



## Preliminary analysis with the German TIMES model

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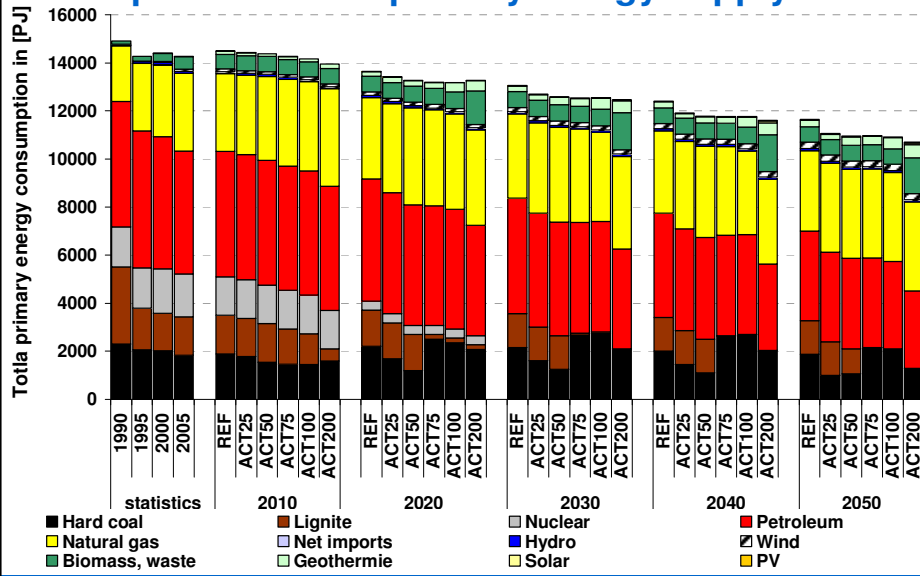
### Model characteristics TIMES-D

- Technologically detailed „bottom-up“ model of German energy system
- Covering energy flows from the useful energy demand over end-use sectors and conversion sector to the primary supply
- Energy imports/exports with abroad modeled by step-wise supply cost functions for the different energy commodities
- Modeling of renewable energy carriers based on the different potentials and supply costs (onshore and offshore Wind, biomass, biogas, biofuels, small and large hydro power, PV, solar thermal, geothermal energy)
- Model horizon until 2050 with model years in 2005, 2008, 2010, 2012, 2015, 2020, ...
- Time resolution within a model year: 8 representative days each divided in 4 time segments
- Balancing of energy related emissions: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, NO<sub>x</sub>, SO<sub>x</sub>, CO, NMVOC, particulates
- Explicit consideration of technological improvements





## Development of total primary energy supply



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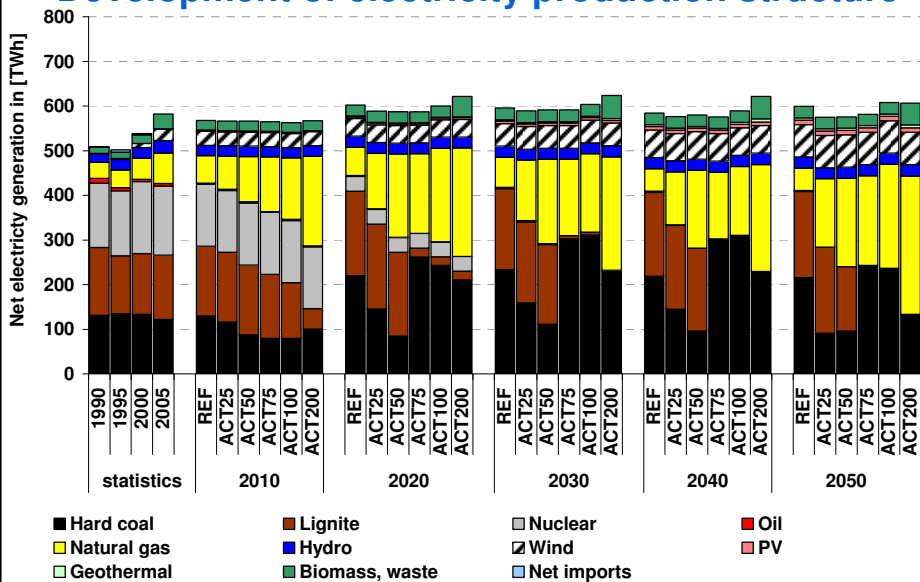
TIMES-D

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## Development of electricity production structure



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TIMES-D

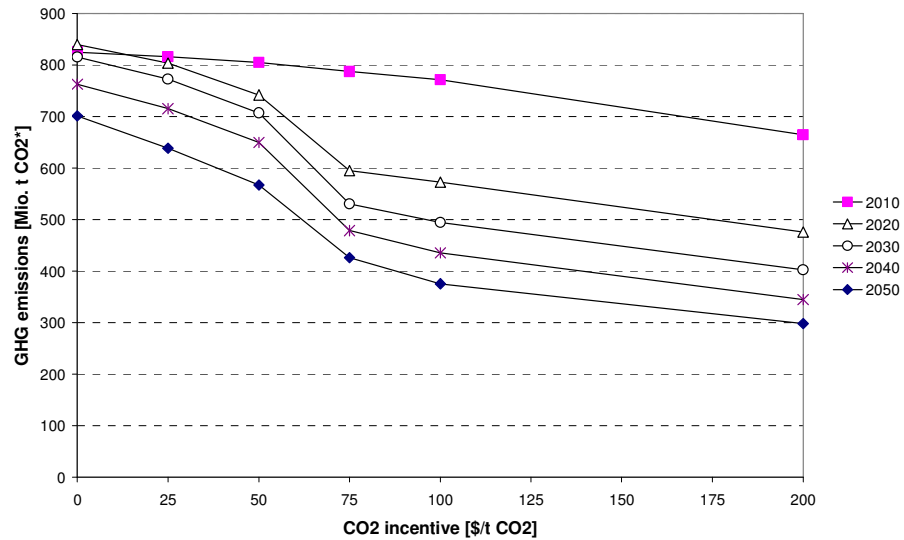
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## GHG reduction depends on the CO<sub>2</sub> certificate price



## Implications on costs

	Cumulative abatement cost bis 2030 Bill. Euro <sub>00</sub>	Average electricity generation cost 2030 [Cent <sub>00</sub> /kWh]
<b>BAU</b>		<b>5.4</b>
<b>ACT Map 25 \$/t CO<sub>2</sub></b>	<b>147</b>	<b>5.6</b>
<b>ACT Map 50 \$/t CO<sub>2</sub></b>	<b>293</b>	<b>5.9</b>
<b>ACT Map 75 \$/t CO<sub>2</sub></b>	<b>428</b>	<b>6.9</b>
<b>ACT Map 200 \$/t CO<sub>2</sub></b>	<b>1038</b>	<b>7.7</b>

