

# *Is there a link between Energy Poverty, Energy Efficiency and (Renewables) for Consumer?*

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This project is funded by the European Union  
Instrument for Pre-accession Assistance (IPA) Civil Society Facility (CSF)  
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*”It was not the  
candle makers  
who invented the  
light bulb!”*



*Dr. Bertrand Piccard*



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# What is Energy Poverty?

Poverty is lack of access to resources and lack of opportunities

896 million of people in extreme poverty vs. 2 billion energy poor

Energy poverty is a situation where a household is unable to access a socially, **environmentally** & materially necessitated level of energy services in the home (Bouzarovski et al. 2010)

**New EU member states >30% of households**

**The parameters:**

- **The efficiency of the building stock**
- **The ability to control the temperature in the building stock**
- **The technology used to warm/cool building stock**
- **The source, energy efficiency and cost of energy**



# What is the legal context?

Treaty establishing the energy community (Article 10):  
Each Contracting Party shall implement the *acquis communautaire* on energy

EU Internal Market in Electricity (2009/72/EZ) and Natural Gas (2009/73/EZ) Directive

**member states to define energy poverty and protect vulnerable energy consumers**

The Energy Efficiency Directive (2012/27/EU)

**....to ensure access to greater energy efficiency to vulnerable consumers**



# What is the cost context?

1	Heating System	Fuel	Unit of Measure	Heat output (kWh)	Purchasing unit	Heat output per unit (kWh)	Unit price (KM)	kWh/KM	Heat cost (KM/kWh)	Heater efficiency	Heat cost (kWh/KM)	Annual cost (KM)*	Annual cost per heated area unit KM/m2
2	wood stove, old type (30% efficiency)	firewood (beech) 50% moisture	kg	2	m3	1485	120	12.4	0.081	30%	3.7	1617	26.9
3	wood stove, old type (30% efficiency)	firewood (beech) 20% moisture	kg	3.8	m3	1930	120	16.1	0.062	30%	4.8	1244	20.7
4	convection heater	electrical energy	kW	1	kWh	1	0.155	6.5	0.155	100%	6.5	930	15.5
5	district heating ("Toplane" Sarajevo)											922	15.4
6	coal stove, old type (30% efficiency)	coal "Banovici"	kg	4.2	tona	4200	140	30.0	0.033	30%	9.0	667	11.1
7	space heater (70% efficiency)	natural gas	m3	9.47	m3	9.47	0.67	14.1	0.071	70%	9.8	609	10.2
8	certified wood stove (80% efficiency)	firewood (beech) 50% moisture	kg	2	m3	1485	120	12.4	0.081	80%	9.9	606	10.1
9	central heating (80% boiler efficiency)	wood pelets	kg	4.86	tona	4860	370	13.1	0.076	80%	10.5	571	9.5
10	central heating (90% boiler efficiency)	natural gas	m3	9.47	m3	9.47	0.67	14.1	0.071	90%	12.7	474	7.9
11	certified wood stove (80% efficiency)	firewood (beech) 20% moisture	kg	3.8	m3	1930	120	16.1	0.062	80%	12.9	466	7.8
12	air conditioner (inverter type, COOP 4)	electrical energy	kW	4	kWh	1	0.039	25.8	0.039	100%	25.8	233	3.9
13													
14	* to heat a dwelling of 60m2 floor area												
15													



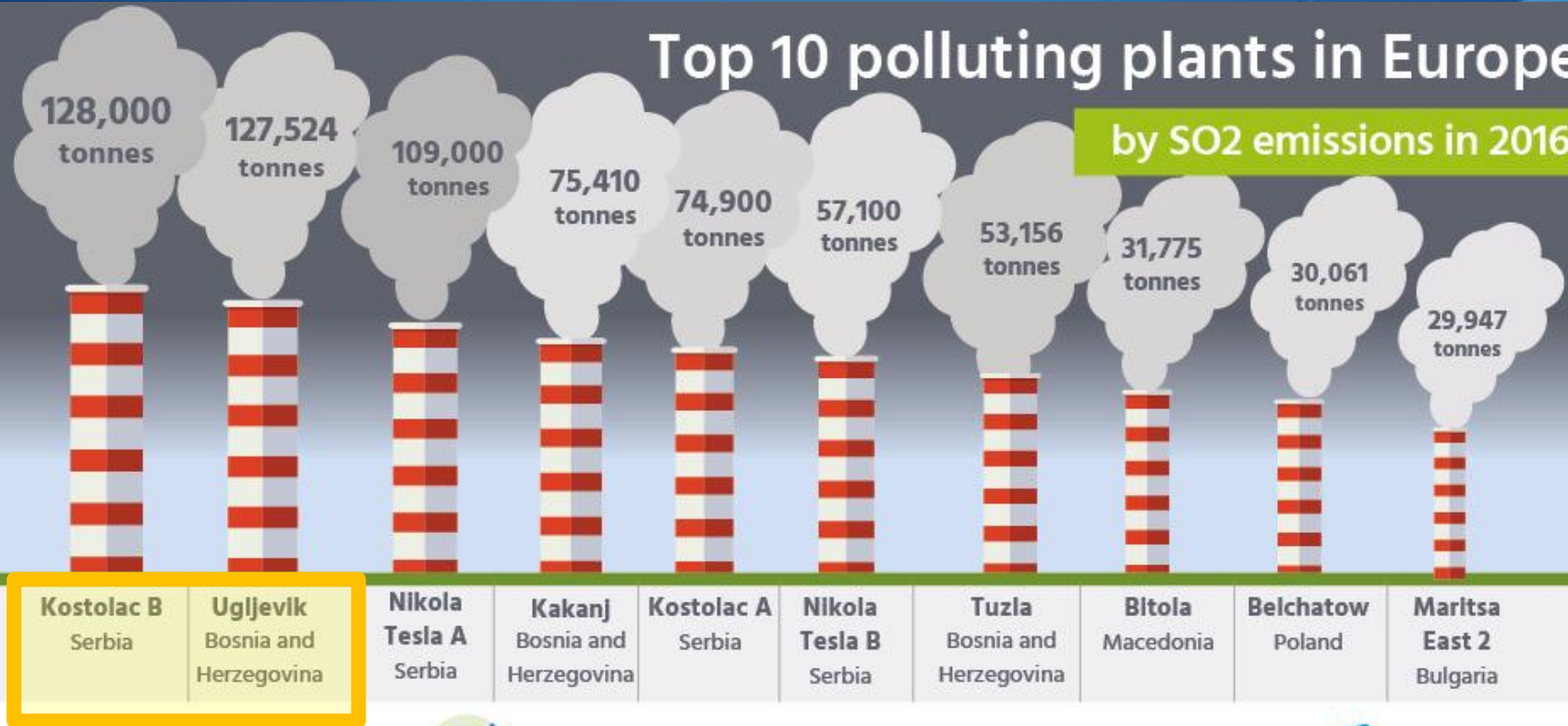
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# Europe's top polluters

## Top 10 polluting plants in Europe

by SO<sub>2</sub> emissions in 2016



# SEE 2050 Calculator



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# SEE 2050 Calculator

## Drilling Down

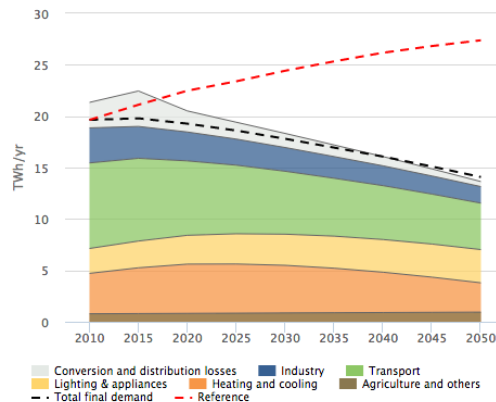
Albania 2050 Calculator

Energy Electricity Security Flows Story Costs

Examples

i Shqipërisë

Final Energy Demand



**Demographic evolution**

Demographic evolution  1  2  3

**Domestic heating and hot water**

- (i) Compactness  1  2  3  4
- (ii) House heating / cooling  1  2  3  4
- (iii) Housing thermal efficiency  1  2  3  4
- (iv) Electrification level  1  2  3  4
- (v) Innovative heating technology  1  2  3  4

**Domestic lighting, appliances, and cooking**

- (i) Demand / efficiency  1  2  3  4
- (ii) Electrification  1  2  3  4

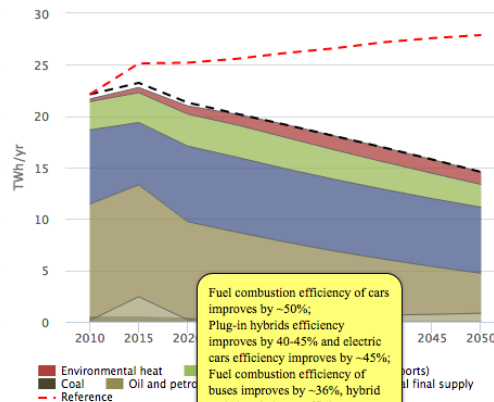
**Commercial heating and cooling**

- (i) Commercial heating / cooling  1  2  3  4
- (ii) Efficiency  1  2  3  4
- (iii) Electrification level  1  2  3  4
- (iv) Innovative heating technology  1  2  3  4

**Commercial lighting, appliances, and catering**

1  2  3  4

Primary Energy Supply



Fuel combustion efficiency of cars improves by ~50%;  
 Plug-in hybrids efficiency improves by 40-45% and electric cars efficiency improves by ~45%;  
 Fuel combustion efficiency of buses improves by ~36%, hybrid and electric buses efficiency improves by ~20%;  
 Rail transport efficiency improves by ~20%

**Domestic passenger transport**

- (i) Travel demand per person  1  2  3  4
- (ii) Modal shift  1  2  3  4
- (iii) Energy efficiency  1  2  3  4
- (iv) Technology mix / electrification  1  2  3  4

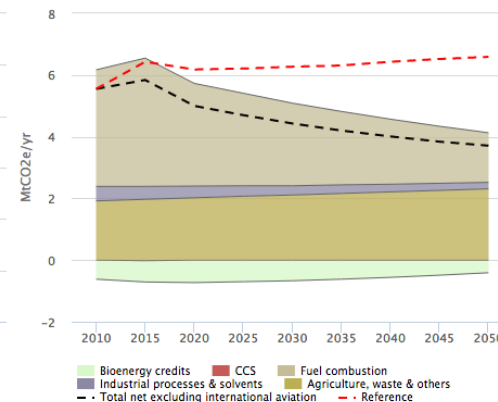
**Domestic freight transport**

- (i) Demand for freight transport  1  2  3  4
- (ii) Modal shift  1  2  3  4
- (iii) Energy efficiency  1  2  3  4
- (iv) Technology mix / electrification  1  2  3  4

**Industry**

- Steel Industry Production  1  2  3
- Energy Intensity of Output  1  2  3  4
- Cement Industry Production  1  2  3
- Energy Intensity of Output  1  2  3  4
- Aluminium Industry Production  1  2  3
- Energy Intensity of Output  1  2  3  4
- Carbon Capture & Storage  1  2  3  4

Greenhouse Gas Emissions



**Supply**

- Energy prices trajectories (Generation)  1  2  3  4
- Onshore wind  1  2  3  4
- Hydroelectricity large  1  2  3  4
- Hydroelectricity small  1  2  3  4
- Geothermal electricity  1  2  3  4
- Solar PV  1  2  3  4
- Solar thermal  1  2  3  4
- Nuclear power  1  2  3  4
- Coal power stations  1  2  3  4
- Carbon Capture Storage (CCS)  1  2  3  4

**Imports of electricity**

- (i) Share of imported electricity  1  2  3  4
- (ii) Share of RES in imported electricity  1  2  3  4

**Bioenergy**

- Indigenous biomass production  1  2  3  4
- Bioenergy imports  1  2  3  4

**Agriculture and Others**

1  2  3  4



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# 2050 Residential & Service Sector Assumptions



Road to EU



## RENOVATION RATE

Around  $\frac{3}{4}$  of the existing buildings are renovated. This requires a sharp increase in renovation rates, from currently lower than 1% per year towards 2%-2.5% as of 2020.



## RENOVATION DEPTH

Retrofitting of existing buildings ramps up – starting with significant improvements like wall and loft insulation and super-glazing, but reaching energy cuts of 90% or more from 2030.



## NEW BUILTS

All new buildings are near-zero energy from 2025: they are well insulated and generate power from rooftop solar panels which is fed back into the grid.



## HEATING TECHNOLOGY

Heating based on heat pumps ramps up, with up to 75% of heating coming from heat pumps. Additional heating includes burning biomass, from community scale or CHP systems. There's no gas, no oil, no coal.



SEE CHANGE NET

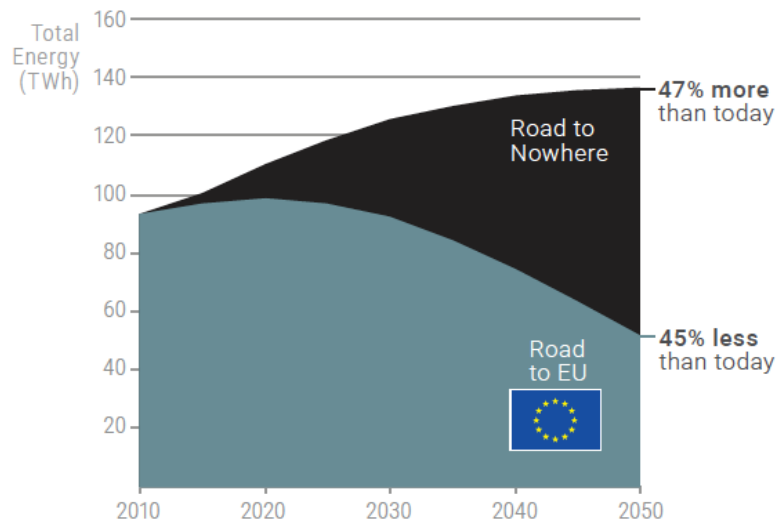


# Total final energy demand (heating & cooling) in buildings

Figure 7

## TOTAL FINAL ENERGY DEMAND (HEATING & COOLING) IN BUILDINGS

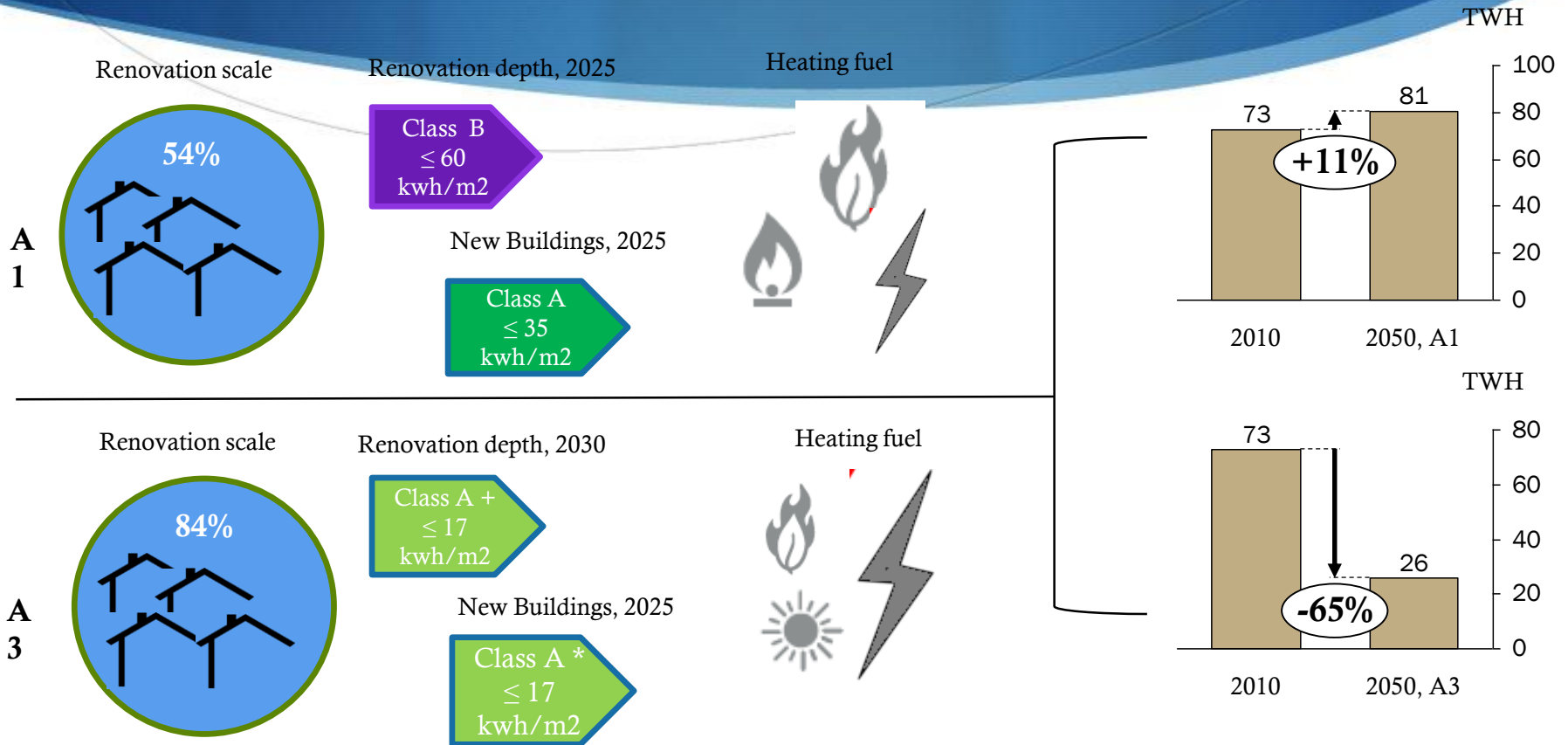
TWh, South East Europe



The two pathways provide very different visions for future energy use in buildings. They are not predictions, but show the implications of different levels of ambition to improve the energy performance of buildings. Technologies are available, and targets are already in place in the EU. SEE needs equally ambitious targets as early as possible in order to capture a large share of the energy-saving potential and avoid the risk of lock-in. Efficiency in buildings also means higher level of comfort. A well-insulated building will feel warmer in the winter, cooler in the summer and be healthier to live in.

SOURCES: SEE 2050 Carbon Calculator ([www.see2050carboncalculator.net](http://www.see2050carboncalculator.net))  
Energy Efficiency...Just do it! Act now for warmer homes, local jobs and cleaner air! 2015 (<http://seechangenetwork.org/wp-content/uploads/2013/07/Report-Energy-Efficiency-Just-Do-It.pdf>), <http://ec.europa.eu/transport/media/publications/doc/trends-to-2050-update-2013.pdf>, <http://www.topten.eu/>

# By refurbishing homes to reduce heating requirements, we can reduce household energy expenditure and lift people out of energy poverty



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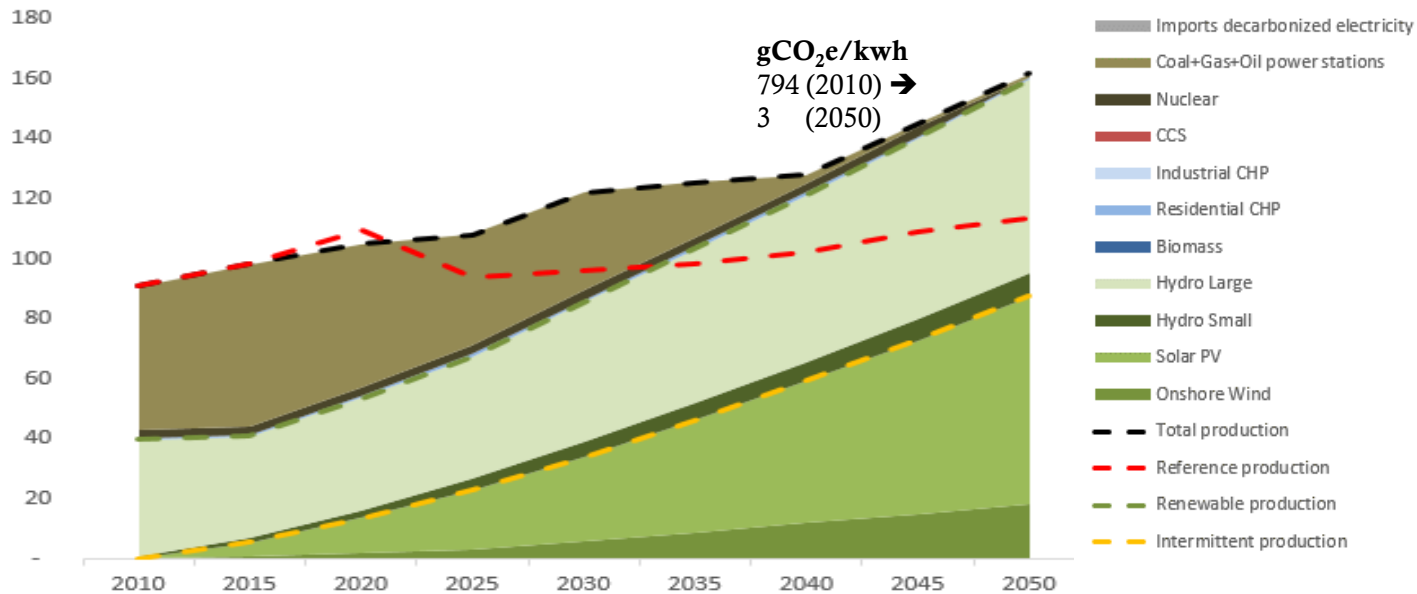
Department of Energy & Climate Change

OAK FOUNDATION

CLIMACT

# Alternative RES becomes crucial component of any 2050 low carbon strategy

## The Good News for Solar



# Thank you!

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