The role of «behavioural aspects»
for reaching net-zero emissions by 2050
EXECUTIVE SUMMARY REPORT

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Webinar on 16 February 2021, organized under the auspices of the
IEA Experts' Group on R&D Priority-setting and Evaluation (EGRD).
Hosted by the Swiss Federal Office of Energy

On 16 February 2021, EGRD organized a webinar on the role of «behavioural aspects» for reaching net-zero emissions by 2050 in cooperation with the Swiss Federal Office of Energy. Many countries have integrated net-zero emissions as their goal for 2050. While the resulting clean energy transition is certainly technically feasible, the challenge will be to design energy markets, regulations and policy measures that enable an efficient and inclusive transition. Behavioural aspects are of central importance for the successful implementation of these tasks.

These are challenging tasks indeed, and global ones. Which is why countries can immensely benefit from international exchange on advances in research, but also on international best practices for policy design.

The webinar thus addressed three main challenges in the field of behaviour change:

The design of policies that can drive behavioural change and public engagement and acceptance: with a focus on lessons learned from policies designed to drive behavioural change in societies for reducing greenhouse gas emissions, and how governments have mobilised support for these policies and what common denominators behind policy successes and failures are.

The role of citizens and communities in clean energy transitions: focuses on the thematic area of behavioural change in the context of governments' efforts to accelerate the clean energy transition. What is the role of the citizens and communities in deep mitigation scenarios and their potential in relation to governments and industry stakeholders for driving change? What are lessons learned from policies and activities that encourage citizens to use energy more efficiently?

The quantification and modelling of «behavioural change» in climate mitigation scenarios: focuses on approaches to accessing better data and to modelling people's behaviour in the context of deep decarbonisation pathways. What are lessons learned from social sciences and how can these be integrated into technology adoption and social diffusion modelling?

All presentations are available here.

Mechthild Wörsdörfer, Director of Sustainability, Technology and Outlooks, IEA, in her welcome speech underlined the importance to understand the role of citizens and communities for reaching net-zero emissions by 2050 and to integrate behavioural change into energy modelling. In line with an official request by COP26 Presidency, the IEA will on 18 May release a new Special report providing the first comprehensive energy-sector pathway towards global net-zero emissions by 2050. The discussion in the webinar could provide valuable input to understand the role of behaviour changes in both the short and long-term energy planning.

The CERT thematic discussion would also provide insight for the IEA's work related to the Global Commission on People-Centred Clean Energy Transitions, bringing ministers and key thinkers together to examine ways to ensure people are at the centre of clean energy transitions around the world. The Commission was convened by Dr. Fatih Birol, the IEA's Executive Director, and is headed by Prime Minister Mette Frederiksen of Denmark with IEA's support. The Commission will focus on efforts to enable citizens to benefit from the opportunities and navigate the disruptions in clean energy transitions. The aim is to identify concrete experience to share recommendations on how to enhance clean energy transitions through better inclusion of social dimensions.

Anne-Kathrin Faust, Manager of the Research Programme «Energy, Economy, Society» (EES) at the Swiss Federal Office of Energy, welcomed the audience in the name of Switzerland, who hosted the meeting.

Switzerland shares the net-zero emissions goal for 2050. The Swiss Federal Office of Energy has recently published the Energy Perspectives 2050+, which show possible technical pathways towards net-zero for Switzerland. But the transition will not only be a technical one. Major private investments and substantial changes in energy consumption will be needed and require behavioural changes. These points are among the research priorities of the EES Research Programme that focuses on economic, social, psychological and political issues throughout the energy sector supply chain.

Anne-Kathrin Faust stressed the high value international exchange on advances in research and best practices for policy design, in order to best include behavioural aspects for reaching net-zero emissions by 2050.

Birte Holst Jorgensen, Chair of the Experts' Group on R&D Priority-Setting and Evaluation (EGRD), told about the EGRD as an informal advisory group under the IEA's Committee on Research and Technology (CERT) and its role of supporting CERT delegates with advice on R&D priority-setting and the linkage to governmental policy objectives, methods and approaches for evaluation of R&D activities, and understanding of emerging and systematic R&D topics. Birte stressed the important role of social science and behavioural aspects for understanding how to reach net-zero emissions for 2050.

The first session focused on **the design of policies** that can drive behavioural change and public engagement and acceptance. **Toby Park** from The Behavioural Insights Team, United Kingdom, presented insights in behaviour-change from practitioners on how to design pro-environmental policy

in a way which maximises public acceptability. Key take-away messages for policy makers were the following:

- Framing matters. Many policies can be justified on multiple grounds (e.g. health and environmental and economic)
- Behaviour-change often comes first, so don't be too fixated on whether current attitudes «permit» intervention (within reason). Legitimate changes to the context (through policy or intervention, e.g. taxes, new technologies, social norms) will lead to new preferences.
- Help people help themselves. We often already have «second order» preferences (to be healthier, live in a more sustainable way) – even though, in the world as it currently is, we fail to live up to them and our short-term preferences prevail.
- Maintain liberty. Nudges can be effective, and choice does not always need to be restricted.
- Highlight the benefits of policy, and their effectiveness.
- Make policy with the public. Citizen assemblies & public dialogues really work.

April M. Salas, Tuck School of Business at Dartmouth College, United States, addressed the new set of actors pushing the design of policies due to inconsistencies in federal policies. In the United States, progressive state policies are driving the change (e.g. in New York, Maine, Colorado, California). Key messages were the following:

- In the US, renewable power capacity additions are outpacing fossil capacity additions, and coal is retiring at a more rapid rate than renewables increase: the clean energy transition is on its way.
- A new set of actors drives the transition: states, cities, towns, individuals and corporations see a whole new way to participate to and lead the transition.
- Companies are becoming more progressive, committing to science based targets and thus accelerating the pace of the transition.
- As an outlook, a broad electrification and decarbonisation policies and programs are expected to be launched government-wide, with a focus on promoting a socially equitable energy transition.

According to **Lars Klüver**, Danish Board of Technology, Denmark, social behaviour change depends on policy change – on the speed, the infrastructure, taxation, dismantling of barriers, investing in education and providing participation situations to engage with the large majority of citizens – and not just the «holy few». Klüver organised his presentation around four examples on how policy introduces unnecessary obstacles:

- Individualising collective responsibilities: people cannot be expected to change their behaviour if society does not deliver its part of the solution (example: the lack of provision of charging infrastructure for e-cars makes it difficult for citizens to decide to have an electric car)
- Failing to provide know-how: Citizens want to do the right things, but don't know how. Governments and policy makers should strengthen their efforts to provide information and public education.
- Ignoring the power of shared ownership: Local opposition to renewable energy projects (e.g.wind turbines, solar or biogas plants) decreases when citizens are given the opportunity to co-invest in and co-own the installations. This is especially true when local citizens are involved

from the very start of the project, a democratic community ownership. Stakeholder involvement and direct citizen participation foster social acceptance for renewable energy.

- Hesitating political behaviour: this is a bad role model for citizens.

The second session explored **the role of citizens and communities** in clean energy transitions. **Marlyne Sahakian**, Professor, University of Geneva, Switzerland, presented a social practice-based approach to energy sufficiency for supporting transformative change. She focused on how to engage everyday people in energy transitions. Prof Sahakian stressed that efficiency must be combined with sufficiency to achieve absolute reductions. As energy consumption is not meaningful in and of itself but rather in the services it provides, social practices are a possible locus for change, with the aim of achieving sustainable well-being. The presentation highlighted three key points to successfully engage citizens and communities to reduce energy demand:

- Problem framing matters: Recognize how energy relates to everyday life dynamics, including infrastructures and material things, but also skills and competencies, social norms and standards, and social relations.
- Normative aims matter: Rather than start from environmental constraints, engage with sustainable wellbeing as a normative aim – actively imagining, what will the good life look like in 2050 at net-zero emissions?
- Process matters: Imposed restrictions may be useful (e.g., covid-19), but forms of self-limitation that come about through participatory methods that encourage reflexivity are highly promising and could lead to sustainable change.

Roman Seidl, Leibniz University Hannover, Germany, presented results from a survey in Swiss cities on potential behavior change. The survey was conducted in 2017 and analyzed behavioural aspects of energy sufficiency in three cities. Potential for behavioural change was grouped according to different types of behaviour and different types of citizens. Candidates for a large reduction of energy consumption and greenhouse gas emissions such as a reduction of individual living space and long distance travel might be effective but will be hard to achieve. However, a «medium group of activities » which are neither trivial nor too hard to change and nonetheless have a substantial impact on energy consumption could be identified. These include aspects of a sharing economy, maintaining a lower room temperature or behavioural changes in everyday life.

Tor Håkon Jackson Inderberg, senior research fellow at the Fridtjof Nansen Institute in Oslo, Norway, gave an overview over INCLUDE, a research centre for socially inclusive energy transitions. The center aims at research to reduce social barriers on the path towards a clean energy transition and deals with topics such as social justice and participation in the transformation process. Examples of studies conducted by the research center include flexible energy consumption measures, wind power siting and municipalities as energy entrepreneurs. The presentation highlighted three main observations to be addressed by future research:

- Social factors largely seem to be outside of the energy sector's mandate.
- Individual and collective agency can represent significant barriers to, as well as facilitate, transition.
- Transitions have potential for creating significant justice issues if left unaddressed.

The third session focused on **the quantification and modelling** of «behavioural change» in climate mitigation scenarios. **Naoko Doi,** manager of the Energy Efficiency Group, Climate Change and Energy Efficiency Unit, the Institute of Energy Economics, Japan, presented a data survey on the potential for Japan's electricity savings by behavioural change. Her key messages were the following:

- A list of options for "Setsuden" – behavioural change for electricity peak savings – should be prepared based on local characteristics and good understanding over how appliances/technologies are utilized.
- Appropriate method of information provision should be tailored to meet regional characteristics.
- Estimation of potential for "Setsuden" – electricity savings at the demand side – can benefit the supply side as it can avoid unnecessary investment at generation, transmission, and distribution.
- The purposes of listing-up options for behavioural change involve 1) emergency preparedness, and 2) load levelling for economic purpose – both offer significant impacts on CO_2 emissions reduction.

How to model human behaviour in climate mitigation scenarios was the question **Charlie Wilson**, professor of Energy and Climate Change of the Tyndall Centre for Climate Change Research, United Kingdom, addressed in his presentation. His presentation focussed on modelling both behaviour and behavioural processes. The main modelling options presented were the following:

- While some behavioural phenomena like income and price responsiveness are quite well known and used in models implicitly, non-economic behavioural phenomena like social influence and social learning are typically not explicitly represented. Low-carbon behavioural change is often understood narrowly as «reducing activity» like deciding to live car-free. With a focus on the transport system, Wilson showed that «structure» – a mix of activities like the shift from cars to public transport – and «intensity» – the efficiency of each form of activity – are also important. This decomposition of energy demand into activity–structure–intensity is used for translating behaviour into models by assigning mitigation potentials from empirical studies.
- In addition, social and behavioural processes and dynamics can be modelled. As an example, we know that diffusion of innovations – like electric vehicles – is influenced by communication over time about the innovation among members of a social system. Meta-studies of evidence from empirical research provide quantitative estimates of social influence on vehicle choice. Wilson showed how this «social learning» effect could be modelled alongside technological learning. The interaction between these two types of learning help accelerate the dynamics of transition towards electric vehicles. Increased electric vehicle market shares can induce technological learning which reduces technology costs while social learning stimulates diffusion from early adopters to more risk-averse adopter groups. In this way, both types of learning process interact to stimulate each other.

Bas van Ruijven, Research Group Leader Sustainable Service Systems, IIASA, Austria, presented experiences with modelling behavioural change in Integrated Assessment Models. In his presentation, he showed that behavioural aspects can be introduced in various ways in these models (endogenously or exogenously, and explicitly or implicitly). Bas van Ruijven illustrated these possibilities with 3 examples: covid recovery scenarios, transport behaviour modelling, and the IPETS model. These examples provided the following important insights:

- Different narratives and characterisations of activities can lead to very heterogeneous scenarios.
- Considering heterogeneity in consumers (for example attitudes towards new technologies) does not change results of transport scenarios that much, when no behaviour change is introduced in the model. The behavioural component has a much larger impact on results, so heterogeneity and behaviour have to be considered simultaneously.
- Social learning should be considered, as static modelling based on current or past observed behaviour is the most conservative assumption to make, and probably too restrictive.
- The demand side has been neglected in modelling for a long time, even though it has a significant impact on energy transitions. This research gap is now more and more being addressed in research projects like the Energy Demand Changes Induced by Technological and Social Innovation (EDITS) project.

Key messages can be clustered in the following five Statements:

Statement 1: Role of citizens and communities: They must play an important role: addressing the energy and climate challenges needs more knowledge about behaviour and social practices and about how to integrate human and behavioural aspects into policies. International exchange on successful research and implementation is key. Policymakers can learn from citizens when designing and implementing policies. Citizens and communities must play an important role in governments net-zero emission plans to meet net-zero emission by 2050. A strong mobilisation of corporations, cities, municipalities and individuals is a prerequisite.

Statement 2: Public involvement and energy justice: Public engagement should be strived for as early as possible in order to design policies that successfully enable the clean energy transition. Particularly for energy infrastructure, participation should preferably already happen in the planning phase. An example from a Danish community showed that financial engagement of citizens in wind parks – as shareholders or co-owners via their energy service provider – could increase acceptance that much that even giant wind turbines in front of their housing areas were accepted. With such participation, the so-called not-in-my-back-yard (NIMBY) effect for infrastructure could be reduced significantly. Policymakers can also learn from citizens when designing and implementing policies – e.g. via citizen assemblies. This could help to prevent designing policies on household level that could lead to energy injustice. Energy (in)justice and distributional aspects have to be accounted for in the design of policies for a society to embrace the clean energy transition.

Statement 3: Incentives and multiple benefits: Encouraging better individual choices is not enough to achieve very ambitious targets. The role of energy in everyday life in relation to energy services and providers has to be better understood, to start a societal transition with the aim of achieving sustainable well-being. Engaging with citizens is key in this process: providing know-how about technologies, policies and environmental as well as societal benefits is important, but also actively demonstrating forms of change. Further, provide concrete options for action helps to incentivise individual change and to contribute to the energy transition. Emphasising multiple benefits for health, comfort, etc of the clean energy transition can help to accelerate change.

Statement 4: No one size fits all solution: Citizens are not a uniform group but highly heterogeneous. Factors such as age, gender, income and education influence attitudes and behaviour and have to be considered when designing policies. Further, findings from one country or among one social

group are not always transferable to others. Cultural differences matter. Culture, social norms, regulations and legal structures, existing infrastructures, climate conditions and context in general have to be considered when designing policies.

Statement 5: Data and modelling: Long-term energy scenarios are important planning tools and provide information for policy design. However, the «demand side» is often neglected when modelling. Behaviour and behaviour change processes have to be integrated in energy system modelling, either through modelling assumptions or internalized as parameters and relationships within the models. Both data and methodology are important for modelling behavioural change. There is a challenge in data gathering. But high quality data is essential to be able to represent behaviour in modelling.