SYNTHESIS OF THE ENABLE.EU PROJECT

Empowering consumers, enabling the energy transition

On the way towards the EU Energy Union, the question on the consumers' role in the energy transition becomes more and more appealing. By understanding what drives their energy choices, policymakers can make targeted decisions and influence the consumers to choose more sustainably.

Since 2016, researchers from 12 European organisations have put consumers' energy behaviours in the spotlight with the ENABLE.EU project. The results of numerous research interventions, including pan-European household survey, randomised controlled trials, interviews, participatory foresight exercises and econometric modelling, show that those behaviours are heavily shaped by individual and collective choices, related to the economic prerequisites, demographic and cultural factors, value systems, gender-based preferences, technical innovations and the efficiency of governance (see D8.5[1]).

Research was led in eleven countries that reflected the variety of European states, representing both larger and smaller countries, richer and poorer populations, those leading the energy transition and those lagging behind. The research included the European Union members Bulgaria, France, Germany, Hungary, Italy, Poland, Spain and the United Kingdom; European Economic Area member Norway, and Energy Community members Serbia and Ukraine.

All countries should pursue efforts to improve their energy governance

The ENABLE.EU research shows that consumers' (i.e. industry and households) **energy choices are shaped by factors associated with their home country, including its demography, geographical conditions, and not least, its regulatory regime**. The conclusions that stem out from the representative household survey conducted in eleven countries is that the situations differ from country to country and that the situations in each country differ from household to household (D4.1). No simple grouping can be made with respect to consumers' choices based on nationality alone. Even countries that some may consider to be in the lead of the energy transition, such as Germany, France or Norway are not homogenous. Paradoxically, the performance of a country in one climate goal can hinder it from performing in the other, as illustrated by Norwegian fully-renewable electricity sector that lowers the incentive to use the resources in a more efficient manner.

1. D8.5 is a long version of this synthesis. All shortcuts (DX.X) refer to project publications that are available at: www.enable-eu.com/downloads-and-deliverables/

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However, all the researched **countries have in common many governance challenges for the energy transition** (D5.2). Even countries considered as leaders in the transition have a large potential for improving their management of the transition through policy-making and implementation actions. Long-term, stable, reliable and strategic energy planning, support for bottom-up transition movements of local communities, full implementation of the EU climate and energy legislations, and higher and optimised human and financial resources in energy administration are just a few of the measures to enable the energy transition at national level (D5.3).

Moreover, the lower cost of clean technology can enhance energy transition and the bottom-up technological shifts. To this end, **the role of the SET Plan in policymaking could be strengthened**, since its current visibility for national stakeholders remains very limited (D5.4).

A significant, though nuanced, impact of economic factors

At the level of both industrial consumers and households, **economic factors remain central in energy choices. At the same time, in relation to the business, the thesis that a rise in energy prices (here through additional taxation) results in energy savings has been partially disproved in ENABLE.EU research** (D3.6). Based on the example of French manufacturers, the research has shown that an increase in energy price causes different reactions among the biggest companies, and small and medium-size enterprises (SMEs; see D3.3). Whereas the first may react with employment reductions, but at the same time innovate more and fill more patents; SMEs more often substitute energy for labour or capital, by i.a. increasing output and investment in end pipe technologies for the abatement of air, water and waste pollution. Some SMEs might also compensate for the higher energy costs by increasing the scale of production.

Among business, new entrants on the market are usually more energy efficient than incumbents, as shown by the study on emissions pathways in the German manufacturing sector (D3.6). Both firm-level energy efficiency improvements and structural changes in the economy are responsible for an overall decline in emissions but differ in importance across industries. The structural changes are especially pronounced for energy-intensive and export-oriented industries.

At the level of households, the impact of pricing is much more nuanced. **First, the research shows that a higher price of electricity does not necessarily lead to significant energy savings. Households may misperceive their energy costs** as research showed in Germany (D3.5), where present bias has influenced short-term energy consumption, but not long-term energy choices (e.g. investment in energy-efficient appliances). Moreover, neither households' true electricity price nor their expected electricity price can predict short-term and long-term energy choices.

Second, information provision tools have limited impact on reducing energy consumption. The consumers' values and attitudes are not stable and may change when confronted with extra costs of pro-environmental actions (D4.1). Too low energy prices may limit the will to save energy, making saving instructions ineffective, as illustrated by a randomised control trial held in Serbia

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(D3.4). Conversely, research in Bulgaria showed that feedback information does not necessarily induce energy savings. This could be explained by the high number of energy-poor households in the country who already consume energy more efficiently and are thus unable to save more by adjusting their behaviour. At the same time, they might not be able to make larger scale improvements to save energy without state support schemes or subsidies (D3.4).

Some information tools, however, may lead to short-term energy savings. One of the projects' experiments held with students in Germany has shown that **immediate billing has the potential of bringing energy savings** (D3.4). The opposition to the installation of smart meters that could give immediate information on energy consumption is still visible in many countries. An experiment in the United Kingdom proves that despite considerable opposition to uptake, **incentivising households to adopt smart meters may be cost-effective** and result in positive net-present-value benefits (D3.4).

Third, long-term investments in energy-efficient durable goods and refurbishment are reckoned to be of primary importance, especially for heating and cooling, where dwelling characteristics and insulation are the major factors influencing the energy consumption (D4.4, D4.5). Long-term investments are also crucial to reduce electricity consumption. Although in the short-term households can adopt behavioural electricity saving measures (such as switching lights off when leaving a room, avoiding using a dryer etc.), the impact of the latter is limited, and the information campaigns to support those actions bring limited results (D3.4). Thus, to cap the households' potential for energy conservation, it might be more beneficial to focus on their long-term commitments. To that end, however, **support schemes are desirable, although such mechanisms are still relatively underused** (D4.1). The research within ENABLE.EU analysed **governmental schemes** for household adoption of energy-saving technologies based on examples from the UK (D3.2). Economic factors, as well as geographical location, proved to be decisive for the uptake of these governmental schemes, though the combination of factors seemed to bring the highest savings return. Moreover, although mostly deprived households benefited from the scheme, the energy-saving potential was greater among more well-off households. Sufficient financial appeal was also a decisive factor for the uptake of loans for energy-saving measures.

Social, cultural and behavioural factors shape energy choices

The ENABLE.EU studies have generally confirmed the previous studies which highlighted the significance of social conventions in explaining energy choices (D2.2). Technological factors can re-shape social conventions. At the same time, demography, income level and age have the strongest influence on energy behaviours, though based on different motivations.

Low-carbon mobility habits of European commuters and their choice of transport mode stand out from all case studies as they remain quite similar across countries (D4.1). On the other side of the scale are heating and cooling practices where consumers' preferences play a much smaller role, and which primarily depend on the dwelling characteristics. Europeans show a variety of preferences towards the opti-

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mal home temperature, which could hypothetically be explained by different social conventions and perceptions of comfort. Although most of those who have such an option adjust the temperature in their house, research shows that the controllability of temperature is neither associated with lower temperature nor with higher energy savings (D4.4).

Interestingly, environmental awareness is usually not a decisive factor in pro-environmental actions (D4.1). In those cases where people decide to change their energy equipment or to produce their own energy, the energy choice might be resultant of the technological interest and knowledge rather than ecological concerns in the first place, like in the case of early adopters of solar PVs (D4.3).

Moreover, strategies like social comparison and the targeting of specific groups seem to positively influence energy conservation and to increase usage of support schemes, though it is the combination of several strategies (e.g. information provision and social norms) that can be particularly effective. Nonetheless, beyond the effectiveness of a specific strategy, the design of a policy should not neglect essential aspects, such as synergies between factors and strategies, implementation cost, timing, consistency with other policies and the institutional context.

More successful than the mere provision of information can be the implementation of behavioural interventions, e.g. in a form of trial periods that can break old habits. Electric car-sharing can be an example here, as it offers an inexpensive way to try a new, cleaner and more energy-efficient technology.

Low carbon mobility case study: Developing new habits

In terms of mobility, European consumers follow similar travel patterns, and the travel modes used vary more depending on the type of trip than across different countries. Moreover, the environmental impact does not appear to be a significant factor when choosing the travel mode; contrarily, the commuters' preferences play a significant role, together with socio-demographic and behavioural factors. At the same time, in those places where parking infrastructure is well developed and public transport is not, households will tend to prefer using private cars.

The additional part of the study was devoted to car-sharing, though at the stage of researching (2018), it was a phenomenon still in an early phase of development and varied significantly across the researched countries. For car-sharing to be a step towards low-carbon mobility, policies need to focus on services based on electric vehicles and linked to the public transport offer (D4.2).

From consumers to prosumers case study

The research has shown that although the number of households becoming prosumers through the production of electricity with solar panels is increasing, the potential for prosumption is still large. Despite a great variation in the contexts of becoming a prosumer among the samples from the different countries, the common profile of

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a prosumer can be identified with respect to demographic data, such as age, education, or income group. Currently, interviewed citizens and statistics mostly draw the profile of a prosumer as a middle-aged man with middle- to higher- education and income. To mainstream prosuming across Europe, raising financial and environmental motivations is crucial, and should be accompanied by support schemes and proper legislation.

Last but not least, when investigating the role of gender in the shift to prosuming, ENABLE.EU researchers have found that men more often drive the process to become prosumers in a household. This points out to potential in addressing and encouraging women to become more active in the households' shift to prosuming (D4.3).

Heating and cooling case study: Dwelling characteristics are vital

Energy consumers differ vastly across Europe in terms of their heating habits and preferences, and the heating sources used. However, the dwelling and household attributes remain the first factors defining the heating costs. Surprisingly, the research has shown that consumers' income level, daily routines or values affect the heating costs in a very limited way. Although the energy efficiency of older dwellings can be improved with proper insulation, the main challenge lies in the amount of buildings that need to be renovated and financial means. Moreover, as the heating challenges overlap in several countries, sets of measures can be defined to address them (D4.4). The ENABLE.EU project looked for measures that achieve a so-called "triple dividend", e.g. measures that reduce the carbon footprint, and have positive impacts in terms of costs and health for households (D4.5).

Modelling: No energy transition without citizens

Following the abovementioned case studies, a participatory foresight exercise was led, where citizens and experts could discuss the changes needed in behaviours and in policy to achieve a sustainable future (D6.3). Based on the issues defined in the participatory foresight, scenarios have been designed to quantitatively assess the role households can play in meeting the goals of the Energy Union and to analyse the wider economic implications in doing so (D7.2).

The results show that ambitious policies to empower and incentivise households could produce significant benefits to speed up the EU energy transition. However, further sustainable actions from other sectors of the economy will be required in order to meet the EU energy and climate goals. Even in the most ambitious scenarios, reductions in fossil fuel consumption and greenhouse gas emissions from changing household behaviours alone would not be sufficient to meet the EU 2030 targets. The simulation also shows that the transition can bring economic advantages to the EU economy.

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Combining different policy tools generates the largest potential for lasting sustainable behaviours

In general, ENABLE.EU research points to a sound conclusion - if individual energy behaviours are to be changed, a combination of actions, such as policies, financing, infrastructure development and social conventions, is required, and later adjusted accordingly. Though some policies (e.g. support schemes for long-term energy-saving appliances, or insulation of dwellings) have a high potential of immediate return by themselves, it is usually the combination of factors that can bring a positive "spill-over" effect in order to foster behaviours that are both new and lasting. Additionally, this combination is essential to avoid social impacts, e.g. rising energy prices affecting more strongly energy-poor households or industry transitions leading to job losses. Direct communication with citizens and practitioners, either in the form of forecasting exercises (D6.1-4), interviews or focus groups (D4.2-4) confirm the need for a holistic approach. A set of measures that policy-makers can adopt at EU, national and local level, are formulated in a policy brief based on this research to contribute to the energy transition[2].

2. The long version of policy recommendations (D8.6) will be available online at the end of October.

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ENABLE.EU Publications

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D2.2 Final comprehensive literature review setting the scene for the entire study
D3.1 Final report on comparative sociological analysis of the business enterprises' survey results
D3.2 Report on the drivers of household adoption of energy-saving technologies using the English Housing Survey
D3.3 Report on the impact of energy prices and other policies on energy-saving innovation and technology adoption in the manufacturing sector based on French company data
D3.4 Report on economic factors impacting individual short-term energy choices
D3.5 Report on economic factors impacting individual long-term energy choices
D3.6 Report on economic factors impacting collective/company energy choices
D4.1 Final report on comparative sociological analysis of the household survey results
D4.2 Synthesis report on the "low carbon mobility" case study
D4.3 Synthesis report on the "from consumer to prosumer" case study
D4.4 Synthesis report on the "heating & cooling" case study
D4.5 Policy paper with recommendations for "triple dividend" low carbon options in the field of heating and cooling
D4.6 Final report on social and cultural factors impacting energy choices and behaviour
D5.1 Report on governance barriers for the social acceptability of energy transition technologies and policies
D5.2 Nine national case study reports on governance barriers to the energy transition
D5.3 Synthesis case study report with policy recommendations
D5.4 Report on national policies, strategies, practices and non-technical bottlenecks in low-carbon energy technology implementation
D6.1 Transition visioning workshop report
D6.2 Transition practice backcasting workshop report
D6.3 Transition practice framework workshop report
D6.4 Participatory foresight evaluation report
D7.1 A working paper detailing the model development
D7.2 A working paper describing the scenarios and the implications of the scenarios for the Energy Union
D8.5 Written synthesis of ENABLE.EU' findings
D8.6 Written formulation of policy proposals (forthcoming)

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