ENERGISE

EUROPEAN NETWORK FOR RESEARCH, GOOD PRACTICE AND INNOVATION FOR SUSTAINABLE ENERGY

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CROATIA

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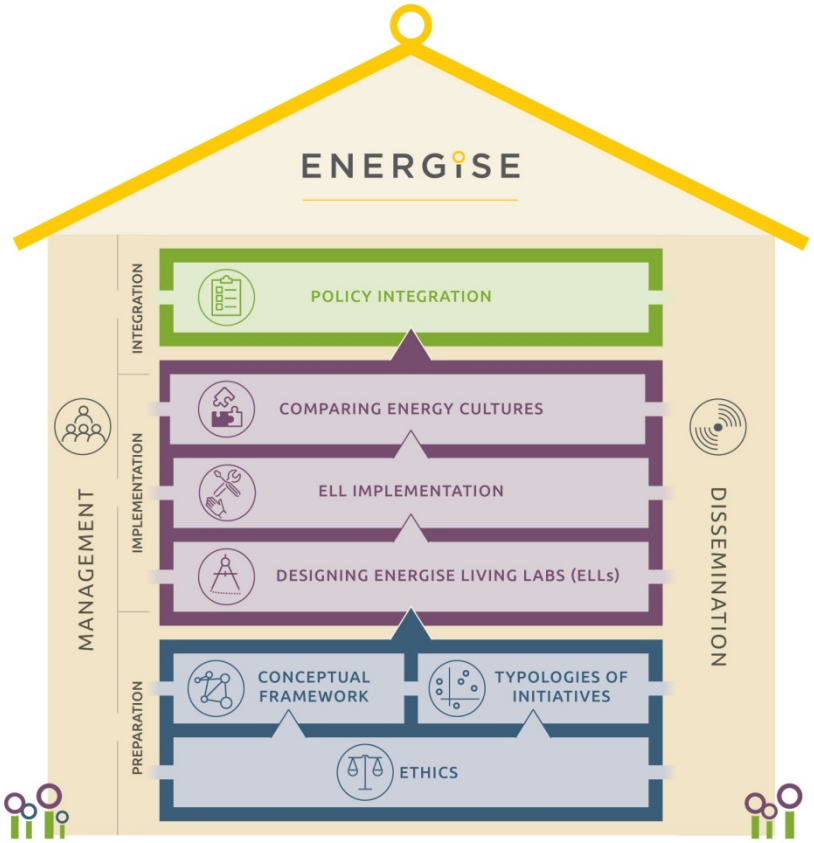
ENERGISE PROJECT

ENERGISE is an innovative pan-European research initiative to achieve a greater scientific understanding of the social and cultural influences on energy consumption. Funded under the EU Horizon 2020 programme for three years (2016-2019), ENERGISE develops, tests and assesses options for a bottom-up transformation of energy use in households and communities across Europe. ENERGISE's primary objectives are to:

- **Develop an innovative framework** to evaluate energy initiatives, taking into account existing social practices and cultures that affect energy consumption.
- **Assess and compare the impact** of European energy consumption reduction initiatives.
- **Advance the use of Living Lab approaches** for researching and transforming energy-related practice cultures.
- **Produce new research-led insights** into the role of household routines and changes to those routines towards more sustainable energy.
- **Encourage positive interaction** between actors from society, the policy arena and industry.
- **Effectively transfer** project outputs towards the implementation of the European Energy Union.



INTRODUCTION

This document is one of 30 national briefs, demonstrating key aspects of national energy supply and demand dynamics. Each brief is comprised of five sections:

Section 1 summarises the energy profile of the country. The section provides basic quantitative information of demand demographics and usage profiles, market trends and energy supply profiles, as well as qualitative reflections on current national energy policy. ***For all the briefs, the quantitative information is derived from ec.europa.eu/eurostat (2015 data), eea.europe.eu (2015 data), and climate-zone.com, unless otherwise stated.***[1] The qualitative reflections are based on a literature reviews and desk-research. References for the literature review and the desk-research are provided in footnotes or in section five.

Section 2 summarises the nationally based sustainable energy consumption initiatives (SECIs) that have been identified as part of ENERGISE WP2 framework (Jensen, 2017). Each SECI has been coded according to the Problem Framing Typology developed in ENERGISE WP2 (Jensen et al, 2017b).

Section 3 provides a *good practice* example of a national SECI that corresponds to category 3: “Changes in Everyday Life” or 4: “Changes in Complex Interactions” in the Problem Framing Typology. Please refer to Jensen (2017) and Jensen et al (2017b) for more information on the way the data for the good practice SECIs has been researched and documented.

Section 4 provides a brief summary of major nationally specific trends and their implication for energy consumption policies.

Section 5 provides an overview of sources used for qualitative assessments, and can be used as inspiration for further reading.

The national briefs provide contextual socio-material information for the further work to be carried out in Work Package 4, Work Package 5 and Work Package 6 in ENERGISE.

1.1 WP2: TYPOLOGIES OF ENERGY INITIATIVES

ENERGISE WP2 is a systematic criteria-guided review and classification of existing sustainable energy consumption initiatives from 30 European countries (EU-28, Switzerland, and Norway), which provides a comprehensive European database of energy initiatives involving households, and related typologies of sustainable energy consumption initiatives. This extensive synthesizing work guides the selection of Living Lab design elements for ENERGISE and future energy consumption research, policy and practice.

[1] Some piecharts will be empty, as no information is available.

This is done in order to

- Construct innovative typologies of sustainable energy consumption initiatives that can inform further research and action.
- Identify key success factors and related indicators, focusing on individual-level, collective, organizational, institutional and societal aspects of energy consumption, which will inform subsequent WP 3 (Designing Living Labs), WP 4 (ENERGISE Living Labs) and WP 5 (Capturing Energy Cultures).
- Progress the goals of the European Energy Union by creating a publicly archived open access dataset of sustainable energy initiatives across 30 countries in Europe.

Suggested further reading:

Jensen (2017) *Identification of key success factors and related indicators.* ENERGISE – European Network for Research, Good Practice and Innovation for Sustainable Energy, Grant Agreement No. 727642, Deliverable 2.2.

Jensen et al. (2017a) *Establishment of a comprehensive open access dataset of sustainable energy consumption programmes and Interventions.* ENERGISE – European Network for Research, Good Practice and Innovation for Sustainable Energy, Grant Agreement No. 727642, Deliverable 2.3.

Jensen et al. (2017b) *Constructions of typologies of sustainable energy consumption initiatives (SECIs).* ENERGISE – European Network for Research, Good Practice and Innovation for Sustainable Energy, Grant Agreement No. 727642, Deliverable 2.4.

Sources of quantitative statistics (unless otherwise stated):

Climate data:
http://www.climate-zone.com/continent/europe/

Demography data:
http://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing

http://ec.europa.eu/eurostat/statistics-explained/index.php/Educational_attainment_statistics

Dwelling type data:
http://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Distribution_of_population_by_dwelling_type,_2015_(%25_of_population)_YB17.png

Energy demand and supply quantitative data:
http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_consumption_in_households

Final energy consumption of households per capita data: https://www.eea.europa.eu/airs/2017/resource-efficiency-and-low-carbon-economy/household-energy-consumption

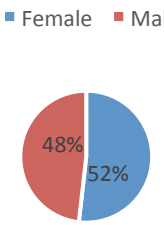
MWh conversion data:
https://www.unitjuggler.com/convert-energy-from-toe-to-MWh.html?val=893.9

CROATIA

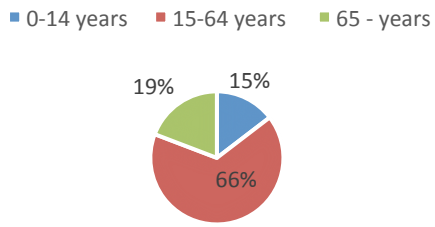
Author: Tomislav Tkalec

DEMOGRAPHY, ENERGY CONSUMPTION AND ENERGY SUPPLY

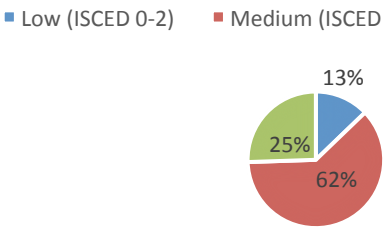
GENDER PROFILE



AGE PROFILE (2016)

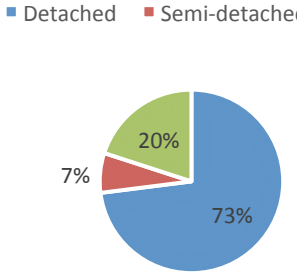


EDUCATIONAL PROFILE (25-54 Y, 2016)

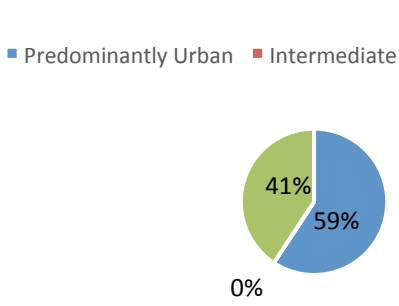


CLIMATE: Mediterranean and continental; continental climate predominant with hot summers and cold winters; mild winters, dry summers along coast

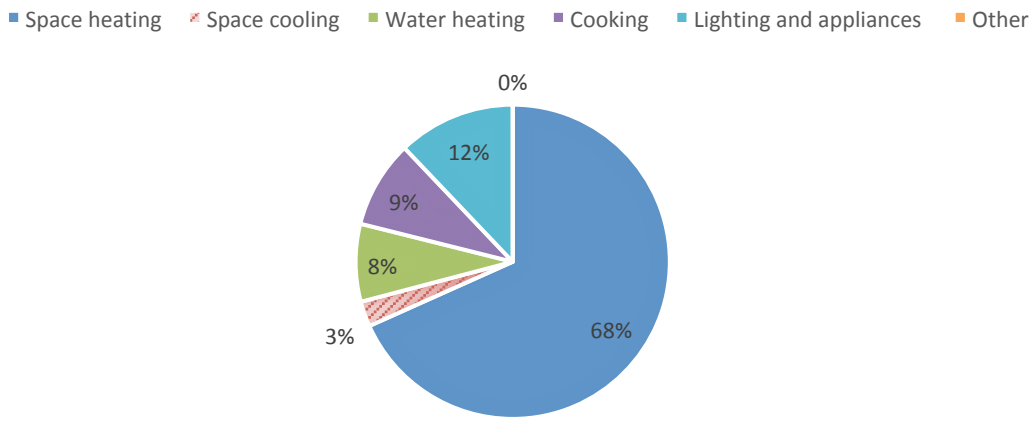
COMMON DWELLING TYPES (2015)



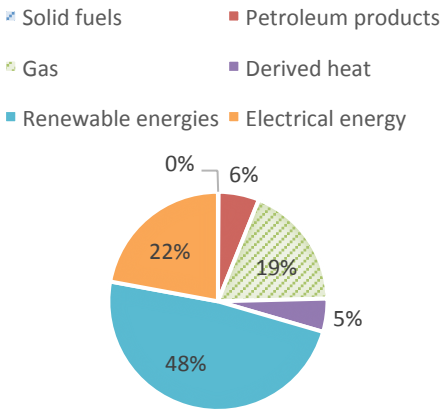
URBAN - RURAL DISTRIBUTION (WORLD BANK)



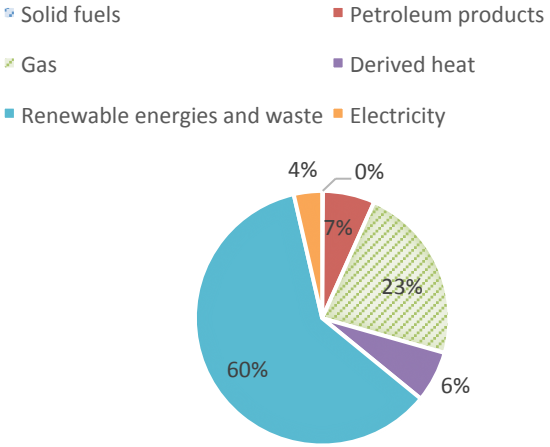
RESIDENTIAL FINAL ENERGY CONSUMPTION BY TYPE OF END-USE (2015)



SHARE OF FUELS IN THE FINAL ENERGY CONSUMPTION IN THE RESIDENTIAL SECTOR (2015)



SHARE OF FUELS IN FINAL ENERGY CONSUMPTION - RESIDENTIAL SPACE HEATING (2015)



FINAL ENERGY CONSUMPTION FOR HOUSEHOLDS, PR CAPITA (2015)

6.683 MWh

ENERGY SYSTEM AND ENERGY POLICY TRENDS

Energy system

Croatia imports about 50 % of the total of about 350 PJ (petajoules) of energy consumed annually. It imports 80 % of its oil needs, 40 % of gas, 35 % of electricity, and 100 % of coal needs. As a member of the European Union (EU) since July 1, 2013, Croatia has adjusted its energy sector regulations and development plans to enable smooth integration into the European energy market and to ensure diversified and sustainable supply of energy resources and improved energy efficiency.

Croatia satisfies its electricity needs largely from hydro and thermal power plants, and partly from the Krško NPP, which is co-owned by Croatian and Slovenian state-owned power companies. Hrvatska elektroprivreda (HEP) is the national energy company charged with production, transmission and distribution of electricity, and although the electricity market is liberalised, HEP still have more than an 80% share in it.

Total installed capacity of generating objects built in Croatia amounts to 3745 MW, 2079 MW of which is hydro-power's share, and 1666 MW comes from thermal power plants. There are 25 hydroelectric power plants and 7 thermal power stations, 3 of which also generate heat for industry and heating in cities. Also, 338 MW is available from the co-owned Krško nuclear power plant, and 210 MW from Plomin 2 coal power plant.

In 2014, domestic production amounted to 12.182 GWh, which was 67.9% of total domestic demand. The remaining 32.1% was covered through trade. Domestic electricity is produced mainly from hydro-power (68,3%) and coal (17,5%), gas and oil cover for 6,5%, and other renewables (biomass, solar, wind) for 6,7% of the generated electricity. Total consumption is around 18.000 GWh.

Source:
http://www.cigre.org/var/cigre/storage/original/application/0f9a2e00204472e1a8c1ecb425e39fba.pdf

Particular socio-material aspects that influence energy consumption

Housing stock is old and mostly energy inefficient. However, the improvement in insulation for buildings are usually concentrated to the better off parts of the population, while the less well-off parts of society are not able to invest into improving energy efficiency of their dwellings.

For the reason of low energy efficiency of buildings in combination with high percentage of ownership of housing stock (more than 95% people live in their own flat/house) and low incomes there is significant percentage of households living in energy poverty. In remote parts of the country, people live even in severe energy poverty (without access to electricity grid).

Because of the warm climate and climate change there is stronger need for energy for cooling in the coastal regions. In the summer time these regions are also full of tourists, which produces more pressure on various resources, especially energy and water.

Current Trends in Energy Policy

Implementation of the Energy Strategy adopted in 2009 has not been quick, primarily due to the 2009-2015 economic recession in Croatia. The new coalition government elected in October 2016 reassigned responsibility for the energy sector from the Ministry of Economy, Entrepreneurship, and Crafts to a newly-created Ministry of Environmental Protection and Energy. The new Minister announced a revision of the Energy Strategy, switching its focus to environmentally friendly technologies (especially solar) that would be based on a sustainable feed-in tariff system. The Minister also expressed support for a few planned major projects, including a floating LNG terminal at the Island of Krk, the Ionian Adriatic Pipeline, and a system of hydro-power plants on the Sava River. However, the governing coalition broke down in May 2017 and the revision of the strategy

and the implementation of the new projects is likely to slow down. Currently there is no financial support scheme for RES electricity generation.

Source: https://www.export.gov/article?id=Croatia-Energy

Trends in national campaigns

National campaigns are run mainly through national Environmental Protection and Energy Efficiency Funds. The fund has programs and financial aids for EE measures (energy refurbishment of buildings, replacement of old inefficient heating systems, waste management, air pollution, subsidies for electric cars). The fund's target groups are households, municipalities, regional authorities, companies and other institutions and organisations.

The fund is also active in campaigns for cleaner air that is targeting air pollution from wood burning. Other non-governmental stakeholders and actors run campaigns on RES projects, civil society has campaigns on community (RES) projects and energy cooperatives, energy efficiency, energy poverty and sustainable mobility. There is especially a strong push from the civil society on the topic of energy cooperatives, and also on energy poverty.

Civil society is also active in campaigns against fossil fuels (Plomin and Ploče coal power plants), drilling for oil and gas in the Adriatic sea, LNG terminal on Island of Krk and nuclear power plants in neighbouring countries.

OVERVIEW OF NATIONAL SECIS

Below please find a list of Croatian SECIs that have been researched and documented through WP2 of ENERGISE. The SECIs are researched, selected and documented based on a set of requirements and research interests (please see Jensen 2017 for details). *The list should not be regarded as exhaustive or representative of all kinds of energy initiatives carried out in the country.*

REACH	Changes in Complex Interactions
START2ACT	Changes in Everyday Life Situations
FIESTA	Changes in Technology
Instigating Simple Energy Efficient Behavioural Practices in Schools (FLICK THE SWITCH)	Changes in Individuals' Behaviour
Common appliance policy – All for one, One for all – Energy Labels (COMEON LABELS)	Changes in Individuals' Behaviour
European Network of Information Centres promoting Energy Sustainability and CO2 reduction among local COMmunities (ENESCOM)	Changes in Individuals' Behaviour

More biking in small and medium sized towns of Central and Eastern Europe by 2020 (MOBILE2020)	 Changes in Everyday Life Situations
Solar maping (Solarno mapiranje)	 Changes in Technology
South East Europe Sustainabile Energy Policy (SEE SEP)	 Changes in Complex Interactions
Awareness and education in rebewable energy sources (AWERES)	 Changes in Individuals' Behaviour
Local Eneregy Dialog (LED)	 Changes in Complex Interactions
Wit knowledge to a warm home (Znanjem do toplog doma)	 Changes in Complex Interactions
Citizens4EnergyTransition	 Changes in Individuals' Behaviour
Laboratory for "do-it-yourself" sustainability	 Changes in Everyday Life Situations
School of Sustainability	 Changes in Complex Interactions
Energy Cooperative "Island Krk" (Energetska zadruga "Otok Krk")	 Changes in Complex Interactions
Energy Cooperative Lug (Energetska kooperativa Lug)	 Changes in Complex Interactions
Energy Cooperative Sunny Hvar (Energetska zadruga Sunčani Hvar)	 Changes in Complex Interactions
Energy Cooperative Kaštela (Energetska zadruga Kaštela)	 Changes in Complex Interactions
Energy advisers for energy poor households	 Changes in Individuals' Behaviour
Solar energy for households in rural areas	 Changes in Technology
Promotion of Energy Efficiency in Croatia	 Changes in Individuals' Behaviour

Project Energy Cooperatives	 Changes in Complex Interactions
CITIZENERGY	 Changes in Individuals' Behaviour
Energy efficiency advisors for low-income households	 Changes in Individuals' Behaviour
Wise Power - Fostering Social Acceptance for Wind Power	 Changes in Complex Interactions
Days of Passive House in Croatia	 Changes in Technology
EUpeR - With energy efficiency against energy poverty	 Changes in Individuals' Behaviour
SUSTAINCO (Sustainable energy for rural communities)	 Changes in Individuals' Behaviour
Video - Manual for energy efficiency	 Changes in Individuals' Behaviour
Electricity supply	 Changes in Individuals' Behaviour
Energy refurbishment of family houses and multiapartment buildings	 Changes in Individuals' Behaviour
Co-financing of purchase of energy efficient A+++ domestic appliances	 Changes in Individuals' Behaviour
National portal for energy efficieny: Advices for sustainable home	 Changes in Individuals' Behaviour
Kids and wind	 Changes in Everyday Life Situations

'GOOD PRACTICE' EXAMPLE OF CROATIAN SECI

Project Energy Cooperatives

Introduction: Increasing renewable use by promotion of knowledge about current possibilities and models of energy cooperatives.

Brief Description

The main goal of this project is to promote renewable energy by promoting energy cooperatives and ownership by local communities and citizens. The project was run by UNDP Croatia and included activities such as workshops for citizens, where they would gain knowledge about energy cooperatives and how to form or start your own, writing a manual on how to form and start an energy cooperative in Croatia, implementing 10 workshops for citizens about energy cooperatives.

Contextualization

Energy cooperatives are associations of local people that have joined their financial and material resources in developing locally owned renewable energy facilities. In this sense, renewable energy sources are becoming a backbone of sustainable development by addressing not only energy aspects but also economic, social and environmental aspects of community development.

Aims and objectives

The main goal of this project is to promote renewable energy by promoting energy cooperatives and ownership by local communities and citizens. Specific objectives of the project is to:

- develop a knowledge base on existing energy cooperative models in Germany, Denmark, Austria and other countries that have developed energy cooperatives tradition,
- organise 10 local seminars on the topic,
- write a manual on setting up an energy cooperative in Croatia,
- pilot between one and three selected energy cooperatives that will later on serve as models for other potential cooperatives to follow.

Methods for intervention

The project will inform the general public about cooperatives through participating in related conferences and developing a project web site. Producing a manual on developing energy cooperatives in Croatia will enable us to educate both the policymakers and prospective energy cooperatives members. Apart from this, future cooperative trainers will be educated. Disseminating knowledge about energy cooperatives and their benefits is crucial for achieving the overall project objective.

Besides targeting the general public, the project will organise 10 seminars for potential future energy cooperative members. This will be done throughout Croatia, in locations where an initial potential for the development of cooperatives exists. The seminars will target the core beneficiaries of the project - prospective energy cooperative members - with the aim of familiarising them with benefits of developing cooperatives. These events

will also foster a dialogue between multiple project stakeholders. Following this, three pilot cooperatives will be selected and their activities will be supported.

Steps of implementation

This project will educate the general public and stakeholders about energy cooperatives and their benefits. Ten local seminars, aimed at specific target groups – such as potential future cooperatives members – will be organised. The seminars will gather members of the financial industry, technology providers, policymakers and locals. During these events the project hopes to foster a collaborative dialogue between these groups of stakeholders. Following this, three cooperatives will be selected and developed further with the aid of UNDP Croatia and project partners. The cooperatives will receive legal, financial and technical support from the project team. In specific, local renewable energy potentials will be evaluated using the Material Flow Analysis methodology. This is a resource management methodology aimed at investigating the best renewable energy projects in a region. After conducting field research, multiple or single projects are evaluated in terms of their pre-feasibility.

Results/outcomes

The project helped in development of 3 energy cooperatives, educating the locals, policy makers, members of the financial community and other stakeholders about energy cooperatives through 10 seminars across Croatia, and publishing a manual for setting up cooperatives.

The role of the households

Households can become members of energy cooperatives and were addressed in this way. In that way they can be engaged in local development and changes that address economic, social and environmental aspects of the traditional energy systems. When locals invest financial resources into such projects, greater added value is circulated within the community. Locals' skills and work is employed more, while projects are developed to address local environmental issues.

Location

Republic of Croatia

The physical/technological aspects of the initiative:

The initiative was focused on developing or bringing in new modes of organising and operating – in the form of energy cooperatives, rather than on technical and physical aspects of the energy topic. Technical aspect was included in form of technical knowledge support for three selected cooperatives.

Shared understandings related to initiative:

Shared understanding of included actors is crucial for the success of this initiative. The economic potential of RES-cooperatives is in locally-owned investments, creation of new jobs and new income for local communities; it brings more energy stability (less energy-import) from locally-available sources, at a price that could be adjusted if necessary, to prevent energy poverty which comes with high prices of uncontrollable and/or imported energy.

Source:

http://www.hr.undp.org/content/croatia/en/home/operations/projects/environment_and_energy/energy_cooperatives/

CONCLUDING REMARKS AND POLICY IMPLICATIONS

Croatia imports about 50% of the total energy consumed annually. Majority of electricity generation comes from hydropower, followed by thermal power plants and nuclear. Trends in Croatian energy policy include reflection on energy transition, with focus on environmentally friendly technologies. But quite some number of big ‘dirty’ projects, including a LNG terminal on the coastline, new gas pipelines, and new coal power plants are in different stages of their development. Currently there is also no support scheme for RES deployment. For that reason energy initiatives, run by non-governmental actors, have started searching and implementing innovative financial mechanisms for new RES projects, among others energy cooperative models. That is also the focus of the highlighted SECI. Socio-material aspects in Croatia include old, inefficient housing stock, problem of energy poverty and high need for cooling in the summer in the coastal regions. National campaigns are focusing on these problems, especially on various energy efficiency measures, governmental campaigns also on air pollution, resulting from wood burning for heating. Other actors are focusing also on RES projects, community energy projects and energy poverty. Especially on the latter two, there is a strong push from civil society and non-governmental actors, as these topics are mostly neglected by the national authorities.

The majority of identified SECIs focus on changes in individuals' behaviour (16), quite a high number of them focus on changes in complex interactions (11), while initiatives that focus on changes in technology and changes in everyday life situations are not that common (4 of each). SECIs are run at a cross-national (12) and national level (10), 7 of them on regional and 5 on local level. Within the identified SECIs, governmental programs are rather scarce; an important part of the action comes from EU projects and environmental NGOs. Surprisingly, there are 5 local initiatives that originated bottom-up, either by the citizens themselves or by the whole communities. Actions are mostly not targeted to specific socio-demographic groups, although there is quite high number of initiatives targeting low-income households, which shows that energy poverty is recognised as an important issue by some of the actors. The SECI in focus shows an example for increasing renewable use by promotion of knowledge about current possibilities and models of energy cooperatives. It focuses on building of energy communities and inclusion of citizens and communities into cooperative or community owned local RES projects. This good practice example shows relevant stakeholders how they can start their own community energy initiative and educates these stakeholders, communities and policy-makers on the topic of community energy and energy cooperatives. It brings in new (but in a way old or forgotten) mode of organising and operating – cooperatives – to the energy sector, which is dominated by big commercial enterprises. It also shows how these initiatives can create new jobs and how local RES facilities can become a backbone of sustainable development in the community, by addressing not only energy aspects but also economic, social and environmental aspects of community development. This is a lesson to be learned, and it is also important for the decision-makers, as it shows new possibilities for part of the energy sector and inclusion of citizens, while at the same time it provides decision-makers with proposals for policy changes.