

# **Calculating with energy and CO2 taxes – Swedish experiences**

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# The starting point - Annex V

Credit shall only be given for energy savings from taxation measures exceeding the minimum levels of taxation applicable to fuels as required in Directive 2003/96/EC (Energy tax) or in Directive 2006/112/EC (Value-added tax)

Recent and representative official data on price elasticities shall be used for calculation of the impact.

# Current situation in Sweden

- Sweden introduced an energy tax based on energy content in the 1950s. A CO<sub>2</sub> tax was introduced in 1992. Today these taxes are for many practical purposes lumped together and primarily perceived as a policy instrument for energy efficiency.
- The general level of the CO<sub>2</sub> tax has been increased several times and is currently 1.12 SEK/kg CO<sub>2</sub>

## Some examples of current tax rates (2016)

Energy	CO <sub>2</sub> tax	Energy tax	Total	EU Energy Tax Directive
Petroleum for cars	3.72 SEK/litre	2.59 SEK/litre	6.31 SEK/litre	359 EUR/1,000 litres, i.e. SEK 3,34/litre
Natural gas (except gas used by vehicles)	935 SEK/1,000 m <sup>3</sup>	2,399 SEK/1,000 m <sup>3</sup>	3,334 SEK/1,000 m <sup>3</sup> or SEK 0.29 /kWh	0.0047 SEK/kWh
Coal	643 SEK/1,000 kg	2,788 SEK/1,000 kg	3,446 SEK/1,000 kg or 0.44 SEK/kWh	0.0047 SEK/kWh
Electricity (non-commercial)			0,292 SEK/kWh	0,086 SEK/kWh

# Recent changes

- Recent tax hike 2014-2016: petroleum and diesel up 14 %
- Electricity up 11.5 % from next year.
- Industry's tax waivers increasingly abolished, however the scheme is constantly changing.

# Swedish experiences

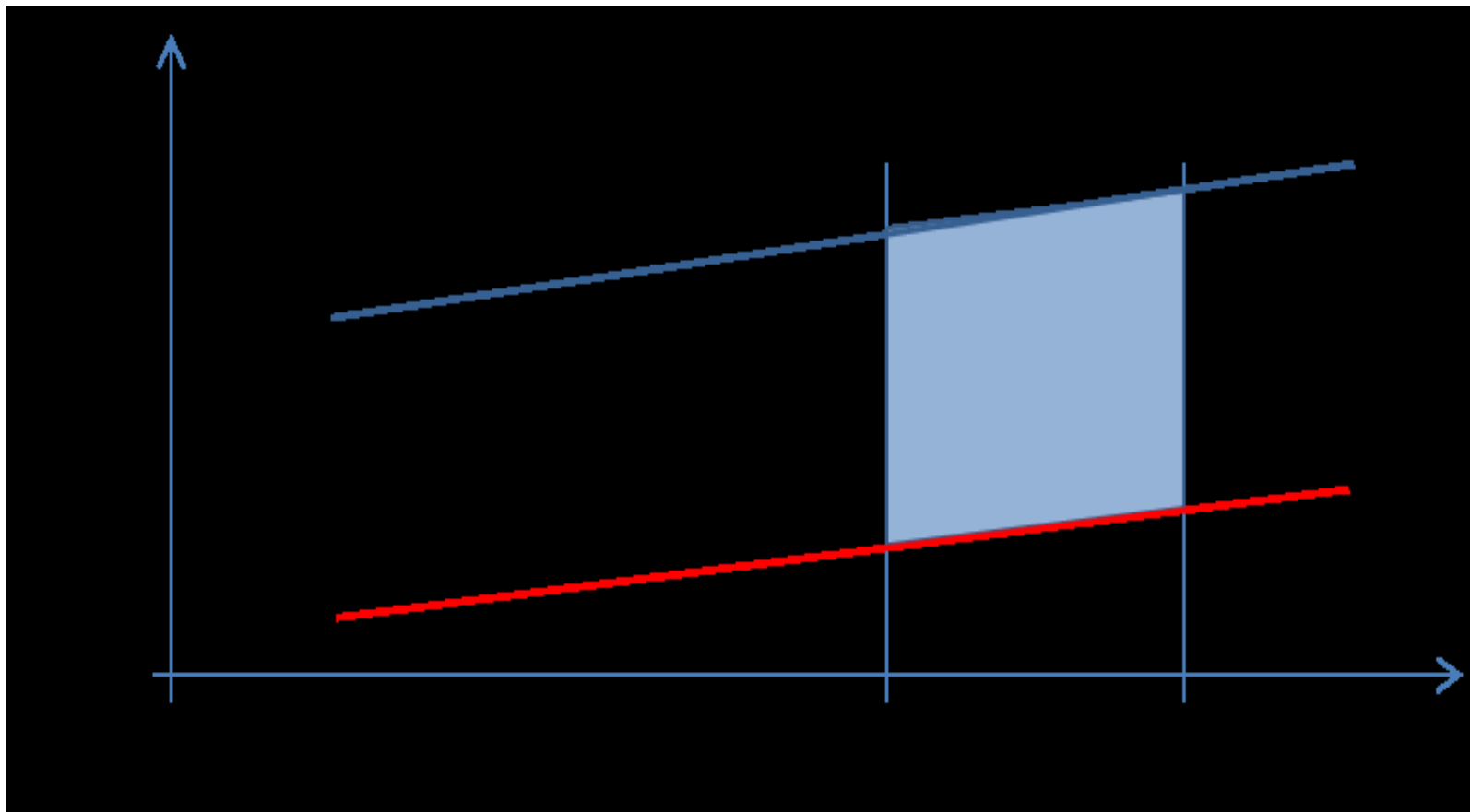
- Taxes are, as a rule, a broad and general policy instrument for energy efficiency, in contrast to narrower and specific instruments targeting one or a few market failures. Taxes encompass the whole economy and aim at the root issue. Thus an energy tax targets excessive use of any energy while a CO<sub>2</sub> tax favours energy causing less or no emissions of CO<sub>2</sub>

# Method

## Simplification of the method

- Starting point: Real energy prices and actual consumption with Swedish taxes.
- A fictive tax reduction takes place to EU minimum levels.
- New counter-factual, hypothetical, level of energy consumption can thus be established by multiplying with relevant elasticities.

# Graphic illustration





# Dynamic model

- For households and transport a dynamic model was applied, i.e. change takes place gradually. Adjustment process over several years.
- There exist long-term and short-term elasticities.

# Avoiding double counting

Double counting is avoided by lumping all energy efficiency policy instruments, including taxes, together and calculate the total effect by only using the calculation method for taxes, i.e. it is explicitly understood that taxes and other instruments interact. Thus the contribution of each specific instrument is not addressed, but are included in the effect of the taxes.

# Elasticities

- Elasticities for energy end users have been published in various recent sources. Professor Runar Brännlund's (Umeå University) recent estimates (2013) on households and transport indicate lower elasticities than previously published. Thus, those elasticities now referred to are actually lower than those previously published.
- Elasticities for household electricity consumption are both short-term and long-term, which is corrected for in the model.

# Different rates apply to industry

- No uniform rate for taxes for industry, e.g. for heating fuels industry within EU-ETS pays 30 % of the general energy tax but no CO<sub>2</sub> tax. Other industry pays 60 % of both.
- For diesel, industry pays full tax, while agriculture and forestry pay a reduced tax.
- No dynamic model has been used for industry (and agriculture and forestry), but a linear because lack of data on elasticities.

# Results

Sector	Annual effect TWh/year (short & long)	Cumulative effect TWh
Households and services	2.2 – 8.1	37.5
Agriculture and forestry	0.08 – 0.54	2.2
Transport	8.8 – 12.9	80.8
Industry	0.48 - 3.34	13.4
Total	11.6 – 24.9	133,9

# Specifically transport

Year	$\Delta$ gasoline %	$\Delta$ diesel %	$\Delta$ gasoline TWh	$\Delta$ diesel TWh	$\Delta$ energy accumulated TWh
2014	21.5	2.5	7.5	1.31	8.8
2015	28.2	0.6	9.9	0.31	19.0
2016	32.1	0.2	11.3	0.09	30.4
2017	34.4	0.1	12.1	0.04	42.1
2018	35.7	0.1	12.5	0.03	55.1
2019	36.4	0.1	12.8	0.03	67.8
2020	36.8	0.1	12.9	0.03	80.8

**Thank you for your  
attention**

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