



For ambitious and evidence-based climate and energy policies since 2015

ECF STUDY -FINAL RESULTS

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Modelling proposed policies and their possible effects on low-income households

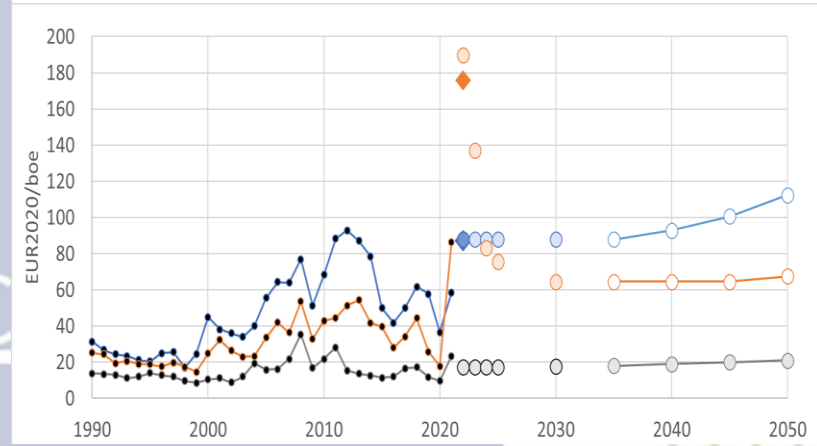
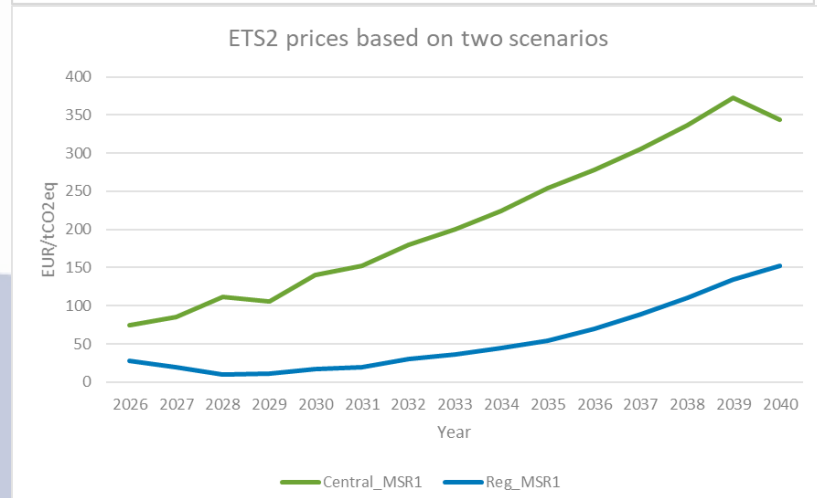
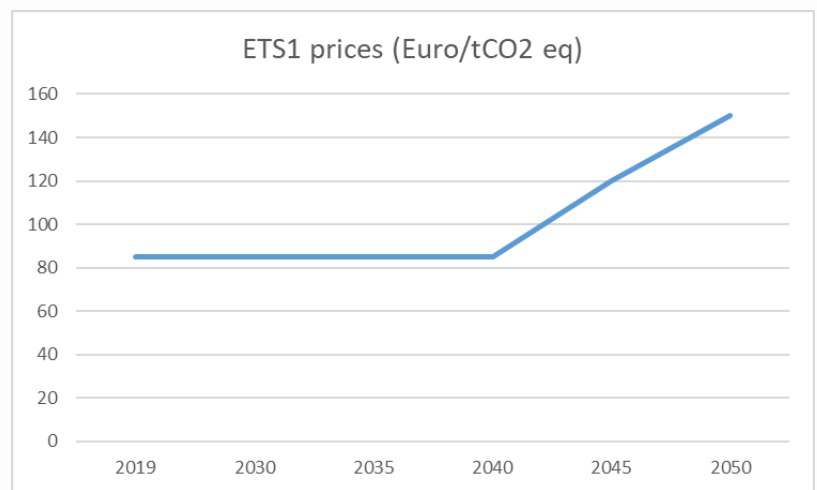
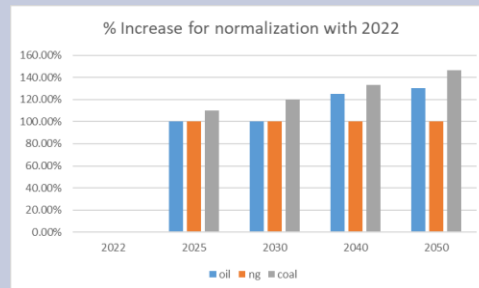
Examined policies:

- **Introduction of a carbon price/ETS on heating fuels.**
- **Introduction of a minimum energy performance standard** (for example an obligation that all buildings need to have an energy label D or E by 2030 or higher, or that all buildings that are sold or newly rented need to reach this energy label).
- **Introduction of a ban on the installation of oil, coal, and gas boilers in new and/or existing buildings.**

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Assumptions

- **Targeted end-uses:** Heating, cooling and domestic hot water.
- **Baseline year:** 2019
- **Elasticities of demand:** National (European if national not available)
- **FEC increase, Fuel prices and ETS1 price:** Increase foreseen in the EU Reference Scenario 2020 for the period 2035-2050.
- **ETS2 price:** Derived by the study, which was conducted by Vivid economics.
- **ETS1 price:** EC 2022 (Analytical basis for the update of NECPs)
- **Fuel price:** EC 2022 (Analytical basis for the update of NECPs) based on EU reference scenario



Examined scenarios

Baseline scenario

Assumptions: No implementation of additional policies.

The foreseen increases of the energy prices within the framework of the EU Reference Scenario 2020 were taken into account. Scenario 1 was considered for the projection of the electricity price.

Scenario 1

Assumptions: Scenario 1 was considered for the projection of ETS2 price.

The foreseen increases of the energy prices within the framework of the EU Reference Scenario 2020 were taken into account in addition to the increase due to the carbon pricing. Scenario 1 was selected for the projection of the electricity price.

Scenario 2

Assumptions: Mandatory phase-out of heating oil, solid fossil fuels, and natural gas (including LNG) in 2035. It was considered that the actual phase-out will have occurred after five years (thus in 2040), and heat pumps will replace the existing heating systems. The installation cost of the heat pumps was assumed equal to €10,000.

Scenario 3

Assumptions: Establishment of MEPS for achieving energy class D in 2030.

75% of the total low-income households) will renovate their buildings.

Assumptions for buildings' energy upgrade: Renovation cost: €15,000/dwelling and delivered final energy savings: 40%.

In 2035 all the building will be upgraded to energy class C (Assumptions for buildings' energy upgrade: Renovation cost: €10,000/dwelling and delivered final energy savings: 10%).

Scenario 4

Assumptions: Combination of Scenarios 2 and 3

Scenario 5

Assumptions: Combination of Scenarios 1, 2 and 3.

Main findings from the first study

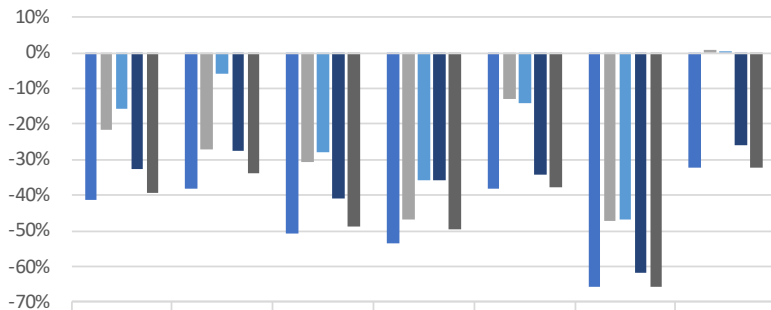
- Minimum energy performance standards for buildings, alongside a phase-out of the sale of fossil fuel boilers and a carbon price for heating fuels, would **reduce the lowest-income households' energy costs by one-third in 2050** while boosting disposable income.
- Introducing a **carbon price** on heating fuels alone could push **more households into energy poverty**. Low-income households already consume around 28% less energy than average households (further reducing energy use requires renovation).
- Without any of these policies, low-income households will spend at least 19% more on energy than today, and the EU will fail to reach its climate targets.
- **Substantial public funding** will be **needed** for investments to decarbonise buildings owned or occupied by low-income households. A proportion of this could be met with **revenues from the ETS** for buildings and the proposed **Social Climate Fund**, however **additional financing** will be **needed** to cover the full €140 billion investment needs for the ten countries analysed.

For more details, see: <https://europeanclimate.org/resources/a-socially-just-eu-renovation-wave/>

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General Results – Main Insights

FEC percentage evolution



	RO	HU	CZ	PL	GR	SK	BG
Scenario 5	-41%	-38%	-51%	-53%	-38%	-66%	-32%
Scenario 1	-22%	-27%	-31%	-47%	-13%	-47%	1%
Scenario 2	-16%	-6%	-28%	-36%	-14%	-47%	1%
Scenario 3	-33%	-28%	-41%	-36%	-34%	-62%	-26%
Scenario 4	-39%	-34%	-49%	-50%	-38%	-66%	-32%

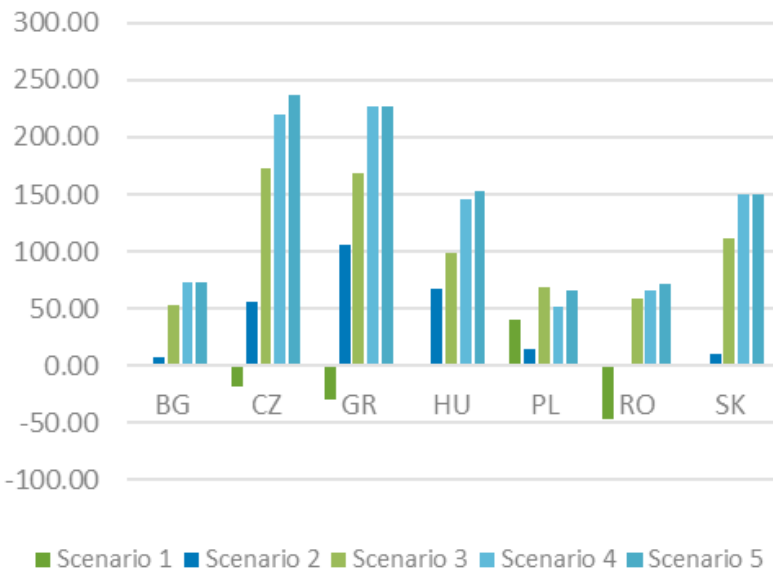
Energy expenses percentage evolution



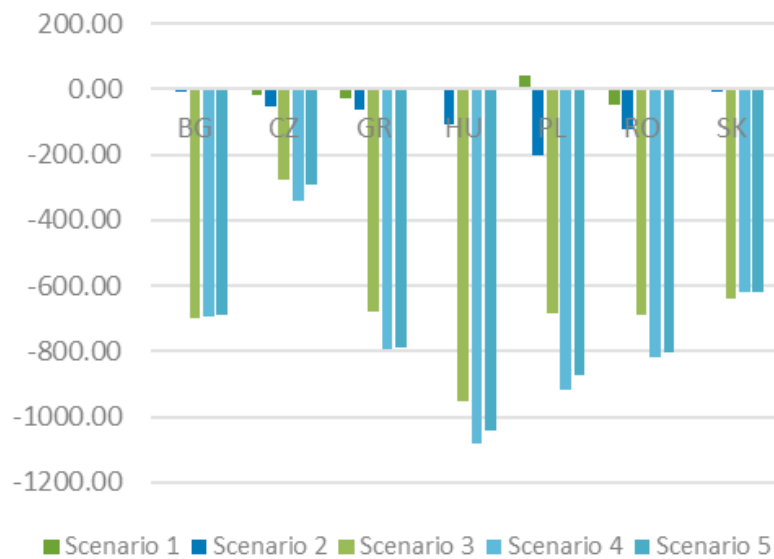
	RO	HU	CZ	PL	GR	SK	BG
Scenario 5	-16%	-31%	-30%	-19%	-38%	-61%	-27%
Scenario 1	39%	1%	21%	-5%	33%	-31%	12%
Scenario 2	16%	-7%	1%	-1%	-16%	-34%	6%
Scenario 3	-7%	-26%	-13%	-20%	-16%	-50%	-13%
Scenario 4	-11%	-25%	-25%	-8%	-38%	-61%	-27%

Financing requirements and income effects

Average change in income if the investments are financed from funds



Average change in income if the investments are financed by households



🌐 Financing required (Assumption again at 100%)

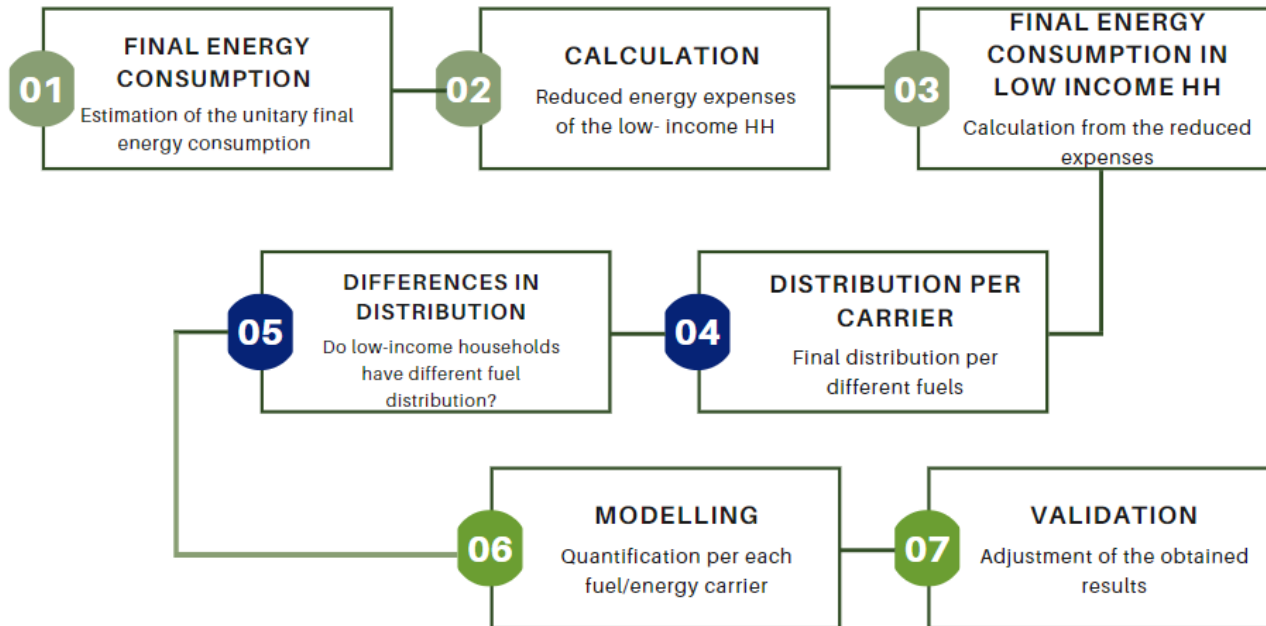
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More info



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Methodological approach



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Data needed for the BaU scenario

Input Parameters										
Number (absolute) of low-income households (dwellings)										
Average income (€)										
Average number of occupants										
Average area (m ²)										
Average expenses for electricity (€)										
Average expenses for thermal energy (€)										
Number of renovated buildings (%) (renovation rate)										
Percentage of utilized fuels for thermal uses (%)	<i>Electricity</i>	<i>Heating oil</i>	<i>Natural gas</i>	<i>Biomass</i>	<i>District heating</i>	<i>Solar thermal</i>	<i>LPG</i>	<i>Other</i>		
Energy prices (€/MWh) (with and without taxes)										

Space heating										
Modelling parameters										
Heating degree days										
Installed capacity of heating system (kW/building)										
Utilization factor (%)										
Useful energy for space heating (kWh/building)										
Percentage of utilized fuels for space heating (%)	<i>Heating oil</i>	<i>Natural gas</i>	<i>Biomass-Central system</i>	<i>Biomass-Individual system</i>	<i>District heating</i>	<i>Heat pumps-Conventional</i>	<i>Heat pumps-High efficient</i>	<i>Electricity</i>	<i>Other</i>	
Efficiency of heating systems										
Calculations										
Final energy consumption (GWh)	<i>Heating oil</i>	<i>Natural gas</i>	<i>Biomass</i>	<i>District heating</i>	<i>Electricity</i>	<i>Other</i>				
Space Cooling										
Modelling parameters										
Cooling degree days										
Utilization factor (%)										
Installed capacity of cooling system (kW/building)										
Percentage of cooling systems (%)							<i>Conventional systems</i>	<i>High-efficient systems</i>		
Performance of cooling systems										
Calculations										
Final energy consumption (GWh)										
Domestic hot water (DHW)										
Modelling parameters										
Consumption of DHW (lt/member & day)										
Useful energy (kWh/building)										
Percentage of utilized fuels for DHW (%)				<i>Electricity</i>	<i>Natural gas</i>	<i>Heating oil</i>	<i>Solar thermal</i>			
Performance of DHW systems										
Calculations										
Final energy consumption (GWh)				<i>Electricity</i>	<i>Natural gas</i>	<i>Heating oil</i>	<i>Solar thermal</i>			
Cooking										
Modelling parameters										
Demand for cooking (kWh/dwelling)										

Modelling tool

Low-income households		2019
Input Parameters		
Number of low-income households (dwellings)		503.841
Energy prices (€/MWh of final energy)	Heating oil	115
	Natural gas	68
	LPG	172
	Biomass	65
	Ambient heat	0
	Solar thermal	0
	District heating	60
	Electricity	178
	Other	30
Increase of energy prices	Heating oil	0%
	Natural gas	0%
	LPG	0%
	Biomass	0%
	Ambient heat	0%
	Solar thermal	0%
	District heating	0%
	Electricity	0%
	Other	0%
Elasticity	Heating oil	-0,5
	Natural gas	-0,5
	LPG	-0,5
	Biomass	-0,5
	Ambient heat	-0,5
	Solar thermal	-0,5
	District heating	-0,5
	Electricity	-0,5
	Other	-0,5
Space heating		
Modelling parameters		
Calculations		
Final energy consumption (GWh)	Heating oil	592
	Natural gas	210
	LPG	42
	Biomass	633
	Ambient heat	71
	Solar thermal	14
	District heating	31
	Electricity	70
	Other	6
	Total	1669

Low-income households		2019
Input Parameters		
Number of low-income households (dwellings)		503.841
Number of buildings for renovation (%)		85%
Energy prices (€/MWh of final energy)	Heating oil	115
	Natural gas	68
	LPG	172
	Biomass	65
	Ambient heat	0
	Solar thermal	0
	District heating	60
	Electricity	178
	Other	30
Performance Ratio	Heating oil	80%
	Natural gas	90%
	LPG	90%
	Biomass	35%
	Ambient heat	100%
	Solar thermal	100%
	District heating	100%
	Electricity	100%
	Other	90%
Space heating		
Modelling parameters		
Phase-out		No
Replacement with heat pumps		No
Heat pumps - SPF		2,7
Heat pumps - COP		3,0
Replacement with biomass		No
Calculations		
Final energy consumption (GWh)	Heating oil	592
	Natural gas	210
	LPG	42
	Biomass	633
	Ambient heat	71
	Solar thermal	14
	District heating	31
	Electricity	70
	Other	6
	Total	1669

2030
503.841
85%
115
68
172
65
0
0
60
178
30
80%
90%
90%
35%
100%
100%
100%
100%
90%
Yes
Yes
2,7
3,0
No
0
0
0
633
218
14
31
904
0
1200

65
0
0
0
78
196
39
30%
30%
30%
0%
10%
0%
30%
10%
30%
-0,5
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504
179
35
633
67
14
26
67
5
1530

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