Newsletter
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penny

Psychological, social and financial barriers to energy efficiency

The PENNY project

What is our aim?

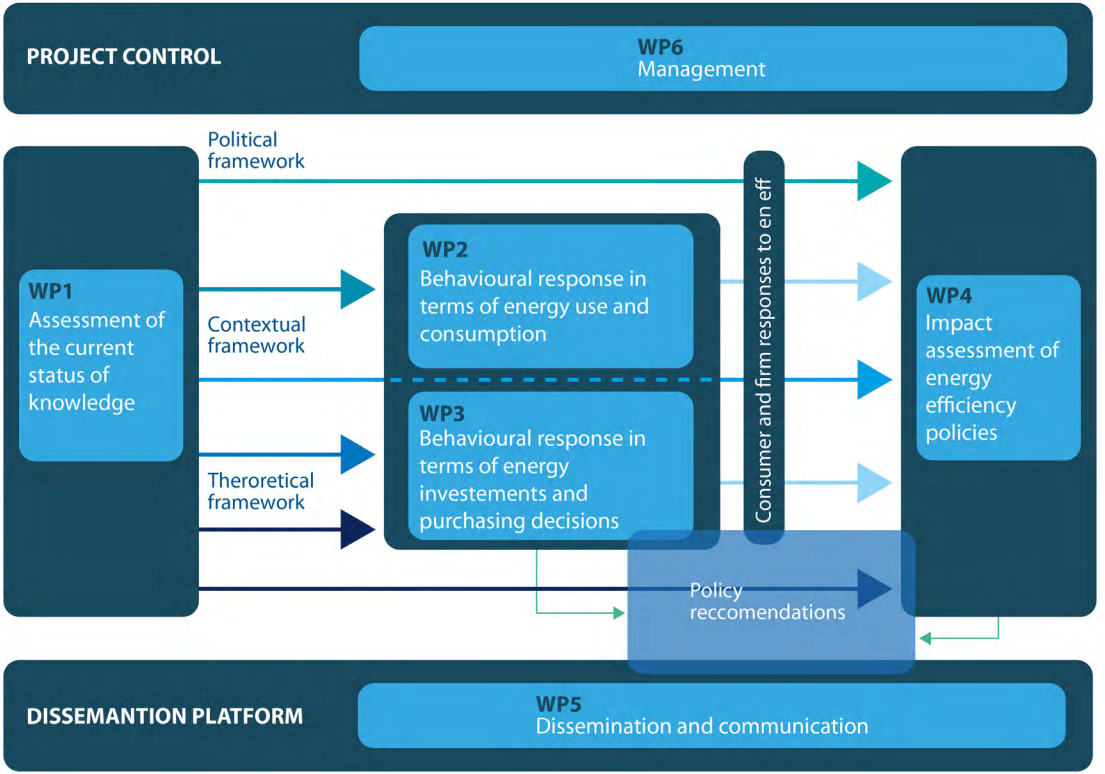
The primary goal of the project PENNY is to understand consumer behaviour in the domain of energy efficiency. The project aims to provide an empirical and numerical assessment of the psychological, social, economic and financial factors that influence energy efficiency in the residential and industry sectors.

What do we do?

In order to achieve such an ambitious goal, the following specific objectives will be addressed:

- **Assess the existing knowledge on behavioural factors for energy efficiency**. Applying the behavioural sciences principles, PENNY conducts a review of the existing behavioural programs and approaches in energy efficiency
- **Conduct a large sample survey** to gather information on residential electricity and gas consumption, the underlying socio-economic drivers and factors influencing acceptability/ effectiveness of energy policies
- **Conduct A/B tests in collaboration with energy industries**. A/B testing (also known as Randomized Controlled Trial, or RCT) is a the gold standard to test and refine policy interventions. PENNY tests various interventions in different countries aimed at influencing both energy use and purchasing decisions
- **Evaluate the importance of sociological aspects and institutional conditions for energy efficiency**. Given the importance of the institutional setting in fostering social response to energy efficiency policies, the project assesses the role of governance in a case study dealing with the renovation of buildings
- **Analyse the importance of energy literacy for energy efficiency**. PENNY collects information on energy and investment literacy, to provide a comparison in the different European countries and assess its effect on household level energy efficiency
- **Evaluate the broader implications of energy efficiency policies for the EU as well as for major world economies**. By means of energy-economy models, and by implementing the findings reached throughout the project into these models, PENNY provides improved estimates of the proposed EU 2030 policies. The aim is to understand to what extent the energy efficiency policies allows strengthening the pledges made in the Paris Climate agreement
- **Increase engagement and promote more sustainable consumption habits using IT applications**. PENNY designs IT platform back-end and awareness apps, based on gaming and gamification in collaboration with an energy utility
- **The project will address the two distinct decisions in the energy efficiency space: energy usage, and technology adoption**

Overview of main project activities and their interrelation



Highlights from the first year of PENNY

Assessment of energy-efficient policies and interventions

Various barriers to the adoption of energy efficiency technologies have been identified. Some are classified as external and other as internal barriers. External barriers capture underlying factors that limit the adoption of energy efficient technologies but can be easily changed. On the contrary, internal barriers have to do with factors cannot be changed or are difficult to change because they are related to preferences and predictable (ir) rational behavior. Because of external and internal barriers, consumers often fail to make energy efficiency choices. Policies and interventions are introduced to overcome these barriers. There are three types of policy instruments that have been used to influence energy efficiency by addressing both internal and external barriers. These are regulatory instruments (energy efficiency standards), economic and financial programs (grants and loan facilities, subsidies, tax deduction, tax credits, rebates and guarantees) and information-based instruments (energy audits, labelling, energy performance certificates, and "nudges", which represent well-crafted interventions that provide for example feedback, peer comparisons, injunctive norms, or that manipulate the default setting and the information metrics).

The review allows us to match the different barriers and the available policy options, taking into consideration their effectiveness.

		Barriers	Policy option
External barriers		Capital market failures	Grants and loan facilities, subsidies, tax deduction, tax credits, rebates, guarantees
		Information problems	Standards, energy performance certificates, grants and loan facilities, subsidies, tax deduction, tax credits, rebates, guarantees, energy audits, product labelling, feedback
		Financial and technological risks	Guarantees on energy efficient investments
Internal barriers	Preferences	Time Preference	Commitment and goal setting programs
		Risk Preference	Grants and loan facilities, subsidies, tax deduction, tax credits, rebates, guarantees, loss-framed messages, pricing
		Environmental Preference	Messages framed in terms of intrinsic goals, moral suasion and appeal to intrinsic values
	(Ir)rational behaviour	Reference Dependent Preference	Subsidies, tax credits, loss-framed messages
		Bounded Rationality	Standards, energy performance certificates, subsidies, tax credits, rebates, loans, tax, energy audits, product labelling, feedback, vivid signals such as thermal images, peer-comparison, information metrics and scales that match the problem-solving, provision of multiple translations of energy-efficiency metrics
		Rational Inattention	Standards, energy performance certificates, subsidies, tax credits, rebates, loans, tax, energy audits, product labelling, feedback
		Present Bias	Standards, energy performance certificates, subsidies, tax credits, rebates, loans, tax, commitment and goal setting programs
		Status Quo Bias	Set the default option that favours energy conservation to opt-out rather than opt-in

Want to learn more about our first results? The deliverable D 1.1 on "Report on assessment of energy-efficient policies and interventions" is online at: www.penny-project.eu/results/science

Understanding of the drivers of the acceptability of fossil energy saving measures

What determines the acceptability of fossil energy saving measures? More specifically, how do psychological, policy and country characteristics interact and affect the acceptability and effectiveness of fossil energy saving policies. Policies may vary in the behaviour that they target (behaviour change regarding energy use or technology investment). Policies vary in the revenue use (revenues go to the general taxes, to environmental causes or back to you). Policies may also differ in the extent to which they are coercive; policies can be either pull measures or push measures. How do all these policy characteristics influence the acceptability of the policy measure? And do different types of people differ in the extent to which they find the policy measures acceptable?

A first important step towards answering these questions has been taken. Through a conjoint analysis among 260 participants in the Netherlands, different policies to encourage fossil energy saving have been evaluated. The first results show that:
Acceptability of the policy measure is most strongly determined by:

- the type of behaviour the policy focuses on (for example policies may target behaviour change regarding energy use -e.g., lowering the thermostat or using energy at moments when the demand for energy is low- or technology investment - adoption of energy-efficiency appliances or use of renewables)

- then the revenue use (will the revenues go to the general taxes, to environmental causes or back to you?)
- lastly if the policy consists of a push or a pull measure (Policies may differ in the extent to which they are coercive; policies can be either pull measures -decreasing the costs of sustainable energy behaviour- or push measures -increasing the costs for unsustainable energy behaviour.

In particular:
Policies focused on technology investment, adoption of energy-efficiency appliances are positively and most strongly related to acceptability (+).
On the contrary, policies focused on behaviour change - switching energy use to times when demand is low or lowering the heater- were negatively related to acceptability (-).
HOWEVER:

- Behaviour change policies (e.g., lowering the heater) become more acceptable, the stronger people perceive the government as taking care of the environment (revenues go environmental causes)

Pull measures (decreasing the costs of sustainable energy behaviour) were positively related to acceptability (+), while push measures (increasing the costs for unsustainable energy behaviour) were negatively related to acceptability (-).
HOWEVER:

- Push measures become more acceptable, the stronger one's environmental self-identity and personal norms

Hidden motivations behind energy-saving and initiatives to reduce energy-use

Why do households start energy-saving? Why do households begin to isolate block of flats or install solar panels? What are the policies encouraging locals to invest in energy-saving? How energy-saving projects are planned a managed?
In-depth case-study in the city of Debrecen has been conducted by interviewing 25 households living in block of flats and almost 10 households living in family houses. Moreover, experts, project-developers, building contractors and representatives of the city council have been interviewed.
The first results of the analysis are the following:

- Energy policy and energy saving initiatives are centrally organized and do not take into account local specialities
- Insulation projects are initiated, planned, conducted and managed the same way: the administrator of the block organizes it together with building contractors and engineers
- Subsidies play an eminent role in initiatives to insulate the block and modernize the heating system. The possibility to reduce energy-use is a secondary, almost ide-effect for locals

Short outlook for 2018

PENNY will continue to understand which interventions better overcome the barriers to energy efficiency. A theoretical behavioural framework which can guide the modelling work foreseen in the project will be developed.

In the living labs set up in collaboration with the companies in Germany, Italy, Switzerland and the Netherlands we will test which interventions are most effective in reducing energy use and promoting the adoption of energy efficient appliances.

PENNY will develop an innovation that brings the classic gamification approach beyond what is usual in the energy efficiency domain. The idea is to experiment with an original mix of digital and non-digital games, which may better convey the stimuli towards efficient energy consumption behaviour.

Barriers to energy efficiency vary depending on the type of consumers but also across sectors and firm size. While large attentions is given to understanding energy efficient behaviour related to individuals, strong improvements may exist for firm as well. PENNY will quantitatively investigate determinants for investments in energy efficiency and their respective effects on energy consumption in the manufacturing industry.

Penny meetings and events during 2017

2nd Project Meeting
The second PENNY project meeting was hosted by the University of Munster, Germany on the 26-27 of September. During the second day of the meeting, a workshop on “Understanding Energy Efficiency” has been organized. The workshop is part of the project and aimed at collecting the perspective and priorities on energy efficiency of experts and stakeholders while presenting preliminary results of the project.

Side Event at the Bonn Climate Change Conference
Penny in collaboration with the Virtual Institute Smart Energy (VISE) organized a side event during the COP23 in Bonn on “Energy Savings in Housing” on the 6th of November. The event sheds light on energy saving behaviour of households, applying insights from behavioural sciences, businesses and consumer advice associations. It demonstrates chances and limitations of strategies for lowering energy demand and fostering energy efficiency.

Upcoming PENNY meetings

3rd Project Meeting
11-13 June 2018
Groningen, the Netherlands

PENNY consortium

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cepe Centre for Energy Policy and Economics Swiss Federal Institutes of Technology	Swiss Federal Institute of Technology Zurich (ETH Zurich), Switzerland
Westfälische Wilhelms-Universität Münster	Westfälische Wilhelms-Universität Münster (WWU), Germany
university of groningen	University of Groningen (RUG), the Netherlands
University of Debrecen Debreceni Egyetem	University of Debrecen (UD), Hungary
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