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# Sweden at a Glance

eXtremOS

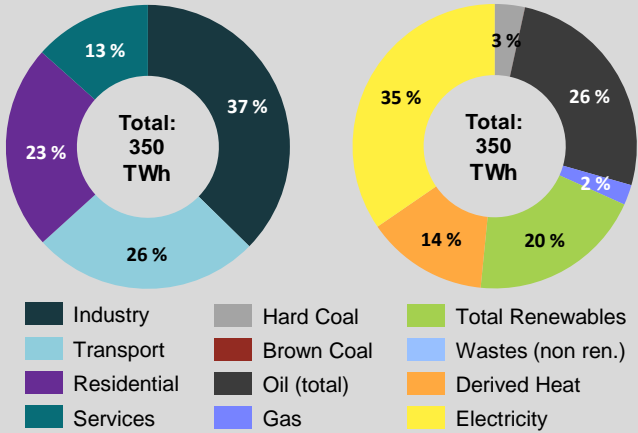


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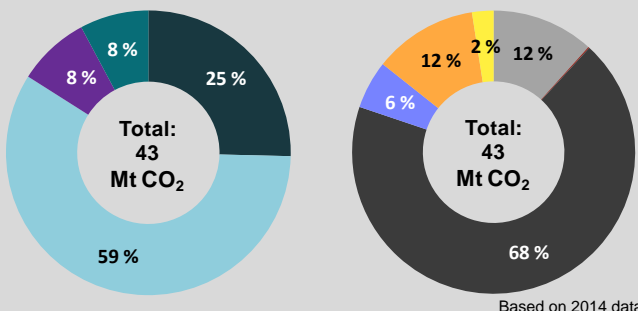


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Final Energy Consumption

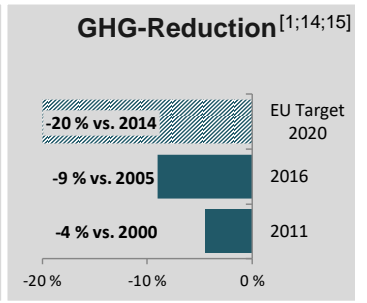
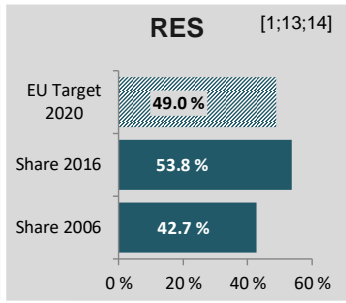
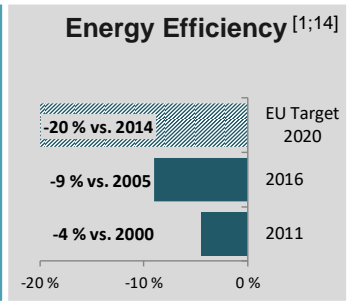


CO<sub>2</sub>-Emissions



Based on 2014 data

Targets



Current Topics

- Specific programme supporting research, development and demonstration in the field of wind energy [1;3]
- Norway intended to exit certificate market, agreement to continue until 2020
- Grid extension and increased exchange with other nordic countries

Key Facts

- Electricity certification market since 2003 (2012: combined with Norwegian electricity market) [4;5;12]
- Target: increase in RE generation 28.4 TWh (extension to 46 TWh)
- Nuclear energy remains important factor in energy policy. Planned extension of district heating slowed down to further use nuclear power in heating sector
- To become independent of oil in 1970, CHP plants and biomass fired boilers were supported but increase in nuclear power prevented further investments in district heating
- Retrofitting of nuclear power plants necessary to meet security standards, however no governmental subsidies



# Sweden's Electricity Sector

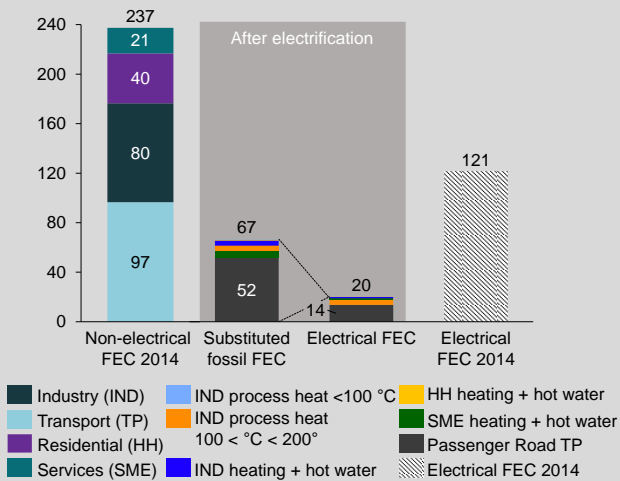


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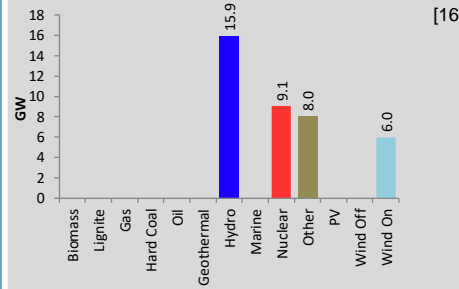
Electrification Potential

## "Low hanging fruits" case 2014

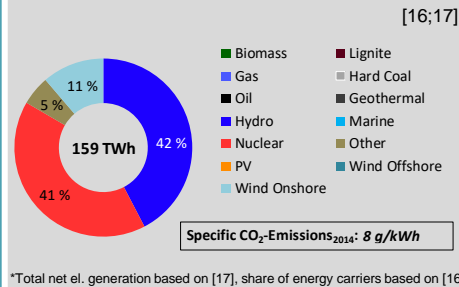
Final Energy Consumption (FEC) in TWh [own calculation]



Installed Capacity

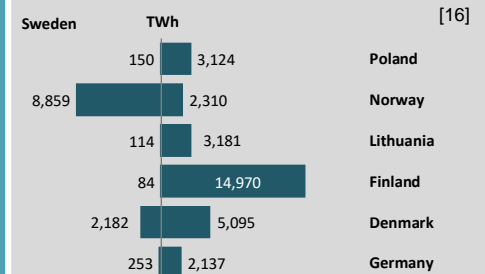


Net El. Generation

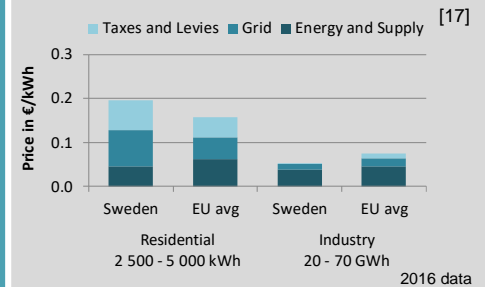


\*Total net el. generation based on [17], share of energy carriers based on [16]

Import-Export



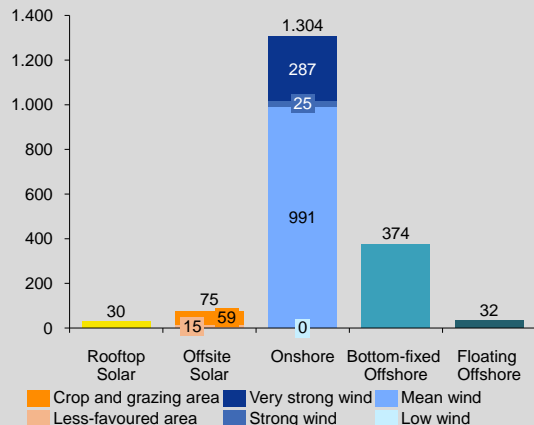
Customer Prices



vRES Potential

## Renewable Energies

TWh [own calculation; compare methodology slides]



## Wholesale Market

- Main Exchange:** Nord Pool (ELSPOT) [8;9;10]
- Additional CO<sub>2</sub>-Pricing:** Starting in 1991 with 26 €/tCO<sub>2</sub> to 120 €/tCO<sub>2</sub> in 2018
- Day-Ahead-Market:**

	2017	DK1 & DK2 Buy	DK1 & DK2 Sell
<b>Volume</b>		33 TWh	26.6 TWh
<b>Avg. Price</b>		31 €/MWh	

## Support Schemes

### Costs

- Certificate price independent of technology; 1.21 €/kWh additionally to market price (2017)
- RES-quota obligation per MWh electricity sold or consumed: 0.299 (2018)

### Policies

- Specific programme supporting R&D and Demonstration in the field of wind energy
- Expansion of combined electricity certificate market by 18 TWh; however Norway's participation reduced to only investing in Swedish projects, no adding of new plants

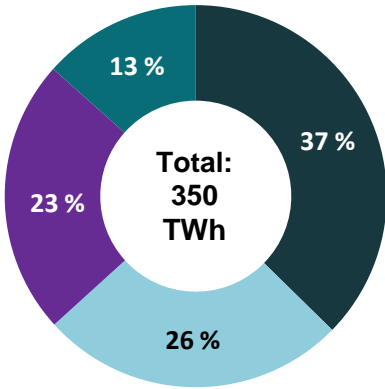


# Sweden's Energy Consumption & Emissions by Sectors and Energy Carriers - 2014

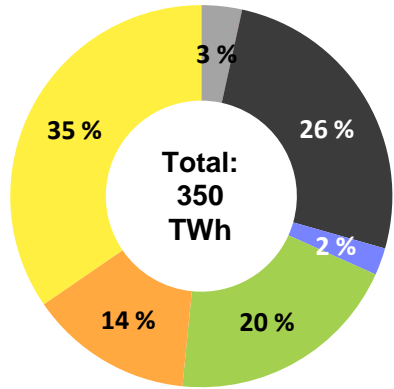


Final Energy Consumption

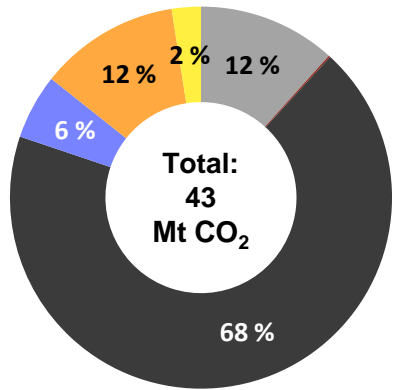
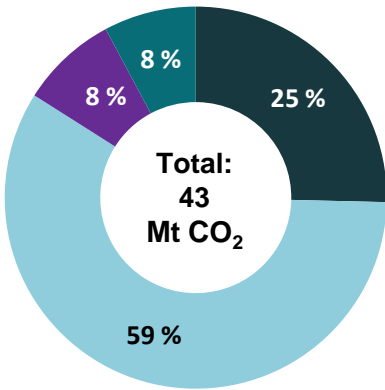
All Sectors



All Energy Carriers



CO<sub>2</sub> - Emissions



- Industry
- Transport
- Residential
- GHD
- Hard Coal
- Oil (total)
- Total Renewables
- Derived Heat
- Lignite
- Gas
- Waste (non. ren.)
- Electricity



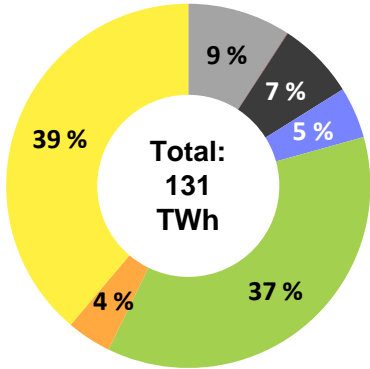
# Sweden's Energy Consumption & Emissions by Sectors and Energy Carriers - 2014



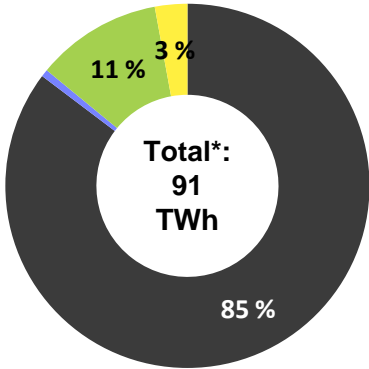
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Final Energy Consumption

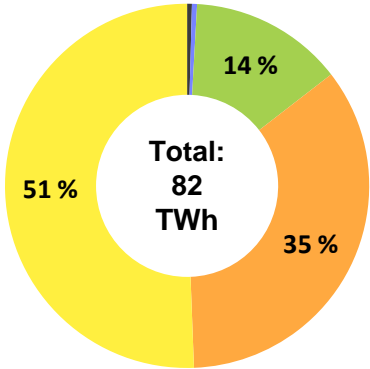
Industry



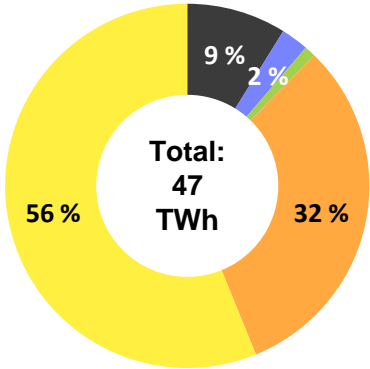
Transport



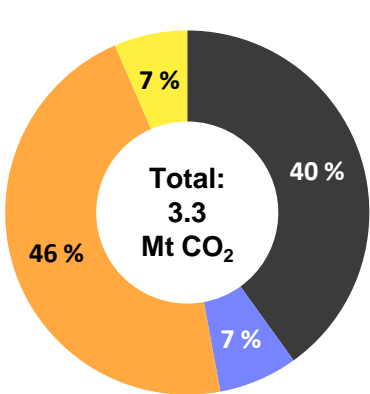
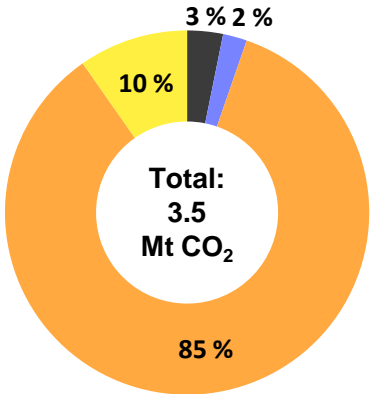
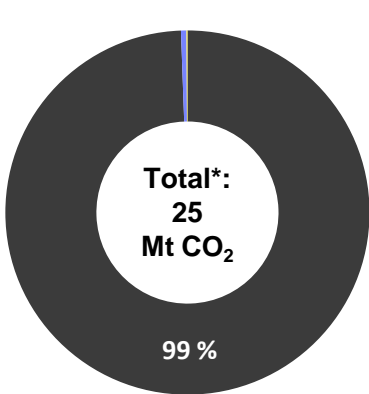
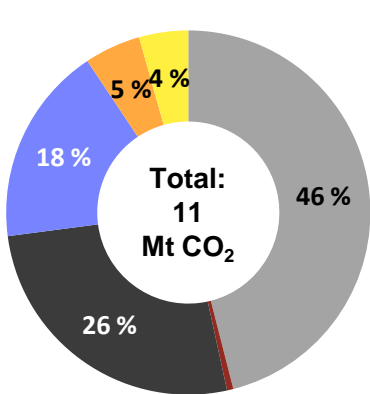
Residential



Services



CO<sub>2</sub> - Emissions



Hard Coal
  Lignite
  Oil (total)
  Gas
  Total Renewables
  Waste (non. ren.)
  Derived Heat
  Electricity

\*excluding international aviation



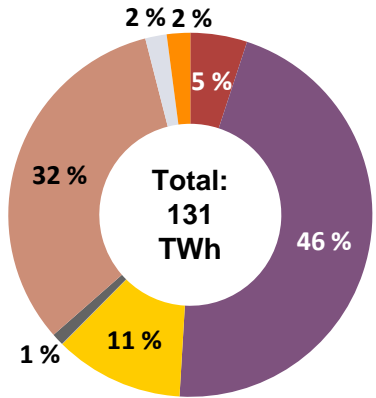
# Sweden's Energy Consumption & Emissions by Application & Sectors - 2014



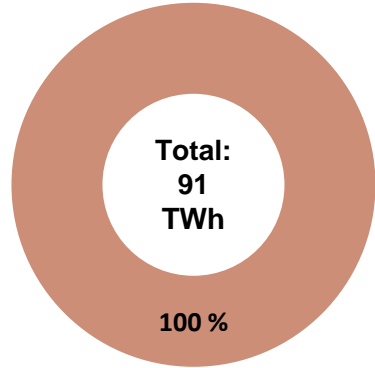
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Final Energy Consumption

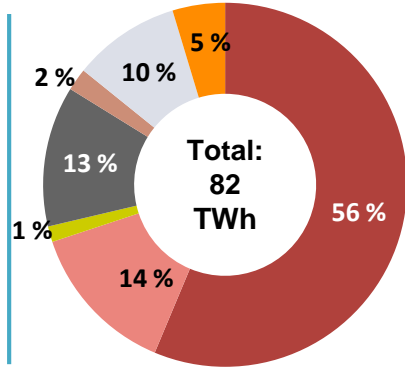
Industry



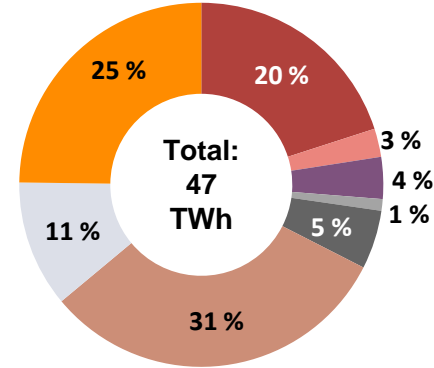
Transport



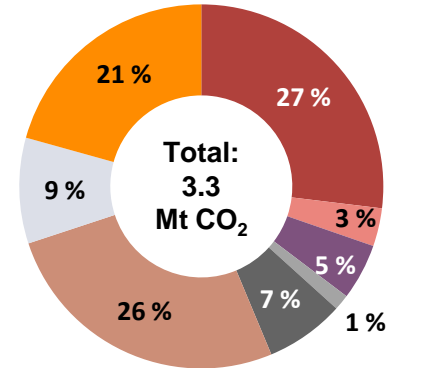
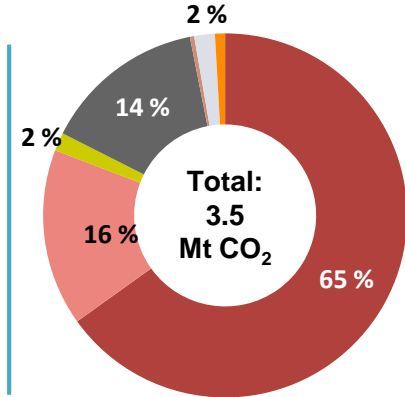
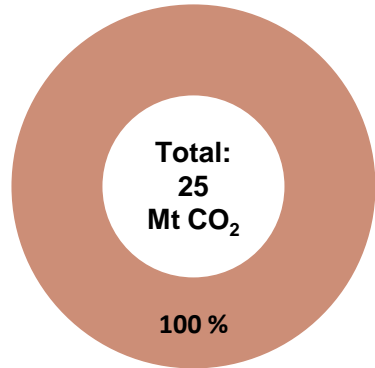
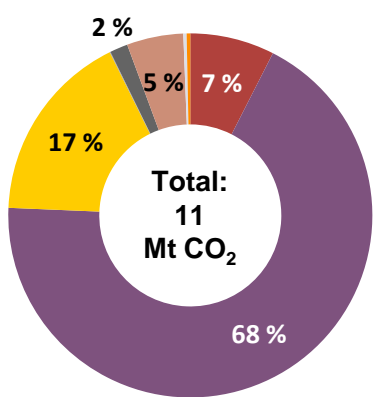
Residential



Services



CO<sub>2</sub> - Emissions



- Space Heating
- Process Heat < 500 °C
- Cooking
- Other Process Cold
- ICT
- Warm Water
- Process Heat > 500 °C
- Climate Cold
- Mechanical Energy
- Lighting

\*excluding international aviation



# Sweden: Sources



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## Institutions

Ministry of Environment and Energy		<a href="http://www.government.se/government-of-sweden/ministry-of-the-environment/">http://www.government.se/government-of-sweden/ministry-of-the-environment/</a>
TSO	Svenska Kraftnaät	<a href="https://www.svk.se/en/">https://www.svk.se/en/</a>
Regulator	Energimarknadsinspektionen	<a href="https://www.ei.se/en/">https://www.ei.se/en/</a>

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- [25] Fleiter, Tobias et al.: Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables) - Work package 2: Data Annex 2 Industrial processes for publication

## Main Studies

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- **Swedish and Norwegian Electricity Certificate Market** (Swedish and Norwegian Energy Agency) <http://www.energimyndigheten.se/globalassets/fornybart/elcertifikat/the-norwegian-swedish-electricity-certificate-market-2016.pdf>
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