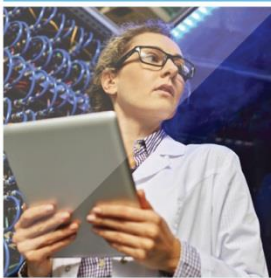
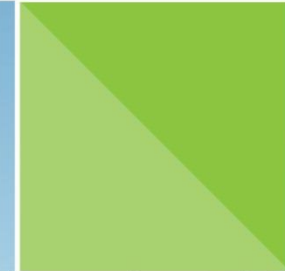




European  
Commission



**Serena Pontoglio, Policy Officer,  
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***Recent experiences quantifying impacts and multiple benefits  
of EU policy***

IEA Workshop "Beyond energy savings: The multiple benefits of energy efficiency" Paris 06 March 2018



# Content

- ✓ Revision of the **Energy Efficiency Directive**
- ✓ What we did to quantify impacts and multiple benefits linked to a set of **energy efficiency targets for 2030**
- ✓ The target ambition level in the ongoing **negotiations**

# Revision of the Energy Efficiency Directive

## GOALS OF THE CLEAN ENERGY FOR ALL EUROPEANS PACKAGE POST – 2020

*" In essence the new package is about tapping our green growth potential across the board"*  
Commissioner Miguel Arias Cañete (2016)



**Energy Union  
Governance**



**Energy Efficiency**  
(Energy Efficiency  
Directive, Energy  
Performance or  
Buildings Directive)



**Renewables**  
(Revised Renewable  
Energy Directive)



**New Electricity  
Market Design**  
(including Risk  
Preparedness)



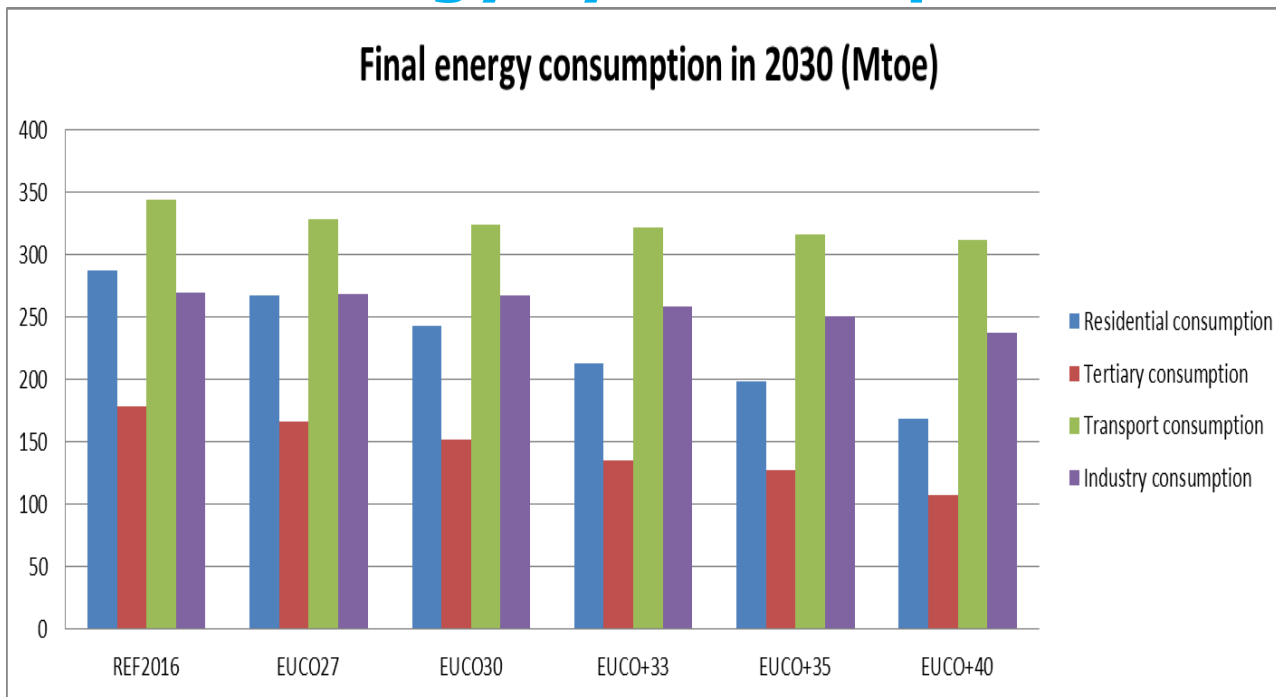
**Energy prices  
and costs  
report**

# What we did to quantify impacts and multiple benefits

## *Construction of scenarios of the Impact Assessment*

- The first specific problem identified by the IA: **the need to identify the level of energy efficiency ambition for 2030 in order to fulfil the political mandate** given by the European Council and by the European Parliament.
- **Primary energy consumption** is, by construction, reduced step-wise according to the 2030 target.
- The **first policy option** is to achieve a target of 27%, the minimum energy efficiency ambition level agreed by the European Council in 2014. It is represented by **EUCO27 baseline scenario**.
- Four **further policy options** explore 2030 **targets of a 30%, 33%, 35% and 40%**. These are represented by **policy scenarios: EUCO30, EUCO+33, EUCO+35 and EUCO+40**.
- Energy efficiency targets needed to be assessed within the framework of the other targets that have been agreed by the European Council.

## Energy system impacts



Source: PRIMES

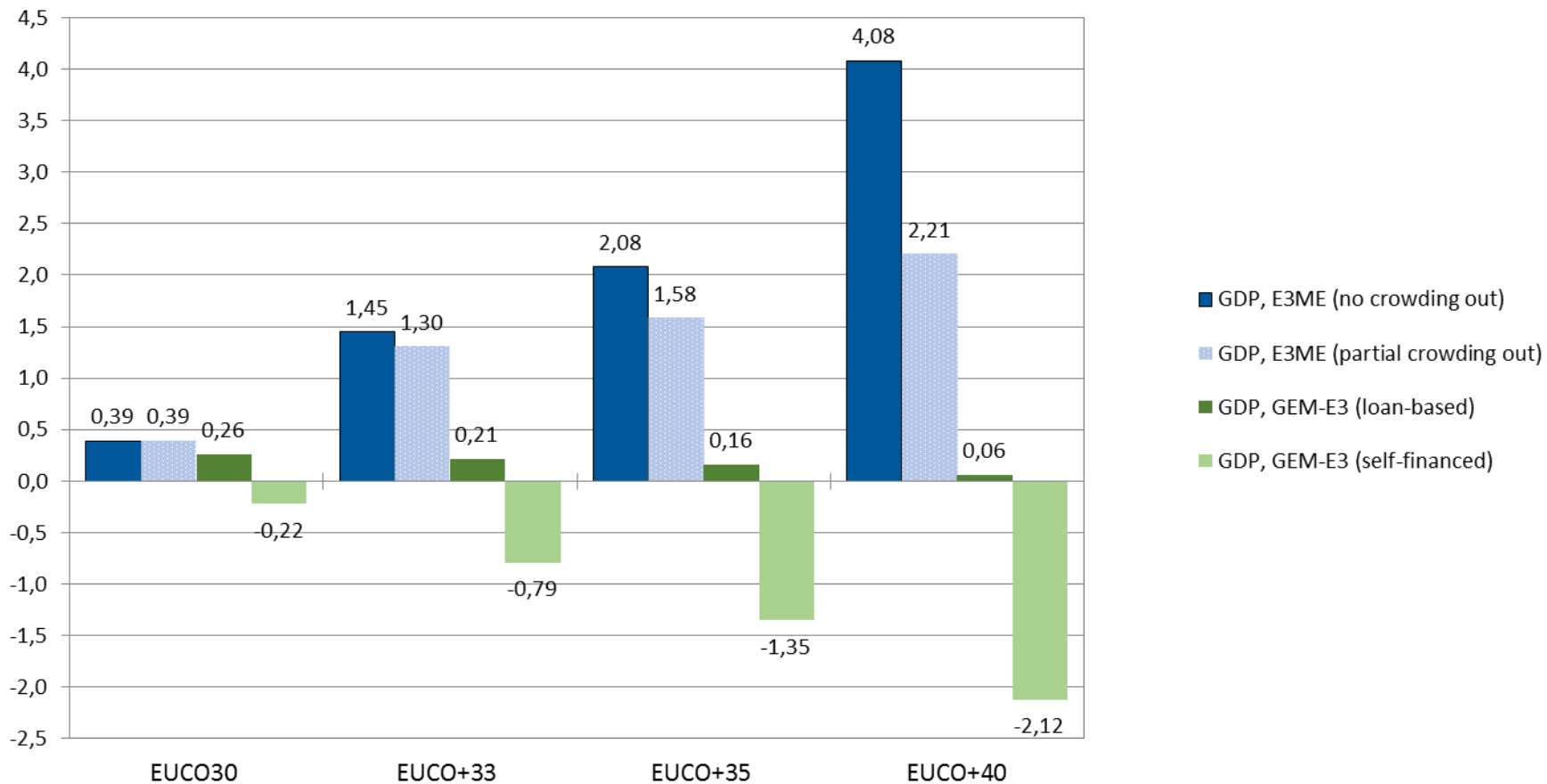
- Energy efficiency improvements are most prominent in the **residential and tertiary sectors**, reflecting the focus of current policy instruments.
- Reductions in the residential sector range from 9% for EUCO30 to 37% for EUCO+40 compared to the baseline EUCO27. In tertiary sector they range from 9 to 35%.
- The main drivers in residential and tertiary sectors are: thermal renovation, improved efficiency of heating and cooling appliances, including higher uptake of heat pumps and lower demand for electricity from other appliances.

## Macroeconomic assessment

- Two macroeconomic models used: E3ME and GEM-E3 to represent two different schools of economic thought
- The same two models were used in the IA on energy efficiency in 2014 but the approach has been nuanced and thus made more thorough by developing additional versions.
- For E3ME, the versions are:
  - **"no crowding out"** - there is no maximum level imposed on production growth. Industries can grow by absorbing investments without negatively impacting other sectors
  - **"partial crowding out"** - imposes a constraint on activity expansion for the sectors benefiting from EE policies (5% over 3 years, compared to REF). Beyond, physical and financial capital bottlenecks appear.
- For GEM-E3, the versions are:
  - **"loan-based finance"** - businesses and households can borrow in the markets
  - **"self-financing"** - no borrowing is possible and economic agents finance their investments in energy efficiency by spending less on other items
- The partial crowding-out and the loan-based scenario were considered in as the more realistic ones

# Impacts on economic growth in 2030

% change relative to EU2027



Source: GEM-E3, E3ME

# What we did to quantify impacts and multiple benefits

## "The macro-level and sectoral impacts of Energy Efficiency policies"

Additional impacts from the Report on the multiple benefits of energy efficiency ( difference from EUCO27)	
<b>Economy and labour market</b>	GDP increases by 0.4 to 4.1% Employment increases by 0.2 to 2.1%
<b>Health and well-being</b>	Annual healthcare cost savings of up to €77 billion
<b>Environmental impacts</b>	Final energy consumption reduced by 7.1% to 17.8% GHG emissions reduced by up to 47% compared to 1990 levels Material consumption increased by 0.7-2.7%
<b>Social aspects</b>	Potentially up to 8.3m households removed from fuel poverty Slightly reduced income distribution inequality Unemployment reduced by between 0.3 and 3.0 million
<b>Public budgets</b>	Increase in annual public balances of between 0.1 and 2.0% of GDP

More detailed results on the macroeconomic benefits are also available in the report:

[https://ec.europa.eu/energy/sites/ener/files/documents/the\\_macro-level\\_and\\_sectoral\\_impacts\\_of\\_energy\\_efficiency\\_policies.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/the_macro-level_and_sectoral_impacts_of_energy_efficiency_policies.pdf)



# Results

Key indicators	Unit	EUCO30	EUCO+33	EUCO+35	EUCO+40
<b>Year</b>		2030	2030	2030	2030
<b>EE PEC target (2007 baseline: 1887 Mtoe in 2030)</b>	%	-30.0%	-33.2%	-35.3%	-40.1%
<b>Primary Energy Consumption (Mtoe)</b>	Mtoe	1321	1260	1220	1129
<b>EE FEC target (2007 baseline: 1415 Mtoe in 2030)</b>	%	-30.3%	-34.3%	-36.9%	-41.7%
<b>Final energy consumption</b>	Mtoe	987	929	893	825
<b>GDP [E3ME model, partial crowding out]</b>	€2013m	18,115,362	18,280,150	18,330,147	18,442,966
<b>GDP [GEM-E3 model, loan-based]</b>	€2013m	17,006,442	16,997,648	16,988,938	16,971,617
<b>Employment [E3ME model, partial crowding out]</b>	th. persons	233,946	235,011	235,535	236,804
<b>Employment [GEM-E3 model, loan-based]</b>	th. persons	217,024	217,193	217,366	217,792
<b>Investments [E3ME model, partial crowding out]</b>	€2013m	4,200,675	4,329,468	4,410,835	4,597,140
<b>Investments [GEM-E3 model, loan-based]</b>	€2013m	3,025,862	3,129,886	3,216,105	3,453,054
<b>Distributional impacts for income by socio-economic group, % change in average real income compared to Reference [E3ME model, partial crowding out]</b>	All households	0.7	1.2	1.4	1.8
	1 <sup>st</sup> (lowest income) quintile	0.9	1.7	1.9	2.6
	2 <sup>nd</sup> quintile	0.9	1.6	1.8	2.4
	3 <sup>rd</sup> quintile	0.8	1.4	1.5	2.0
	4 <sup>th</sup> quintile	0.7	1.1	1.3	1.7
	5 <sup>th</sup> (highest income) quintile	0.5	0.8	0.9	1.5

# Results

Key indicators	Unit	EUCO30	EUCO+33	EUCO+35	EUCO+40
Public budget impacts as % of GDP - difference from Reference, 2030 (current prices) [E3ME model, partial crowding out]	%	0.08	0.5	0.8	1.2
Annual health cost impacts, difference from Reference - Mortality & morbidity / cost savings NOx, SOx, PM10 and PM2.5 in 2030 [E3ME model, partial crowding out]	m€ / year	-125,730	-137,018	-147,122	-188,974
Total GHG emissions (% change to 1990)	%	-40.8%	-43.0%	-43.9%	-47.2%
ETS sectors emissions (% change to 2005)	%	-43.1%	-44.3%	-44.2%	-48.3%
non-ETS sectors (excl. LULUCF) emissions (% change to 2005)	%	-30.3%	-33.7%	-35.5%	-38.7%
International oil prices (compared to EUCO 27; average 2020-2030) Source: POLES, JRC	%	-0.3%	-0.6%	-1.0%	-1.4%
International gas prices (compared to EUCO 27; average 2020-2030) Source: POLES, JRC	%	-1.1%	-2.3%	-3.0%	-4.3%
International coal prices (compared to EUCO 27; average 2020-2030) Source: POLES, JRC	%	0.02%	0.01%	0.01%	-0.03%
Carbon price ETS sectors	€'13/ t of CO2	27	27	20	14
Total import dependency	%	53.4%	52.6%	52.3%	51.8%
Net natural gas imports	bcm	272.7	236.7	220.2	181.5
Net Electricity Generation (TWh)	TWh	3285630	3215512	3122930	2921332
Renewable energy share in electricity generation	%	41.8%	42.1%	41.8%	44.3%
Average Electricity prices	€	157.5	158.0	156.9	159.0
Total System Costs in bn €'13 (average annual 2021-30)	bn €'13	1951.8	1977.2	2014.0	2076.7
Total Energy System Costs (average annual 2021-2050)	bn €'13	2254.7	2289.9	2323.7	2384.5
Transport System costs (average annual 2021-30)	bn €'13	674.1	682.0	705.2	710.4
Household System costs (average annual 2021-30)	bn €'13	710.8	728.9	741.9	770.4
Services System costs (average annual 2021-30)	bn €'13	316.6	324.6	331.8	354.3
Industry System costs (average annual 2021-30)	bn €'13	306.6	305.3	303.7	307.2
Investment expenditures in power generation (2021-2030 period)	bn €'13	394	379	350	341
Investment expenditure (energy related, average annual)	bn €'13	379	503	591	825

# Methodological issues

## Marco-economic assessment:

- How to account for **distribution effects**?
- How to model **crowding-out effects** for the economic sectors most stimulated by EE investments?
- Economy-wide **rebound effects**?
- How to apply **discount rates** to take into account in modelling consumers' EE investments?

## Health and well-being:

- Towards a standard methodology to assess **health benefits** and the related cost savings?



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