ENERGISE

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

Project acronym:	ENERGISE
Title:	European Network for Research, Good Practice and Innovation for Sustainable Energy
Grant Agreement number:	727642

COUNTRY REPORT:

GREECE

EXTRACTED FROM D2.5: PRODUCTION OF 30 NATIONAL SUMMARY BRIEFS

Deliverable 2.5 description:	30 national summary briefs of national energy supply and demand.
Lead parties for deliverable:	AAU
Deliverable 2.5 authors:	Charlotte Jensen, Inge Røpke (AAU), Gary Goggins, Frances Fahy, Eimear Heaslip (NUIG), Marko Hajdinjak, Desislava Asenova (ARC Fund), Mathias Claeys Bouuaert, Tomislav Tkalec, Lidija Živčič, Renda Bellmallem , Kristjan Čoklc, Camille Gomes (FOCUS), Edina Vadovics, Kristóf Vadovics, Jozsef Slezak, Gergő Horváth, Szandra Szomor (GDI), Marfuga Iskandarova, Audley Genus (KU), Eoin Grealis, Annika Musch, Henrike Rau (LMU), Eva Heiskanen, Senja Laakso, Jari Kolehmainen, Eeva-Lotta Apajalathi (UH), Julia Backhaus (UM), Laure Dobigny, Marlyne Sahakian (UNIGE).
Cite as:	Jensen et al. (2018) *30 national summary briefs of national energy supply and demand.* ENERGISE – European Network for Research, Good Practice and Innovation for Sustainable Energy, Grant Agreement No. 727642, Deliverable 2.5.

This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No 727642.

ENERGISE partners	Logo
National University of Ireland, Galway (NUIG), University Road, Galway, Ireland	
Aalborg Universitet (AAU), Fredrik Bajers Vej 5, Aalborg 9220, Denmark	
Kingston University Higher Education Corporation (Kingston), River House High Street 53-57, Kingston Upon Thames KT1 1LQ, United Kingdom	
Universiteit Maastricht (UM), Minderbroedersberg 4-6, Maastricht 6200 MD, Netherlands	
Université de Genève (UNIGE), 24 rue du Général-Dufour, 1211 Genève 4, Switzerland	
GreenDependent Institute (GDI), Eva utca 4, Godollo 2100, Hungary	
Ludwig-Maximilians-Universitaet Muenchen (LMU Muenchen), Geschwister-Scholl-Platz 1, Muenchen 80539, Germany	
Focus Drustvo Za Sonaraven Razvoj (FOCUS), Maurerjeva Ulica 7, Ljubljana 1000, Slovenia	
Applied Research and Communications Fund (ARC Fund), Alexander Zhendov Street 5, Sofia 1113, Bulgaria	
Helsingin Yliopisto (UH), Yliopistonkatu 4, Helsingin Yliopisto 00014, Finland	

LEGAL NOTICE

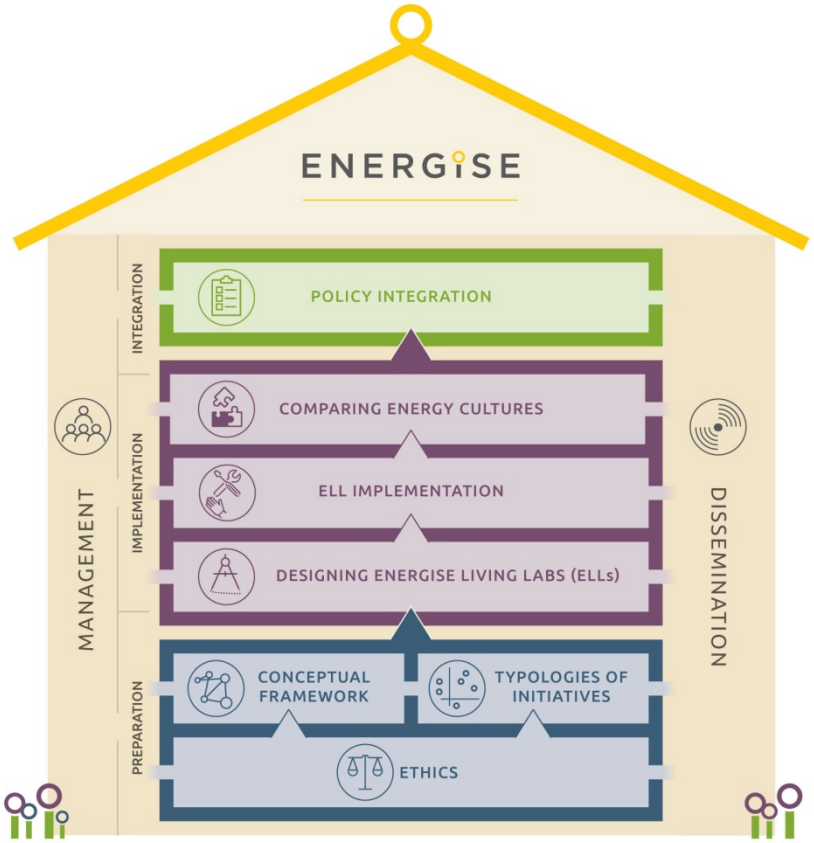
DISCLAIMER

ENERGISE is a Horizon 2020 project funded by the European Commission. The views and opinions expressed in this publication are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Commission. Neither the INEA nor the European Commission is responsible for any use that may be made of the information contained therein.

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

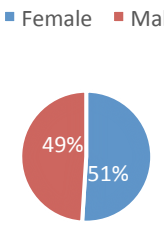
MWh conversion data:
https://www.unitjuggler.com/convert-energy-from-toe-to-MWh.html?val=893.9

GREECE

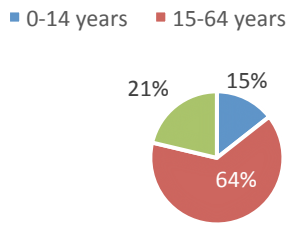
Authors: Marko Hajdinjak, Desislava Asenova

DEMOGRAPHY, ENERGY CONSUMPTION AND ENERGY SUPPLY

GENDER PROFILE

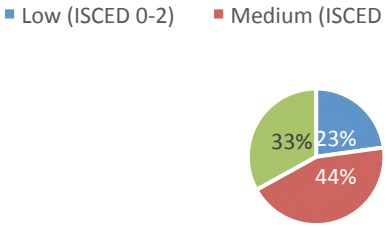


AGE PROFILE (2016)

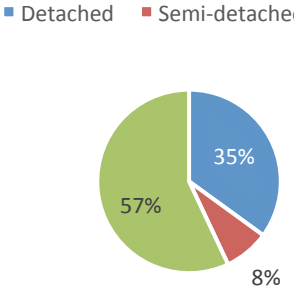


CLIMATE: Temperate, mild and wet winters, hot and dry summers

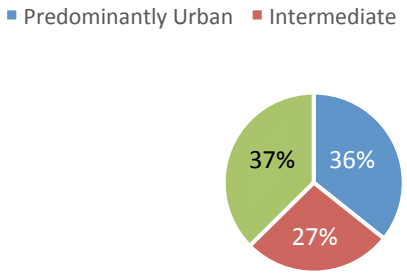
EDUCATIONAL PROFILE (25-54 Y, 2016)



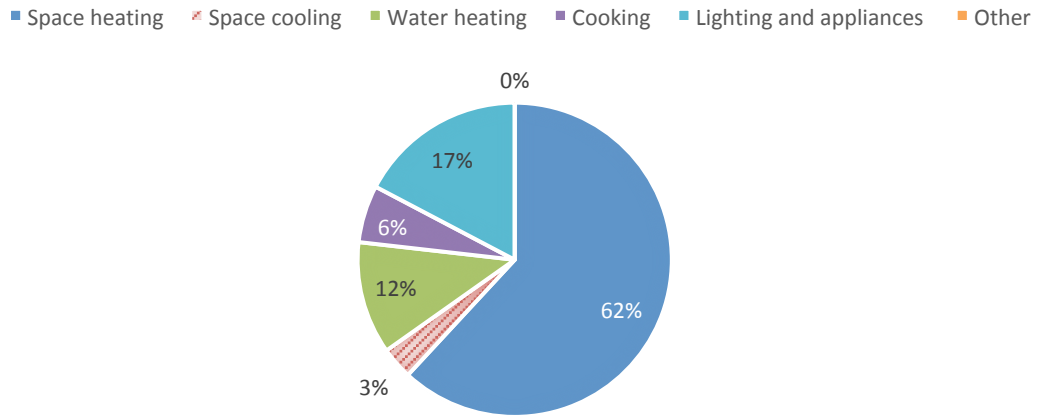
COMMON DWELLING TYPES (2015)



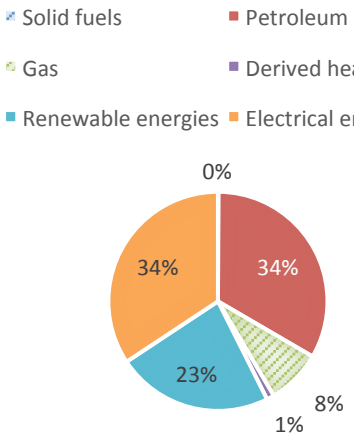
URBAN - RURAL DISTRIBUTION (OECD)



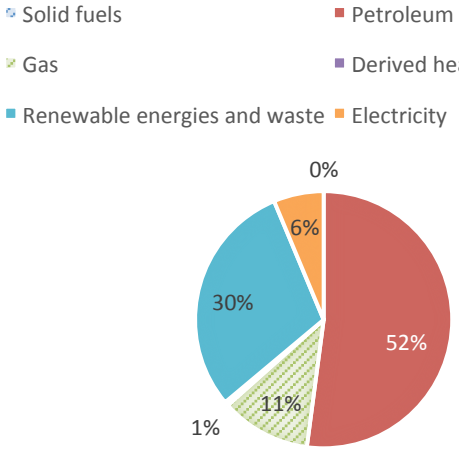
RESIDENTIAL FINAL ENERGY CONSUMPTION BY TYPE OF END-USE (2015)



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)

4.730 MWh

ENERGY SYSTEM AND ENERGY POLICY TRENDS

Energy system

The Greek energy sector is highly dependent on fossil fuels, most of which are imported. Around 60% of Greece's primary energy supply comes from imports, while the remaining 40% are covered through domestic energy sources that include lignite and renewable energy sources (mainly hydro-power, wind, solar energy and biomass).[2]

The main electricity producer and supplier is the Public Power Corporation (PPC). It owns almost 75% of the installed capacity of thermal power plants in the country, including lignite, hydropower, petroleum, gas and renewable energy stations. The PPC has three subsidiaries: i) Independent Power Transmission Operator (IPTO S.A.); ii) Hellenic Electricity Network Distribution Operator (HENDO S.A.); iii) PPC Renewables S.A. The IPTO S.A. is responsible for the management, operation, development and maintenance of the Hellenic Electricity Transmission System. The HENDO S.A. is responsible for the management, development, operation and maintenance of the Hellenic Electricity Distribution Network. The PPC Renewables S.A., in turn, is responsible for the management of the renewable energy sources.[3]

Greece relies entirely on imports for covering its natural gas requirements. The natural gas is distributed to customers through three entry points connected to the country's transportation system: i) Sidirokastro on the Greece-Bulgaria border; ii) Kipoi on the Greece-Turkey border; iii) Agia Triada that is the connection with the neighbouring Revithoussa LNG terminal. The public natural gas supply corporation in Greece is called DEPA. In order to liberalise the gas market, a fully owned subsidiary was created (called DESFA SA) in 2005 to transport natural gas within Greece. There are three regional gas distribution/supply companies that operate on the market called EPAs (EPA Attikis, EPA Thessaloniki, EPA Thessaly). They hold the exclusive right to plan, design, construct, operate and exploit the distribution network in the area they operate in as well as to supply gas to small consumers in the same area. It is important to note that small consumers connected to the distribution grid of a certain EPA cannot switch to alternative gas suppliers.[4]

Particular socio-material aspects that influence energy consumption

Since large part of the Greek building stock has been constructed before the introduction of the Thermal Insulation Regulation in 1979, most of the buildings do not contain any external envelope insulation, which affects the thermal energy performance of buildings and increases energy consumption for heating the space. Poor boiler maintenance also influences the consumption of energy.

Energy price is another factor that influences energy consumption of households. The electricity prices for household end users have increased from 11.81 euro cents per kWh in 2011 to 19.36

[2] Energypedia (2017). *Greece Energy Situation*. Available at: https://energypedia.info/wiki/Greece_Energy_Situation#Energy_Supply
[3] Kastis, S. and Kitsios, V. (2017). *The Energy System of Greece. A Techno-economic and Environmental Approach*. Available at: http://www.diva-portal.org/smash/get/diva2:1088651/FULLTEXT01.pdf
[4] Giamouridis, A. (2009). *Natural Gas in Greece and Albania. Supply and Demand Prospects to 2015.* Oxford Institute for Energy Studies. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG37-NaturalGasInGreeceAndAlbaniaSupplyandDemandProspectsTo2015-AnastasiosGiamouridis-2010.pdf;
DEPA (Public Gas Supply). Available at: http://www.depa.gr/ ;
Katsivelis, P. S. (2013). *Energy in Greece. Basic Information and Figures*. Rosa Luxemburg Stiftung Brussels and Athens. Available at: https://rosalux.gr/sites/default/files/report_katsivelis_rozalux_0.pdf

euro cents for kWh in 2017. The increasing electricity prices in combination with the constantly rising oil prices and taxes for oil space heating, along with decreasing income levels of households, had led to reduced energy consumption.[5]

As part of an EU funded project called the PEPESEC (Partnership Energy Planning as a tool for realising European Sustainable Energy Communities) a research on energy consumption behaviour of citizens in the Municipality of Amaroussion was conducted. The main findings of the research showed that most citizens of Amaroussion are not informed about environmental and energy saving issues, which reflects on their energy consumption habits: i) most of the citizens are not aware of the energy classes (A+, A++, etc.) and do not consider them when buying new appliances; ii) citizens very often leave doors open when air conditioning is on or leave lights turned on in empty rooms; iii) most citizens do not fully load the washing machine. The results of a questionnaire among citizens of Amaroussion showed that they have a positive attitude towards applying energy conservation in their everyday routine, but the lack of adequate information and the high cost of related technologies are seen as main barriers in this regard. According to citizens, education of children at school as well as implementation of pilot projects in the field of energy efficiency could help increase awareness on local level and move towards greener energy habits of population.[6]

Current Trends in Energy Policy

The main objective of the Greek national energy policy is to ensure and manage energy resources in a way that secures uninterrupted, reliable and affordable energy supply for all users. It also aims to secure energy stocks through alliances and alternative energy sources.

The country has set a national target of 20% renewable energy sources share in gross final energy consumption by 2020 (which exceeds the national target of 18% set by the EU Directive from 2009). The overall target is to be achieved through a combination of measures in the fields of electricity production, heat supply and transport sector. By 2015 the target for RES heating and cooling share of 20% was surpassed and stood at 25.9%.[7]

The further penetration of RES in the interconnected system in Greece will be ensured through the upgrade of networks to smart grid and metering systems along with the introduction of intelligence automation and control systems.[8]

The Ministry of Environment and Energy is responsible for the integration into the national legislation and the implementation of the EU Directive 2012/27/EE on energy efficiency (EED). Other ministries and organisations (such as the Ministry of Infrastructure, Transport and Networks and the Ministry of Economy, Development and Tourism; the Centre for Renewable Energy Sources and Saving) are also involved in the formulation of energy efficiency measures as well as in various initiatives regarding the EED implementation. In order to comply with the EED focus on the importance of the energy upgrade of buildings and the significance of a long-term consideration of the investment required for renovating the building stock, the Greek Ministry of Environment and

[5] Davaki, M. (2011). *Analysis of Energy Use in Typical Greek Residential Buildings and Proposed Retrofit Strategies*. Georgia Institute of Technology Available at: https://smartech.gatech.edu/bitstream/handle/1853/44922/davaki_maria_201108_mast.pdf.pdf; Statista (2018). *Electricity Prices for Household Consumers in Greece from 2010 to 2017*. Available at: https://www.statista.com/statistics/418083/electricity-prices-for-households-in-greece/

[6] PEPESEC PROJECT - Energy planning for sustainable communities (2009). *Research Conducted on Energy Consumption Behavior of Amaroussion Citizens*. Available at: http://www.cres.gr/pepesec/ereyna_uk.html

[7] Energypedia (2017). *Greece Energy Situation*.

[8] Kastis, S. and Kitsios, V. (2017). *The Energy System of Greece.*

Energy developed a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private. The first version of the strategy was completed in 2014. It presents existing measures and policies to boost renovation of building stock in Greece and proposes future-oriented prospects based on energy renovation scenarios.

The existing measures and policies to boost renovation of building stock in Greece include: i) The Regulation on the efficiency of buildings (KENAK); ii) the "Savings at Home Programme"; iii) Mandatory installation of solar thermal systems in new buildings; iv) "Allazo KLIMAtistiko" (changing air conditioning); v) Upgrade of public buildings.

The document concludes that the energy upgrade of residences and tertiary and public sector buildings could result in actual and substantial recovery in the construction and real estate markets. Further benefits are energy savings and reduction in the energy dependence.[9]

Trends in national campaigns

The Greek government aims at improving energy performance of existing buildings through different projects such as the "Exikonomo" project (in English – "Energy saved at home"). The aim of the project is to provide owners with free or low-interest loans and grants for external or roof insulation, replacement of heating oil or gas boilers, the installation of solar collectors and installation of solar systems for hot water.[10]

There are also efforts to develop energy saving habits among children in Greece. The "Changing Behaviour" project aims to teach children how to use energy in an efficient way, to raise awareness on RES and on efficiency in transport. Thus, reduction of energy use in school buildings and in homes could be achieved. The main outcome of the project was the development of an educational package on active learning and energy monitoring that was tested in 10 primary schools in Greece. It was estimated that in result of the implementation of the active learning and energy monitoring, 10-14% of energy savings were achieved.[11]

OVERVIEW OF NATIONAL SECIS

Below please find a list of Greek 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.

European Citizens Climate Cup (ECCC)	 Changes in Individuals' Behaviour

[9] NEEAP (2014). *Report on long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private.* Available at: https://ec.europa.eu/energy/sites/ener/files/documents/GreekReportBuildingsArticle4_en.pdf

[10] Davaki, M. (2011). *Analysis of Energy Use in Typical Greek Residential Buildings and Proposed Retrofit Strategies.*

[11] Vasilis, P. and Malamatenios, C. (2009). *Active Learning: Teaching Children to Use Energy in Greece*. CHANGING BEHAVIOUR project. Available at: http://www.energychange.info/downloads/doc_download/354-cbcase27greeceactivelearning

ELIH MED: A Euro-Mediterranean Program to Fight Energy Poverty	 Changes in Technology
iBROAD : Individual Building (Renovation) Roadmaps	 Changes in Technology
SAVES2: Students Achieving Valuable Energy Savings 2	 Changes in Individuals' Behaviour
ACCESS: Accelerated Penetration of Small-Scale Biomass and Solar Technologies	 Changes in Technology
enCOMPASS: Collaborative Recommendations and Adaptive Control for Personalised Energy Saving	 Changes in Individuals' Behaviour
SECHURBA: Sustainable Energy Communities in Historic URBan Areas	 Changes in Individuals' Behaviour
PROMISE; Promoting best practices to support energy efficient consumer behaviour on European islands	 Changes in Technology
EYEMAN CHAMPIONSHIP: European Young Energy Manager Championship	 Changes in Individuals' Behaviour
FEEDU: Persuasive force of children through education	 Changes in Individuals' Behaviour
COMEON LABELS: Common appliance policy – All for one, One for all – Energy Labels	 Changes in Individuals' Behaviour
ENESCOM: European Network of Information Centres promoting Energy Sustainability and CO2 reduction among local COMmunities	 Changes in Individuals' Behaviour
PROMOTION 3E: Promotion of energy efficient appliances	 Changes in Individuals' Behaviour
SAVES: Students Achieving Valuable Energy Savings	 Changes in Individuals' Behaviour
REMODECE: Residential Monitoring to Decrease Energy Use and Carbon Emissions in Europe	 Changes in Individuals' Behaviour
P.E.E.S.: Pattern of Energy Efficiency in the Schools	 Changes in Everyday Life Situations

KIDS4FUTURE: Creating Actions among Energy Conscious Children	Changes in Individuals' Behaviour
BEHAVE: Evaluation of Energy Behavioural Change programs	Changes in Individuals' Behaviour
ACTIVE LEARNING Integration of Active Learning and Energy Monitoring with School Curriculum	Changes in Individuals' Behaviour
ENERGY PATH: An E-learning Platform for Education of the New Generations in the Sustainable Energy Field	Changes in Individuals' Behaviour
RES and RUE Stimulation in Mountainous - Agricultural Communities towards Sustainable Development (MOUNTAIN-RES/RUE)	Changes in Technology
ERACOBUILD: Countdown to Low Carbon Homes	Changes in Technology
ELE.C.TRA: Electric City Transport	Changes in Individuals' Behaviour
AD PERSONAM: A Direct Marketing program for Public Transport	Changes in Individuals' Behaviour
10ACTION: Actions to Increase Energy Awareness and Improve the Sustainable Behaviour of European Citizens	Changes in Individuals' Behaviour
BAMBINI: Socialisation towards Clean and Energy Efficient Transport	Changes in Everyday Life Situations
ENERGY AMBASSADORS: Campaign to Fight against Fuel Poverty and Raise Awareness on Energy Efficiency and Energy Savings	Changes in Individuals' Behaviour
Energy Neighbourhoods 2 - The Energy Challenge (EN2)	Changes in Everyday Life Situations
Energy BITS – Young people and media for a low energy footprint (E-BITS)	Changes in Individuals' Behaviour
SAVE AGE: Strengthening Energy Efficiency Awareness Among Residential Homes for Elderly People	Changes in Individuals' Behaviour

‘GOOD PRACTICE’ EXAMPLE OF GREEK SECI

P.E.E.S.: Pattern of Energy Efficiency in the Schools

Brief Description

P.E.E.S. was an educational project for increasing the energy awareness of secondary school students, but their teachers were also actively involved. The initiative was implemented by DEMEKAV, a non-profit agency of the Municipality of Volos, established to develop and implement municipal policy regarding urban development. The general goal of the initiative was to change the behaviour of energy users, and to promote a sustainable consumption of energy. Teenage students (15-18 years old) and their teachers represented the main target groups, but the messages of the project influenced also the behaviour of other members of their households. The project also had a technological aspect, as meters for reading and auditing energy consumption within school buildings were installed. Selected workgroups of students and teachers cooperated with the technicians of DEMEKAV (Volos Municipal Enterprise for Urban Studies, Construction & Development).

Brief Contextualization

Volos is located in central Greece. It is the capital of Magnesia province, and has a population of 85,000. Volos is a very important commercial centre and a home to the third largest port in Greece. The city also features a university and a vibrant cultural scene. Volos municipality has adopted its Local Action Plan on Climate Change 2010-2020. Recognising the climate change as the major global environmental problem, the municipality pledged to take action in several roles:
(a) as a consumer and service provider,
(b) as a planner, developer and regulator,
(c) as an advisor and motivator and
(d) as a producer and supplier.
The overall objective of municipalities’ activities is to substantially reduce greenhouse gases (GHG) emissions, promote awareness, provide training on climate change and its mitigation, and initiate different actions with the active participation of citizens. P.E.E.S. initiative can be seen as an element of this wider context.

Aims and objectives

The main objectives of the P.E.E.S. were:

- contribution to the forming of a “energy consciousness” among the students
- organisation of educational activities
- development of instruments and skills for analysis and evaluation of energy consumption
- common methodology for the calculation of energy consumption
- teaching students and teachers how to monitor their own daily “energy behaviours”.

Methods for Intervention

The main target group of the initiative were students of the secondary schools aged between 15 and 18, as well as their teachers. A secondary target group were families,

relatives and friends of students directly involved in the activities. Involved students were used as “energy ambassadors”. The initiative produced a didactic methodology that combined theoretical and experimental aspects with the objective of informing the students and raising their awareness about energy efficiency. Methodology was divided in two main steps.
1) “General Educational Schedule”, which provided the main information about proper everyday energy behaviour.
2) “Technical Educational Schedule”, which aimed at producing relevant changes in the energy behaviour and energy consciousness by offering knowledge about more technical and scientific topics.
The energy agency tasked with the implementation of the initiative conducted energy audits in three pilot schools in cooperation with a group of about 30 students and 3 or 4 teachers (“Energy Teams”) in each involved school. The energy audits were realised with the help of a specially designed “P.E.E.S. software,” consisting of a group of interlinked spreadsheets, which calculated the annual energy consumption (electrical and thermal) of the school buildings.

Steps of implementation
Implementation started in October 2007. In the first phase, DEMEKAV developed an educational programme about energy and environmental issues, including information booklets and lesson plans. In the central phase of the initiative, the General and the Technical Educational Schedules were implemented in the pilot schools, focusing on the implementation of a methodology for monitoring the energy consumption in schools. In each pilot school, students and teachers were trained and then formed the “Energy Teams,” consisting of 3 teachers and 10 students. These Energy Teams were responsible for conducting the energy audit of their school. The teams were supported by DEMEKAV’s technicians to properly use the specially developed software to calculate the energy consumption, to identify any critical issues, and to plan the potential corrective measures according to the criteria of energy efficiency. In the final phases of the project, numerous dissemination activities were realised, involving thousands of students and hundreds of teachers from 30 schools in the area of Volos.

Results/outcomes
The implemented activities have resulted in reduction of CO2 emissions in the pilot schools. During the dissemination phase, more than 5000 booklets and 90 models of renewable energy parks were distributed in most of the schools of the area of Volos.

The role of the households
Households as such were not directly involved in the initiative. Rather, by involving students as local “energy ambassadors,’ P.E.E.S. tried to change and improve the energy behaviour of the citizens of Volos, and thereby influence in a positive way their environmental and energy awareness. Students, especially the ones trained for participation in the Energy Teams, also had a potentially large impact on their parents, friends and relatives, bringing a more energy conscious thinking into numerous households in Volos.

Location
Schools in Volos, the capital of Magnesia province, located in central Greece.

Was/is the initiative successful?
According to the feedback from different actors (teachers, students, politicians and the general public), the initiative attracted considerable interest and approval. Numerous schools made inquiries and expressed desire to implement the initiative as well. As all the methodologies and materials developed during the lifetime of the initiative have been successfully tested, they can be easily used and implemented in other schools across Greece.

Textual and communicative aspects of the initiative:
The tools created by P.E.E.S. project can be easily applied in other schools across entire Greece, helping them to influence their students to become more aware of energy and environmental issues, save energy and money and reduce CO2 emissions of their schools. These tools include:

- A didactic methodology combining theoretical and experimental aspects for the education of teachers and students on basic issues in the fields of energy and environment.
- "Sheet of Environmental and Energy Values" – a report pointing out significant changes in the energy behaviour and energy knowledge.
- Energy Balance for school buildings.
- "Words for Energy" dictionary.
- Methodology for energy audit conducted by students and teachers.

The physical/technological aspects of the initiative
DEMEKAV agency was actively involved in helping the pilot schools with the Energy School Management (ESM) system. Its technicians trained students and teachers and provided all necessary technical assistance during the energy audit process. DEMEKAV also installed the necessary equipment in schools and developed the special software for measuring the energy consumption. "P.E.E.S. software" was designed specifically to correspond to the requirements and skills of young people. The software used the data provided by the Energy Teams to present the evolution of the energy consumption from year to year and to calculate the efficiency of the school building in terms of energy and CO2 emissions.

Shared understandings related to the initiative
Being an educational project, P.E.E.S. relied strongly on the shared and common understanding that increased energy awareness among students and teachers could contribute considerably to achieving relevant changes in the behaviour of energy users. The project was based on several shared assumptions regarding the energy consumption:
1) Buildings are among the largest end users of energy (about 40% of the final energy demand in EU countries).

2) Market and policy solutions are insufficient to overcome cultural and behavioural barriers.
3) Environmental education and energy saving education can be easily integrated into several school subjects (physics, chemistry, geography, biology, home economics and social sciences).
4) Young people can play a strategic role in the development of a new environmental awareness.
5) Only dissemination of the knowledge is not sufficient. To achieve deeper changes in the energy behaviour of people, proactive methods of involvement are necessary.

CONCLUDING REMARKS AND POLICY IMPLICATIONS

Greece is a country that has been traditionally heavily dependent on imported fossil fuels to cover its energy needs, despite excellent geographical preconditions for large-scale production of energy from renewable sources. Not surprisingly, the most important objective of the national energy policies is to increase the share of RES, and in the recent years, Greece has made substantial progress. In 2015, the 20% target for 2020 was already surpassed and renewable energy sources covered 25% of the final energy consumption. The second major priority area is the renovation of old building stock, which is a reason for large energy consumption in winter (heating) and summer (air conditioning). Finally, the national policies also address the need to change the energy consumption behaviour of the population, which has traditionally not been overly concerned regarding wasteful use of resources and energy, but has been in recent years forced to adopt a new approach because of a sharp increase of energy prices.

SECIs examined by the ENERGISE team reflect well this necessity to change energy consuming behaviour – 21 out of 30 focus on different measures that try to induce Greek households to consume less energy or to do it in a more efficient way. Six of the initiatives can be positioned within the first two priority areas – accelerated uptake of renewable energy sources (biomass, solar power, wind power) or thermal insulation of old buildings. Some initiatives from both groups target vulnerable households, as energy poverty is becoming an issue in Greece in recent years. For example, ELIH MED tested innovative cost-efficient technical solutions for improving energy efficiency in low-income households, and ENERGY AMBASSADORS tackled energy poverty by helping vulnerable groups to manage their water and energy consumption through the intervention of specially trained social workers. SAVE AGE encouraged measures in energy efficiency in residential homes for elderly people. School children and students are at the heart of quite a few initiatives. The opinion that Greek society can become more responsible towards energy and resources tomorrow only if proper education and training are undertaken today seems to be widely shared. In addition to P.E.E.S. project described in detail in Section 3, the following SECIs deserve attention:

- ENERGY BITS used interactive web tools and games to stimulate behavioural change regarding efficient and sustainable use of energy among young people.
- ACTIVE LEARNING introduced energy education into classes of children aged 6-12, changing their attitudes towards energy use and achieving actual energy savings in the schools and homes of the children.

- KIDS4FUTURE targeted pilot schools with a common energy story, events and websites for children, creating enthusiasm for energy saving and sustainable future.
- Various games, competitions, debates and workshops were organised by 10ACTION project to promote awareness about renewable energy, energy efficiency, and responsible use of energy among children, teenagers and students.
- FEEDU aimed at teachers and pupils of primary schools, popularising renewable energy sources, rational use of energy and sustainable mobility.
- Three projects targeting young people had a competitive aspect as well. EYEMAN CHAMPIONSHIP united teachers and students in an energy saving competition at their schools and homes, while SAVES and SAVES2 involved students living in university accommodation (dormitories) – students from different dormitories competed which dormitory would achieve the highest cuts in the quantity of energy used.

REFERENCES:

Camillo D'Alessandro, C., Stampone, F. et al. (2010). *How to Get Started with Educational Projects: Methods, Guidelines and Examples from the P.E.E.S. Project*. A.L.E.S.A., Local Energy and Environment Agency of the Province of Chieti. Available at: https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/p.e.e.s._final_publishable_report_en.pdf

Davaki, M. (2011). *Analysis of Energy Use in Typical Greek Residential Buildings and Proposed Retrofit Strategies*. Georgia Institute of Technology. Available at: https://smartech.gatech.edu/bitstream/handle/1853/44922/davaki_maria_201108_mast.pdf.pdf

DEPA (Public Gas Supply) website. Available at: http://www.depa.gr/

Energypedia (2017). *Greece Energy Situation*. Available at: https://energypedia.info/wiki/Greece_Energy_Situation#Energy_Supply

Giamouridis, A. (2009). *Natural Gas in Greece and Albania. Supply and Demand Prospects to 2015.* Oxford Institute for Energy Studies. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG37-NaturalGasInGreeceAndAlbaniaSupplyandDemandProspectsTo2015-AnastasiosGiamouridis-2010.pdf

Kastis, S. and Kitsios, V. (2017). *The Energy System of Greece. A Techno-economic and Environmental Approach*. Available at: http://www.diva-portal.org/smash/get/diva2:1088651/FULLTEXT01.pdf

Katsivelis, P. S. (2013). *Energy in Greece. Basic Information and Figures*. Rosa Luxemburg Stiftung Brussels and Athens. Available at: https://rosalux.gr/sites/default/files/report_katsivelis_rozalux_0.pdf

NEEAP (2014). *Report on long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private*. Available at: https://ec.europa.eu/energy/sites/ener/files/documents/GreekReportBuildingsArticle4_en.pdf

PEPESEC PROJECT - Energy planning for sustainable communities (2009). *Research Conducted on Energy Consumption Behavior of Amaroussion Citizens*. Available at: http://www.cres.gr/pepesec/ereyna_uk.html

Statista (2018). *Electricity Prices for Household Consumers in Greece from 2010 to 2017*. Available at: https://www.statista.com/statistics/418083/electricity-prices-for-households-in-greece/

Vasilis, P. and Malamatenios, C. (2009). *Active Learning: Teaching Children to Use Energy in Greece*. CHANGING BEHAVIOUR project. Available at: http://www.energychange.info/downloads/doc_download/354-cbcase27greeceactivelearning