Inclusion of the heating sector in the EU ETS

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Inclusion of the heating sector in the EU ETS

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Heating in EU`s policy framework

EU ETS

- The EU ETS covers combustion installations with a rated thermal input exceeding 20 MW.
- Basically a large share of the combined heat and power plants (CHP plants) and district heating are regulated under the EU ETS.
- In addition, smaller installations have been opted-in by e.g. Finland and Sweden.

(The number of district heating systems around 3500 in EU)

NON-ETS

- Most of the energy used in heating, like single boilers and heating of individual buildings with fossil fuels, fall outside the scope of the EU ETS.
- The non-ETS sector is regulated with other means, typically a combination of taxes and command-and-control regulations, like energy efficiency measures.

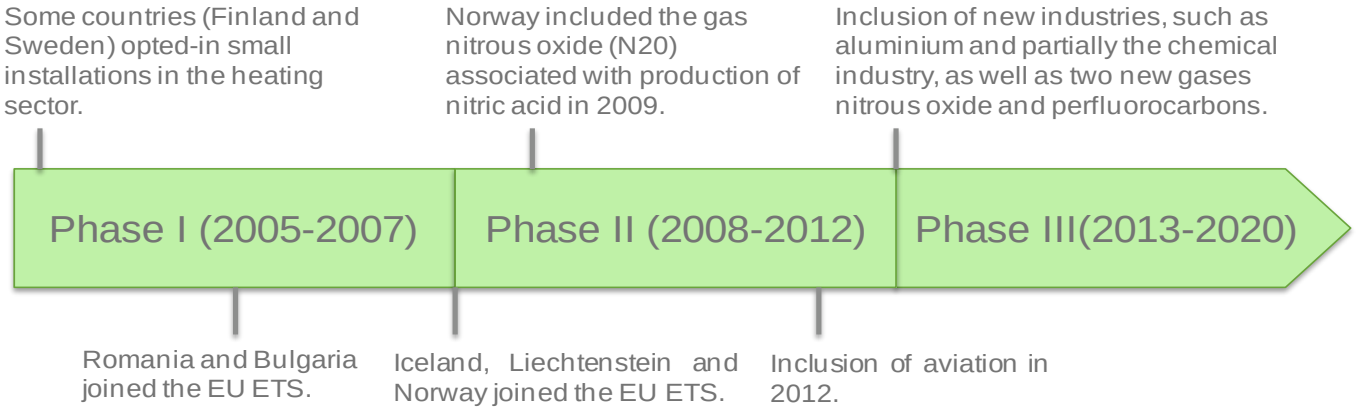
(The total number of boilers in residential buildings in EU around 132 million.)

➢ When discussing the extension of the EU ETS to the entire heating sector the question is including emissions also from combustion installations below the threshold (so called small emitters or installations)

Development of the EU ETS

Since the start in 2005, the scope of the EU ETS has been extended several times:

- Both by community and unilatery by member states, through the so-called opt-in mechanism.



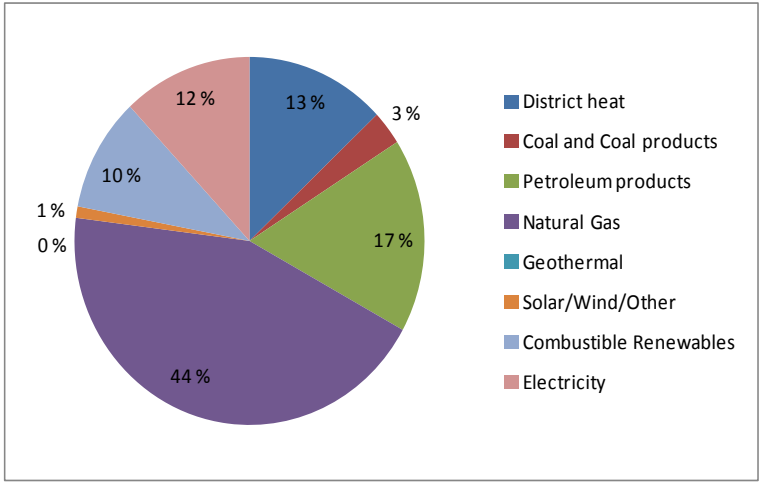
<u>The largest extensions:</u>

1. Inclusion of aviation into the system (212 Mt CO2)
2. Romania and Bulgaria joined the EU ETS (108.8 Mt CO2)
3. The inclusion of new industries and few new gases in 2013 (around 100 Mt CO2)

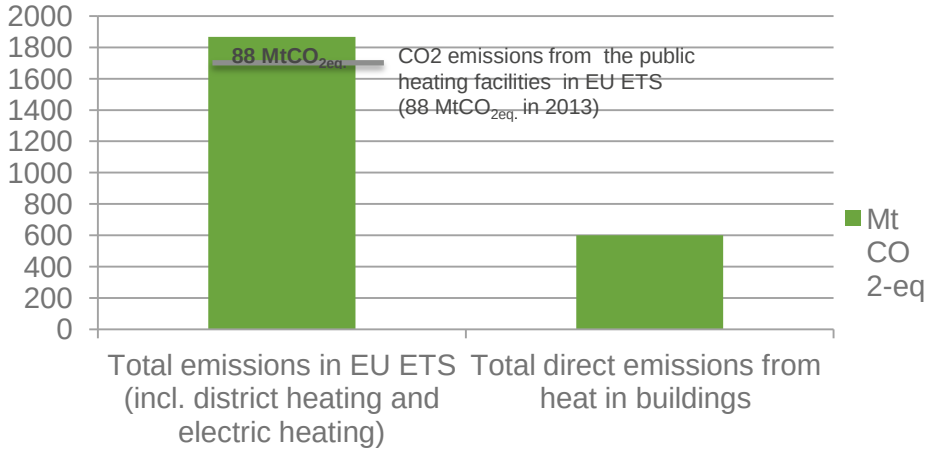
Fuel use and emissions

- Speaks for the consideration of inclusion of the entire sector in the scheme.

Composition of the origin of heat supply to residential and service sector buildings in EU 2010



The emissions from the non-ETS buildings sector (1A4a and 1A4b) in EU were around 600 Mt CO2 eq. in year 2012



- Around 64% of the total heat supply in non-ETS sector
- Around 25% of the total heat supply in EU ETS sector
- Around 11% from renewables

- The amount of the emissions from the heat in buildings sector (non-ETS) is 32 % compared to the total amount of emissions of the EU ETS sector in 2012 and around 7 times higher than the public heating facilities in ETS sector

Source: Heat Roadmap Europe 2050 (2013), EEA (2015) and Thomson Reuters

Current policy instruments

Supply-side measures

- Supply-side measures cover the heat production and their purpose is to reduce the carbon intensity of the production by increasing the conversion efficiency or shifting to low carbon fuels.

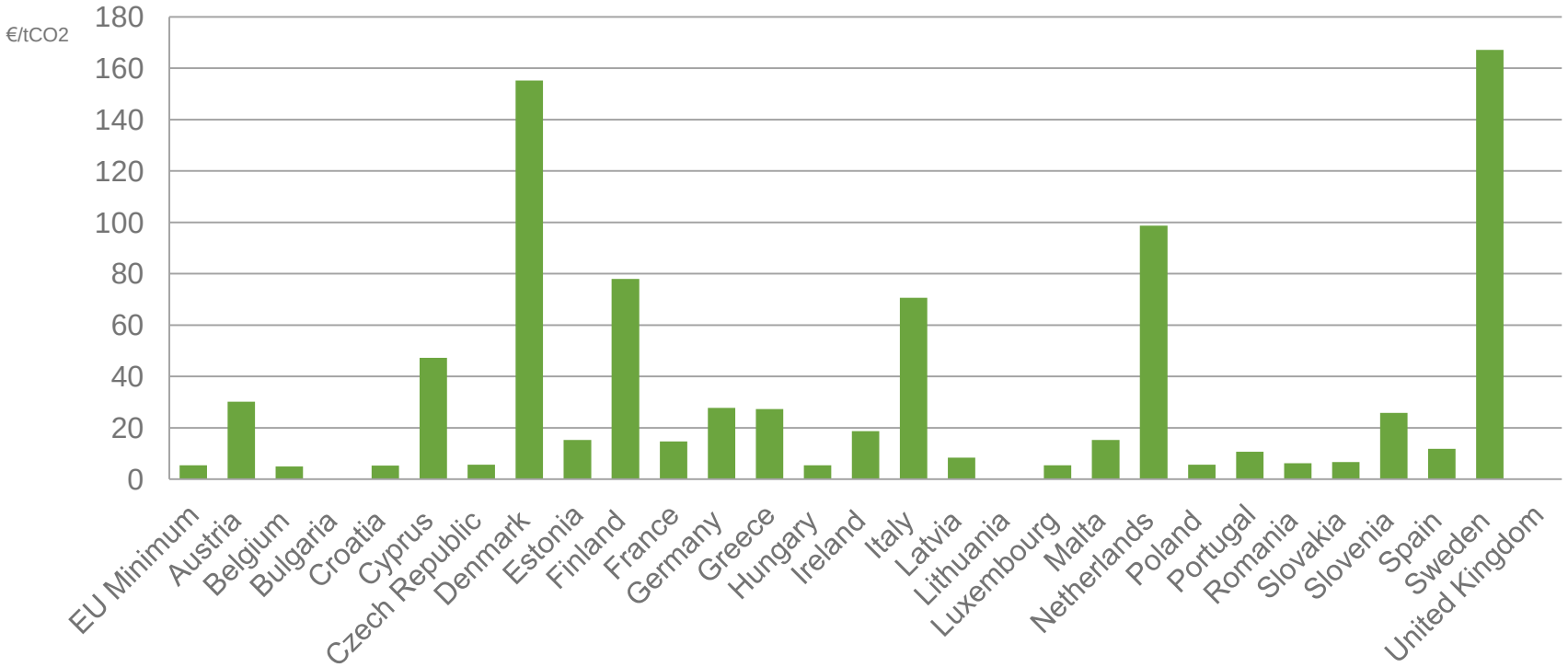
Demand-side measures

- The demand-side measures reduce the CO_2 emissions indirectly by lowering the energy consumption in residential/commercial as well as industrial sectors.

- The policy measures contain basically different energy efficiency measures like reducing the energy intensity of end-use technologies and improving the energy efficiency of new and existing buildings.

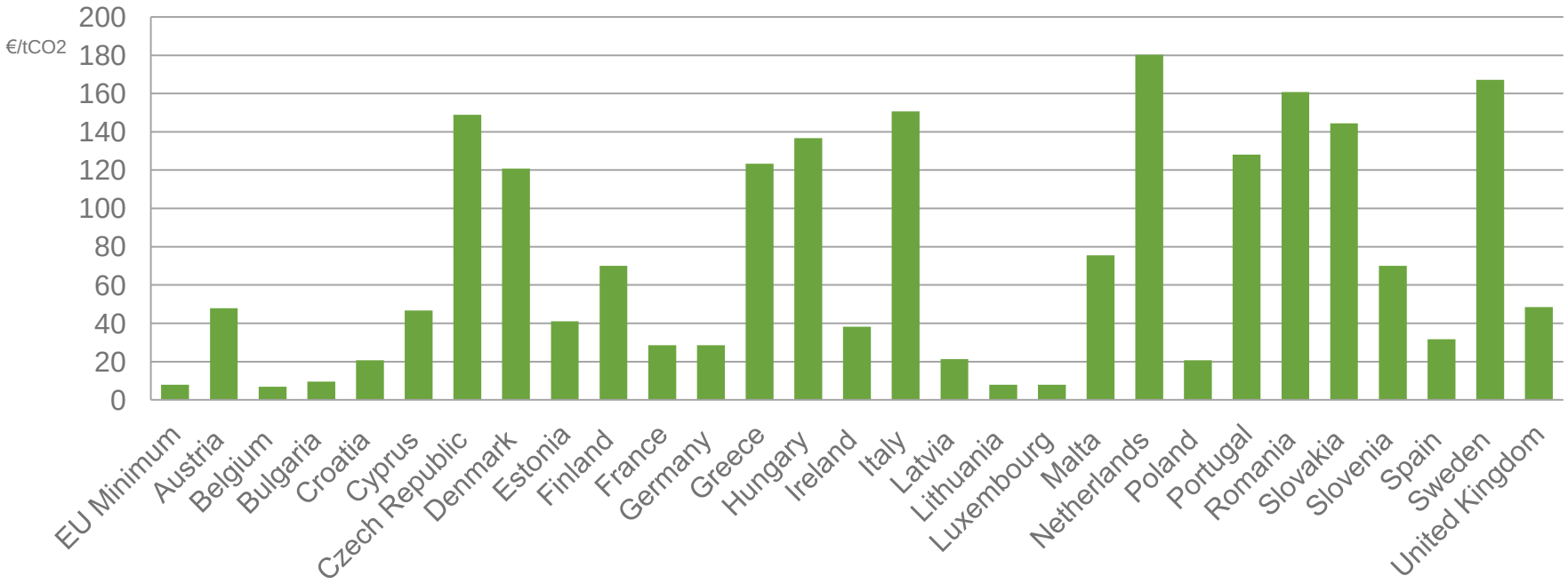
Some of the policy measures can be categorized in both supply-side and demand-side measures, e.g. energy taxation

Excise duty rates for natural gas
(non-business use at January 2015)



Source: EC (2015), Excise duty tables

Excise duty rates for light fuel oil
(non-business use at January 2015)



Source: EC (2015), Excise duty tables

Overlaps in the case of inclusions

- The current supply- and demand-side policies to reduce emissions from heating in the EU countries can be divided in the following six categories as follows:
  - Compulsory energy efficiency standards
  - Voluntary energy efficiency agreements for industry and municipalities
  - Subsidies for energy efficiency improvements
  - Investment subsidies
  - Fuel taxes
  - Production subsidies for renewable heat generation, heat only or co-generation

- Energy taxation of fuels used in heating varies to a large extent between the Member States and between fuels. The fuel taxes obfuscate the price signals of the EU ETS, and consequently reduce efficiency.
  - ➢ **Most likely candidate for removal or lowering as a result of the inclusion**

- Proponents of compulsory energy efficiency standards claim that consumers severely discount the value of future energy savings, which prevents them from carrying any upfront costs for energy efficiency technologies. As a result, the technologies do not diffuse through the society or do so very slowly.
  - ➢ **The least likely candidate for removal as result of the inclusion**

Comparison of abatement potentials

Estimated marginal abatement cost bands for heating that are not included in the EU ETS in 2020			Estimated marginal abatement cost for the EU ETS in 2030		
Measure	**Cost in euro/tCO2**	**Potential in MtCO2**	**Abatement measure**	**Cost in euro/tCO2**	**Potential in MtCO2**
Cost Band A	< 0	83.7	IGCC (Build integrated gasification combined cycle plants in place of ultra-supercritical coal plants	-34	64
Cost Band B	0-25	3.6	EE in Industry	10	100
			Nuclear energy	17	141
			Hydropower	20	1
Cost Band C	25-50	1.6	Energy efficiency 1st tranche	35	60
			Onshore wind	39	39
			Replace old lignite with new gas	40	230
Cost Band D	> 50	29.1	Replace old coal with new gas 1st tranche	64	184
			Biomass	74	200
			Offshore wind 1st tranche	83	103
			Offshore wind 2nd tranche	49	32
			CCS 1st tranche	127	14
			CCS 2nd tranche	68	28
			CCS 3rd tranche	51	229
			CCS industry	80	95

Non-ETS heating sector:

- Most of the abatement potential lies in the existing building stock and can be realised by renovation measures.
- The most cost-effective renovations measures are related to improvements of insulation and the replacement of heating systems by more efficient ones.

Source: AEA (2012) and Blyth and Bunn (2011)

Abatement potentials in the buildings sector and costs for the 10 largest EU countries

- covers 92% of the total abatement potential

Member state	Remaining potential in 2020	Remaining abatement potential per cost band in MtCO2 per year				Current excise duties €/tCO2	
		Cost Band A (< 0 Euro)	Cost Band B (0-25 Euro)	Cost Band C (25-50 Euro)	Cost Band D (> 50 Euro)	Light fuel oil in heating	Natural gas in heating
Germany	23.2	16.3	0.2	0.7	6.1	29	28
UK	17.1	12.3	0.6	0.0	4.3	48	0
France	15.2	10.1	0.2	0.5	4.5	29	15
Poland	10.7	8.6	0.1	0.0	2.0	21	6
Spain	10.9	8.3	0.8	0.1	1.7	32	12
Italy	12.1	8.0	1.1	0.1	3.0	151	71
Belgium	6.4	5.3	0.2	0.0	0.9	7	5
Netherlands	6.9	5.2	0.0	0.0	1.6	180	99
Ireland	2.8	2.3	0.0	0.1	0.5	38	19
Czech Republic	2.3	1.6	0.1	0.0	0.5	149	6
SUM	**107.8**	**78.0**	**3.2**	**1.5**	**25.1**	**N/A**	**N/A**

Source: AEA (2012) and EC (2015): Excise duty tables

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Own-price elasticity of demand for energy use in buildings.

Main category	Sub category	Short Run			Long Run
		Year 1	Year 2	Year 3	Year 25
Residential	Electricity	-0.12	-0.21	-0.24	-0.40
	Natural gas	-0.08	-0.14	-0.17	-0.28
	Distillate fuel	-0.08	-0.14	-0.17	-0.20
Commercial	Electricity	-0.12	-0.20	-0.25	-0.82
	Natural gas	-0.14	-0.24	-0.29	-0.45
	Distillate fuel	-0.14	-0.24	-0.29	-0.42

- In the short-run the own-price elasticity for gas and oil is very low.

Source: U.S. Energy Information Administration (2014)

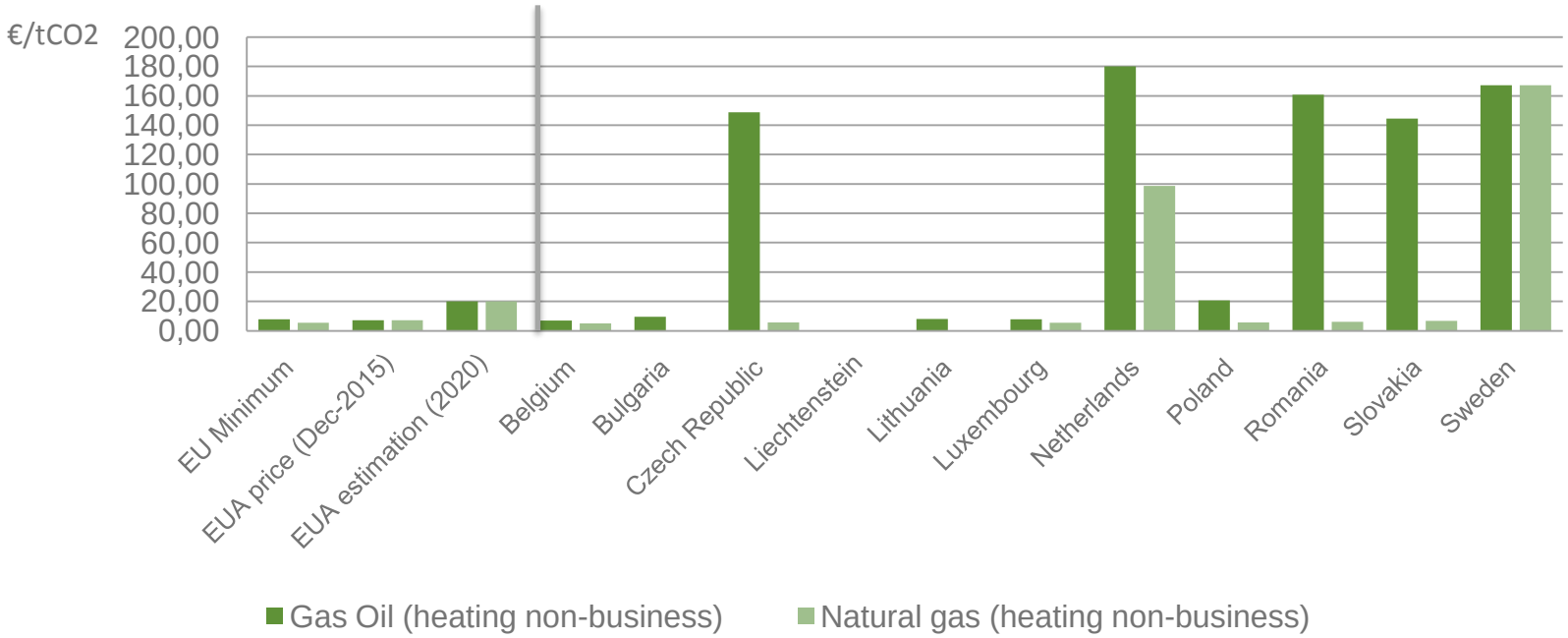
Effect on the EUA price

- The demand for heating fuels is inelastic, especially in short term.
- As consequence, an inclusion of the heating sector is likely to have little effect on fuel use.
  - This is regardless of whether the current excise taxes are adjusted or not as a result of the inclusion.
- With inelastic demand, the effect on the EUA price is determined by the stringency of the cap for emissions from heating fuels.
  - If the cap is larger than current emissions, the heating sector will be a net seller of emissions allowances, which will push the EUA price down.
  - If the cap is smaller than the current emission, the heating sector will be a net buyer of emission allowances, which will push the EUA price up.

Auction revenues

- The total revenues collected from the energy taxes (excise duties) in the heating sector may be considerable in some EU countries.
  - Repealing the current energy taxes in the case of inclusion the sector into EU ETS could mean serious fiscal problems caused by the lost of tax revenues.
- The allocation method in the case of the inclusion of the CO_2 emissions of the heating sector into the EU ETS, especially the heating of residential and commercial sector, would likely be auctioning.
- The increasing auction revenues from other sectors could compensate partially lost government revenue caused by the removal or lowering the rates of the excise duties from the heating sector.
- Any changes in the EUA price due to the inclusion will affect the auction revenue from all sectors subject to auctioning, not just the heating sector.
  - With expected auction volume (973 million EUA) and estimated emissions (584MtCO_2 = 584 million EUA) of the heating of buildings in 2020, the multiplier is in the range of 2.5, i.e. a EUA price increase of 1 euro is fiscally equivalent to a 2.5 euro price increase of average excise tax on heating fuels in the EU.
  - Because of the multiplier effect, a 1 euro increase of the EUA price will generate as much additional revenue as a 2.5 euro increase of the average excise tax on heating fuels.

Excise duty rates for gas oil and natural gas in selected member states as well as the EU minimum price for the excise duties, current EUA price and the EU price estimation for the 2020.

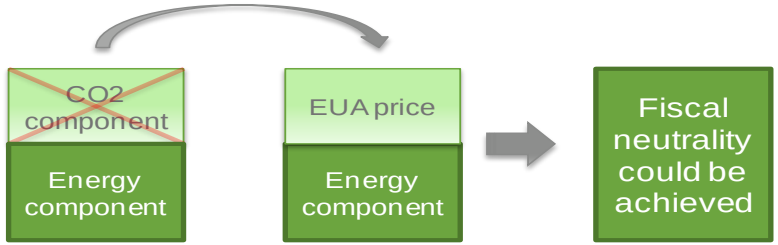


Source: Thomson Reuters /Point Carbon and EC (2015), Excise duty tables

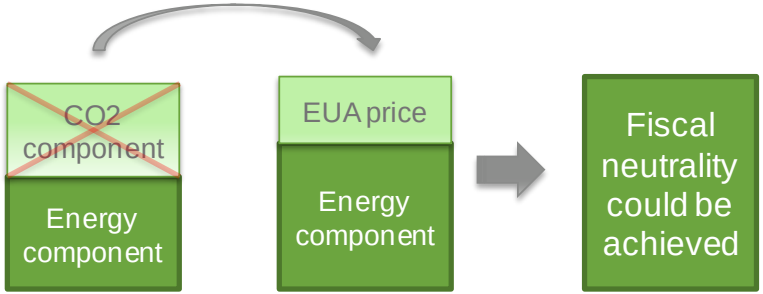
Alternatives to achieve the fiscal neutrality

1. The EUA price will compensate the entire excise duty of the fuels.

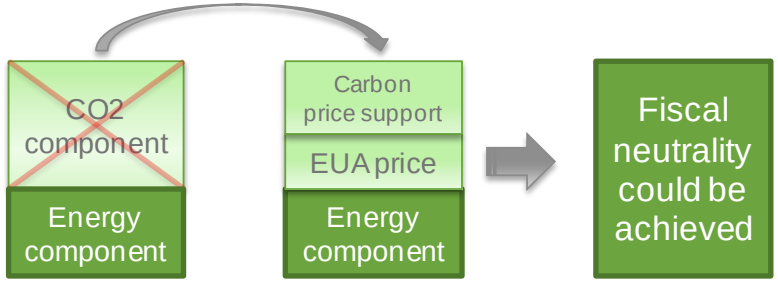
2. The EUA price will compensate the CO_2 part of the excise duty.



3. The energy content tax could be increased to cover the gap between the removed CO_2 component and the EUA price.



4. A carbon "price floor" or a "carbon tax support"



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Implementation of the inclusion of the heating sector - barriers and solutions

- In practice, there are two procedures for enlarging the scope of the EU ETS:
  - Amending (at least Annex 1 of) the Directive (EU-wide amendment of the scope)
  - Opt-in (per and on initiative of Member States
- Common for both amending is that both set the technical feasibility of Monitoring, Reporting and Verification (MRV) as a basic condition for extension of the scope of the system.
- Challenge for extending the EU ETS also to small installations is the cost-efficiency of MRV.
  - The large amount of installations (132 million) poses a challenge for regulation of the installations under an ETS and administration of the scheme.
  - The transaction costs for compliance are disproportionately high compared to the size of the individual emission sources.
- There are examples of other cap-and-trade schemes that has developed systems to include small-scale sources in the scheme without compromising cost-efficiency of MRV.

Upstream approach

•The point of regulation can also be upstream, in which case the emissions are regulated higher up in the supply chain, e.g. at supplier/distributor level.

•The same approach has been raised by the Commission for inclusion of heating of buildings and road transport into the EU ETS.

•An upstream approach has been considered to contain many advantages, such as being administratively less complex.

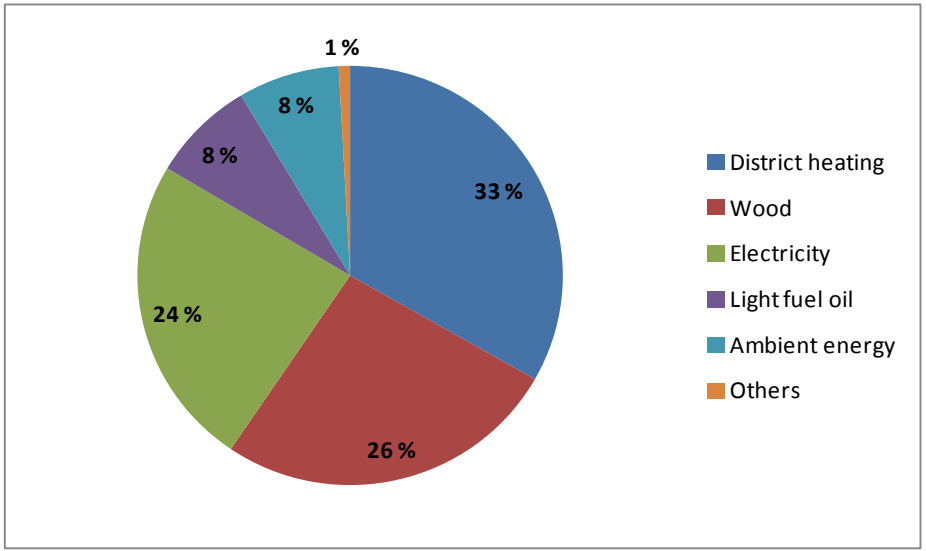
•The California cap-and-trade scheme is an example of a mixed upstream and downstream scheme:

- Large stationary sources are subject to compliance obligations but emissions from road transport and residential and commercial buildings are included through the inclusion of transport fuel and natural gas suppliers.
- The fuel suppliers are not required to monitor, report and verify emissions from fuels distributed either outside California or sectors outside the scope of the ETS subject to the provision of sufficient evidence that the fuels have indeed been exported out from California or supplied to non-ETS sectors.

Opportunities and challenges when moving the ETS compliance obligations upstream.

- For heating, this would mean that either the compliance obligation for the entire sector is moved to upstream entities or that the point of obligation are the upstream entities for small scale sources and the direct source of emissions (i.e. the installation) for large scale sources.
- Especially in the case that the point of obligation would be both in upstream and downstream the questions of double counting of emissions would also require to be addressed appropriately.
- One solution could be that fuels suppliers would provide sufficient evidence of the fuel being provided to another entity with compliance obligations.
- Inclusion of upstream emitters is an amendment of essential elements of the EU ETS and would require the adoption of a MRV-framework for upstream point of obligations.
- Inclusion of upstream emitters through opt-in limit the benefits of the inclusion as the amount of emissions and entities covered limited compared to an EU ETS wide inclusion.

Case Finland: Heating of residential buildings by energy source (2013)



Fuels for district heat and CHP in Finland in 2013:

- Wood and other bio fuel 27.8%
- Coal 26%
- Natural gas 25.8%
- Peat 13.3%
- Industrial reaction heat, heat pumps 2.3%
- Oil 2.1%
- Others 2.7%

Source: Statistics Finland (2014) and Finnish Energy Industries (2013)

CO2 emissions in Finland (2013)

Finland's greenhouse gas emissions amounted to 63.2 $MtCO_2$ eq.

- The EU ETS sector covered 31.7 million tons
- Non-ETS 31.5 million tons

The non-ETS GHG-emissions in the heating sector amounts to total of 3.4 Mt CO2eq.

- The CO_2 emissions of the heating of buildings (IPPC 1A4a and 1A4b) in Finland in non-ETS sector are clearly below the EU averages

The emissions based on fuel combustion in:	CO_2 emissions (2013)
Commercial and institutional buildings (1A4a)	0.9 $MtCO_2$ eq
Residential category (1A4b)	1.6 $MtCO_2$ eq
Production buildings in agriculture (1A4cB+1A4cD)	0.5 $MtCO_2$ eq
District heating (1A1aB)	0.4 $MtCO_2$ eq

Source: Statistics Finland (2014)

Excise duties (taxation) in the non-ETS heating sector (2013)

- To avoid exposing the heating sector to double carbon pricing, the natural shift in the case of the inclusion of the heating sector into EU ETS could be that the CO_2 component of the current excise duty would be replaced by the EUA price.

Fuel	Tax	Tax rate €/tCO_2
Light fuel oil	Energy content tax	34.76
	CO2	34.91
	Strategic stockpile fee	1.31
	Total	70.65
Natural gas	Energy Tax	22.46
	CO2 Tax	34.98
	Strategic stockpile fee	0.04
	Total	57.84
Coal	Energy Tax	19.51
	CO2 Tax	34.97
	Strategic stockpile fee	0.49
	Total	54.97

- However, the current EUA future price for 2020 is well below the current CO_2 component part of the excise duty and even the price estimations for 2020 lags clearly below the CO_2 component price.

Different CO_2 rates for:	€/tCO_2
Total excise duty for fossil fuels	55-71
CO_2 component of the excise duty	35
EUA price Dec-2015	7.19
EUA price Dec-2020	7.96
EUA price estimation for 2020	20

Review of the government revenues in the case of light fuel oil.

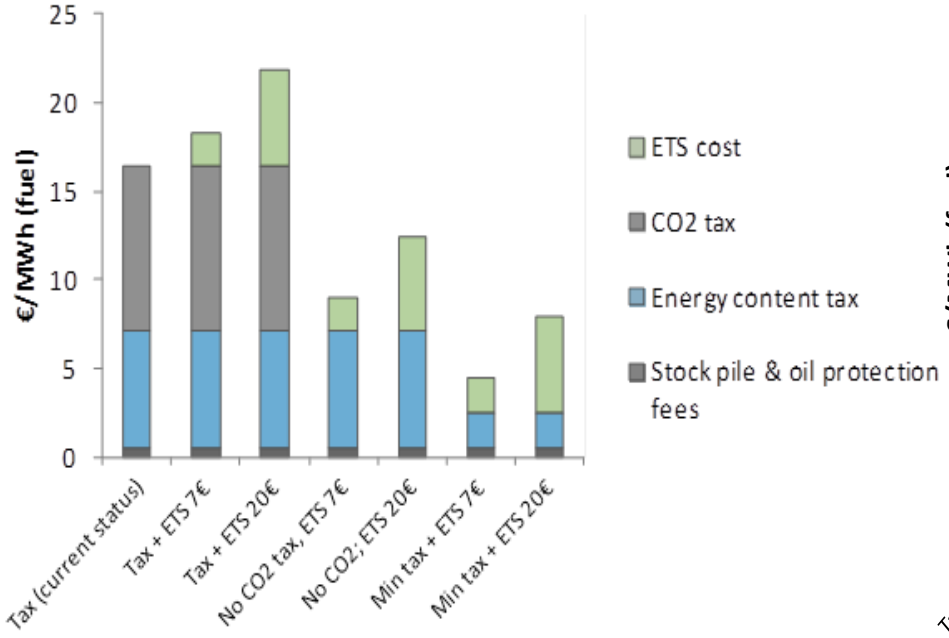
Total excise duty rates and revenues for the government from light oil fuel.
(Current situation and 2 illustrative scenarios)

Light oil fuel	Total tax rate (€/tCO_2)	Revenues(million €)
Situation in 2013.	70.65	88
The CO_2 component has replaced by EUA Dec-2020 price.	44.03	55
The CO_2 component has replaced by EUA price estimation for 2020.	56.07	70

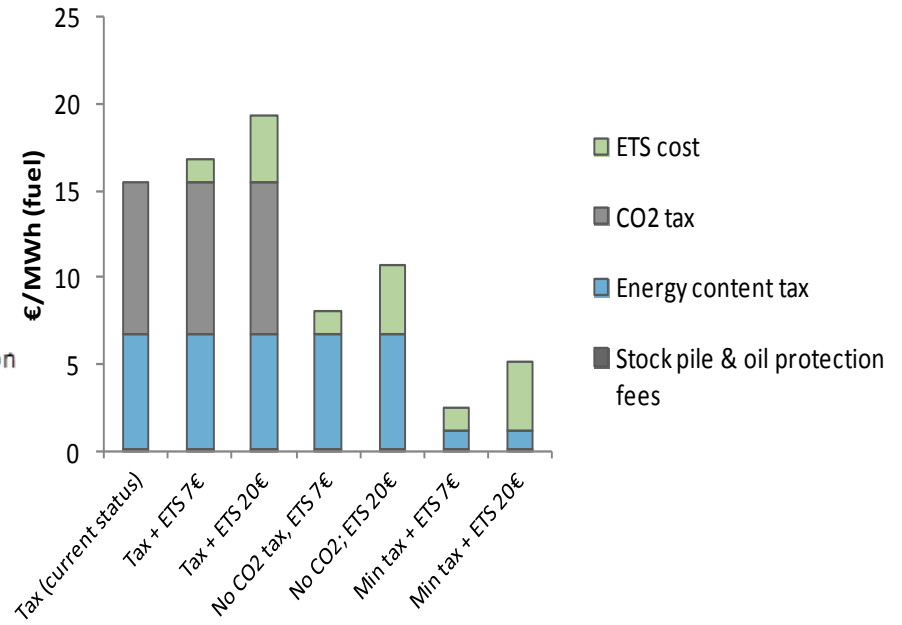
The government revenues in 2013 and 2 scenarios for 2020.

Auction volume (EUA)	EUA price (€/t CO_2)	Revenues (million €)
15.2 million (realized volume in 2013)	4.15	63
18.3 million (estimated volume for 2020)	8	14
18.3 million (estimated volume for 2020)	20	364

Changes to cost of using oil and natural gas in the small heating installation (2015 tax rates)



Excise taxes and emissions trading cost of Light Fuel Oil applied in heating in Finland; illustrative scenarios (€/MWh fuel)



Excise taxes and emissions trading cost for natural gas applied in heating in Finland; illustrative scenarios (€/MWh fuel)

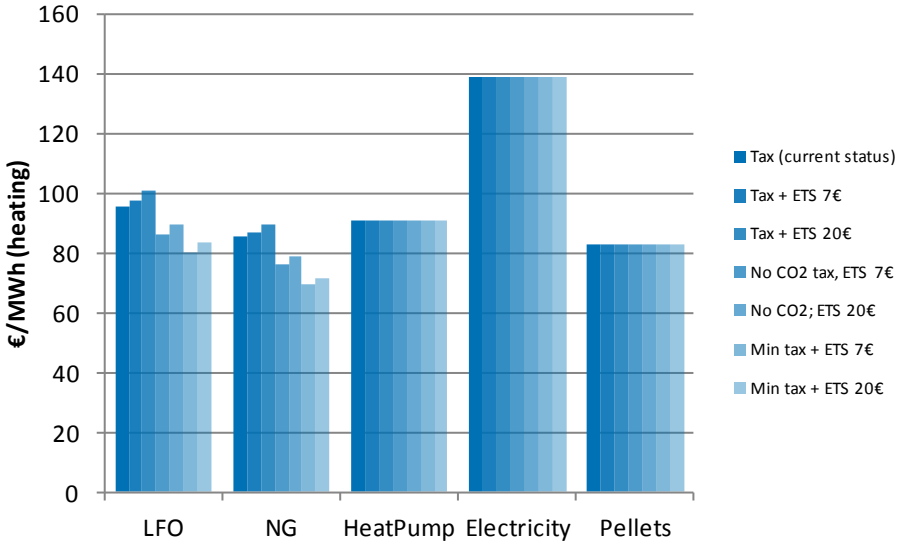
Cost of existing oil and gas based heating systems compared to alternative new system in different scenarios

Assumptions:

- 200m^2 single family house that consumes 30 MWh heating energy per year.
- Capital costs of the new systems have been allocated to an energy unit by assuming an operation time of 20 years and 5% return for investment.
- Any capital costs have not been allocated to the existing oil and natural gas fired systems.
- Furthermore, the calculation assumes current (Q1/2015) energy prices for the whole 20 year period.

Conlucions:

- ➢ inclusion of small heating installations in the EU ETS would not easily create a significant additional incentive for moving away from fossil fuels in the building specific heating installations.
- ➢ The current CO_2 price is a relatively small factor compared to the tax-inclusive retail prices of oil and natural gas.



Source: Pöyry Management Consulting (2013)

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Conclusions

The emissions from the non-ETS buildings sector speaks for the consideration of inclusion of the sector in the EU ETS.

The argument for expanding the EU ETS is to improve cost efficiency of reducing emissions:

- Given the large differences in the current excise taxes on heating fuels across member states and fuel types there is likely to be room for improving cost efficiency.

However, there are a number of obstacles in the inclusion:

- Firstly, the EU ETS would overlap with existing policy instruments regulating the non-ETS heating emissions.
- Secondly, removing or lowering excise duties may threaten government revenue.
- Thirdly, the challenge of including the non-ETS heating sector consisting of a large amount of small emission sources is the high costs for monitoring, reporting and verification (MRV) of the emissions as well as the increase of the administrative burden of regulators.

A defining feature of the demand for heating fuels is that it is very inelastic in the short term:

- Hence, the inclusion of the heating sector in the EU ETS would have a little effect on emissions in the short term regardless of whether current excise taxes are adjusted or not.
- However, in the long-term inclusion in the EU ETS may unlock some of the previously unrealized abatement potential in the non-ETS heating sector.

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