

POLICY PAPER

Behavioural Science for the Environment

Milan Urbaník

To effectively address climate change, both structural and behavioural policies are needed. To formulate effective and efficient behavioural policies, the government should establish Behavioural Policy Team. The agency of the team should be to design policies that are conducive to facilitating behavioural changes against unsustainable behaviours, such as high energy and water consumption or polluting transportation. Furthermore, the team should test different approaches through randomization to determine the best value-for-money policies.

The urgency to respond to climate change

There are strategic as well as immediate reasons for Czech Republic to step up its response to climate change. From the strategic point of view, implementing policies that increase sustainability of households and businesses can lead to financial and political benefits from the relationship with the EU in the face of its European Green Deal.¹

From the immediate perspective, climate change proves a costly challenge to the local authorities, whereas climate associated disasters currently limit Czech citizens and create pressure on national budget. Of the past 11 years, a prolonged period of drought occurred in 5 of them.² The 2018 extreme drought has caused damage to crop of up to CZK 12 billion.³ The occurrence of wildfires grew up to 5 times in 2018.⁴ 2People in over 60 municipalities faced water shortages and had their water usage limited to 100 litres a day.⁵ The combined investments of the Ministry of the Environment and the Ministry of Agriculture to fight droughts between 2014 and 2019 have amounted to 39 billion crowns.⁶ For illustration, this was similar to the annual budget of the Czech Police in 2017.⁷

The need for behavioural policymaking

To effectively and efficiently tackle the climate challenge, the policies should focus on large structural changes as well as changes to the behaviours of citizens. The reasons are

two-fold. Firstly, some sectors cannot be effectively decarbonized at present. An example of such sector is aviation⁸. Biofuels are a solution to decarbonize aviation, however, they would compete for land use with other priorities like food production and biodiversity conservation.⁹ Electrification is more promising in land transport, because in planes it only produces limited range and the advancements are too slow to achieve necessary short-term emissions reductions. Therefore, there is a need for demand reduction – a change in behaviour.

Secondly, the benefits brought by structural changes can be offset by negative changes in the behaviour. A good example hereof is the UK; the country initiated a move away from the most polluting energy-generation source – coal. As a result of the effort, in early May 2010, the country passed one week without coal power for the first time since 1882. However, as the report¹⁰ published by the Energy and Climate Change Committee outlines, "...the rate at which the UK's consumption-based emissions have increased have far offset any emissions savings from the decrease in territorial emissions. This means that the UK is contributing to a net increase in global emissions." Therefore, if structural changes are not accompanied by corresponding behavioural adjustments, the net effects might be null or even negative.

Furthermore, if policy design overlooks the study of actual drivers of behaviour, it can lead to unwanted consequences that either lead to no effect of the policy, or even potential negative effect of the policy. The so called behavioural spillovers or rebound effects occur when policy intervention not only affects the targeted behaviour, but also has an

¹ The European Green Deal, European Commission, 2019, Available at: <https://bit.ly/2ENeSQJ>

² Extreme Drought of 2018 in the Czech e, EGU General Assembly, 2019, Available at: <https://bit.ly/2l8G6aP>

³ Czech Republic Experiences One of the Worst Droughts in its Recent History, Brno Daily, 27.10.2018, Available at: <https://bit.ly/2mIUOpa>

⁴ Extreme Drought of 2018 in the Czech Republic, EGU General Assembly, 2019, Available at: <https://bit.ly/2l8G6aP>

⁵ Increasing number of municipalities limit tap water use, Radio Prague International, 16.8.2018, Available at: <https://bit.ly/2l5SOPk>

⁶ Czech Republic : At the Office of the Government, the National Coalition for Drought Collision met for the second time,

Market Watch, 7.2.2019, Available at: <https://on.mktw.net/2n8MfEm>

⁷ Rozpocet, Policie Ceske Republiky, Accessed 7.12.20, Available at: <https://www.policie.cz/clanek/rozpocet.aspx>

⁸ Changing Behavior to Help Meet Long-Term Climate Targets, Nicholas and Wynes, 2019, Available at: <https://bit.ly/2SdMn1M>

⁹ Carbon Budgets for Aviation or Gamble with Our Future?, Bows-Larkin and Anderson, 2013, Available at: <https://bit.ly/3cJgkQC>

¹⁰ Consumption-Based Emissions Reporting, Energy and Climate Change Committee, 2012, Available at: <https://bit.ly/3ijIkva>

unintended effect on other behaviours.¹¹ For instance, direct negative spillover effects occur when lower energy costs (e.g., from improved motor vehicle fuel economy or more efficient household appliances) increase the use of and thus energy consumption from those same goods. In some situations, people who spend time, resources and energy having their appliances changed for more energy-efficient and eco-friendly ones, then use more energy by increasing heating at home, because they perceive that they did their fair share by changing the appliance.¹² In the context of the recent Czech policy, this danger applies directly to the subsidies for coal boilers that were issued under the 2014-2020 Operational Programme Environment.¹³ This was a well-crafted policy, however, with a major weakness in the fact that the design did not take into account the potential rebound effect. Post hoc evaluation of the overall effects of the policy on GHG emissions would be necessary to uncover, whether the rebound effect occurred. More importantly, nevertheless, the consideration of the actual drivers of behaviour should become a part of policy design to ensure an effective response to climate change.

The Czech Republic is lagging behind nations and institutions that build their policy design on the psychological and social insights about human behaviour. Today, some 202 institutions are applying insights about human behaviour to policies around the world.¹⁴ At the international level, the EU, the World Bank and the OECD have published reports emphasising the importance of identifying and addressing the behavioural element in policy. From the countries in the immediate surrounding, Poland, Austria, Slovakia, German as well as Hungary have applied behavioural insights into policy design. Thus, to address the challenges and design effective policies, the Czech Republic should begin designing the policies with human behaviour in mind. This should be done by establishing a specialised

team of behavioural scientists with relevant expertise and budget to develop and test the policies.

Designing effective behavioural policies

There are two necessary ingredients for an effective behaviour change policy – a thorough theoretical and empirical study of the particular human behaviour and its context; and empirical testing to determine the correct and most effective approach.

Behavioural design

The first component of effective behaviour policies is behavioural design – a policy design guided by behavioural sciences. Behavioural sciences comprise the systematic analysis of the processes underlying human behaviour. They combine knowledge and research methods from the fields of psychology, economics, sociology, neuroscience, among other sciences.

Behavioural sciences have shown that context and biases can influence decision-making. The difficulty or ease of performing an action, salience of various alternatives, the timeliness of the intervention or whether the action is private or social can influence how people behave. Incorporating these influences in the design and implementation of policies may increase their effectiveness compared to policies that disregard the context.

Successful examples of behaviourally informed policies are vast and span across multiple domains such as employment, tax compliance, environment, health, education and many others. In Germany, a large-scale field study tested the impact of a brochure that informed job seekers about job search strategies and the consequences of unemployment.

¹¹ Truelove, H. B., Carrico, A. R., Weber, E. U., Raimi, K. T., & Vandenbergh, M. P. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. *Global Environmental Change*, 29, 127-138.; Maki, A., Carrico, A. R., Raimi, K. T., Truelove, H. B., Araujo, B., & Yeung, K. L. (2019). Meta-analysis of pro-environmental behaviour spillover. *Nature Sustainability*, 2(4), 307-315.

¹² Gillingham, K., Kotchen, M. J., Rapson, D. S., & Wagner, G. (2013). The rebound effect is overplayed. *Nature*, 493(7433), 475-476.

¹³ Operational Programme Environment, European Union, Available at: <https://www.opzp.cz/about/>

¹⁴ Behavioural Insights, OECD, Available at: <https://bit.ly/33h3uWM>

The brochure had a positive effect, but mostly for job seekers who displayed increased risk of long-term unemployment. In this group a 4% increase in employment and earnings in the year following the intervention was achieved. In the UK, the Tax authority (HMRC) decided to boost tax compliance with payment reminder letters in 2011. The behaviourally informed messages were sent to the latecomers. The minority social norm message produced a 5.1% increase in taxes paid within the 23 days trial period (equivalent to £2.367 million).¹⁵

Evaluation of policy design – Randomized experiments

The second component of effective behavioural policies is the scientific evaluation of their impact during the design as well as implementation. The scientific evaluation should be done by means of randomized experiments or RCTs. Randomised controlled trials (RCTs) are the best way of determining whether a policy is working. They are used extensively in international development, medicine, and business to identify which policy, drug or sales method is most effective.

Randomized experiments evaluate the effect of the policy by incorporating two key features: the presence of a counterfactual sample who do not receive the intervention (creating a 'treatment' and 'control' group), and random assignment of the sample population into these two groups (or more, as there may be multiple different 'treatments' we wish to compare against the control and each other, such as different variants of campaign materials).

The purpose of the control group is to identify what would have happened without the intervention. Without this counterfactual, it would be impossible to attribute any differences we see in our outcomes to the intervention itself, as other extraneous factors may have confounded us. For example, if a policymaker wants to measure the impact of a campaign on meat consumption without a control group, an observed drop in meat consumption following the

intervention may be down to the campaign or may have happened anyway due to wider, cultural shifts. Only a good counterfactual group (that also experience the same cultural shifts, but do not experience the campaign) can address this problem.

The purpose of allocating the sample randomly is to ensure that the two or more groups are like-for-like in every respect except for their receipt of the intervention (treatment). Randomization achieves this if the sample size is large enough.

Human behaviour is messy and what works in one context for some people may not in other. Even if the design is sound and worked elsewhere, it may not work in our context. Thus, to ensure the policies work, they need to be tested. By enabling the policymaker to demonstrate just how well a policy is working, RCTs can save money in the long term - they are a powerful tool to help policymakers and practitioners decide which of several policies is the most cost effective, and also which interventions are effective or not. This is especially important to be confident that public money is spent on policies shown to deliver value for money.

Where exactly can the policies be implemented

Overview of emissions by source indicate that that major gains can be achieved if people change their behaviour in transportation, energy usage, and waste.¹⁶ Transportation is especially important contributor, as the absolute amount of emissions decreased from the early 1990s in all sectors, except for transport. The increase of total emissions caused by transportation can be attributed to individual automobile transportation. This recorded a steady increase in passenger transport, from 58 % in 1990 to 71 % in 2015. In 1990, transportation-generated emissions amounted to mere 6.1 % of the total CO₂ emissions in the Czech Republic. In 2009, this value rose to 17.7 % and the maximum value was reached in 2014 – 18 %. The amount of emissions from transport decreased between years 2009-2013, but only

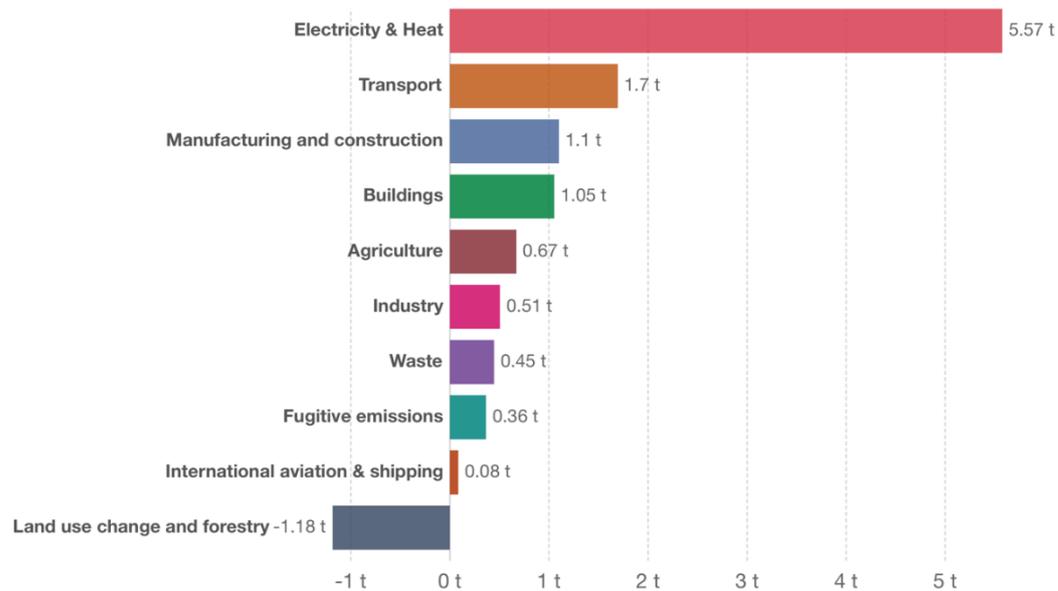
¹⁵ Behavioural Insights Applied to Policy, European Union, 2016, Available at: <https://bit.ly/2SesYxS>

¹⁶ Emissions by sector, Our world in data, Available at: <https://ourworldindata.org/emissions-by-sector>

due to the economic crisis and reduction in fuel consumption. Additionally, as drought is an important issue in Czech Republic, it is worthwhile to review behavioural change policies that tackled this problem elsewhere.

Per capita greenhouse gas emissions by sector, Czech Republic, 2016

Per capita greenhouse gas emissions are measured in tonnes of carbon-dioxide equivalents (CO₂e) per person per year. This metric converts all greenhouse gases to CO₂e based on their global warming potential value over a 100-year timescale.



Source: CAIT Climate Data Explorer via. Climate Watch

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

Behavioural policies in transportation

One of the behaviourally-informed policies that aim to shift commuting behaviour from cars to non-automotive modes of travel in Japan are Travel Feedback Programs. Travel Feedback Programs (TFPs) vary in the specifics of techniques, but all aim to achieve shifts in travel behaviour through one or more of the following behavioural strategies: (1) by making negative impacts of travel methods more salient through information about carbon emissions or health effects; (2) by using goal-setting and/or plan-making techniques to help commuters follow through on their intentions to change travel behaviour; and (3) by providing personalized information (occasionally based on multiday travel diaries) on travel planning.

As a typical example, one successful 2004 TFP in the city of Suzurandai provided area-specific transit information to 210 participants, and asked each individual to make a behavioural plan for how to reduce their car use, as well as specify the percentage by which they aimed to increase their usage of public transport. This programme resulted in a 19% decrease in car use, and a 51% increase in public transit. A meta-analysis of various TFPs across Japan showed a 7.3% reduction in car use, and a 68.6% increase in public transportation use. Analysing only TFPs with control groups showed a 12.1% reduction in car use and 38.6% increase of public transportation use. Some of these

effects were sustained 1 year after the implementation of the intervention, indicating positive long-term effects.¹⁷

Another successful example of behavioural policy comes from the Swedish city of Malmö.¹⁸ The city of Malmö is home to about 300,000 people. A 2003 poll revealed that half of all car trips made in the city were less than 5 kilometres. The city declared that this was “ridiculous,” given the traffic congestions and expensive infrastructure supporting such short trips. So they started a campaign—which continues to take place each year—called “No ridiculous car trips,” which invited residents to submit written accounts about their most nonsensical car trips for a chance to win bicycles. In a humorous and memorable way, this campaign drew attention to the often-habitual choice to drive short distances and implied a general public commitment to changing behavioural norms.

The city also gave small gifts to cyclists, like seat covers and drying cloths, as thanks for choosing to bike; this created feelings of reciprocity that encourage people to continue to ride. The campaign also asked cyclists—wearing bright orange clothing—to time specific routes around the city to prove the convenience and quickness of cycling. A 2008 evaluation of the campaign showed that about 75% of residents remembered the campaign’s main objective of using bicycles instead of cars as their mode of transportation and 15% of residents reported a sustainable shift in their behaviour due to the campaign. Coupled with infrastructure improvements, Malmö has seen significant changes in behaviour: 12,000 residents made fewer short trips by car and 30% of the population reported cycling (up from 20% in 1996).

Behavioural policies in energy use

Households in the United States were sent energy reports that compared their energy consumption to their

neighbours. The field experiment included more than 234,000 single-family households in the three sites in Midwest and West Coast. After receiving the reports, consumers immediately reduced their energy consumption, but then slowly returned to their previous consumption levels. After two years of receiving the reports, consumers continued to respond with reductions in energy use. Those that continued receiving the reports saved 50 to 60% more energy than those that stopped receiving reports after two years.¹⁹

In another example from the US, households in the large residential community in Lost Angeles were sent two different types of messages. A health-based frame, in which households consider the human health effects of their marginal electricity use, induced persistent energy savings behaviour of 8–10% over 100 days; whereas a more traditional cost savings frame, drove sharp attenuation of treatment effects after 2 weeks with no significant savings versus control after 7 weeks. Differences in behavioural responses due to message framing become more significant over time.²⁰

In Germany, researchers studied the impact of monetary vs pro-environmental framing on behavioural spillover outside electricity saving. Households were delivered one of the two messages:

- Treatment 1: Electricity saving tips with monetary framing – savings in Euro
- Treatment 2: Electricity saving tips with pro-environmental framing – savings in CO2
- Control: No information

The environmental and monetary framing group both showed higher intentions for saving electricity. However, positive spillover on climate-friendly intentions, beyond the

¹⁷ Fujii, S., & Taniguchi, A. (2006). Determinants of the effectiveness of travel feedback programs—a review of communicative mobility management measures for changing travel behaviour in Japan. *Transport policy*, 13(5), 339-348.

¹⁸ Consuming differently, Consuming sustainably: Behavioural insights for policymaking, 2014, UN Environment, ideas42, Case study of Malmö, Available at: <https://bit.ly/36ky0kt>

¹⁹ Allcott, H., & Rogers, T. (2014). The short-run and long-run effects of behavioral interventions: Experimental evidence from energy conservation. *American Economic Review*, 104(10), 3003-3037.

²⁰ Asensio, O. I., & Delmas, M. A. (2016). The dynamics of behavior change: Evidence from energy conservation. *Journal of Economic Behavior & Organization*, 126, 196-212.

realm of saving electricity, was found in the environmental framing condition only. For monetary framing no effect was found. Furthermore, the spillover effect was found to be completely mediated by personal norms and self-efficacy, thus uncovering new mediating variables for pro-environmental spillover.²¹ Therefore, using strictly economical perspective on behaviour change is limiting the potential to induce holistic changes to the lifestyle, whilst perspective of behavioural science can offer benefits beyond the behaviour targeted by the policy.

Behavioural policies in waste

In England, researchers evaluated the effectiveness of stickers as a visual prompt to encourage the separate collection of household food waste for recycling in two local authorities in South East England.²² In the control group there was no change in the average weight of food waste captured for recycling between the baseline and experimental period. There was a significant increase in the weight of collected food waste (20.74%) in the treatment group, and this change in behaviour persisted in the longer term (4 months). The cost of sticker prompt was 11702GBP total or 0.35GBP per household. The benefits of separation of food waste outgrew the costs in 23 weeks.

In the UK²³, households in the treatment group were sent two postcards that provided feedback on how their street performed on food waste recycling compared with the average for their neighbourhood. Feedback included also an injunctive norm in form of a smiley or frowned face. Intervention had a positive effect on the food waste participation with an effect size of 2.8% compared with a control group.

In Sweden, researchers studied the effect of social marketing information campaign on food waste recycling.²⁴ The estimated effect was an increase amounting to 12.32kg collected per station in treatment group (corresponds to an increase of about 26% compared to a pre-intervention average). The effect of the intervention lasted even 8 months after the intervention regardless of any potential attenuation over time.

Water use

Water consumption in Belén, Costa Rica (a town of about 21,000 residents) was 25% greater than the national average in 2010.²⁵ Researchers and analysts estimated that if consumption remained constant, Belén could face water shortages by 2030. Reducing water consumption was thus a key policy priority for the Belén municipal administration.

Furthermore, other interventions had not worked previously in Belén. A price increase in November 2012 had limited impact even though prices increased by more than 100 percent. Despite this large increase in prices, total household consumption only decreased by 15 percent in December 2012. Moreover, these changes were short-lived. Total consumption in January 2013 and February 2013 were 1 percent and 5 percent higher than in November 2012, respectively. Meanwhile, scope for price increases were limited by legal provisions that stipulate that governments cannot increase prices beyond what is needed in order to recover costs.

To reduce water usage, the municipal government of Belén, Costa Rica sent postcards to households comparing their water consumption to nearby neighbours. Postcards also provided tips for how residents could reduce their water usage and prompted them to plan how they would meet

²¹ Steinhorst, J., Klöckner, C. A., & Matthies, E. (2015). Saving electricity—For the money or the environment? Risks of limiting pro-environmental spillover when using monetary framing. *Journal of Environmental Psychology*, 43, 125-135.

²² Shearer, L., Gatersleben, B., Morse, S., Smyth, M., & Hunt, S. (2017). A problem unstuck? Evaluating the effectiveness of sticker prompts for encouraging household food waste recycling behaviour. *Waste management*, 60, 164-172.

²³ Nomura, H., John, P. C., & Cotterill, S. (2011). The use of feedback to enhance environmental outcomes: A randomised

controlled trial of a food waste scheme. *Local Environment*, 16(7), 637-653.

²⁴ Linder, N., Lindahl, T., & Borgström, S. (2018). Using behavioural insights to promote food waste recycling in urban households—Evidence from a longitudinal field experiment. *Frontiers in psychology*, 9, 352.

²⁵ Datta, S., Miranda, J. J., Zoratto, L., Calvo-González, O., Darling, M., & Lorenzana, K. (2015). A behavioral approach to water conservation: evidence from Costa Rica. *The World Bank*.

lower consumption levels. The sticker-based intervention that highlighted neighbourhood comparisons (versus town level) reduced monthly water consumption between 3.7% and 5.6%. In a different group, prompting residents via postcard to take steps to conserve water reduced consumption between 3.4% and 5.6%. On average there was a 4.6% reduction in water usage. If all households in Belen received these interventions, about 6,720 cubic meters of water could be preserved each month. This translated to 94,080 washing machine loads, 188,000 showers, or 222,000 dishwasher loads saved - in a single month. In monetary terms the savings could be estimated from US\$2,600 to US\$5,200. Given the additional costs to implement the treatments (essentially the cost of printing out the stickers or postcards, which was approximately US\$ 400), the experiment would produce a benefit/cost ratio varying from 6.5 to 13 times, justifying its expansion to the entire municipality.

In the US in May 2007, a water utility in metropolitan Atlanta studied the impact of 3 different messages on water conservation during drought²⁶:

- Treatment 1: Technical message with tips how to save water
- Treatment 2: Weak social norm message (county level)
- Treatment 3: Strong social norm message (county level)
- Control: No message

Although its effects declined by almost 50% after 1 year, they remained detectable and policy-relevant six years later. The persistence of the effects made the intervention more cost-effective than previously assumed (cost drops by almost 60%). The estimate of the authors was that had the message been sent to all homes in the experimental sample (which was all customers with a pre-treatment water history from the year earlier), the utility could have expected to

reduce water consumption by 453 million gallons over the 2007–2013 period.

Policy recommendations

Given the successful examples of policies to change human behaviour towards more sustainable across the most important areas in the Czech Republic exist, there is a significant potential for improving sustainability of the nation. However, these policies cannot be simply replicated in Czech context. A careful consideration and empirical testing are needed to determine whether they can be effective with Czech households. Therefore, **the policy paper recommends an establishment of a dedicated Behavioural Policy Team** that could test these and other policies, or design new ones that were particular to the Czech context.

The team should be comprised of relevant experts from sociology, psychology, economics and related disciplines that have strong methodological knowledge of statistics and experimental design. The agency of the team would be to design policies to change unsustainable behaviours such as high energy and water consumption or polluting transportation. Furthermore, the team would test different approaches through experimentation to determine the best value-for-money policies.

The team should be established by collaboration of the Ministry of the Environment and Ministry of the Foreign Affairs. The Ministry of Environment should provide support for the team in terms of authority and budget to develop and test policies. The role of the Ministry of Foreign Affairs would be to collaborate with foreign partners that already have similar teams and bring their expertise to Czech Republic, either in form of a training program or expert exchange.

The Behavioural Policy Team should become a part of the Department of Environmental Policy and Sustainable Development as a standalone unit, communicating both with the existing Unit of Environmental Policy and Strategies

²⁶ Bernedo, M., Ferraro, P. J., & Price, M. (2014). The persistent impacts of norm-based messaging and their implications

for water conservation. *Journal of Consumer Policy*, 37(3), 437-452.

as well as Unit of Economic analysis, building on the knowledge and competency already established by the Ministry. The Behavioural Policy Team should serve as a methodological backbone to empirically pre-test the policies formulated by other units and support the design of policies of other units under the auspices of the ministry. To achieve this successfully, it should furthermore have an established role of reviewing relevant policies to strengthen the institutionalisation of this aspect in Czech policymaking. Furthermore, it should itself formulate behaviourally informed policies. Lastly, it should contribute to the knowledge exchange among various Ministries, supporting the proliferation of behaviourally-informed policymaking into other Ministries of the Czech Republic. Establishing the Behavioural Policy Team could potentially increase positive perception of the Czech public on the Czech policymaking, as this step would communicate the desire of the ministry to innovate and implement state-of-the-art knowledge and processes into policymaking

Conclusion

The Czech Republic already faces the impacts of climate change both economically as well as in terms of environmental endangerment. The 2018 extreme drought has caused damage to crop of up to CZK 12 billion and the occurrence of wildfires grew up to 5 times in 2018. To effectively and efficiently address climate change it is necessary to implement policies that aim to change unsustainable human behaviour. To achieve this change, Behavioural Policy Team should be established that would design, test, review and implement policies informed by the knowledge of sciences that study human behaviour.



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