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Joint Research Centre



Energy efficiency investments: a policy approach to tackle energy poverty

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- Why economic poverty is different to energy poverty
- Energy poverty under the provision of Clean Energy Package
- Energy efficiency benefits
- Households' exposure in volatile energy prices and services
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Climate Change – Energy Poverty: synergies?



COP23 | FIJI

UN CLIMATE CHANGE CONFERENCE

BONN 2017-18



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

COP23, Bonn, 2017-18

Parties:

- Defined the rules of **implementation** of the **Paris Agreement** (groundwork for a draft negotiation text on the “**Paris Rulebook**”)
- Expressed the **confidence** that Parties are **on track** to conclude the deliberations on the Paris Rulebook **at COP24 in Katowice**

COP21, Paris, 2015

Parties agreed on:

- a long-term goal of keeping the increase in global average temperature to **well below 2°C** above pre-industrial levels
- to aim to limit the increase to **1.5°C**, since this would significantly reduce risks and the impacts of climate change
- on the need for **global emissions to peak as soon as possible**, recognising that this will take longer for developing countries
- to undertake **rapid reductions thereafter** in accordance with the best available science

EU climate and energy goals

2020 climate & energy framework

Key targets for the year 2020:

- **20%** reduction in **greenhouse gas** emissions (from 1990 levels)
- **20%** of EU energy from **renewables**
- **20%** improvement in **energy efficiency**



2030 climate & energy framework

Key targets for the year 2030:

- At least **40%** reduction in **greenhouse gas emissions** (from 1990 levels)
- At least **27%** share for **renewable energy**
- At least **30%** improvement in **energy efficiency** proposed

Issues at a stake

- Energy transition and the right to energy access
- Energy Poverty:
 - Lack of a uniform definition among MS of energy poverty
 - Lack of official definition in many MS
- Intersection of energy poverty and economic poverty
- Buildings' stock energy intensity
- Price volatility in energy services and fuels
- Social tariffs and subsidies for the most deprived

Issues at a stake (cont.)

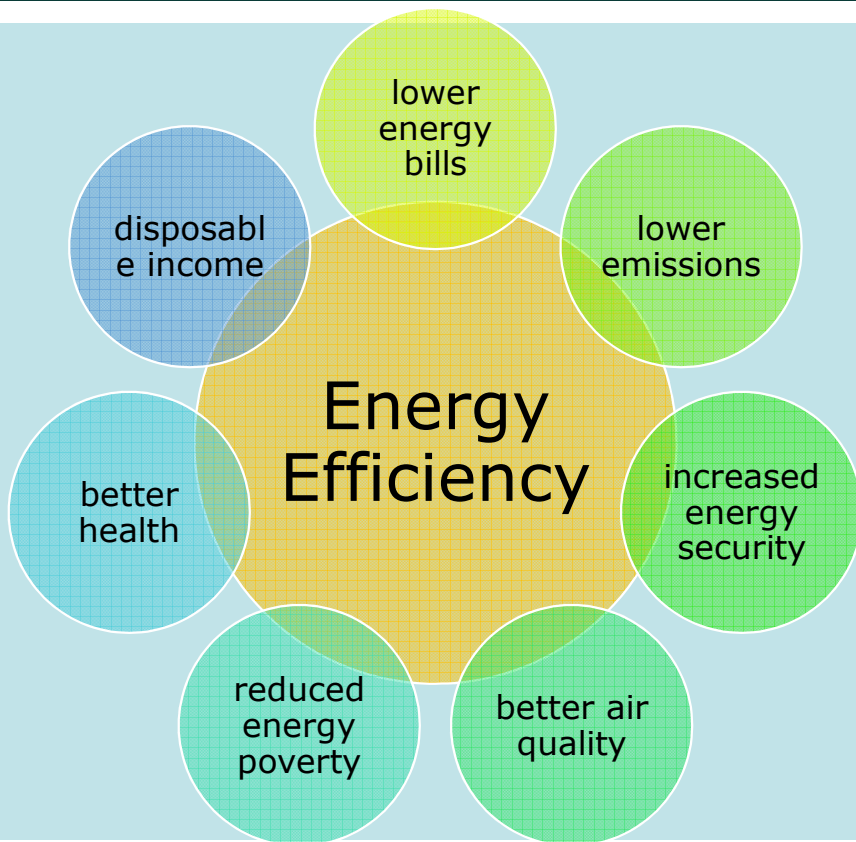
- **Energy Poverty** cannot be alleviated without **specific energy policy interventions**:
 - Social transfers defer rather than alleviate energy poverty
 - Reduction of energy consumption, through energy efficiency improvements is the key to reduce exposure to energy poverty
- **Major improvements** are needed in the quality of building infrastructures at the level of:
 - Single –Multi dwellings
 - Community / social houses
- There is **need for acceleration** of energy efficiency **investments**
- The role of **communities** in the **conundrum** of **diversifying investment** and resources should be examined

Energy poverty vs. economic poverty

- Energy poverty extends beyond income poverty
- ~14% of the GR population are not at persistent risk of economic poverty yet they cannot keep their households warm enough
- ~27% of the GR population are not at persistent risk of economic poverty yet they have arrears in their utility bills

Inability to keep house warm				leaking dwellings				Arrears			
GEO/TIM	2010	2015	2016	GEO/TIM	2010	2015	2016	GEO/TIM	2010	2015	2016
Bulgaria	50.1	23.0	23.9	Bulgaria	-1.0	-3.3	-3.0	Bulgaria	15.2	15.2	16.4
Greece	-2.2	15.9	13.9	Greece	-0.5	1.8	-0.5	Greece	1.2	28.7	27.0
Cyprus	18.1	21.0	16.7	Cyprus	20.8	19.2	19.5	Cyprus	7.1	12.8	7.8
Lithuania	17.8	16.8	15.8	Lithuania	11.8	2.7	4.7	Lithuania	3.5	-5.9	-3.8
Hungary	5.0	2.4	1.3	Hungary	18.5	18.2	18.8	Hungary	16.4	12.2	8.3
Portugal	16.9	10.2	11.0	Portugal	8.7	14.5	19.0	Portugal	-6.8	-5.8	-4.2
Slovenia	-2.2	-2.5	-3.7	Slovenia	25.5	18.8	15.3	Slovenia	11.1	9.4	7.4

Energy Efficiency Benefits



- *European Parliament proposes **a minimum 35% binding target**, and a solid agreement on energy savings for consumers to be negotiated with EU ministers*
- *The building sector is responsible for **40% of final energy consumption** (more than a third of EU CO₂ emissions stems from the sector), therefore energy efficiency is particularly important in buildings, in line with the agreement on **Energy Performance of Buildings Directive***

From the "3rd energy package" to the "Clean energy package"

3rd Energy Package

- Improving competition through better regulation, unbundling & reducing asymmetric information
- Improving security of supply by strengthening the incentives for sufficient investment in transmission & distribution capacities
- Improving consumer protection & preventing energy poverty

Clean Energy Package Goals

- Putting energy efficiency first
- Achieving global leadership in renewable energies
- Providing a fair deal for consumers

Electricity Directive: energy poverty provisions

- **Aim:** *To tackle consumers' vulnerability and energy poverty via **regular measuring, monitoring and reporting** by the Member States.*
 - MSs shall **define** a set of **criteria** for the purposes of measuring energy poverty
 - MSs shall **continuously monitor** the number of households in energy poverty
 - MSs shall **report** on the evolution of energy poverty and measures taken to prevent it to the Commission every two years

Energy Efficiency Directive (EED) - Energy Performance in Buildings Directive (EPBD): energy poverty provisions

- **Aim:** *To strengthen the social aspects of energy efficiency by requiring **energy poverty to be taken into account in designing energy efficiency obligation schemes and alternative measures.***
 - **Considering** the partial installation of new renewable energy technologies in buildings
 - **Incentivising** energy poverty alleviation by strengthening the links between public funding for renovation and energy performance certificates
 - **Focusing** on potential energy savings and efficiency improvement of existing building stock to alleviate energy poverty (this proposal could contribute to taking out of energy poverty between 515 000 and 3.2 million households in the EU)

Energy Union Governance Regulation: energy poverty provisions

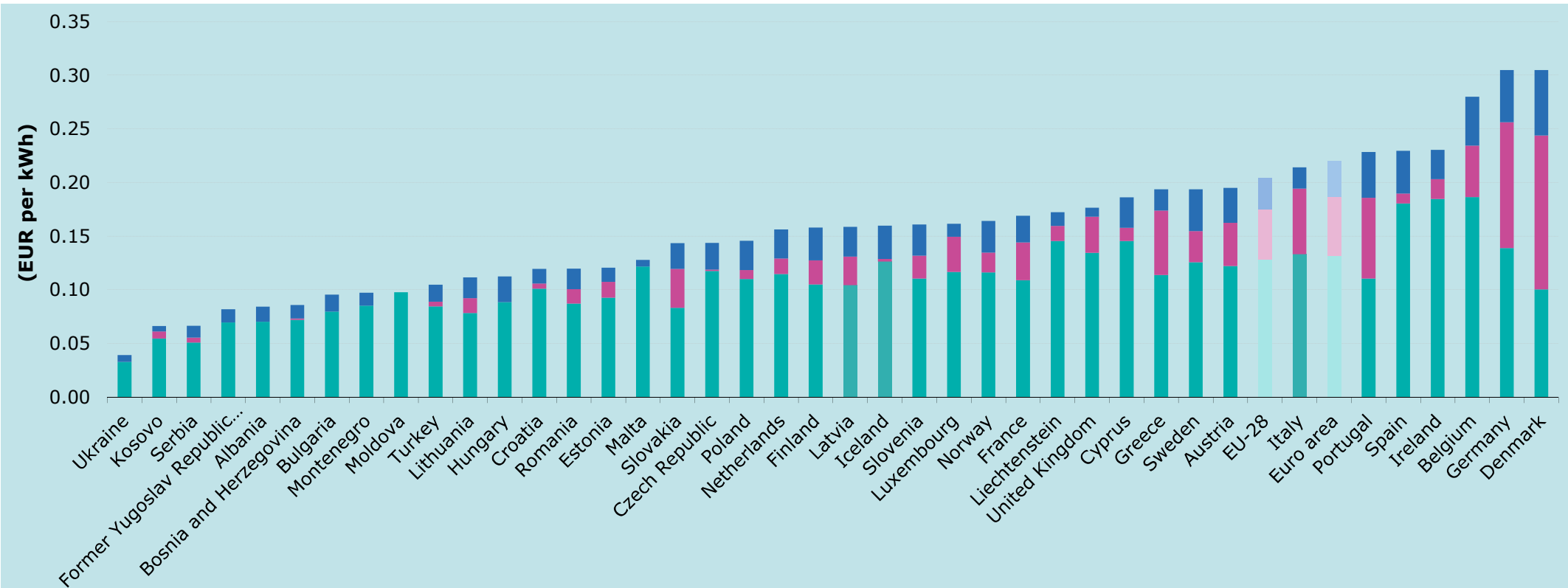
Aim: *To strengthen of Energy Union governance structures and the development of a more robust, concrete and transparent framework with a clearer division of competencies among EC and the Member States.*

- MSs will submit integrated **national energy** and **climate progress reports** every two years
- MSs should **assess** the **number of households in energy poverty**, taking into account the necessary domestic energy services needed to guarantee basic standards of living in the relevant national context
- MSs should **outline existing and planned policies** and measures addressing energy poverty

Minimising the risk of households' exposure

- **Households in Greece are currently exposed to:**
- ***Price volatility of energy services and fuels*** (oil and NG)
 - Electricity price trajectory +7,07% (GR average, 2008-2017)
 - Volatility of crude oil price
(Av. 64,05\$/ barrel - Min.16,51\$ barrel-Max. 143,95\$/barrel)
 - Fossil –based fuels for heating spaces (~60% of the final energy consumption)
 - Increasing impact of space heating in consumer's price index
- **Financial distress due to the recent economic crisis**
- **High unemployment rates**
- **Old building stock**

Electricity prices for household consumers, first half 2017

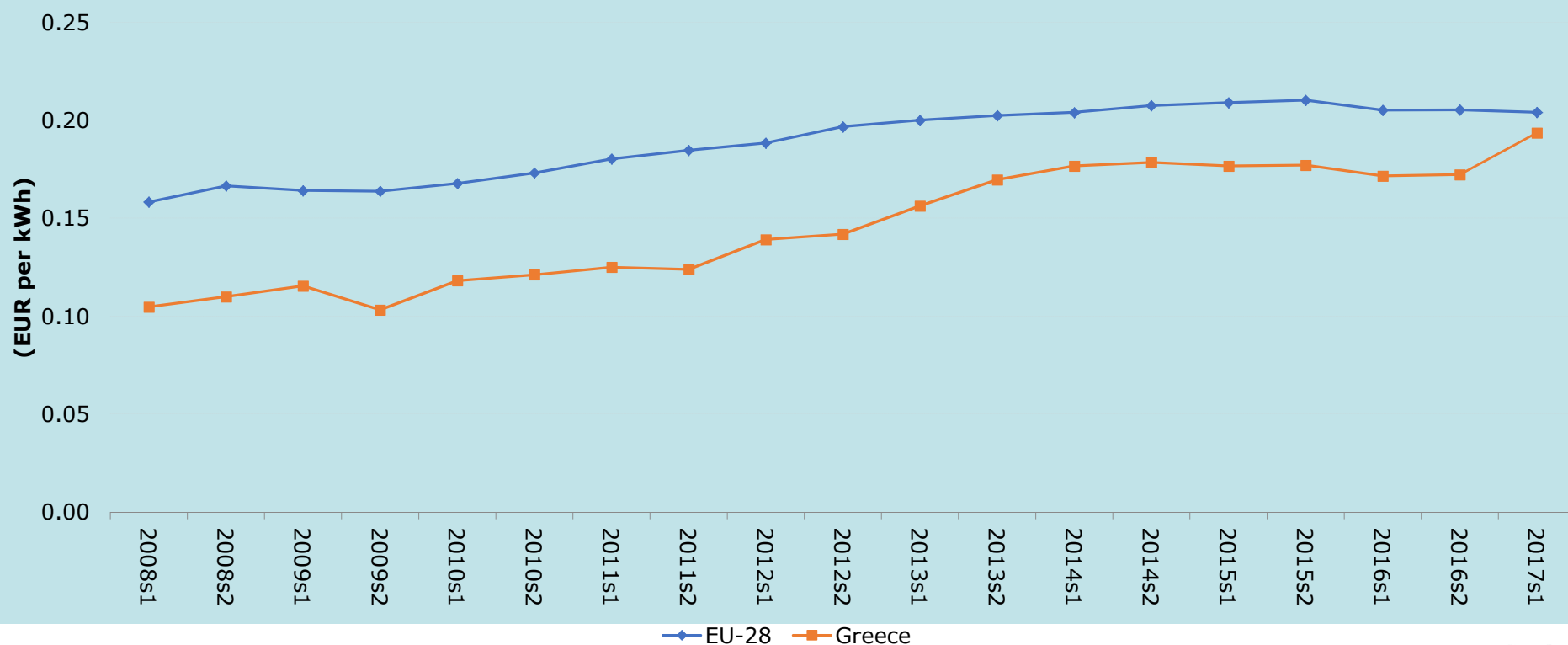


Source: EUROSTAT, 2018

■ Without taxes ■ Other taxes ■ VAT

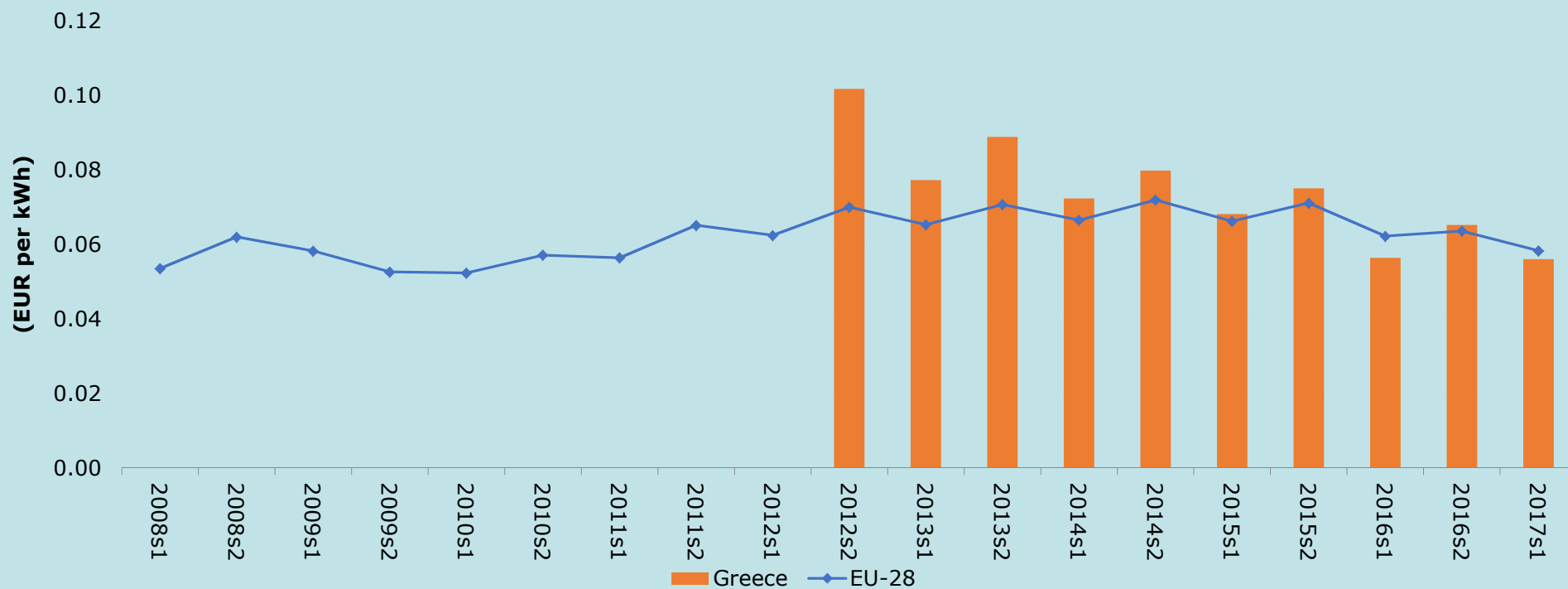


Development of electricity prices for household consumers, EU-28 and EA, 2008-2017



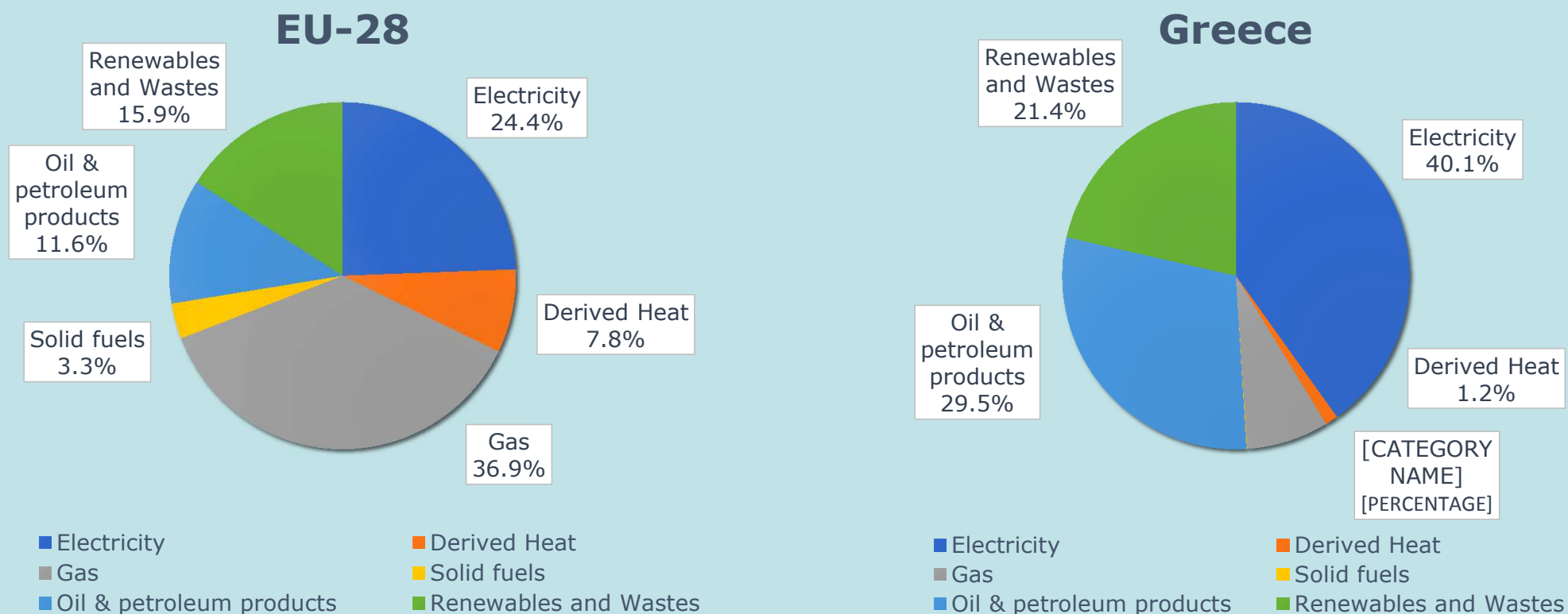
Source: EUROSTAT, 2018

NG prices for household consumers, EU-28 and EA, 2008-2017



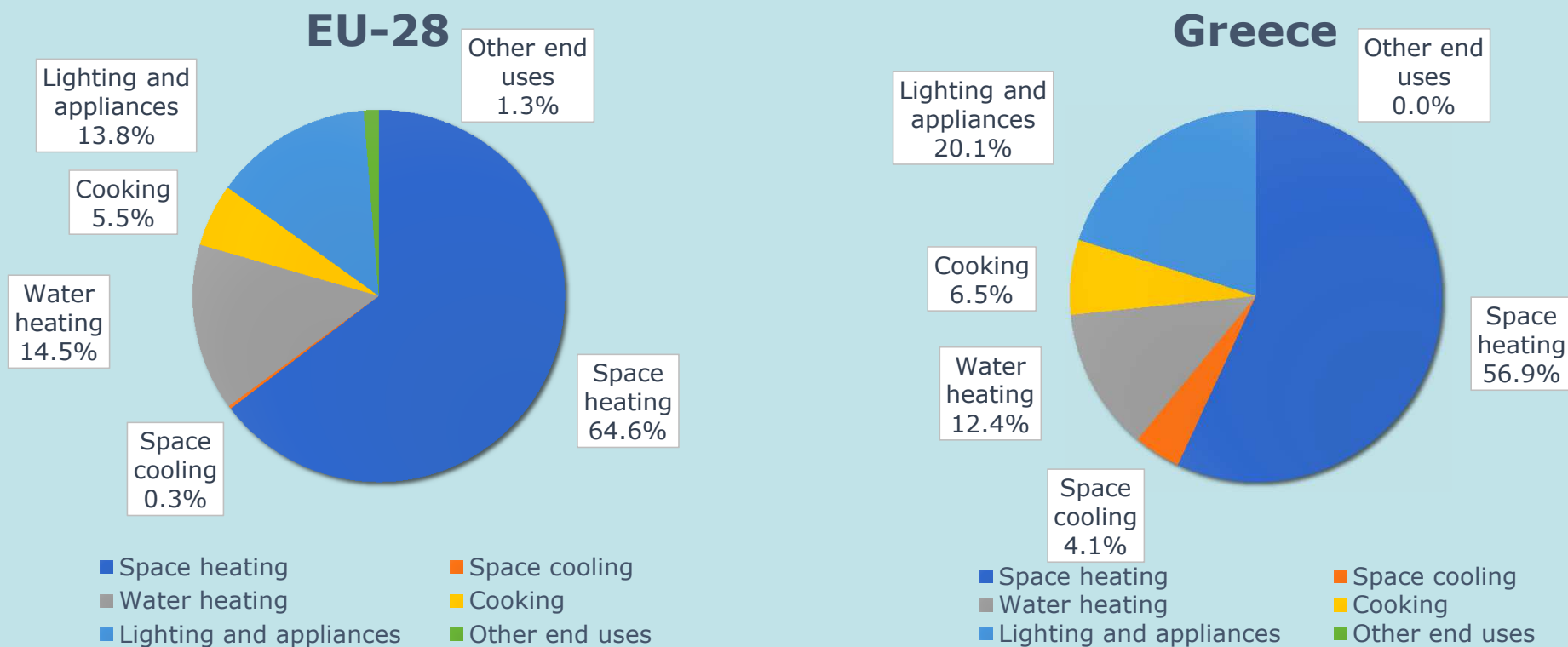
Source: EUROSTAT, 2018

Share of fuels in the final energy consumption in the residential sector, 2016 (%)



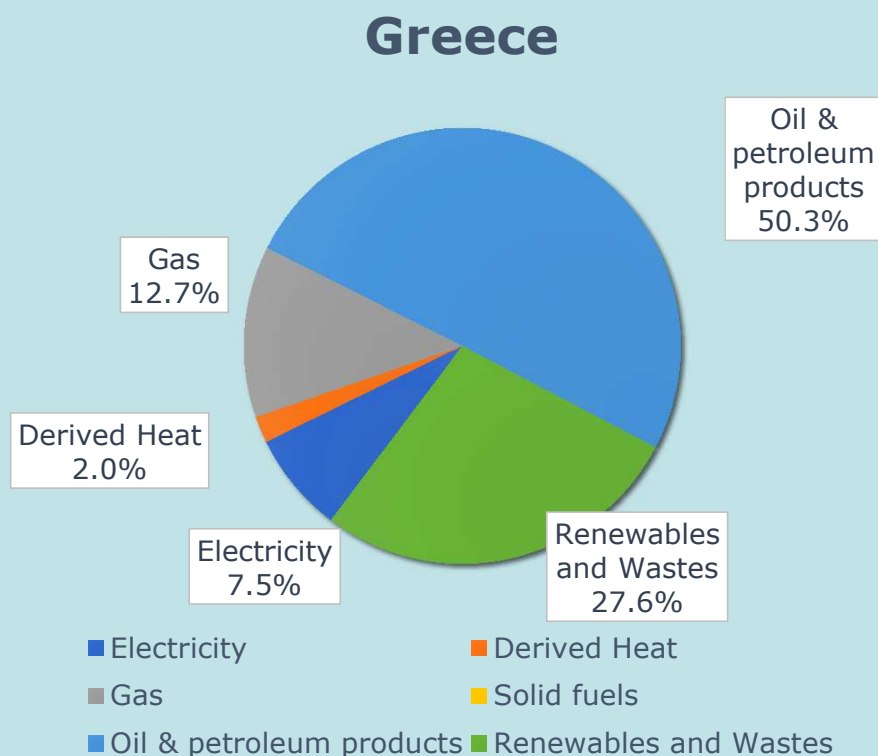
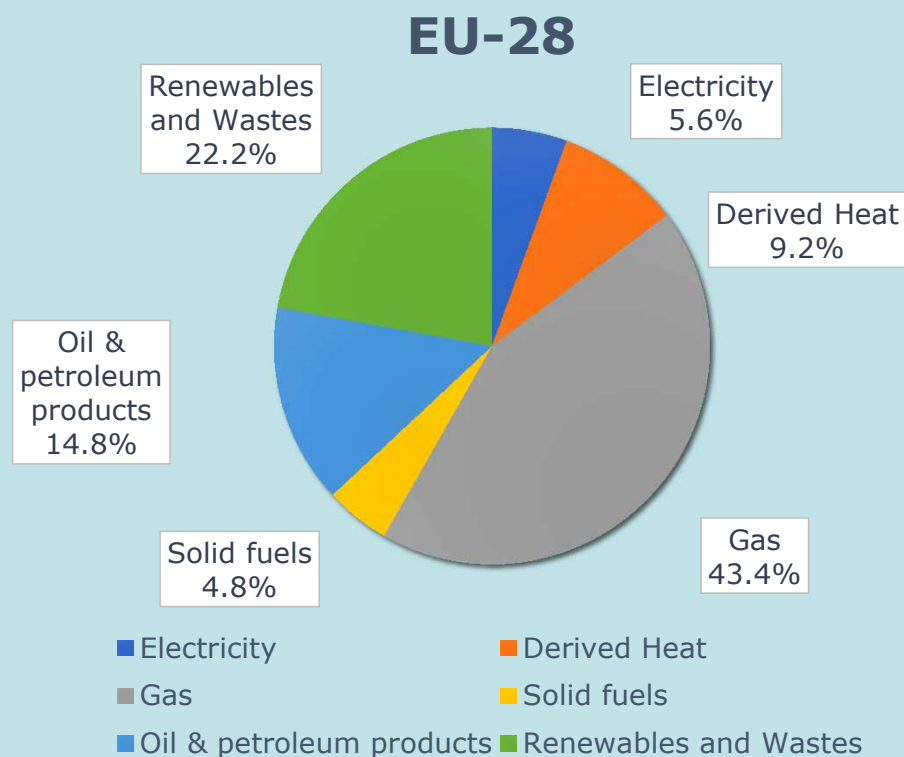
Source: EUROSTAT, 2018

Share of final energy consumption in the residential sector by type of end-use, 2016 (%)



Source: EUROSTAT, 2018

Share of fuels in the final energy consumption in the residential sector for space heating, 2016 (%)



Source: EUROSTAT, 2018

Unemployment in Greece



Source: EUROSTAT, 2018



Space heating impact on consumer's price index (March – April 2018)

Goods & services	Fluctuation (%)	Impact
Fresh vegetables	1.5	0.02
Fresh fruits	2.8	0.04
Potatoes	4.4	0.02
Meat in general	-0.7	-0.03
Olive oil	-2.8	-0.03
Fresh fish	-2.7	-0.03
Cheese	-1.7	-0.03
Heating oil	2.1	0.06
Pharmaceutical products	1.1	0.03
Car fuel (gasoline)	2.0	0.11
Passenger transportation by airplane	-5.2	-0.10
Telephone services	3.5	0.14
Hotels - motels – inns	6.9	0.05
Other types of personal care	0.8	0.02
Price reset due to discounts	-	0.63

Source: STATISTICS, 2018

Energy efficiency investments – Threats & Opportunities

Challenges

- The upfront cost of technological interventions
- The upfront cost of renewables integration
- Households shrinking disposable income

Opportunities

- Energy efficiency technologies (profitable, matured, niches for new technologies' uptake)
- The potential of locally available financial resources for investments
- Decentralized Solutions
- Effective pilot projects
- Energy communities

Energy Efficiency Technologies

Mature technologies

- Windows
- Insulation
- RES water heaters
- Fuel switching
- Heat pumps
- Small & Medium size district heating

Prospective technologies

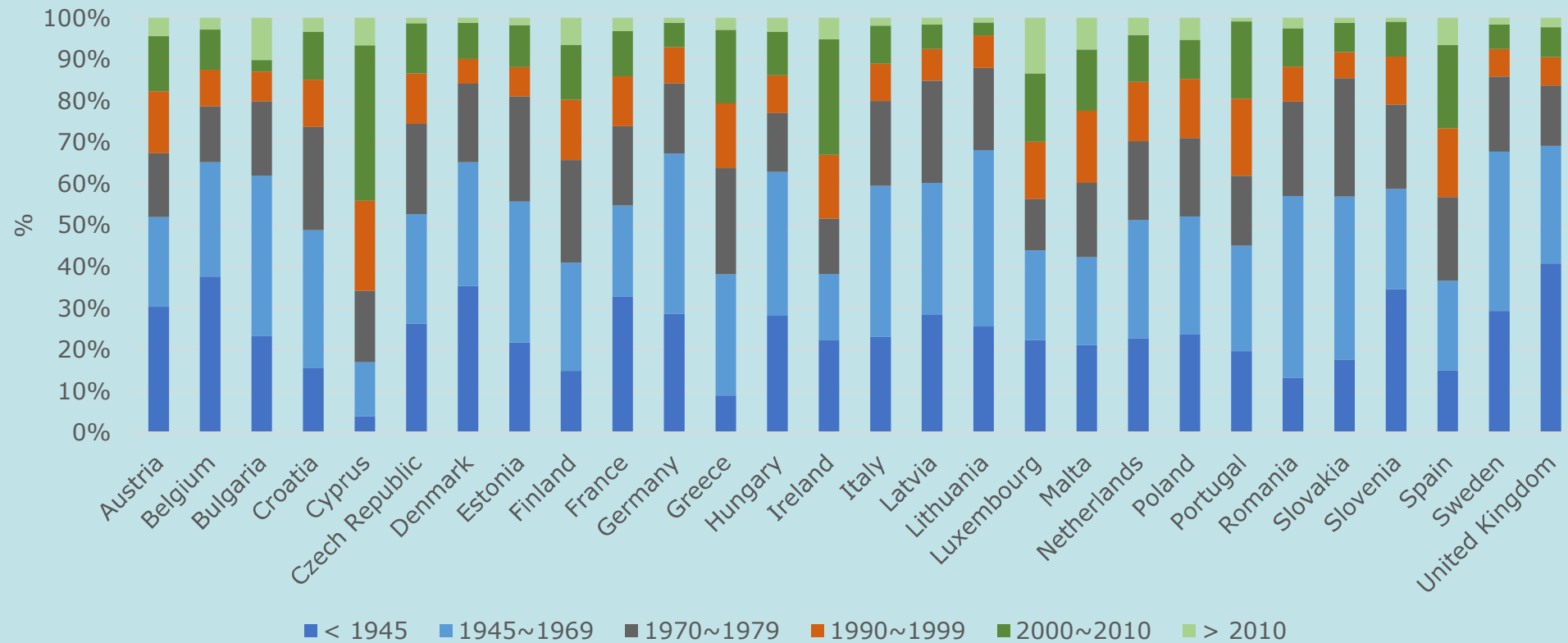
- Smart houses and smart equipment
- Ultra efficient equipment and materials (advanced building materials, high-performance windows, advancements in natural gas and other fuel-driven equipment)

Average floor space in EU MSs (2014)



Source: ODYSSEE-MURE, 2016

European Building Stock Vintage



Source: ODYSSEE-MURE, EUROSTAT, STATISTICS 2017

Energy-saving measures for the Greek buildings stock

No	Energy-saving measures in the building stock	Savings percentage (%)	
		Thermal energy	Electricity
1	Exterior wall thermal insulation	33-60	
2	Thermal insulation on roofs - floors	2-14	
3	Restoration of glazed units (windows, doors and frames)	14-20	
4	Maintenance of central heating systems	10-12	
5	Installation of new high-efficiency, oil-fired central heating systems	Up to 17	
6	Installation of a gas-fired central heating system	Up to 21	
7	Installation of compensating thermostats	3-6	
8	Installation of space thermostats	3-6	
9	Installation of external shading	10-20	
No	Energy-saving measures in the building stock	Thermal energy	Electricity
10	Installation of ceiling fans		Up to 60
11	Night ventilation		Up to 10
12	Installation of solar collectors for hot water		50-80
13	Installation of high-efficiency lighting systems		Up to 60
14	Installation of a building management system (BMS)	Up to 16-21	Up to 30
15	Airtightness		
16	Replacement of air conditioners with high-efficiency heat pumps		65-75
17	Use of geothermal pumps	Up to	
18	Installation of a planted roof	Up to	Up to 30
19	Use of cool materials	Up to 15	

Energy saving measures and indicative costs

No	Intervention-renovation measures for energy savings	Cost
1	External thermal insulation	EUR 50 / m ²
2	Glazed units - window/door frames and glazing	EUR 200-250 / m ²
3	Solar water heater	EUR 1 000 - 1 300 for a typical residence
4	More efficient heating installations -	EUR 8 000 - 10 000
5	High energy-efficiency lighting systems	EUR 2 / m ²
6	Green/planted roofs	EUR 90 - 120 / m ²

Pilot-cases in the context of energy poverty

Pilot projects help at:

- **Strengthening and identifying**, inequalities, particularities and shortcomings, that exist in common indicators and criteria definitions for measuring energy poverty
- **Minimizing risk management**, as pilot projects can be used for implementing a practice, exercise and /or solution in a limited capacity where the impact of failure may be obsolete
- **Validating benefits**, as pilot projects offer the opportunity to assess and validate benefits by applying the policy recommendations /solutions in a limited-scope
- **Upscaling, transferring and possibly replicating the solution**, as innovative and small-scale pilot projects can offer the opportunity to expand / scale up or replicate to reach out to more people and/or broaden the effectiveness of an intervention.
- **Provide a comparable framework of analysis**, by identifying challenges, barriers to overcome, success factors, lessons learned, transferability and upscale

Municipality of Peristeri as a pilot case



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Γενική Διεύθυνση

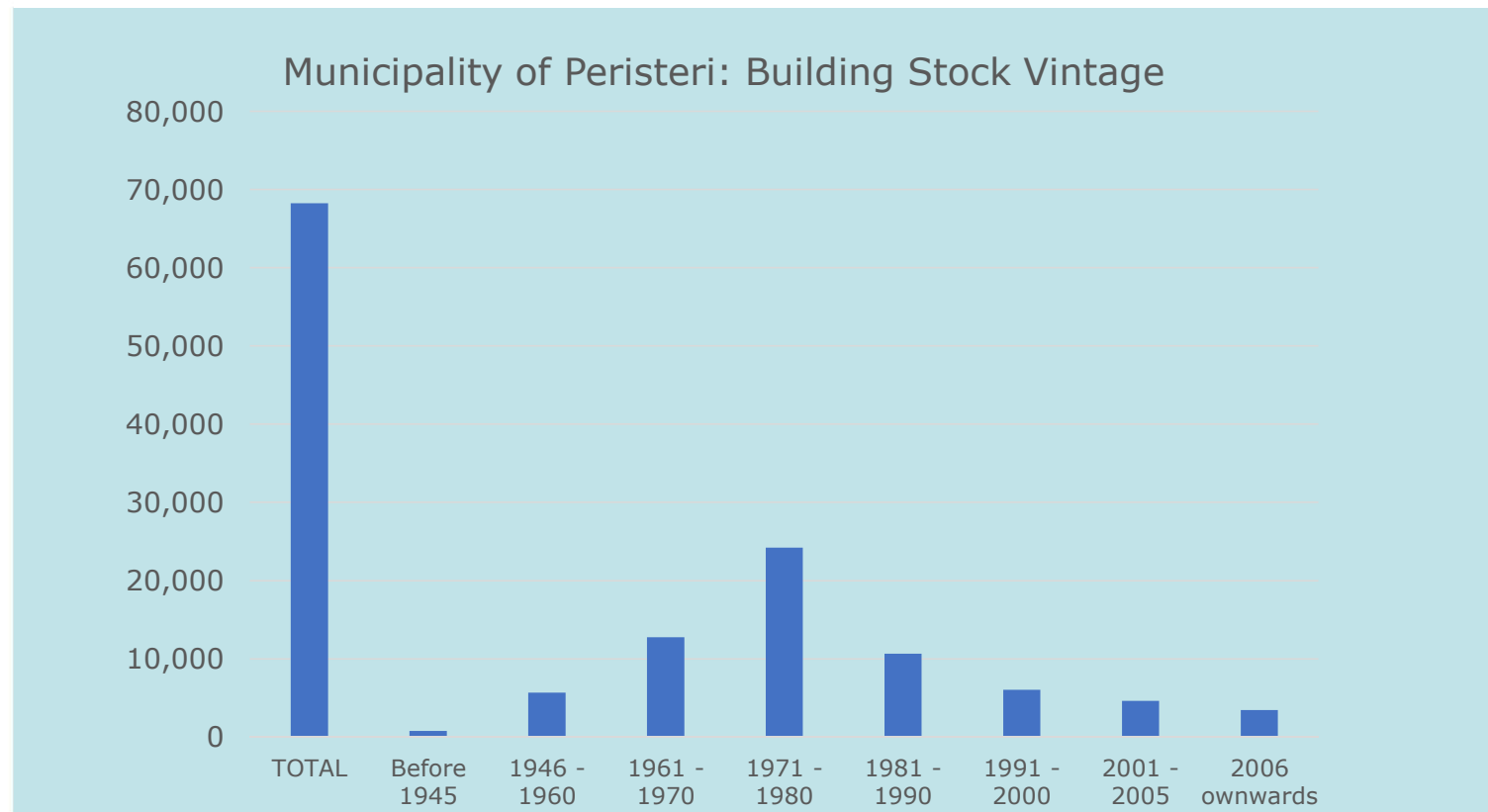
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Ολοκληρωμένη Χωρική Επένδυση
ΒΙΩΣΙΜΗ ΑΣΤΙΚΗ ΑΝΑΠΤΥΞΗ
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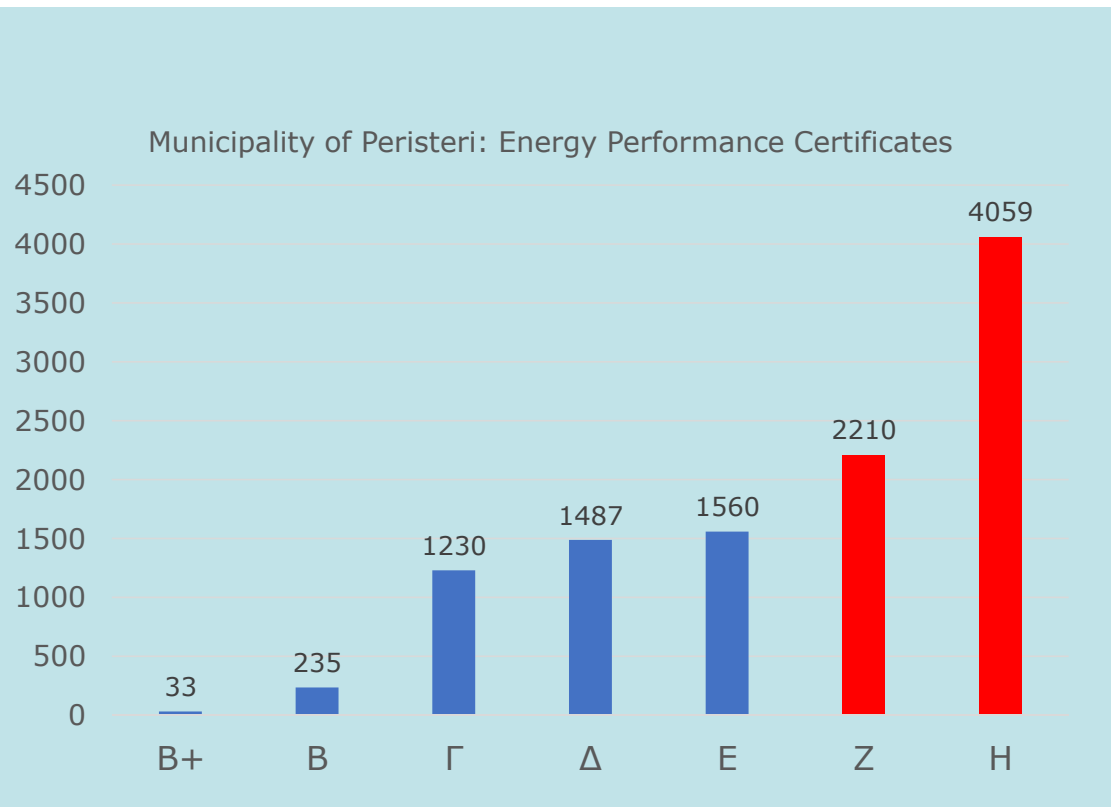
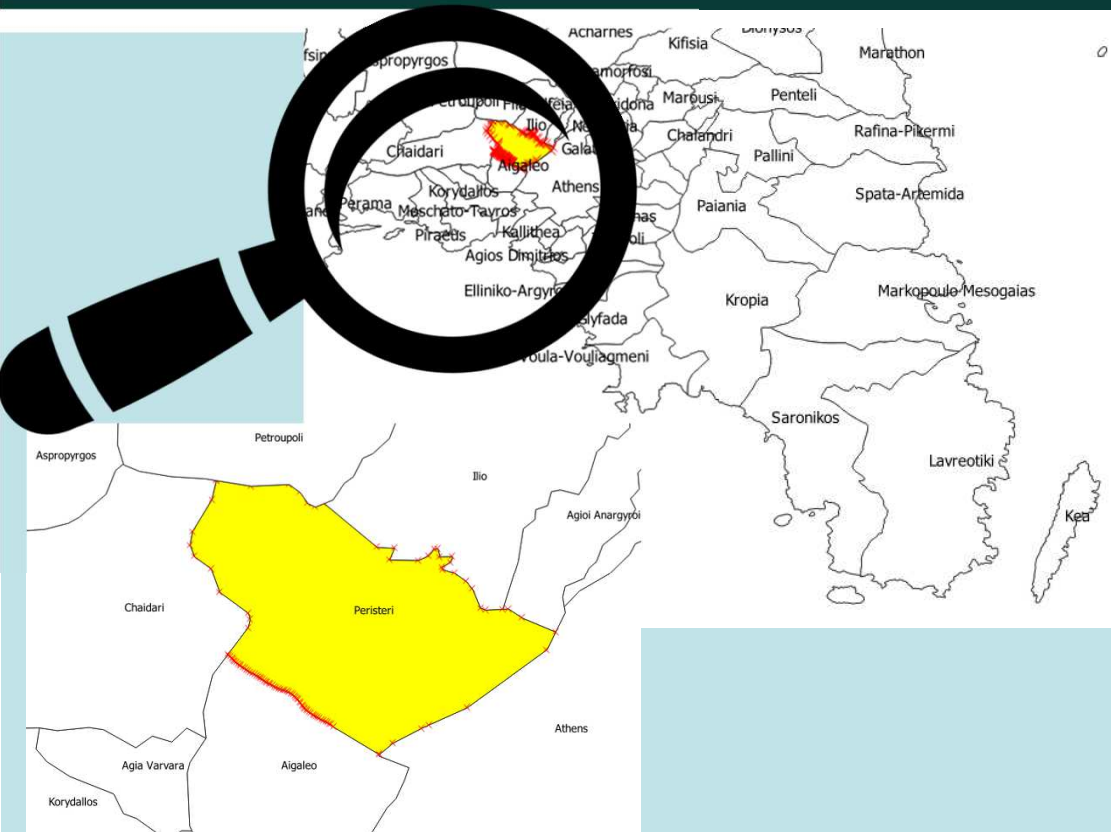
για την Προγραμματική Περίοδο 2014-2020 μέσω αξιοποίησης του «Εργαλείου» της ΟΛΟΚΛΗΡΩΜΕΝΗΣ ΧΩΡΙΚΗΣ ΕΠΕΝΔΥΣΗΣ (Ο.Χ.Ε.) στο πλαίσιο του ΕΣΠΑ και του ΠΕΠ ΑΤΤΙΚΗΣ 2014 - 2020 και Περίοδο Εφαρμογής 2017-2023

ΤΕΧΝΙΚΟ ΚΕΙΜΕΝΟ ΥΠΟΘΡΗΣΗΣ ΤΗΣ «ΑΝΟΙΧΤΗΣ ΔΙΑΒΟΥΛΕΥΣΗΣ» ΜΕ ΤΟΥΣ ΚΟΙΝΩΝΙΚΟΥΣ ΚΑΙ ΕΠΑΓΓΕΛΜΑΤΙΚΟΥΣ ΕΤΑΙΡΟΥΣ
Μάρτιος 2017



Source: ELSTAT,ASDA, 2017

Municipality of Peristeri as a pilot case (cont.)



Source: ELSTAT, ASDA, 2017

Municipality of Peristeri as a pilot case (cont.)

- **Challenge:** Targeted renovation at targeted building stock vintage (Z,H ~ 6,200 households)
 - **Objective:** To estimate opportunity costs for renovation at Municipality Level
 - Average annual primary energy consumption per household: 22410kWh
 - Average annual primary energy consumption: 249 kWh/m²
 - Average floor space per household: 90m²
 - PPC current allowance per household 1600 kWh / 4m, 4800kWh/year
 - Current price of kWh (Γ1, Remaining for 0.1EUR/kWh)
- Social tariff of kWh (0.045 EUR/kWh)
FEAD beneficiaries : 2820 households

Municipality of Peristeri as a pilot case (cont.)

Opportunity costs (FEAD beneficiaries)

a) From consequent customers : 264 EUR/year/household

✓ Annually: 744, 480 EUR/year

b) Hidden poverty ~ 11600 caps or 4640 households (2 ½ members)

✓ Unemployment rate in Peristeri ~ 20%

✓ Population: 58,0000 caps

✓ Annually: 1,224,960EUR/year

Investing in Energy Efficiency: concluding remarks

- Energy efficiency urgency stems from the adopted climate targets, yet it provides an opportunity to mitigate energy poverty
- Energy poverty is manifesting not only in households below the poverty line
- Energy policies are required to complement social policies, as direct social transfers only temporarily provide a relief
- Targets and policy measures should combine energy efficiency interventions with building stock renovations of energy poor households
- Residential energy conservation could be facilitated by community actions driven by initiatives from local governments/municipalities

Investing in Energy Efficiency: concluding remarks (cont.)

- Energy efficiency technologies are mature and in tendency for lower cost/kW
- There are niches for new energy efficient technologies and innovative system configurations at higher cost/kW (ESCOs, district heating, energy communities)
- Pilot interventions targeting renovations towards energy poor households are effective and can be well targeted.
- Local community level as potential test-beds to combine efforts and spend resources for permanent sustainable solutions.
- National/local HUBs could engage stakeholders, coordinate actions, monitor & measure energy poverty.



Any questions?

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