Swedish energy and CO$_2$ taxes

Experiences and visions for the future

Energy Cities’ Annual Rendezvous

Building the Energy Transition

Presentation by
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Outline of my presentation

• Brief overview of Swedish environmentally related taxes

• Design and development of Swedish taxation of energy
  – Main elements of our system
  – How to deal with barriers to the use of taxes in policy design
    • Addressing distributional effects
    • Energy intensive industry and coordination with emission trading schemes
  – Major environmental and economic effects

• The road forward .... Swedish tax policy design in the future
## Different environmentally related taxes in Sweden

<table>
<thead>
<tr>
<th>Category</th>
<th>Revenues Billion € (2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Energy tax</strong></td>
<td></td>
</tr>
<tr>
<td>- electricity</td>
<td>4,86</td>
</tr>
<tr>
<td>- petrol</td>
<td>2,42</td>
</tr>
<tr>
<td>- other fossil fuels than petrol</td>
<td>1,39</td>
</tr>
<tr>
<td><strong>B. CO₂ tax</strong></td>
<td>3,15</td>
</tr>
<tr>
<td>- petrol</td>
<td>1,10</td>
</tr>
<tr>
<td>- other fossil fuels than petrol</td>
<td>2,04</td>
</tr>
<tr>
<td><strong>C. Other environmentally related taxes</strong></td>
<td>0,06</td>
</tr>
<tr>
<td>- tax on sulphur</td>
<td>0,004</td>
</tr>
<tr>
<td>- tax on pesticides</td>
<td>0,01</td>
</tr>
<tr>
<td>- landfill tax</td>
<td>0,02</td>
</tr>
<tr>
<td>- tax on natural gravel</td>
<td>0,02</td>
</tr>
<tr>
<td><strong>D. Vehicle related taxes</strong></td>
<td>1,54</td>
</tr>
<tr>
<td>- tax on motor vehicles</td>
<td>1,35</td>
</tr>
<tr>
<td>- road user charges</td>
<td>0,09</td>
</tr>
<tr>
<td>- tax on congestion</td>
<td>0,09</td>
</tr>
<tr>
<td><strong>Total (A+B+C+D)</strong></td>
<td>9,61</td>
</tr>
</tbody>
</table>
Swedish energy and CO\textsubscript{2} taxation 1924 – 2013

Basic design

and

environmental effects
Energy tax and CO$_2$ tax (1)

- **Excise duties on energy – two components:**
  - Energy tax on fuels and electricity.
  - CO$_2$ tax on fossil fuels.

- **Energy tax:**
  - Strictly based on energy content of fossil heating fuels from 2011. Moving towards a uniform energy content application for motor fuels.

- **CO$_2$ tax:**
  - Based on fossil carbon content of fuels.
  - Introduced in 1991, along with existing energy tax. Part of major general tax reform.
  - CO$_2$ tax achieves cost effective emission reductions.
Energy tax and CO₂ tax (2)

- **Basic principle:** Same level of CO₂ taxation for motor fuels and heating fuels, per ton CO₂.

- **Two levels of CO₂ tax for heating fuels, per ton CO₂**
  - *high* for households and service (27 € in 1991; 114 € in 2013)
  - *low* for sectors subject to international competition and risk of carbon leakage = industry, agriculture and heat production in combined heat and power plants (CHP).
    - *In 1991: 7 €; in 2013 outside EU ETS 34 €, within EU ETS industry and CHP 0 €.*
    - Energy tax for industry and CHP within EU ETS to fulfil EU minimum tax levels.
    - Gradually raising the lower CO₂ tax level

- **Two levels of energy tax for heating fuels and electricity**
  - high for households and service
  - low for industry (within and outside EU ETS) and agriculture
Development of the Swedish CO\textsubscript{2} tax
\textit{general level and industry level}
from 2008 industry outside EU Emissions Trading Scheme (EU ETS)

General level for 2013 level in figure
Administration and calculation of tax rates

- **Low administrative costs for tax authorities and operators**
  - A CO$_2$ tax can easily be added to an existing energy tax system.
  - Administrative costs for Swedish Tax Administration is 0.1 % of total revenues for energy and CO$_2$ taxes.

- **Same taxation points for energy tax and CO$_2$ tax**
  - Facilitates tax collection and control.
  - Same tax payers and tax collection for both taxes.

- **No need to measure actual energy content or CO$_2$ emissions from fuels**
  - Average factors (CO$_2$ emissions and energy content for different fuels) are used by the Government to calculate tax rates.
  - Tax rates in tax law are expressed in commonly used trade units (ton, litre).
Cost-effective policy packages 1991 – 2013

*How to reach emissions reductions?*

*How to address distributional effects?*
Policy packages ....

1990/1991 tax reform

- Reduced and simplified labour taxes (~6 billion €)
- VAT introduced on energy (+1.6 billion €).
- CO₂ tax introduced at a low levels combined with ca 50% cuts in energy tax rates (+0.3 billion €).
- Investment state aid for fossil free electricity production, mainly bio fuel CHP plants. Replaced in 2003 by green electricity certificate system.

Green tax shift 2001 – 2006

- 1.6 billion € shift; raised environmental taxes, cuts in income taxes (focus on low incomes, e.g. increased basic deduction).

Policy 2007 – 2013

- Environmental tax increases for households and firms; cuts in taxes on labour, in order to increase labour supply and employment.
- 2007 – 2013: Increased environmental taxes + 0.6 billion €; reduced taxes on labour – 8.6 billion €.

No earmarking of revenues!
An average SE household pays approx. 480 € total energy tax and CO₂ tax on motor fuels in 2013 (about 2 % of total annual tax paid by the household).

**Heating fuels**: The CO₂ tax has led to the phasing out of fossil heating fuels used by households.

- Replaced by district heating and wood pellets burners.
- Temporary aid for conversion to renewable heating.
- SE traditionally electrically intensive (basically hydro and nuclear).

**Green tax reform 2001-2006**: Increased basic tax deductions for low and middle income households.
Distributional effects, business

- **Industry in EU ETS**: Generally energy intensive.
  - No CO₂ tax from 2011, lower energy tax. Replaced earlier tax reduction schemes.

- **Industry outside EU ETS**: Generally less energy intensive.
  - 30 % CO₂ tax 2013, and 60 % CO₂ tax 2015.
  - In general low costs for energy and high costs for labour and capital.

- Large shares of the SE industry’s use of energy consist of **bio fuels (36 %, mainly paper and pulp)** and **electricity (35 %)**.
  - No tax on solid bio fuels and residues; low energy tax on electricity for industry.
  - Steady decline in specific energy use (amount of energy used per monetary unit of value added).

- **District heating** is a significant provider of **space heating for service sector** (offices, shops etc.): **80 % in 2011**. 68 % of in-put is bio-fuels and waste.
Major environmental and economic effects
Real GDP growth and CO$_2$e emissions in Sweden, 1990-2011

1990 – 2011:
16 % reduction of CO$_2$e emissions
+ 58 % economic growth

How to do design
energy and CO$_2$ taxes in the future .....
Swedish goals and visions

Climate and energy policy goals for 2020:

– 40 % reduction of greenhouse gas emissions outside EU ETS, compared to 1990
– 50 % renewable energy of total energy use
– 10 % renewable energy in transport sector
– 20 % increased energy efficiency


Priority for 2030: A vehicle fleet which is independent of fossil fuels.

Vision for 2050: A sustainable energy supply that makes efficient use of resources and gives rise to zero net emissions of greenhouse gases to the atmosphere.
The road forward ..... 

- **Energy related taxes and other economic instruments** are primary instruments to reach set targets for 2020 (climate, share of renewable energy and energy efficiency)
  - CO₂ taxation of fossil fuels remains the key instrument for climate policy outside EU ETS
  - Fine-tuning tax design in order to ensure reaching targets cost-effective

- **EU ETS sector**: No CO₂ tax *(climate and renewable energy targets)*

- **Non EU ETS sectors**: CO₂ tax *(climate and renewable energy targets)*
  - one price for carbon emissions irrespective of which fuel and where used = same tax level SEK/kg CO₂ for motor fuels and heating fuels (carbon leakage may be addressed)
  - More effective environmental taxation by less reductions of tax level for industry and, if need be, raised general level of CO₂ tax

- **Energy tax for all sectors** *(energy efficiency target; fiscal reasons)*
  - According to energy content; in the future aiming at such alignment also for motor fuels
  - Higher energy tax for motor fuels (external traffic costs etc.) than for heating fuels
Conclusions

Key points:

- CO$_2$ taxation and other market based policy instruments
- “Polluter Pays Principle”

CO$_2$ taxation of fossil fuels:

- Easy to administer and gives results.
- Start at low levels, raise gradually and announce well ahead of time. Stepwise approach towards a uniform tax level on fossil CO$_2$.
- Revenues can e.g. be used for time limited aid schemes, addressing distributional consequences and effects on labour supply, green tax shift reforms.
- Emission reductions and revenues can be combined with economic growth.

=> Cost-efficient reductions of CO$_2$ emissions! <=
For more information ....

- see following slides


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### Theory put into practice – part of the 2009 package

**Taxation of fossil heating fuels in Sweden**

**2010, 2011 and 2015**

<table>
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<tr>
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<tbody>
<tr>
<td>Households and service</td>
<td>100 % energy tax – not based on energy content (0.1 – 0.8 € cent/kWh) 100 % CO₂ tax</td>
<td>100 % energy tax – based on energy content (0.8 € cent/kWh) 100 % CO₂ tax</td>
</tr>
<tr>
<td>Industry outside EU ETS + agriculture</td>
<td>0 energy tax 21 % CO₂ tax 0.8 % rule – further tax reductions</td>
<td>30 % energy tax = 0.25 € cent/kWh 30 % CO₂ tax (60 % in 2015) 0.8 % rule more strict (abolished in 2015)</td>
</tr>
<tr>
<td>Installations within EU ETS</td>
<td><strong>Industry + Heat production in CHP (Combined Heat and Power Plants):</strong> 0 energy tax 15 % CO₂ tax <strong>Other heat plants:</strong> 100 % energy tax; 94 % CO₂ tax</td>
<td><strong>Industry:</strong> 30 % energy tax = 0.25 € cent/kWh 0 CO₂ tax  <strong>Heat production in CHP:</strong> 30 % energy tax = 0.25 € cent/kWh 7 % CO₂ tax (0 CO₂ tax in 2013) <strong>Other heat plants:</strong> 100 % energy tax; 94 % CO₂ tax</td>
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Energy input sources for district heating in Sweden, 1970-2010

District heating in Sweden

- 2010 68 TWh (+ 66 % since 1990).
- 92 % of all flats.
- 60 % delivered by municipality companies.
- In-put bio mass (wood scrap, household waste etc.) 10 % in 1990; 68 % in 2010.

Source: Swedish Energy Agency and Statistics Sweden.