
However, there have been many constraints in the implementation of sustainable transport policies at the national and local levels. These include the coupling of car use with economic growth and a general failure to curtail car use. Current Lithuanian urban and transport planning practices remain car-oriented, and the

mode share of private cars continues to grow. Policy reform is essential to reduce the negative externalities associated with suboptimal car use. The following sections discuss different policy options for advancing the sustainable mobility agenda in Lithuania.

4.6.1. Integration of land use and transport planning

Lithuania faces a number of pressing urban development challenges. Population density in urban areas has decreased over the past two decades (Figure 4.5). On the one hand, the lack of consistent urban planning policy and weak land-use regulations resulted in extensive sprawl of urban areas, with residential development mainly taking place on the outskirts of major cities. Vilnius, for instance, has one of the lowest population densities among large Lithuanian cities with 1 400 inhabitants/km^2. The city centre is far from compact, which lengthens travel times and creates a need for a network of wider streets, while reducing opportunities to get around on foot or by bicycle. Reducing low-density urban sprawl is a key focus of the new national comprehensive spatial plan.

Figure 4.5. Urban sprawl is increasing, pushing up costs of providing transport infrastructure



Note: Number in brackets indicate the population density (inhabitants per km^2) in 2019.
Source: OECD (2021), "Regional demography", *OECD Regional Statistics* (database).

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On the other hand, urban sprawl and low-density development have been shaped by transport policies that have traditionally focused on accommodating traffic growth by providing additional road capacity and facilitating travel by car. This approach has exacerbated car dependency and created a vicious circle of car-centred planning that encourages dispersed patterns of development, and vice versa. What's more, congestion and the excessive time and money spent by certain groups on travel can significantly reduce disposable incomes, amplify inequalities, and damage health and the environment (OECD, 2019).

In recent years, Lithuania has made progress in improving the country's urban and transport planning processes. The Law on Municipal Infrastructure Development, which entered into force on 1 January 2021, establishes a development fee for municipal infrastructure imposed on beneficiaries of new developments. Previously, there were no rules or financial incentives that required developers within or outside urban areas to provide public transport links. Municipalities had to assume all infrastructure costs, while resulting tax revenues accrued mainly to the central government. Under the new law, municipalities are obliged to

make their infrastructure plans by 2023 and identify priority and non-priority areas that will encourage construction. Until then, the entire territory of the municipality will be considered non-priority. Private developers will have to contribute financially to necessary improvements in transport infrastructure.

The Comprehensive Plan for the Territory of Lithuania (2018) foresees the establishment of additional financial instruments that encourage local planners to increase population density in built-up areas. Additional compactness criteria are laid out in the Spatial Planning Standards approved by an order of the Minister of Environment. The recommended maximum distance from the dense built-up area of a large city to the newly formed residential area is 15 km; the minimum is 3 km. The recommended population density of residential districts is being formulated.

At the same time, since SUMPs must consider general master plans, they have been a step towards better co-ordination between urban and transport planning. However, in the vast majority of cities, land-use and transport planning remain the responsibility of separate authorities with limited or no co-ordination between them. This means that transport and spatial plans still function separately. As a result, many development projects continue being car-centric. They are frequently located on the periphery, far from transport links or with poor access to services, thereby exacerbating car use and associated environmental impacts.

Spatial planning should be based on an integrated approach to sustainable urban and transport policy. Co-ordination of urban transport and land use would help reduce infrastructure costs, limit urban sprawl and improve environmental performance. Both transport and land use should aim towards “the ease of people’s access to goods, services and activities” (Litman, 2020). Improving access through better linkages between the transport system and urban development has potential to avoid unnecessary movements by private vehicles and shift private trips to more sustainable transport modes.

To foster compact development, land-use planning should, first, aim at urban densification. Second, it should prioritise locations with good public transport networks when locating new residential and/or office developments (OECD, 2018). This will improve the efficiency of public transport and help reduce car dependency. All new development should promote compact settlement and have easy access to transport links, as well as safe walking and cycling routes. Accessibility indicators could help identify locations suitable for new developments. One of the best-known examples is the Public Transport Accessibility Level (PTAL) Indicator used by Transport for London. PTAL ratings reflect the proximity of a location to a public transport stop. PTAL is used across London to provide clear guidance on appropriate ranges of density for future development: areas with better public transport access are encouraged to be developed at a higher density level (ITF, 2019).

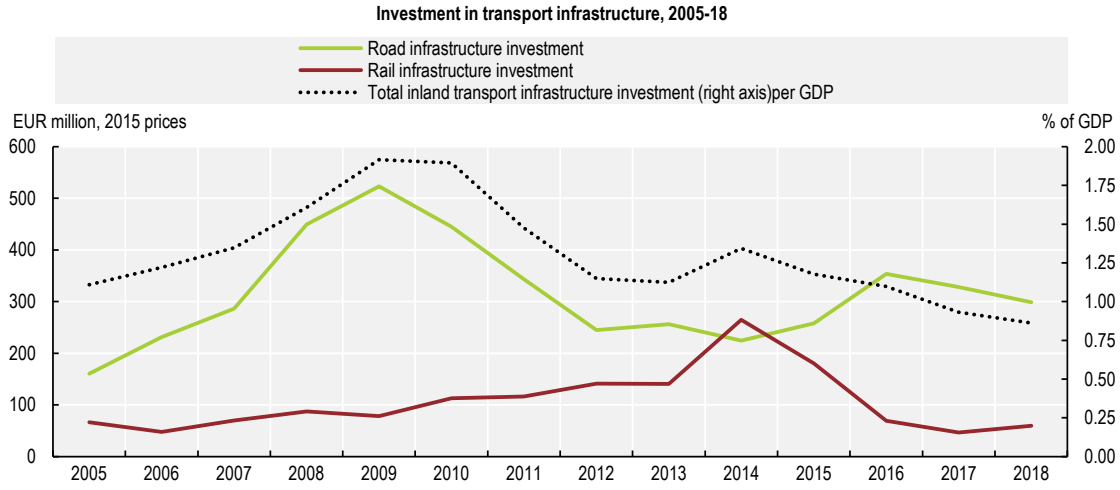
4.6.2. Investment in sustainable mobility

Over the past decade, national investment in transport infrastructure – both for rail and roads – declined from a peak of 2% of gross domestic product to less than 1% (Figure 4.6). During that period, the government allocated annually about EUR 150 million to cities and EUR 350 million for road development and maintenance. Lithuania relies on support from the EU Structural Funds and Cohesion Fund for investment in transport infrastructure. Investment is focused on international projects such as Rail Baltica and Via Baltica, with the aim to improve links between the Baltic states and central, western and northern Europe. The 2021-26 New Generation Lithuania recovery plan includes support for shifting to a low-carbon transport system. The main priorities of the plan are a gradual shift away from polluting urban and regional public transport and development of alternative fuelling and charging infrastructure. The plan’s implementation by 2026 will require an estimated EUR 320 million in investment.

The amount of EU funds allocated to rail and road infrastructure projects is of a similar magnitude. Investment in the railway sector, coming both from the state budget and the operational income of Lithuanian Railways, is expected to increase significantly in 2021-23. The main priorities for investment are modernisation of railway infrastructure to reduce travel times, improved safety and increased capacity

for freight operations. To date, however, the state budget funding allocated to road infrastructure projects has been dominant. Lithuania still has a very high percentage of gravel roads: 27% of state roads and 62% of local roads. Thus, much of this investment is directed at upgrading gravel roads, especially in the countryside where poor road infrastructure has a negative impact on road safety and limits possibilities for residents to choose other (non-cars) environmentally friendly vehicles.

Figure 4.6. Roads receive the largest share of national land transport investments



Source: ITF (2021), *ITF Transport Statistics* (database).

StatLink https://doi.org/10.1787/888934268528

To avoid "locking in" an emission-intensive development pathway and exacerbating car dependency, Lithuania needs to avoid scaling up investment in new road transport infrastructure. Instead, it needs to ensure that investment in public transport and sustainable modes remains a priority. Evidence suggests that accommodating traffic growth through building additional roads leads to increased traffic volumes, aggravating congestion, pollution and GHG emissions (ITF, 2016; WSP, 2018). Conversely, investments in more sustainable transport solutions can deliver environmental, social and economic benefits beyond GHG reductions. This means limiting road investment to necessary construction and maintenance based on cost-benefit analysis, while prioritising public transport to achieve inter-regional connectivity. Given that passenger levels in public transport are increasing, the rail and bus network should be viewed as valuable national assets. A high-quality bus network and innovative solutions such as a stronger reliance on ride-sharing in sparsely populated areas could help increase accessibility and reduce private car use responsible for congestion and declining environmental quality.

Improving sustainable infrastructure in urban areas is also an essential ingredient of curbing carbon emissions from transport. To date, municipalities are responsible for investment in urban public transport and infrastructure for non-motorised modes. However, municipalities have few own tax revenues and rely heavily on transfers from the central government to cover spending responsibilities in sustainable transport, which are often limited. EU Structural Funds are also used to support development and implementation of SUMPs. Between 2014 and 2020, EUR 1.1 million was allocated for the preparation of sustainable mobility plans and EUR 18.8 million was allocated for implementation of sustainable mobility measures identified in the plans. Even with the financial backing from EU Structural Funds, implementation of actions identified

in SUMPs remains problematic. To advance necessary improvements in climate impact and air quality, it is highly recommended to channel available national funding towards transport projects that promote low-carbon modes, such as walking and cycling. Additionally, municipalities should consider earmarking revenues from parking fees towards improvement in cycling and walking conditions, which could be an important source of local funding.

4.6.3. Promoting renewable energy in transport

In transport, Lithuania uses two main support schemes for biofuels: blending mandates (with quotas) for biodiesel and bioethanol, and exemptions from excise and environmental pollution tax. The new Law on Alternative Fuels has provisions for support of biofuels, biomethane and hydrogen. The law sets a deadline of 2030 to reach a 15% share of RES in transport's final energy consumption. The 2020 target of 10% in RES was missed by approximately five percentage points (Szuppinger and Menadue, 2020). The aim is to develop a market for advanced biofuels, electrify the railways and prepare infrastructure for the electrification of light vehicles. Lithuania is developing the concept of biomethane use in the transport sector and its implementing measures. It pays particular attention to the transformation of the freight transport sector (Section 4.6.8). The government plans to expand the network of natural gas filling points and promote the purchase of vehicles powered by biomethane and green hydrogen. These alternative fuels are expected to account for at least 5% of final energy consumption in the transport sector.

At the same time, Lithuania plans to increase the biofuel blending obligation for fuel suppliers to 16.8% in 2030, with a sub-target of 3.5% for advanced biofuel, through a certificate system for renewable transport fuels. According to the Law on Alternative Fuels, all public transport and passenger vehicles purchased through public procurement should run on alternative fuels by 2030. Municipalities will be required to create LEZs in the main cities (Section 4.6.1). This should encourage a switch to clean vehicles, biking and walking, thus improving air quality.

The government plans to establish a Sustainable Mobility Fund under the law to finance implementation of the alternative fuels policy. The fund will need to raise significant revenues. Apart from EU funding, the government will need to examine options for raising fuel, excise and road usage taxes, and phasing out exemptions to these taxes.

4.6.4. Strategy to promote electric vehicles

Increasing uptake of EVs is one of the pillars of Lithuania's strategy to curb GHG emissions from transport and meet the 2030 emissions reduction target for the non-ETS sectors. Lithuania has set ambitious targets, aiming to reach more than 46 000 EVs in circulation already by 2025, followed by a fivefold increase by 2030.

To date, Lithuania is lagging behind in terms of percentage of the total stock of EVs when compared to top performing countries such as Norway. In 2019, only 3 000 EVs were registered in Lithuania. This represents less than 2% of the total fleet (Government of Lithuania, 2019). In recent years, however, the number of EVs has been increasing: around 2 000 new EVs registered in 2018, up 119% over 2017. Lithuania plans for EVs to account for 10% of passenger cars (registered and reregistered) in 2025 and 20% in 2030.

Until 2020, Lithuania had few non-fiscal incentives for choosing an EV. These were access to dedicated public transport lanes in Vilnius, reduction of parking fees and exemption from the entry toll in the town of Neringa municipality. In 2020, the Climate Change Programme introduced additional incentives for purchasing low-emission vehicles (Table 4.2). In the long term, decisions on granting subsidies and setting incentives for EVs should be aligned with the overall strategy for the sector and potential impacts carefully assessed. For instance, allowing EVs to use bus-reserved lanes in Norway increased congestion for buses (Lindberg and Fridstrøm, 2015). Thus, while promoting a shift towards an electric fleet, the Norwegian

policy impeded higher use of public transport. As the number of EVs increases, it will be important for Lithuania to review access to dedicated bus lanes.

Similarly, free public parking for EVs can be effective in accelerating the electrification of the private fleet. However, the opportunity costs of urban road space are high. Less space-intensive modes should be a priority. Promotion of EVs boosts car ownership and use, with an associated increase of congestion. Moreover, non-exhaust particulate emissions from tyre wear, brake wear, road surface wear and resuspension of road dust are high with EVs.

Table 4.2. Lithuania is increasing support for the purchase and use of electric vehicles

Previous incentives	
Non-fiscal incentives	**Access to dedicated public transport lanes**
Electric vehicle toll and parking incentive	Reduction of parking and entry fee in Lithuanian cities. The toll for entering the territory of Neringa municipality applies to all vehicles except all classes of electric vehicles powered only by electricity.
Incentives that came into force in 2020	
Purchase grant	A purchase allowance for electric vehicles: EUR 5 000 for a new vehicle and EUR 2 500 for second-hand EVs up to five years old.
Scrappage compensation	Compensation of EUR 1 000 is paid when an old vehicle is scrapped.
Low motor tax	EVs qualify for the lowest motor tax band available.
Fuel excise/carbon tax	No excise duty is applied to electricity consumption, whereas this duty represents a significant share of diesel and petrol prices.
Public charging points	Charging of EVs near national roads is free for five years from the date of installation; ongoing expansion of fast charging points. Additionally, there is an obligation to install at least one charging access for electric vehicles in new or renovated buildings.
Planned incentives for 2021	
Support for the purchase of company cars	In 2021, the government plans to introduce an incentive for legal entities to purchase an electric vehicle.

Availability of vehicles and charging infrastructure, limited choice of models, range anxiety and low levels of consumer awareness have all considerably slowed down the uptake of EVs. These trends, however, have been changing. For instance, the choice of models has grown significantly.[2] This has likely played a role in the recent growth in uptake levels in Lithuania and in Europe in general (IEA, 2020).

Lithuania does not yet have a dense enough network of publicly accessible recharging points: the spatial distribution of recharging points does not cover the needs of vehicles in terms of distance requirements. To address this, it is developing EV charging infrastructure on the main trans-European road network, approximately every 50 km on national highways. The biggest problem remains the installation of EV charging infrastructure in residential areas of major cities and near commercially unattractive places on state roads. Therefore, the government is considering subsidies for the purchase/installation of EV charging equipment in such locations.

About 130 electric vehicle charging stations operate in the capital (more than half of which were established through private sector initiatives). In 2020, given the growing number of EVs and the need for charging access, Vilnius installed another 59 public EV charging stations in accordance with the installation site plan approved by the City Council. The Law on Alternative Fuels gives municipalities until 2022 to prepare plans to develop EV charging infrastructure by 2030. Many local governments have already done so in their SUMPs. By the summer of 2021, another 100 new EV charging stations are planned in Lithuanian municipalities.

Another reason for lower uptake, compared to other countries, is related to the taxation regime. Until July 2020, Lithuania was one of few countries in the European Union that did not levy a registration or an ownership tax for non-commercial vehicles. The introduction of a motor registration tax will, to a limited extent, bridge the price difference between ICE vehicles and EVs. However, taxation levels on the sale of

new ICE vehicles remain below that applied in leading countries in terms of EV penetration (Chapter 3). Evidence suggests that EV take-up is higher in countries such as the Netherlands and Norway where taxation for high-emission cars is significantly higher than for low-emission cars. Tax differences are not as substantial in countries with lower EV take-ups, such as Germany and the United Kingdom. Norway has been successful at increasing the stock of EVs largely due to its policy of equalising the difference in purchase price (or lifecycle cost) between battery EVs and ICE vehicles (Lindberg and Fridstrøm, 2015; IEA, 2020).

To advance the uptake of EVs, the most successful countries, such as Norway and the Netherlands, have used LEZs and congestion charging to complement subsidies. This is done in tandem with efficient taxation regime for ICE vehicles. In Lithuania, there is substantial potential to manage travel demand via fiscal and non-fiscal instruments (i.e. integration of land use and transport planning), while encouraging a shift towards low-carbon modes.

Lithuania plans to continue financial support for purchase of EVs, with additional support for the purchase and installation of EV charging stations (with a focus on unattractive locations near national roads and in cities). However, the cost to the state of maintaining the level of EV support could grow significantly. Reduced fuel excise receipts could drain the state's finances in the medium term. Higher taxes for polluting vehicles and lower taxes for clean vehicles (i.e. a bonus-malus system) can help reduce the need to subsidise EVs.

In the long term, the potential of electrification may lead to a fall in revenues from fuel excise and vehicle taxes. Consequently, Lithuania should consider a comprehensive transport tax reform to protect revenues. This means finding the right mix of taxing distances driven, vehicles and fuels (Chapter 3). In particular, shifting to a country-wide electronic or a global positioning system of charging distances by the kilometre can be a promising long-term strategy to collect stable revenues (van Dender, 2019).

For many suburban and rural households, the car remains the only means to access opportunities. Therefore, Lithuania should consider the potential social costs of an EV promotion strategy. The benefits of EV financial support are regressive in nature as they tend to benefit the wealthier in society. To ensure equitable transition to low-emission vehicles, special rebates for low-income, car-dependent households could be considered as part of the strategy.

4.6.5. Low-emission zones to reduce air pollution from urban transport

The 2021 Law on Alternative Fuels requires municipal councils to establish LEZs in urban areas by 2023. This should be done with appropriate consideration of SUMPs and data on state environmental air monitoring and/or municipal environmental air monitoring. As a result, some ICE vehicles will likely be dropped from the fleet and/or replaced with zero-emission vehicles. This is a welcome development.

LEZs are usually established to reduce the use of older, more polluting vehicles within problematic areas, which has been one of the most pressing issues across Lithuania. LEZs also have potential to accelerate the uptake of EVs. More than 250 cities in the European Union restrict access for the most polluting passenger cars (Transport & Environment, 2019). In some cities, LEZs focus only on restricting access for heavy-duty and delivery vehicles. Other cities also include restrictions for passenger cars and motorcycles (e.g. Berlin and Milan).

LEZs can play an important role in vehicle retrofit, emission reduction and air quality improvement, yet they do not affect the distances people travel and/or the number of trips in the long term. If congestion becomes a major concern, road pricing should be considered as the most effective way to relieve traffic pressure. Experience in Milan shows that an ECOPASS pollution charge for the city's central area initially reduced traffic levels. However, the long-term effects were less beneficial in tackling congestion. As more vehicles complied with standards and were able to gain free entrance, traffic reductions gradually declined. Consequently, authorities made a transition towards a scheme that includes both banning most polluting vehicles from the inner ring and a congestion charge (ITF, 2017).

Similarly, in London, a LEZ and a congestion charge aim to incentivise a shift towards low-emission vehicles and relieve traffic pressure (Box 4.1). The city's LEZ policy has played an important role in vehicle retrofit, emissions reduction and air quality improvement. According to some estimates, five years of the London LEZ led to an additional 20% drop in pre-Euro 3 rigid vehicles3 (Ellison, Greaves and Hensher, 2014). Following implementation of the Ultra-Low-Emission Zone (ULEZ), roadside NO_2 has dropped 44% in central London, with 44 100 fewer polluting cars in the zone daily (GLA, 2020).

Box 4.1. Gradual introduction of low-emission zones increased effectiveness and public acceptability of implementation in London

The London Low-Emission Zone (LEZ) is an area that covers most of Greater London (4 071 km^2). It encourages most polluting heavy diesel vehicles driving in London to become cleaner. The LEZ is in operation 24 hours a day. It is monitored with cameras that read plate numbers to automatically identify whether vehicles meet the LEZ emission standards, are exempt, are registered for a discount or must pay the daily charge.

The LEZ was implemented in three phases that were announced in advance. The LEZ was established with the objective of making freight vehicles cleaner. Since 2008 the standards have become stricter with each stage, changing from the initial Euro 3 to Euro 5.

Steps in the implementation of the London LEZ:

Date	Type of vehicle	Vehicles that must pay a charge to enter
2008	Heavy vehicles	Euro 3 or lower for PM_{10} and vehicles registered as new before 2000. The daily charge is GBP 200.
2012	Heavy vehicles and buses	Euro 4 or lower and vehicles registered as new before 2005.
	Delivery vans	Euro 3 or lower for PM_{10} and vehicles registered as new before 2001. The daily charge is GBP 100.
2015	Transport for London double-decker buses	Euro 4 or lower and vehicles registered as new before 2005.
2021	All large commercial vehicles and buses	Euro 6 or lower. The daily charge is GBP 100 per day. Commercial vehicles that do not meet the older standards (Euro 4) are charged GBP 300 per day.

In 2013, the mayor proposed an **Ultra-Low-Emission Zone (ULEZ)** in addition to the LEZ. In 2017, as a transition stage for ULEZ, an emission surcharge on top of the GBP 11.50 congestion charge was put in place. A toxicity "T-Charge" of GBP 10 was levied on most polluting diesel and petrol vehicles registered before 2006. In 2019, the ULEZ replaced "T-Charge" in central London. ULEZ applies 24 hours a day, 365 days a year. It sets much tighter standards for entrance into Central London with charges of GBP 12.50 a day and covers all vehicle types. ULEZ applies to:

- motorbikes that do not meet Euro 3 standards (most vehicles pre-2007)
- petrol cars and vans that do not meet Euro 4 standards (most vehicles pre-2006)
- diesel cars and vans that do not meet Euro 6 standards (most vehicles pre-2015)
- buses, coaches and lorries must meet or exceed the Euro VI standard or pay GBP 100 a day.

Source: ITF (2017), Strategies *for Mitigating Air Pollution in Mexico City: International Best Practice*, International Transport Forum, Paris, www.itf-oecd.org/strategies-mitigating-air-pollution-mexico-city; GLA (2018), *Mayor's Transport Strategy*, Greater London Authority, www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf.

The design of LEZs is critical for their effectiveness. First, the size of the LEZ determines which residents will be directly impacted and what share of the vehicle fleet will be concerned (Transport & Environment, 2019). A large proportion of LEZs use the Euro standards that classify vehicles depending on their environmental performance as a basic criterion for granting access to the LEZ or determining the size of

the fee. Second, in congested situations, low velocity and high vehicle dynamic range (frequent acceleration and braking) may double the emissions.

Increasing public acceptability

Introducing LEZs is often politically challenging. Cities seeking to implement them are likely to encounter opposition. The need for LEZs should be framed around environmental concerns and health benefits from better air quality, while ensuring that residents see tangible benefits of the scheme.

Experience from around the world shows that LEZ policies should be introduced incrementally and gradually made stricter, rather than through a "big-bang" approach (Transport & Environment, 2019). This tends to lead to greater acceptance by the public and local businesses. Over time, cities tend to increase the area covered by the zone, the vehicle standards, the levels of charging and the area(s) from which polluting vehicles (or all vehicles) are banned.

Experience in cities shows that good alternatives to car use in urban areas are needed for a LEZ to be effective. Given that in urban areas a majority of trips are below 10 km, there is considerable potential to promote walking, cycling, new forms of micromobility (e.g. e-scooters) and public transport. This, in turn, will help reduce pollution, congestion, noise and accidents. Thus, LEZs should complement policies promoting a switch to clean alternatives, such as walking and cycling. They should also complement electrification of all modes, including public transport, taxis, shared and private vehicles, and delivery vans.

Potential distributional impacts should be carefully assessed before implementation. Promoting a shift to public transport, walking and cycling should always be the first option. However, some households depend on cars to reach jobs (e.g. shift workers) and cannot afford to purchase a clean vehicle. Thus, exemptions and financial support schemes should be targeted at low-income and car-dependent households that absolutely need to use their vehicles in cities. The LEZ in Greater Paris, for example, provides such additional support to lower-income households and people with disabilities (Transport & Environment, 2019). Exemptions, however, should be carefully monitored and follow a strict timeline. Otherwise, there is a risk of having too many exemptions and spending public budgets on subsidising unjustified car use.

4.6.6. Parking policy

Lithuanian cities need to address both availability and pricing of parking. Policies encouraging oversupply of free parking often result in environmental problems and welfare losses (Russo, Ommeren and Dimitropoulos, 2019). In urban areas across Lithuania not all car users have to pay for parking at their origin and destination. This is either because they can park for free on the road or because their employer or shop offers them free parking off-street.

Abolishing minimum parking requirements

All cities in Lithuania require developers to provide minimum numbers of parking spaces in new developments. Regulations that set minimum requirements for the provision of parking both encourage an oversupply of parking and bundle the cost of unnecessary new parking with new housing. Minimum parking space regulations can also lead to excessive land use (Brueckner and Franco, 2017) and drive up the cost of housing since they add costs for developers (Litman, 2016), all while incentivising car use.

Eliminating minimum rate requirements is critically important. This approach is required at both the origin (place of residence) and destination (work, shops, etc.). Reducing parking requirements decreases vehicle ownership and use, and allows more compact development. This, in turn, reduces traffic problems and sprawl-related costs (ITF, 2021). Evidence suggests that maximum requirements could be particularly useful in downtown areas or in areas where on-street parking is scarce and expensive.

Ensuring that regulations and building codes require developers to provide an electrical charging point can help facilitate the uptake of EVs. Provision of EV charging points is already mandated by the 2018 EU Energy Performance of Buildings Directive.[4] The directive requires that developers install appropriate pre-wiring for a charging point in each parking space in all new and thoroughly renovated residential buildings with more than ten parking spaces. In Lithuania, building codes provide for the developer to create at least one charging access for EVs in residential and non-residential buildings with more than ten parking spaces. This may not be sufficient. The spatial development strategy for Greater London, for example, stipulates that all developments must ensure that one in five spaces provide an electrical charging point (London Plan, 2016).

Parking pricing

The cost of parking in urban areas can determine whether residents choose to drive to a particular destination. Municipalities in Lithuania can set different prices for on-street public parking in various segments of the urban area. Some Lithuanian cities (notably Vilnius and Klaipėda) apply reasonably high parking charges. Yet the areas where parking pricing applies are often limited to city centres. Revenues from on-street parking accrue directly to the general budget, with no earmarking towards transport or urban realm improvements. In many other cities worldwide, in contrast, revenue from increased parking prices is directed towards improving the attractiveness of other transport modes.

Under-pricing of parking results in inefficient use of space and excessive parking demand. Car users tend to spend more time cruising, which often results in more congestion in urban areas (Shoup, 2005a). In this context, expanding the area of priced parking and increasing parking fees is warranted. Ideally, parking tariffs should vary according to the availability of public transport, with higher prices and shorter maximum stays in well-served areas. Revenues should (at least partly) be used to improve and promote alternatives. In this way, linkage can be expected to increase public support for the policy reforms and contribute to modal shift.

Given fluctuations in demand, a dynamic parking pricing system could be the most efficient, where tariffs vary over space and time, using information on occupancy in surrounding areas. Efficient parking tariffs prevent capacity saturation and cruising, while ensuring high occupancy rates. Several cities, including San Francisco, Seattle and Washington, DC, have initiated pilot projects that adjust curb-side parking prices to occupation in real time and by location. SFPark in San Francisco is a pioneering example of such a pricing scheme, which helped reduce distance travelled by car (Pierce and Shoup, 2013; SFMTA, 2014).

Lithuanian cities should avoid discounts for long-term parking. To be considered effective, daily rates should be at least 6 times higher than hourly rates, and monthly rates at least 20 times higher than daily rates (TDM Encyclopaedia, 2019). Lithuania should also consider compensating vulnerable and car-dependent groups through targeted complementary measures.

Removing employer-paid parking subsidy

Free or cheap parking at a workplace also needs to be addressed because free parking from employers is an implicit incentive for commuting by car (Franco, 2020). In one estimate, the supply of free parking to employees implies a subsidy equal to around 30% of the private costs of a car trip (Russo, van Ommeren and Dimitropoulos, 2019).

In Lithuania, the impact of workplace parking on car use depends on whether an employer assigns parking space to a specific employee or opens it for use by all employees. In the former case, such benefits are treated as taxable employment income. Otherwise, the benefits are not taxable (Chapter 3). In these cases, Lithuania should eliminate such exemptions of employer-paid parking from employees' taxable income. Furthermore, it should apply the benefit in-kind tax to the provision of all spaces, regardless of whether they are used by a specific employee.

There are several ways to address workplace parking and thereby discourage commuting by car. Municipalities could increase parking charges and reduce the number of parking spaces, while reserving some for car sharers. Employers could also offer employees a cash-value in lieu of a parking space, known as a "parking cash-out". Parking cash-outs are common in California, where law requires many employers to offer commuters cash in lieu of any parking subsidy. They have proven effective in reducing the number of employees who drive solo to work, as well as of increasing the number of car poolers and of those who walk or bike to work. In this way, they contribute to reducing vehicle-kilometre travelled for commuting and related CO_2 emissions (Shoup, 2005b; Franco, 2020).

To minimise adverse tax impacts, employers can offer tax-exempt public transport passes or vanpool benefits. Governments should also make emerging transport services with potential to reduce environmental impacts and congestion – such as bike sharing – eligible for commuter benefits.

4.6.7. Reallocation of road and parking space to promote use of alternative modes

Lithuanian cities through their SUMPs are committed to road space reallocation measures, including proposals for bus, cycling and walking priority systems and car traffic restrictions in urban streets. Micromobility (e-scooters, electric bikes and pedal bikes, whether docked or dockless) presents an additional opportunity. It has the potential to address congestion, emissions and air quality, while better connecting people to public transport.

The main responsibility for achieving higher shares for sustainable modes lies with municipalities. In particular, provision of cycling infrastructure and improvements to the urban realm falls under the responsibility of local governments. However, cities often have limited budgets. There is also a mismatch between developed strategies, in particular SUMPs, and following through with implementation. Similar observations can be made in relation to policies favouring pedestrians.

Redistributing road space to non-car modes can represent a technically challenging and politically sensitive option. Public concerns tend to focus on predictions of traffic chaos and adverse economic impacts. Yet a growing body of evidence suggests that well-planned measures aiming at reducing road space for private cars do not necessarily result in additional traffic. On the contrary, there is increasing understanding of "disappearing traffic" as a result of road space reallocation and reductions in road capacity (Cairns et al., 2002; Tennøy and Hagen, 2020). Reallocation schemes offer an opportunity to improve public space and liveability by improving conditions for pedestrians, cyclists or public transport users. This generally benefits the retail sector, as well-planned improvements to public spaces can increase footfall and retail sales (ITF, 2021).

Examples from European cities confirm the theoretical findings. In Oslo, for instance, a reduction in capacity on three main roadways since 2016 did not result in either severe delays or congestion. Car use on commutes fell from 21% to 16%, but the quality of commuters' experience (for all modes) remained high (Tennøy and Hagen, 2020). The city of Copenhagen reported that the total number of people travelling across a main thoroughfare bridge increased following two measures. First, space for private motor vehicles was reduced. Second, space designated for walking, cycling and public transport on the bridge was increased (City of Copenhagen, 2017). The example of Paris shows that a continuous effort to reallocate road space backed by investment could result in a significant mode shift and overall improved liveability (ITF, 2021).

Re-prioritisation of road space requires significant investment, timetabled targets and a strong monitoring regime. It also needs a robust institutional structure to support it and oversee implementation. All projects should have specific annual targets attached to detailed monitoring and enforcement programmes to ensure their achievement. In this context, government support will be essential in improving conditions for non-motorised modes. Indeed, the NCCMA calls for constructing at least 600 km of dedicated bike lanes by 2030.

4.6.8. Tackling environmental impacts of road freight

The logistics sector plays a vital role in achieving the targets set out in the National Energy and Climate Action Plan. Heavy-duty vehicles accounted for 27% of the total transport energy consumption in 2018. GHG emissions from road freight have been rapidly increasing, and carbon contributions from this transport sub-sector are too large to ignore.

Lithuania aims to replace the time-based road use charge (Eurovignette) for the use of main roads with an e-tolling distance-based system by 2023 (Chapter 3). This would be an opportunity to substantially increase revenues from road use charges and reduce losses due to cross-border fuel tourism. The e-tolling system is projected to collect an additional EUR 50-70 million, with the funds used to develop and maintain state roads.

Lithuania is also planning to create infrastructure to improve efficiency of operations and multi-modality. To that end, it will build intermodal terminals and improve connections between different modes to encourage operators to use multi-modal transport instead of transporting units just by road. By 2030, the aim is to shift 5% of freight to combined transport. This is projected to reduce GHG emissions by 19% compared to moving freight only by road (Government of Lithuania, 2014).

Additionally, to improve efficiency of rail operations and reduce GHG emissions, Lithuania is planning to electrify its rail network. Today, the share of electrified railways is only 8%, making it one of the lowest in the European Union. By 2030, Lithuania plans to electrify 45% of railways infrastructure. It is also working to implement the Rail Baltica project to create a new high-speed railway line for freight transport. With Rail Baltica in place, Lithuania could transport an estimated 70% of cargo on railways. By 2050, it wants to use rail or inland waterways to transport at least half of all goods travelling more than 300 km.

The government is exploring alternative fuel types such as biofuels, hydrogen, CNG and LNG as economically and environmentally friendly alternatives to diesel. It is planning a 40% subsidy for purchase of commercial vehicles powered by these fuels, as well as for construction of alternative fuel stations. The government also intends to require companies to use at least 10% of renewable energy sources in their final fuel consumption.

While CNG and LNG are promoted for their lower carbon content, they are still fossil fuels, with a potential for significant methane leakage. GHG emissions of LNG trucks are systematically underestimated in the European CO_2 regulations for trucks (Mottschall, Kasten and Rodríguez, 2020). Certification procedure neglects methane and NO_x emissions, which means they fail to consider a large portion of tank-to-wheel emissions. The same authors suggest the technology can lock countries on a pathway incompatible with climate-neutrality goals. Therefore, the rationale behind the regulatory and fiscal incentives for LNG trucks should be revisited. In the long run, the potential of freight electrification, if realised, could make significantly higher contributions to the low-carbon transition.

Given limited financial resources, road freight decarbonisation also requires implementing low-cost easy-to-adopt elements that have already shown they can quickly reduce emissions in the sector (ITF, 2018b). Fuel consumption could be reduced due to changes in driving and intelligent transportation system technologies. This includes vehicle-to-vehicle communication systems that can be used to set up semi-automated vehicle columns (truck platooning). Since 2010, drivers in Lithuania have already been introduced to the basics of eco-driving through voluntary training programmes. A financial incentive for eco-driving measures is planned in 2021-30 to ensure that as many drivers as possible acquire eco-driving knowledge and skills. Additional measures, such as standardisation and sharing of logistics data, could accelerate collaboration between organisations. Meanwhile, consolidation centres could reduce freight traffic circulating within a target area by fostering consolidation of cargo at a terminal (ITF, 2018b). Further institutional support to make these low-cost elements mandatory in freight is highly warranted.

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Notes

[1] The International Transport Forum refers to pedestrians, cyclists, riders of mopeds and motorbikes as vulnerable users.

[2] There were seven new EVs on the European market in 2018, a number that will rise to 45 in 2021.

[3] Rigid vehicles are vehicles with unlimited gross vehicle mass and tow trailers up to 9 tonnes without axle limitation. Rigid vehicles may include buses, trucks or articulated buses with more than two axles.

[4] The directive requires that all new and thoroughly renovated residential buildings with more than ten parking spaces be equipped with appropriate pre-wiring for a charging point to be installed in each space.

OECD Environmental Performance Reviews

LITHUANIA

Lithuania's rapid economic growth has increased many environmental pressures. The country has declared ambitious medium- and long-term climate change mitigation goals. However, existing policies will not be enough to meet them. Total greenhouse gas emissions have not declined over the last decade, while those from transport have been rising rapidly. Lithuania needs to build on its impressive progress in moving away from landfilling to reduce waste generation and steer towards a circular economy. Water pollution with nutrients from the increased use of fertilisers and insufficiently treated wastewater must also be addressed. These efforts require improved integration of environmental considerations into sectoral policies and a whole-of-government approach to environmental management.

Lithuania is implementing a series of positive changes in environment-related taxation. However, the trend of declining public environmental expenditure should be reversed. One priority area is additional investment in public transport and improvements in cycling and walking conditions that would help steer user behaviour towards sustainable transport modes.

This is the first OECD Environmental Performance Review of Lithuania. It evaluates progress towards green growth and sustainable development, with a special chapter focusing on sustainable mobility.

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