



Wir schaffen Wissen - heute für morgen

Implications of global challenges and uncertainties for regional energy strategies

World Engineers' Convention 2011

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Geneva, 6th September 2011

- 1 Swiss energy strategies in a global context
- 2 Methodology
 - MERGE
- 3 Case studies
 - Business as usual scenario
 - Climate stabilization scenarios
- 4 Policy implications

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What?

- Determine how efforts to promote a sustainable Swiss energy system may affect, and be affected by global/regional influences
- Identify robust technology and policy options.

How?

- Develop a model of the global energy system with an explicit representation of Switzerland
- Analyze how policy and technology options for Switzerland are affected by global factors. Different scenarios of:
 - Global economic and technological development
 - Resource availability and depletion
 - Climate change policy regimes

- Climate stabilization scenario:
 - Role of nuclear
 - Resources: Fast Breeder Reactor
- Fukushima:
 - Nuclear phase out in Switzerland
 - Global phase out of nuclear
 - How does this affect climate stabilization scenarios?

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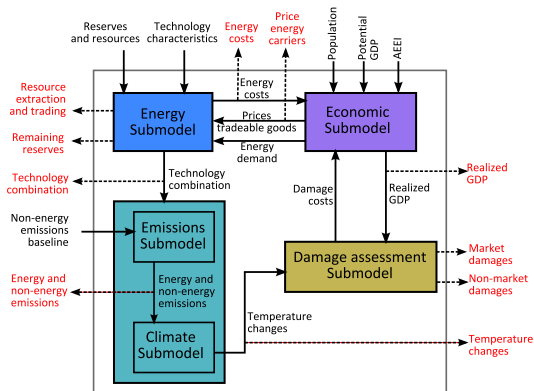
3 Case studies

- Business as usual scenario
- Climate stabilization scenarios

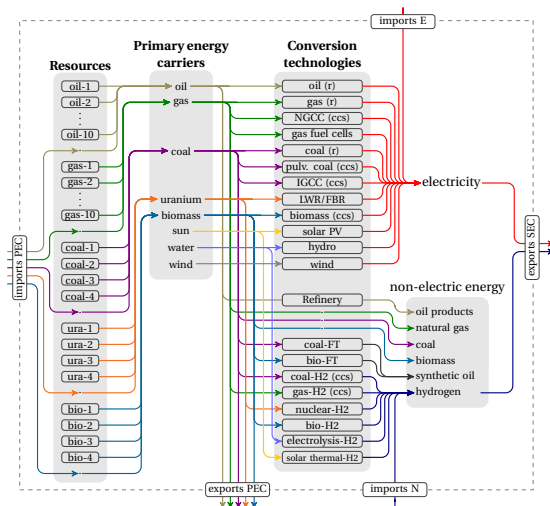
4 Policy implications

Model for Estimating the Regional and Global Effects of GHG reductions (Manne, Mendelsohn, and Richels, 1995)

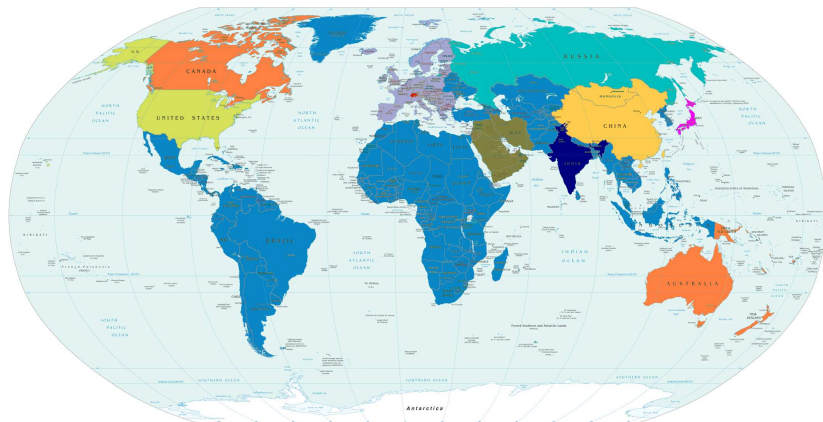
→ Integrated assessment model



Energy submodel: Reference system



(r)=remaining (ccs)=carbon capture and storage



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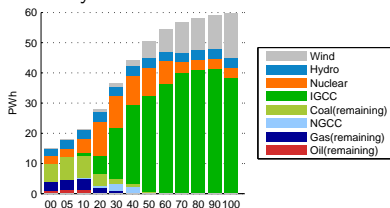
- **Business as usual scenario**
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4 Policy implications

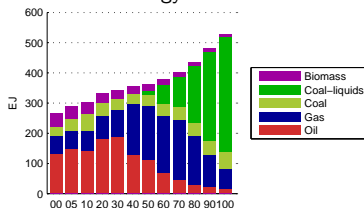
- Based on the B2 scenario from the IPCC's Special Report on Emission Scenarios
- No climate policy or impact of climate change

Global

Electricity

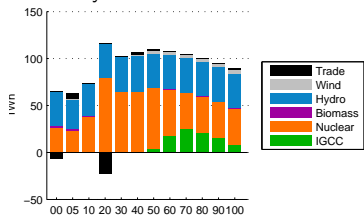


Non-electric energy

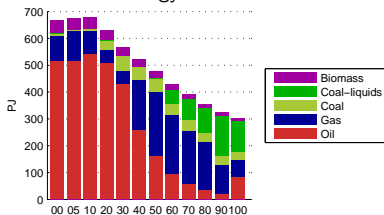


Swiss region

Electricity



Non-electric energy



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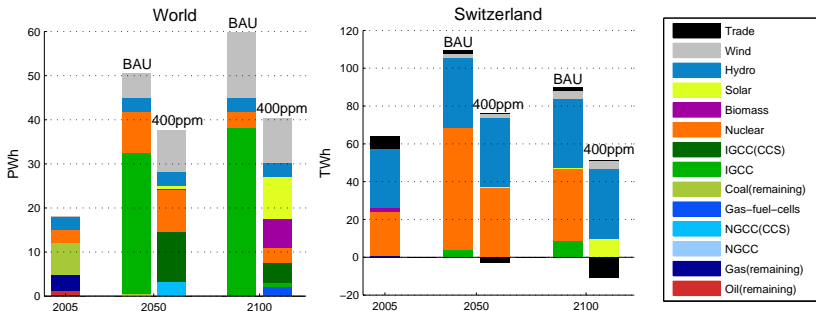
- MERGE

3 Case studies

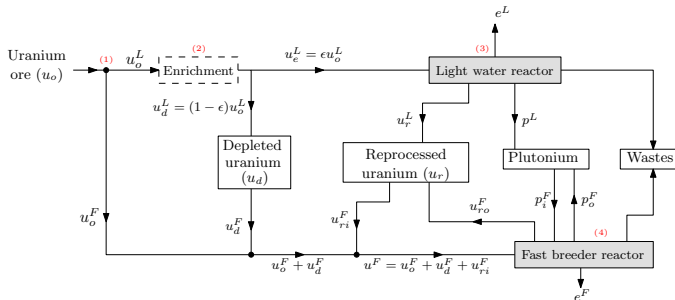
- Business as usual scenario
- **Climate stabilization scenarios**

4 Policy implications

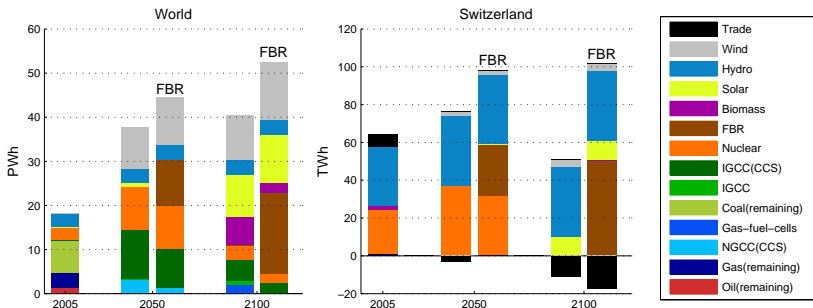
- BAU: 784 ppm CO₂ by 2100
- Stringent long term CO₂ target: 400ppm → 2°C



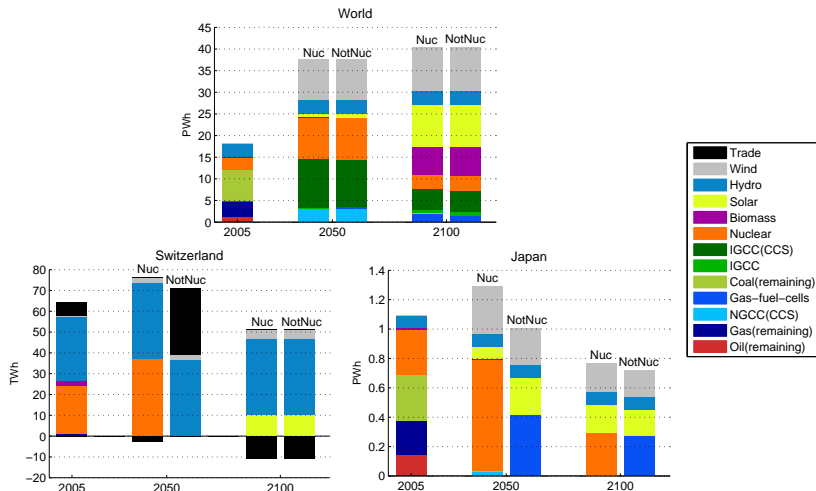
Simplified Nuclear cycle



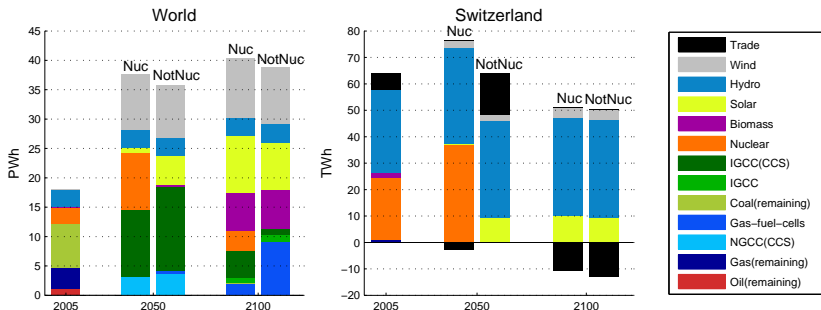
400 ppm scenario with and without FBR

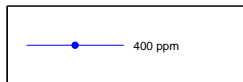
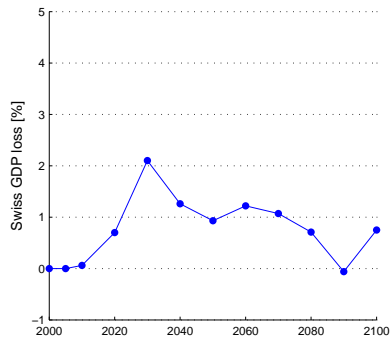
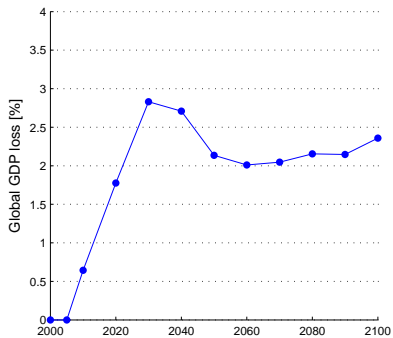


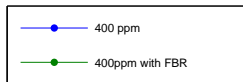
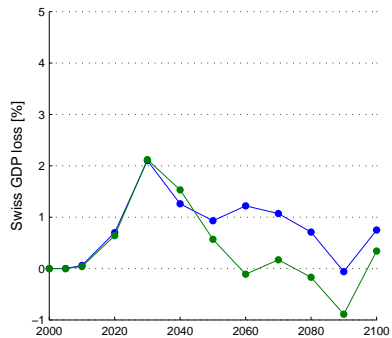
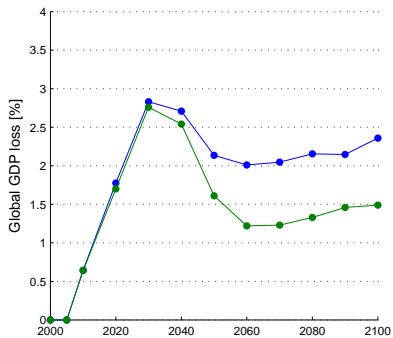
400 ppm scenario with nuclear phase out in CH and Japan

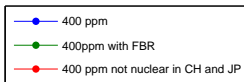
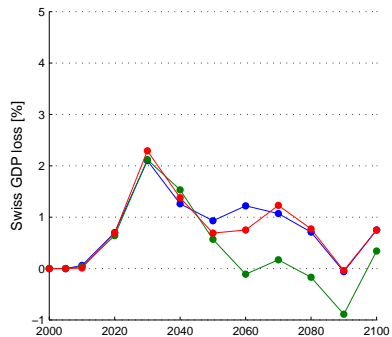
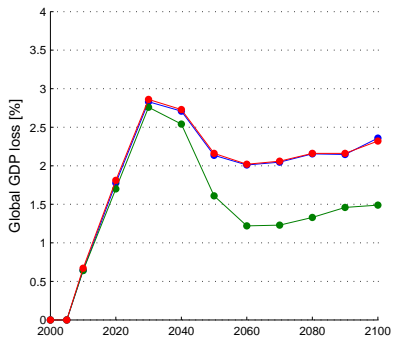


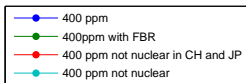
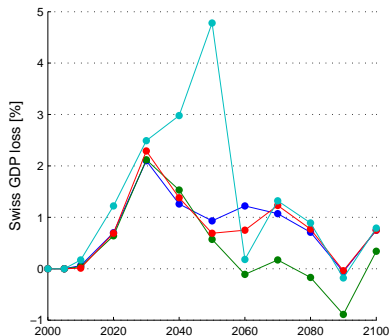
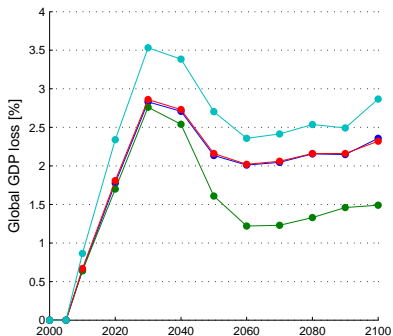
400 ppm scenario with nuclear phase out globally












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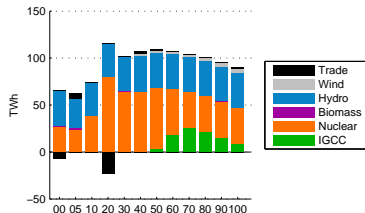
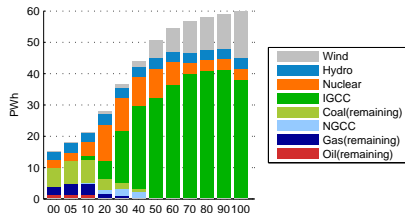
- Climate policy:
 - demand reduction
 - efficiency measures
 - deployment of low-carbon emissions (nuclear)
 - reduction of global GDP
- Nuclear resources
 - Conventional resources likely to be depleted
 - FBR: an option to overcome this problem
- Fukushima: moratoria on new NPP
 - Additional efficiency
 - Large share of renewables: challenges in reliability
 - Additional costs to achieve climate targets



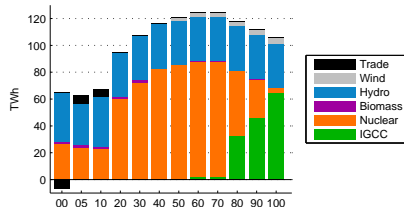
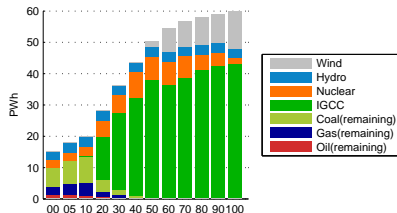
Thank you for your attention

2010 calibration

Current

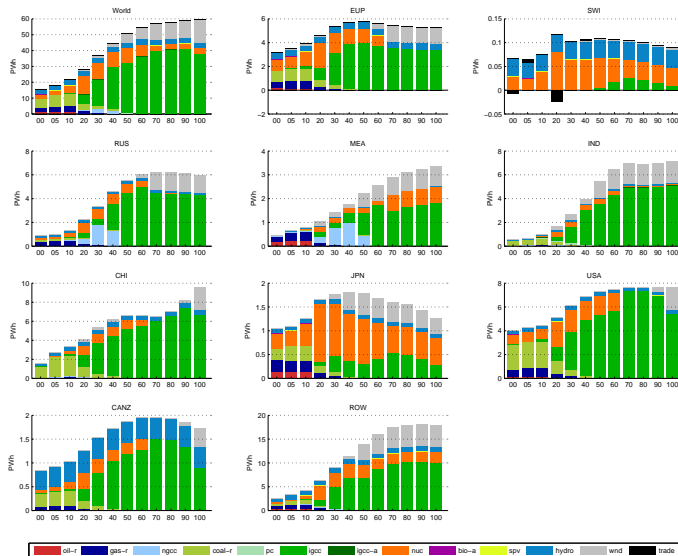


2010 calibrated



- Other resource scenarios
- Nuclear cycle
- Technology learning spillovers
- Other climate policy scenarios

400ppm scenario: Regional Electricity



400ppm scenario: Regional Electricity

