Confronting the energy crisis: Changing behaviours to reduce energy consumption

19 April 2023

Key messages

- Russia's war of aggression against Ukraine is strongly impacting energy markets worldwide, particularly in Europe and Asia, where gas and electricity prices reached all-time highs in 2022. Even though energy prices have moderated since late 2022, they are likely to stay high and volatile for some time. Without further demand reductions, challenges remain in securing sufficient storage levels for the 2023-24 winter (OECD, 2023[1]) .
- In some countries, high prices have incentivised some demand reductions from firms and households, with EU consumption of natural gas dropping by 20% in the period August-November 2022 compared to previous years. A relatively mild winter in Europe also helped moderating demand. However, the crisis calls for additional changes in behaviour to accompany long-term technical and structural solutions to lower gas demand and improve energy efficiency.
- A large share of energy consumption in the EU comes from households - as a result, encouraging them to reduce their energy consumption could be crucial. Reducing households' energy use can not only help curb the current crisis, but, if the reduction is sustained over time, it can also support the transition to net zero.
- Inducing behavioural change is less obvious than it might appear. A range of structural and psychological barriers make it hard for consumers to change their level of energy consumption. There is often a significant discrepancy between consumers' knowledge, values, and intentions, and their observable energy behaviour — examples include the 'knowledge-action gap' and the 'status-quo bias'.
- To counteract these barriers, governments can scale up information and policy instruments that provide clear evidence for users on the benefits of their behavioural changes and how to implement these changes. The impact of these interventions hinges on the choice of message that policymakers send to consumers, how and when the information is provided to households and through which channels. Moreover, it is crucial that the right incentives and policies are in place to ensure that behavioural changes can effectively take place.
- The effectiveness of these interventions should be monitored to gauge evolutions in behaviours and research solutions to behavioural barriers.

Background

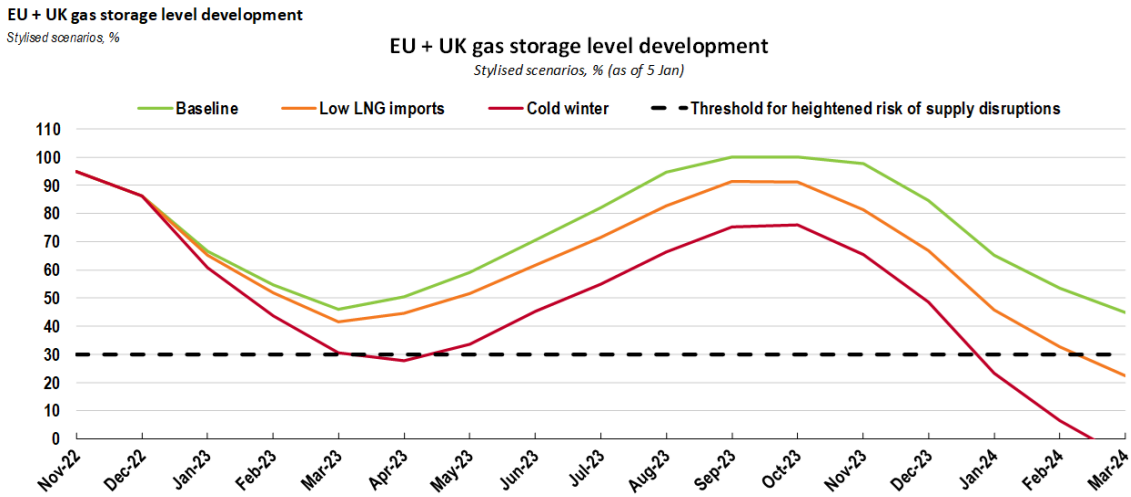
Russia's war of aggression against Ukraine is strongly impacting energy markets worldwide, particularly in Europe and Asia, where gas and electricity prices reached all-time highs in the course of 2022. While relatively mild weather avoided the risk of rationing over the 2022-2023 winter in European countries, challenges remain in securing sufficient storage levels for the 2023-24 winter, with supply from Russia in 2023 likely to be minimal, in contrast to the early months of 2022 (OECD, 2023[1]).

High prices and emergency measures have already incentivised demand reductions from firms and households in some countries. For example, the EU consumption of natural gas dropped by 20.1% in the period August-November 2022, compared with the average gas consumption for the same months (August-November) between 2017 and 2021 (Eurostat, 2022[2]). However, governments should consider additional measures to sustain future savings in the gas and electricity demand.

The current energy crisis calls for significant changes in behaviour

Diversifying energy sources and reducing energy demand will be critical. Some of these changes will take time to be implemented, such as improving buildings' energy efficiency and investing in clean-tech solutions. However, the current crisis also calls for policies leading to more immediate demand reduction (Figure 1).

Figure 1. Without demand reductions, Europe may risk gas supply interruptions



Note: For all scenarios, assuming 90% storage levels at the end of November; no imports from Russia from November 2022 and domestic production at average 2019-2021 levels. In the baseline, we assume "10% reduction" in gas demand relative to the 2017-21 average consumption, imports from other sources at 28 bcm/month, of which 13.5bcm/month from LNG imports. "Cold winter" assumes consumption at the maximum 2017-21 levels, a 10% reduction in gas demand relative to the maximum 2017-2021 levels and imports from other sources, incl. LNG imports, as the baseline. Low LNG imports assumes 12bcm/month of LNG imports starting from 2023 and a 10% reduction in gas demand relative to the 2017-21 average consumption.

Source: Update of OECD Ecoscope Blog (Haas, Kozluk and Sarcina, 2022[3]).

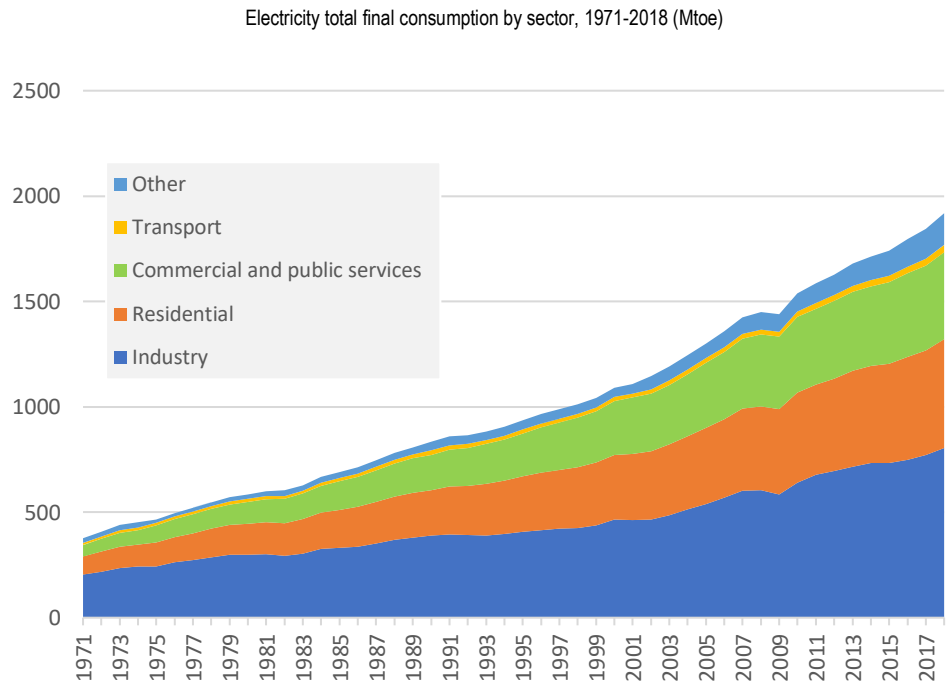
Some of these actions will need to come from changes in the behaviour of households, as they represent a substantial share of energy usage. Examples of desired behavioural changes could include adopting more energy efficient technologies, such as for lighting or transportation (Dixon, 2010[4]); reducing

consumption, either overall or at selected time periods when demand for energy is high (Schultz, 2015[5]); (Sintov, 2015[6]); and shifting patterns of consumption to match time periods when energy can be generated from lower carbon sources (Stoll, 2014[7]).

Behavioural changes need to be supported by appropriate price incentives, resources to ensure access to the more sustainable service and commitment to sustain behavioural changes. However, even when price incentives for these changes in behaviour exist, households are substantially inelastic to them and do not adopt the incentivised behaviours. For example, there is evidence of very low take-up of energy efficiency programmes even when they are widely believed to be privately beneficial from a monetary perspective (Fowlie, 2015[8]). As a result, identifying the psychological factors that influence energy conservation behaviours is becoming increasingly important, because such behaviours are the result not only of responses to prices but also of psychological factors, such as expectations, habits, and biases (Carrus, 2021[9]).

Tackling these psychological factors and biases matters, as the weight that households' behaviours carry is substantial (Figure 2). For example, in the EU, almost 24% of energy consumption comes from households, with an even higher share in winter (OECD, 2022[10]). As such, reducing households' energy use can not only help curb the current crisis, but, if the reduction is sustained over time, it can also support the transition to net zero and accompany efforts to raise the share of renewable sources in the energy mix.

Figure 2. Industry and households account for a large share of electricity consumption



Notes: Other includes agriculture, fishing and non-specified sectors.
Source: (IEA, 2021[11])

While the behavioural changes needed for energy security and the climate emergency are not necessarily aligned, some synergies could be leveraged. In particular, systematic energy demand reductions can reduce GHG emissions and facilitate the transition to more sustainable energy mixes, while also lowering bills and diminishing exposure to supply shortages in the crisis context (EC, 2022[12]). The World Energy Outlook 2022 emphasises that the current energy crisis could be a historic turning point towards a cleaner and more secure energy path (IEA, 2022[13]).

Similarly, the European Scientific Advisory Board on Climate Change evaluated how different types of policy responses to the energy crisis can affect the transition towards climate neutrality. Among its recommendations to tackle simultaneously the energy crisis and the climate crisis, the board encouraged EU Member States to pursue further reductions in energy demand, not only through technical approaches (e.g. accelerated renovations of the building stock) but also non-technical (behavioural changes) approaches (European Scientific Advisory Board on Climate Change, 2023[14]).

Indeed, behavioural measures are expected to produce considerable positive impact both on energy affordability (a key priority in the energy crisis context) and on GHG emissions (key element for the climate crisis) (European Scientific Advisory Board on Climate Change, 2023[14]). Recent measures in EU countries include, for example, calls on commercial operators to turn off lights at night-time, as well as awareness-raising campaigns to encourage citizens to lower thermostat temperatures, take shorter hot showers, switch off lights, reduce car use, and turn off appliances (Sgaravatti, Tagliapietra and Trasi, 2022[15])

Overall, the potential for energy savings through behavioural changes is substantial. For example, in the short term, estimates from the European Commission indicate that, coupled with energy efficiency measures, behavioural changes can help reduce the short-term EU demand for gas and oil by, respectively, around 13 billion cubic metres and around 16 million tonnes of oil equivalent (EC, 2022[12]). In the longer-term, the IEA estimates that a behavioural change such as limiting heating to 19-20°C in buildings could reduce cumulative emissions from fossil fuel boilers by 10% until 2030 (IEA, 2022[16]). Meanwhile, in the UK, it is estimated that one third of the emissions cuts required to meet net zero targets will need to come from behavioural changes, understood as people changing how they travel, what they eat and how they heat their homes (House of Lords, 2022[17]).

How to facilitate a behavioural response to energy savings?

Inducing behavioural change is less obvious than it might appear. Price signals alone are often insufficient, as a range of structural and psychological barriers make it hard for consumers to change their energy consumption. Behavioural barriers include a gap between the intention to engage in behaviours that would reduce energy consumption – *I will turn off the light when I exit the room* – and the actual action – *but in fact I leave it on* – because of inattention, sheer habit or because of the perception that no one else is doing it. The capacity of individuals to process information can also be a barrier. Information campaigns that are not sufficiently clear on what can be done or ask people to take many actions at once can be difficult to understand and act upon.

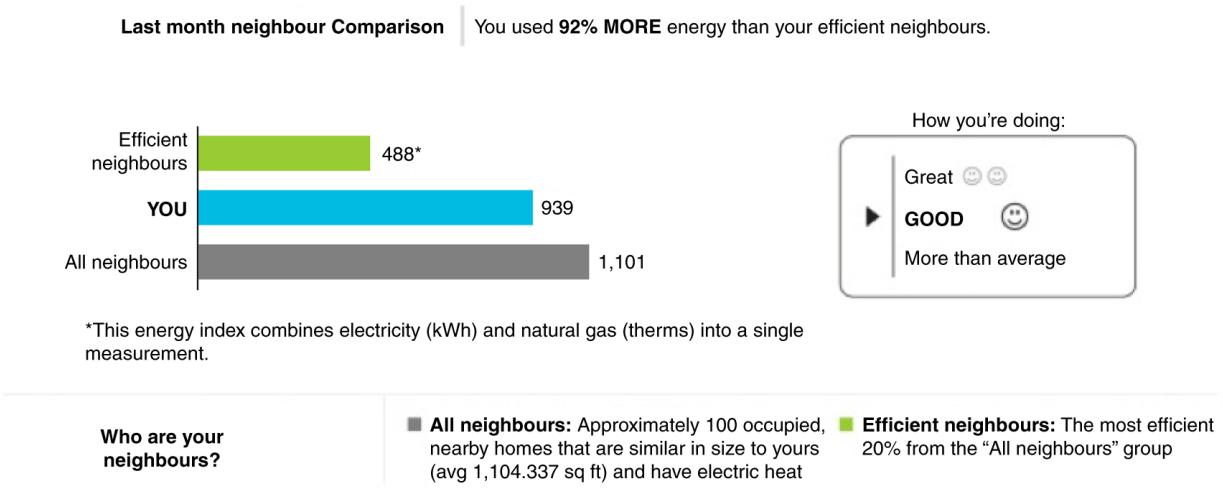
There are, however, ways of counteracting these behavioural barriers.

Successful information campaigns tend to provide a set of clear and actionable guidelines, which can be important for emergency situations when short-term action is needed (Cornago, 2022[18]). For example, after the 2011 earthquake and tsunami hit the Fukushima nuclear power plant in Japan, the government launched an information campaign (cost: 4 billion JPY) to encourage households to reduce energy consumption (METI – Ministry of Economy, 2011[19]). Government and energy utilities disseminated checklists of energy saving tips with simple steps that could be followed (Institute of Energy Economics, Japan, 2021[20]). These checklists were complemented by technical support to commercial and industrial consumers (cost: 3.7 billion JPY), including engineers visiting 150,000 sites and holding 10,000 workshops (METI – Ministry of Economy, 2011[19]). Overall, the campaign led to 15% less electricity being used in 2011 relative to the previous year in the most affected regions. The results prompted by the emergency situations persisted over the following years: in summer 2014, households consumed 18% less electricity than in 2010. A notable characteristic of the post-2011 electricity savings in Japan is that a large demand reduction was achieved without price increases (Kimura and Nishio, 2016[21]).

More recently, over the winter 2021-2022, UK-based energy utility Octopus launched a 'winter workout' which encouraged households to save energy with reminders and tips: this contributed to a reduction in the average gas bill by 12% for customers who signed up to receive tips (Octopus Energy, 2021[22]). The extent to which this approach can be scaled up would of course need to be further tested, as those who signed up could be customers already willing to reduce consumption ("self-selection bias"). An additional example from the current energy crisis context is the joint EU Commission-International Energy Agency 'Playing my part' campaign launched in April 2022, which provides some key steps that individuals and companies can take to reduce their energy consumption (EC-IEA, 2022[23]).

Social norms and social comparison are also strong determinants of action and can influence the effectiveness of information campaigns. For example, a study on the role of beliefs in energy conservation found that the belief that neighbours were reducing energy consumption correlated highly with reported energy saving efforts, a finding which has been replicated in multiple real-life applications which tested the impact of redesigned energy bills stressing social comparison (e.g., Figure 3) (Jachimowicz, 2018[24]). It has also been found that consumers who receive social comparison-based home energy reports continue to respond to repeated treatment even after two years (Allcott and Rogers, 2014[25]).

Figure 3. Sample of redesigned energy bill emphasising social comparison



Source: (Jachimowicz, 2018[24])

Consumers' inertia to change can also be used to "default" them into lower energy consumption. In 2013, the OECD tested the power of defaults on thermostat settings with OECD staff. Experts manipulated the thermostats during the winter heating season and observed staff's chosen thermostat settings over a period of six weeks. They found that a 1°C decrease in the default led to a reduction in the chosen temperature by 0.38°C on average (Brown, 2013[26]). However, a 2°C degree decrease in the default setting triggered a tendency to increase the temperature, leading to an overall increase in heating. A key lesson is that piloting default settings can be important to avoid backfiring ("rebound effects").

Behavioural change can also be promoted through a combination of price mechanisms (time of the day pricing) and user-centric technologies, with lasting effects overtime. In a large-scale study, the OECD tested the impact of regulatory change and technological shift from analogue to smart meters in Ontario, Canada, between 2011 and 2012. The intervention aimed to provide citizens with a better informational basis through the provision of in-home displays linked to smart meters that provided real-time feedback on electricity consumption, price and expenditures (OECD, 2019[27]). The results showed that households reduced electricity demand by an average of about 3% once they received an in-home display, with results increasing steadily to around 4% over a five-month period.

In line with these different examples, Table 1 presents possible responses that build on behavioural sciences and can be used to counteract different behavioural barriers affecting energy consumption in the short and long term, pointing at real-life or lab applications of behavioural principles.

Table 1. Examples of behavioural barriers that can affect energy consumption in the short and long term and possible responses

Behavioural principles affecting short-term action	Possible behavioural interventions	Example
Social norms – conforming to the behaviour and beliefs of others in the social network. For example, individuals are more likely to conserve energy if they think others are doing it.	Social social norms interventions (e.g. energy savings motivated by shared sense of solidarity for Ukraine)	In a real-world experiment across 600,000 households in the US, receiving letters comparing one's electricity use to that of neighbours has been shown to reduce energy consumption by 2.0% (Allcott, 2011[28]).
Status quo bias – aversion to changing one's own habits, such as habitual heating temperatures at home.	Providing feedback on consumption; changing defaults.	When customers are assigned a "green default", such as being automatically enrolled in renewable energy sources, they tend to stick to the option they have been assigned to, as attested by real-world evidence in Germany (Kaiser, 2020[29]).
Intention-action gap – discrepancy between one's intentions and actions, such as an awareness of climate risks which does not translate in energy conservation behaviours.	Goal setting	A field study with over 12,000 households showed that households who set a goal of energy conservation between 0% and 15% reduced their consumption by 11%, with sustained reductions after 18 months (Harding and A. Hsiaw, 2014[30]).
Forgetfulness – attention is limited and easily distracted, e.g. forgetting lights on at home.	Reminders	Interactive posters/prompts in office buildings and student halls can 'nudge' occupants' behaviours towards energy-saving when combined with a clear message/ feedback (e.g. taking the stairs, rather than the lifts) (Agha-Hossein, 2015[31]).
Costly information acquisition – knowledge of which energy behaviours to adopt might not be easily available to consumers and they will not pro-actively search for it.	Communication and awareness campaigns	(Ölander and Thøgersen, 2014[32]) provide evidence for the positive effect of visualising information in form of a simple label: changing an energy efficiency scale from a complex "A+++ - D"-system to a simpler "A – G" more than doubled the probability that an energy-efficient device is chosen.
Behavioural principles affecting long-term action	**Possible behavioural interventions**	**Example**
Optimism bias – predisposition to systematically overestimate the probability of positive events and underestimate the probability of negative events. For example, –tendency to attribute the highest level of severity to environmental risks that are geographically far.	Communication and awareness campaigns	When people are made aware that certain targeted behaviours are achievable and that they can actively contribute, then optimism can propel people toward electricity conservation (Herabadi, Kadarusman and Yachinta, 2021[33]). However, an action perspective to cope with environmental threats must be provided to enhance perceptions of self-efficacy and prevent inaction (De Vries, 2020[34]).
Present bias – tendency to underestimate risks perceived to be far in the future, as climate change.	Commitment devices and goal setting	When investigating the example of a web portal designed to motivate customers of a utility company to reduce electricity consumption, it was shown that consumers who had a goal-setting functionality at their disposal and who set a goal were able to save, on average, 2.3% more than those in the no-goal condition (Loock, 2013[35]).
Risk misperceptions – tendency to misinterpret the likelihood of complex events, such as climate disasters or energy shocks.	Changes in defaults; communication and awareness campaigns	Evidence from the UK and Mexico indicate that people who have experienced higher levels of power outages are more likely to intend to engage in social energy saving behaviours, suggesting a key role for communications around environmental experiences in order to promote sustainable behaviour (Spence, Leygue and Andeane, 2021[36]).

Source: OECD elaboration from (Andor and Fels, 2018[37]), (Feygina, 2010[38]), (Gifford, 2011[39]) (Mol, Jantsje M., et al., 2020[40]) (OECD, 2019b[41]) and cited case studies.

How to make behavioural changes sustainable over time?

Many insights can be drawn from both successful and unsuccessful behaviour change interventions on how to design awareness and behavioural change campaigns. Behavioural measures will not always produce the desired effect, neither in terms of the desired magnitude of change nor in terms of the duration of the impact. Real-life applications can prove less effective than hypothesised or even produce rebound effects in cases where unobservable real costs limit uptake or the effect of making information clearer and understandable fade away quickly. The impact on behaviour crucially hinges on the choice of message that policymakers send to consumers, the tone, how the policy is designed and the transmission channels (IEA, 2022[42]). The policy context and whether price incentives and access to effective energy saving solutions are in place is also key. Behaviourally-informed interventions are not the only instruments that can bring effective change.

Whether or not these measures will lead to long-term effect on energy use (which could hold relevance for climate change) depends on how long measures remain in place and whether the measures will lead to long-term changes in behaviours or preferences (European Scientific Advisory Board on Climate Change, 2023[14]). Indeed, similar cases suggest that crisis-response measures may not always translate into sustained efforts.

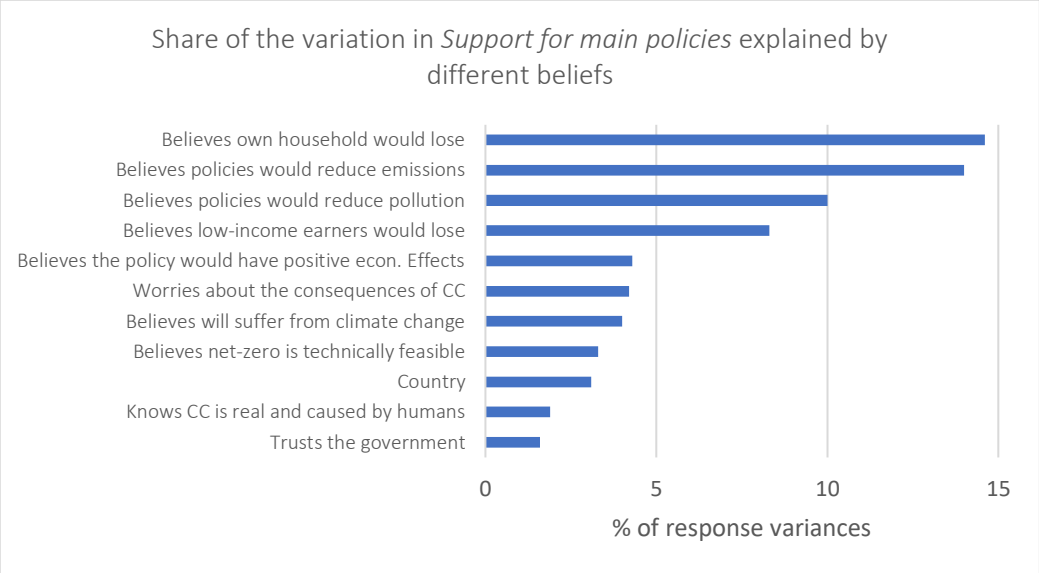
For example, in Cape Town, South Africa, in 2017, the risk of insufficient water supply ("Day Zero") was avoided through a combination of aggressive water conservation and efficiency measures, such as a city-wide water map allowing residents to compare their consumption to their neighbours and the rest of the city. Among several initiatives, Cape Town's government asked people to save water by taking showers that lasted two minutes or less. An effective way of facilitating such a behavioural change was to launch "shower songs", whereby some of the most popular songs were re-recoded to last 2 minutes. In this case, technical fixes and regulatory controls implemented by the government were particularly important to reducing water consumption and avoid the "Day Zero," but reaching such levels of conservation would not have been possible without large-scale behaviour change by residents and businesses. After the crisis, daily water use for the city resurged (Allsop, 2018[43]). Nonetheless, in the year following the emergency, consumption figures still stood at about 650 million litres of water per day, in comparison to the 1,200 - 1,500 million litres of water per day that the city used to consume before the crisis in peak summer months (Sköld, 2020[44]). This was also thanks to the fact that some measures remained in place after the crisis, such as significant water and sewer tariffs, as well continued, albeit reduced, media coverage (e.g. across the airwaves, dam levels are now read out with the weather forecast).

This example begs the question of how to ensure that citizens' virtuous behaviours can be sustained in the long-term. One solution comes from acknowledging the importance of systematically and continuously monitoring and researching behaviours to design effective interventions when facing novel and dynamic situations, such as the energy crisis or the recent COVID-19 pandemic (Lunn, 2021[45]).

Recent OECD work sheds light on another key driver of behaviour change in the long-term: the willingness and acceptance of the public to modify their own habits. A recent OECD study explored the question of what drives acceptance of climate policies (Dechezleprêtre, A., et al., 2022[46]), a topic that could hold relevance for energy-policies as well. The cross-country evidence - covering 20 countries - found that, with regard to a given climate policy, factors such as 1) its perceived effectiveness, 2) its perceived

distributional impacts and 3) its perceived impact on people's own households, are major predictors of whether citizens will support it. In particular, self-interest is a strong driver of acceptability: those who think they will themselves lose from a given policy, are much less likely to support it. This belief alone explains 15% of the variation in policy views (Figure 4). This is in line with long-standing theories of loss aversion in behavioural economics.

Figure 4. Main beliefs driving support for climate policies (share of variation)



Source: (Dechezleprêtre, A., et al., 2022[46])

Note: The Figure depicts the share of the variance in the support a main climate policies index, that is explained by each belief and perception, conditional on country fixed effects. The three main climate policies in the climate policies index are carbon tax with lump sum revenue recycling, a green infrastructure programme and a gradual ban of combustion engine cars.

Factors that increase acceptability of policies can be used to design policies that citizens will support not only with intentions but also with actions. While willingness to change behaviours does not automatically translate into behavioural change, the two are, to some extent, correlated (Dechezleprêtre, A., et al., 2022[46]). The lesson for the current context is that communication campaigns around energy savings which include an element of personalisation (e.g., with personalised feedback on energy use) can be expected to be not only more acceptable, but also more effective.

Conclusions

Governments should already concentrate on measures that will prepare us for the next winter, and which may also resonate with climate objectives. This implies not only implementing measures to cut heating in the short term, but also paving the way for behavioural changes for next year and beyond – investing time to select the best strategies and design them well. When designing measures to reduce energy consumption, governments can scale up information and action programmes that provide clear evidence for users on the benefits of their behavioural changes and how to implement these changes. The impact

of these interventions hinges on the choice of message that policymakers send to consumers, how and when the information is provided to households and through which channels. The effectiveness of these campaigns and actions also depends on the monitoring and understanding of behavioural barriers and researching solutions to these barriers, within the framework of existing policies and market conditions.

What are the key considerations for policy makers?

- Changing households' behaviours to reduce energy consumption will be crucial to cope with the ongoing energy crisis.
- As governments devise strategies to promote energy savings among consumers, it will be crucial to experiment on a range of possible policies to promote energy reductions, including behaviourally informed communication campaigns, measures that harness social influences and innovative infrastructure that can help households track their consumption, like smart meters, to be designed in line with behavioural principles. These interventions should complement and interact with appropriate price mechanisms and policy aimed to providing access to greener energy sources.
- Factors that increase acceptability of energy policies should also be considered to ensure public support and buy-in**.** Testing the acceptability of measures for individuals will be crucial to ensure sustained impact.
- To durably reduce energy consumption beyond the horizon of the ongoing energy crisis, monitoring behavioural changes over time will be key.

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Note by the Republic of Türkiye
The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the “Cyprus issue”.

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