

LCA of Electricity Mixes according to the Energy Strategy 2050

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Energy Strategy 2050

- Study about possible socio-economic, political and technical future situations regarding energy supply and its impacts
- 3 different scenarios for possible development of prospective energy supply situations in Switzerland
 - Business as usual (WWB)
 - New energy policies (NEP)
 - Political measures (POM)
 - 2 -3 variations of the technology mix for power production in each scenario (option C, option E and option C+E)
- Electricity scenarios cover Swiss consumption, no electricity trade considered

Scope of this study

- Modeling environmental impacts of future electricity mixes
- 1 option for each scenario
 - WWB, option C
 - NEP, option C+E
 - POM, option E
- 2 models: one without and one with electricity trade
- 3 impact indicators:
 - Global warming potential
 - Cumulative energy demand
 - Ecological scarcity 2006
- Present technologies (no adaption to future improvements or new technologies – except adaption to CCS-technology within import)

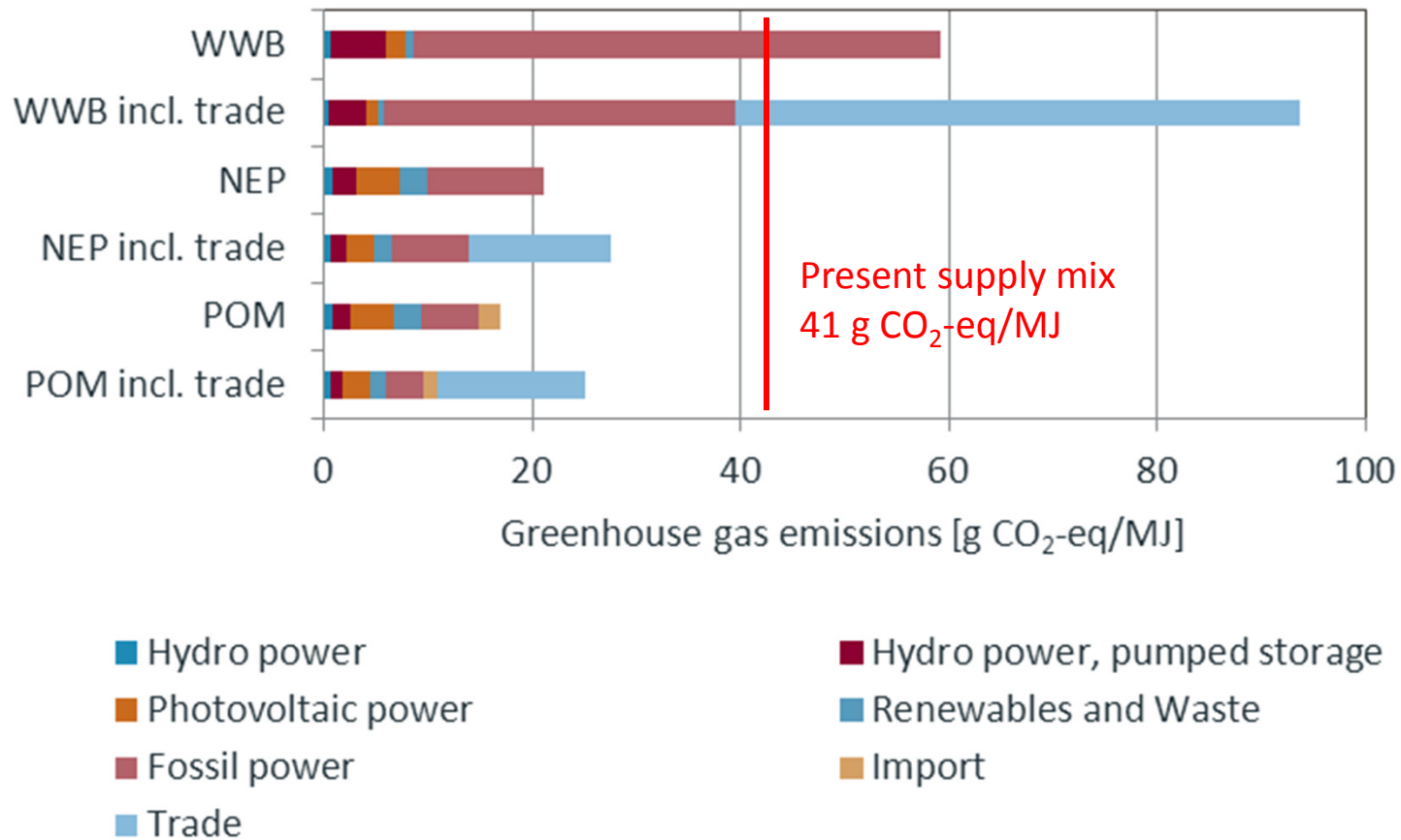
Technology shares

Production mix	WWB option C	NEP option C+E	POM option E
Renewables	61.4 %	89.7 %	84.5 %
Hydropower	50.5 %	59.4 %	55.9 %
New renewables	10.9 %	30.4 %	28.6 %
Non-renewables	35.8 %	6.3 %	2.7 %
Nuclear power	0.0 %	0.0 %	0.0 %
Fossil fuels	35.8 %	6.3 %	2.7 %
Waste	2.8 %	4.0 %	3.7 %
Imports	0.0 %	0.0 %	9.1 %
Electricity consumed	82.3 TWh	74.4 TWh	79.0 TWh

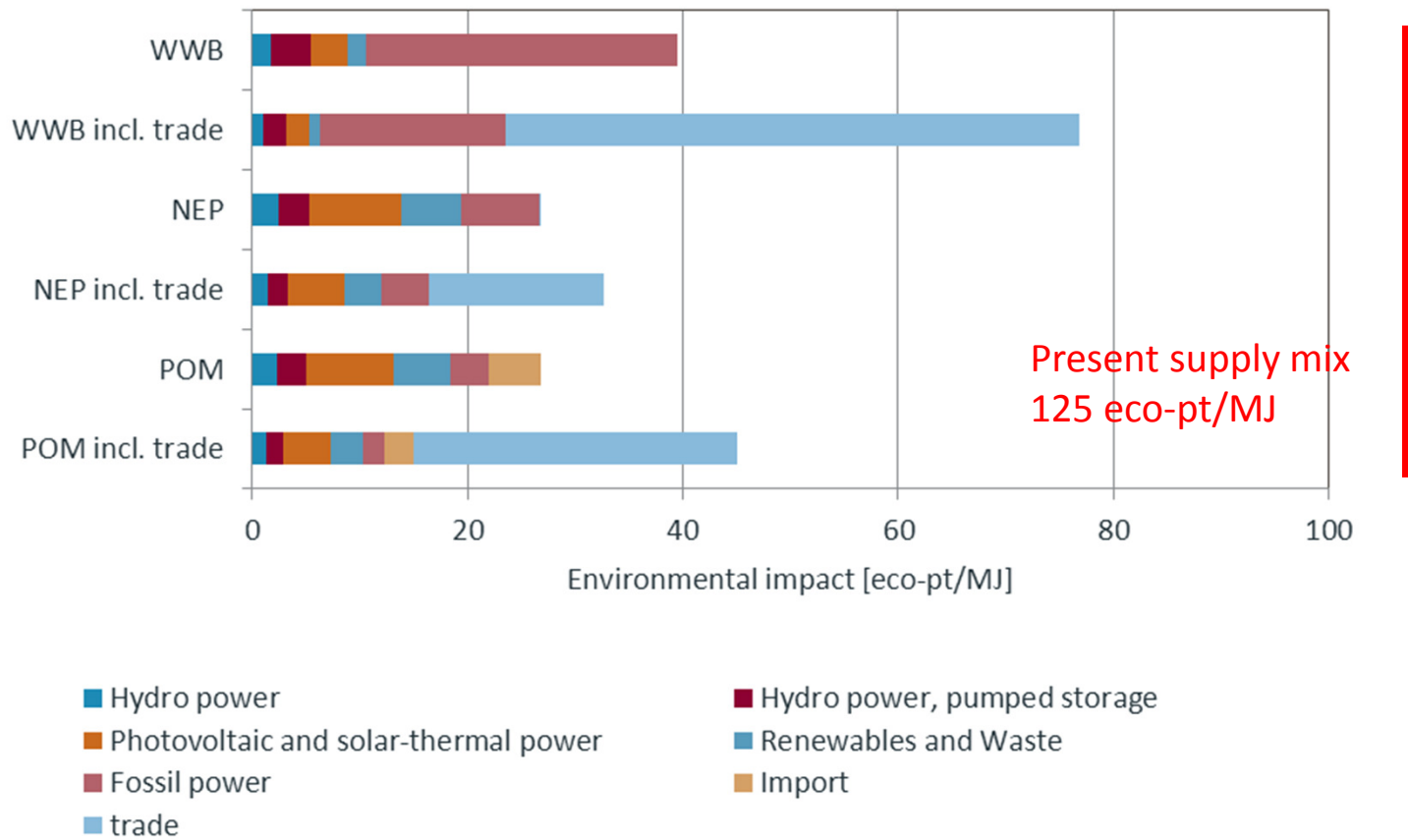
Electricity trade

- In Switzerland in 2009 64 % was domestic production and 35 % were imported
- Assumption: Share of traded electricity remains constant
- Traded electricity mix modeled based on European scenarios according to the NEEDS project
 - WWB -> pessimistic
 - NEP -> very optimistic
 - POM -> realistic-optimistic
- Technology improvement (CCS technology) considered for hard coal and natural gas in NEP and POM scenarios

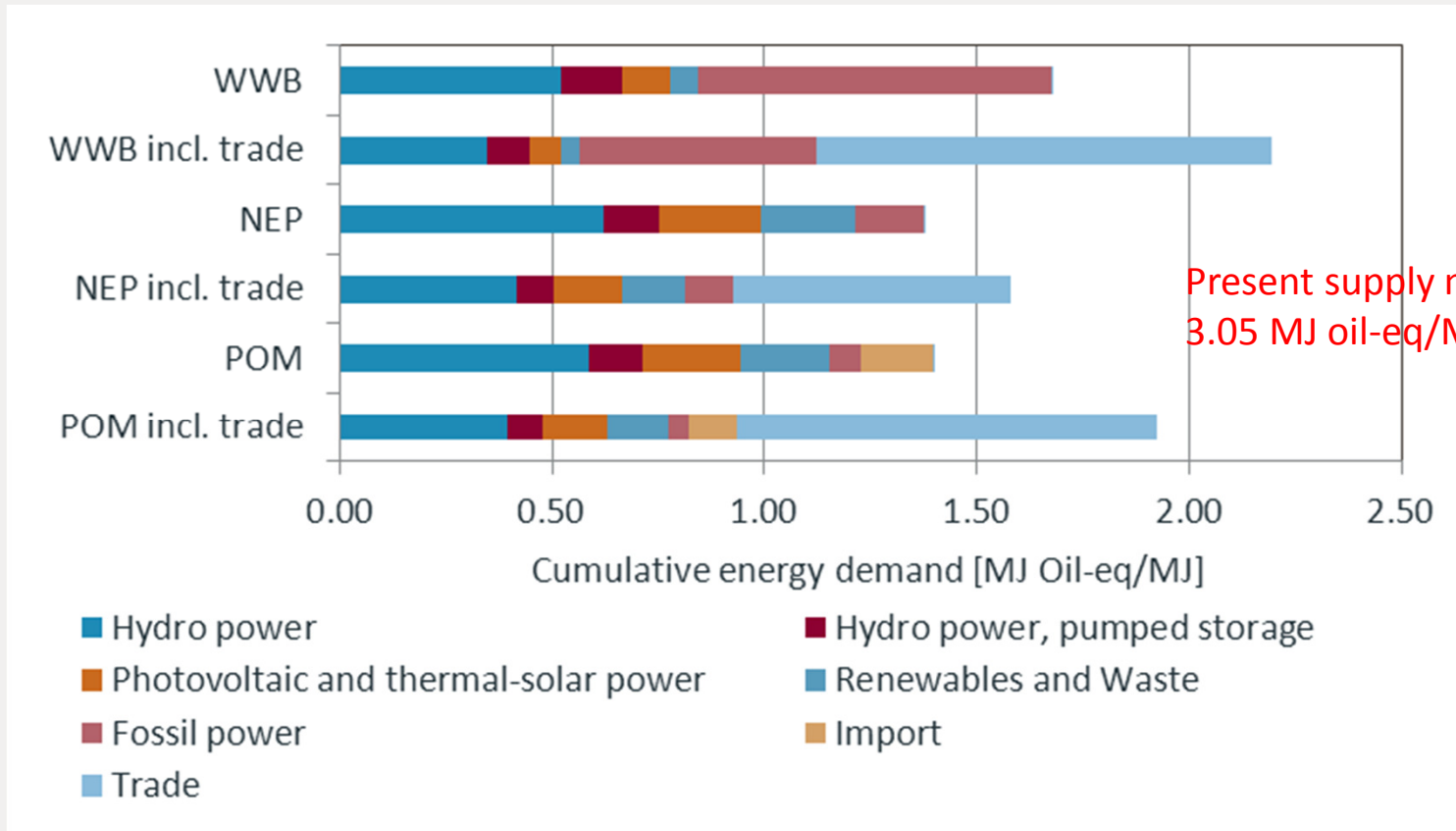
Global Warming Potential



Ecological Scarcity 2006



Cumulative Energy Demand



Conclusions

- **Business as usual** will cause **higher greenhouse gas emissions** (large share of **fossil power**)
- **Phase out of nuclear** leads to comparatively **low environmental impacts**
- **Electricity trade** leads to **higher greenhouse gas emissions** and **higher environmental impacts**
- **Traded renewable electricity** has **modest effect** on greenhouse gas emissions and environmental impacts
- **Primary energy demand** per kWh electricity: **reduction** by **1/3** (including trade) to more than **50 %** by 2050

Thank you for your attention!

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