

# Energy Strategy 2050: Economic impacts

Some insights from:

- Ecoplan (2012), Volkswirtschaftliche Auswirkungen der Energiestrategie 2050
- Ecoplan (2012), Volkswirtschaftliche Auswirkungen einer Ökologischen Steuerreform
- Ecoplan (2013), Ökologische Steuerreform – Rückverteilung und Ausnahmeregelung
- Ecoplan / WTI / Uni Zürich (2013), Border Tax Adjustments -> **Prof. Böhringer**

SSES Annual Meeting 2013

Neuchâtel, June 20, 2013

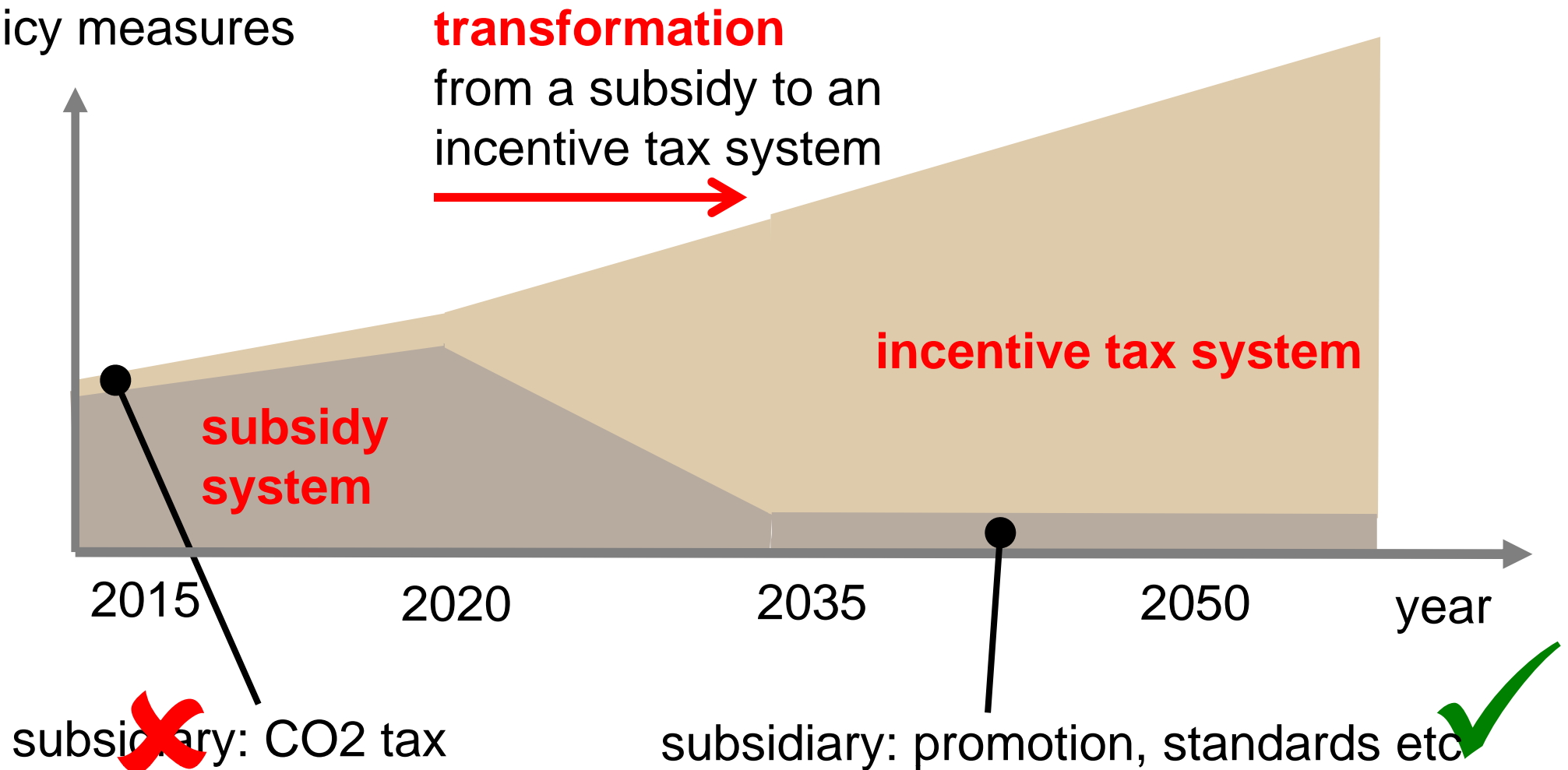
André Müller, Ecoplan

# Content

- 1. **Energy Strategy 2050** – from a subsidy to an incentive tax system
- 2. **Data&Model** – disaggregated data & large-scale model of Swiss economy
- 3. **Scenarios** – targets & policy measures
- 4. **Impacts of Energy Strategy 2050** – model results
- 5. **Concluding remark**

# Energy Strategy 2050: from a subsidy to an incentive tax system

magnitude of policy measures



# Question: Economic impacts of Energy Strategy 2050?

**Impacts from 2008 (benchmark year) to 2050**

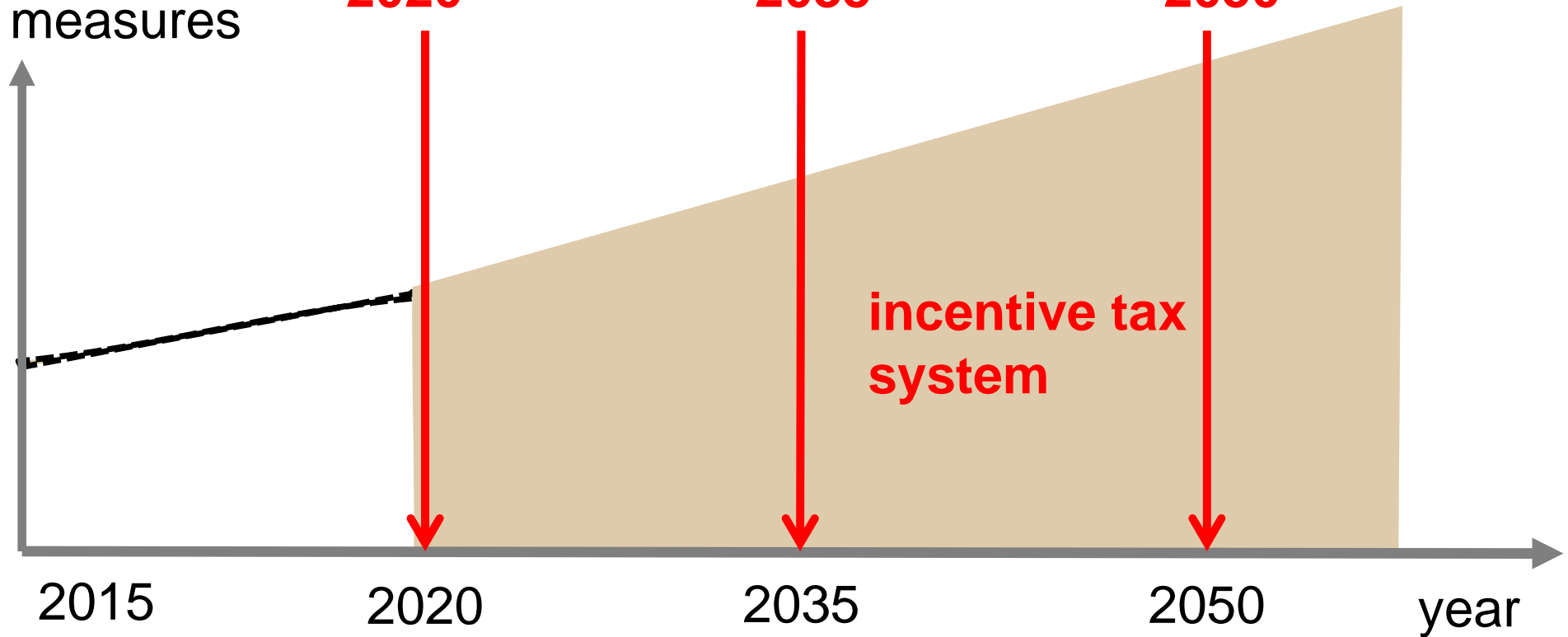
**results are on display for milestone years:**

**2020**

**2035**

**2050**

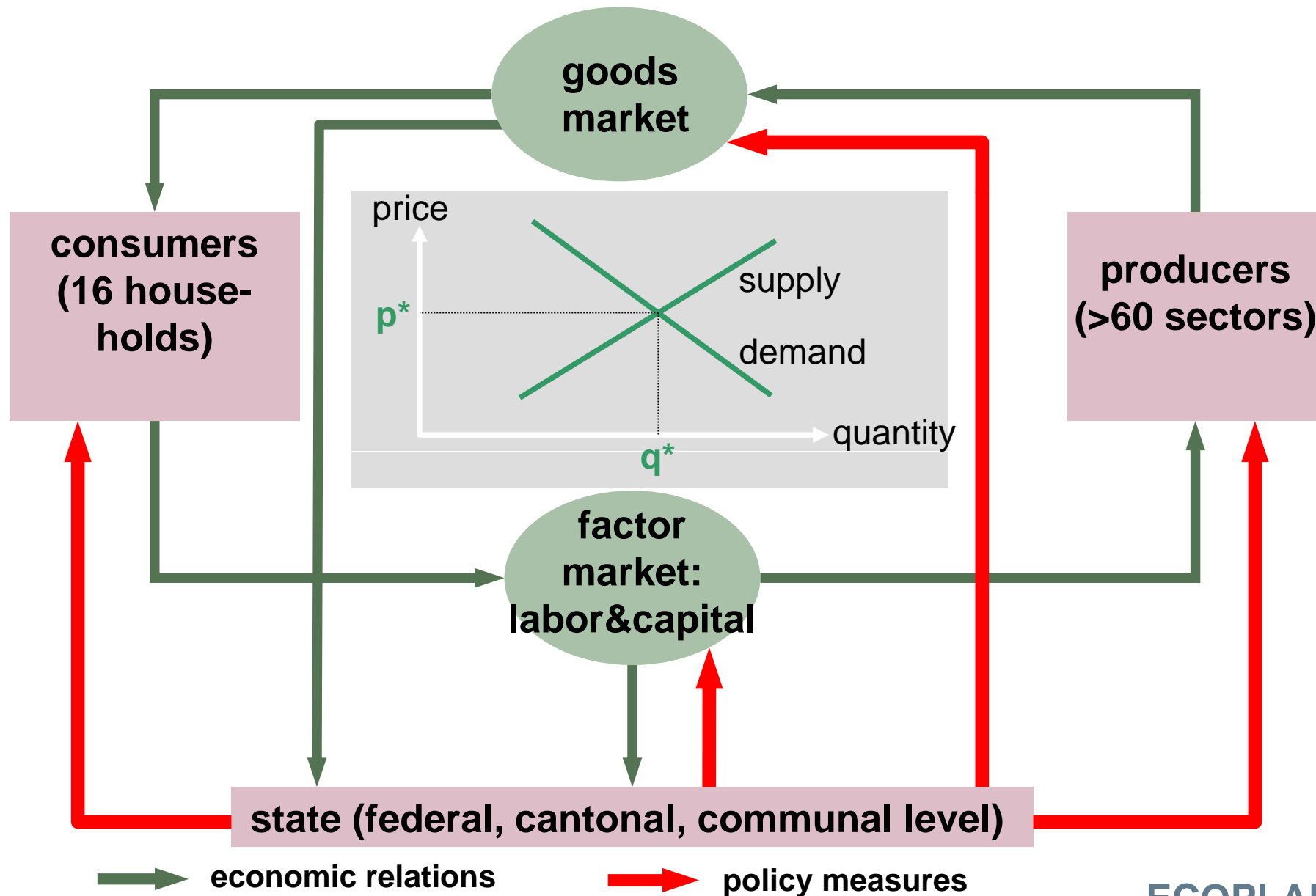
magnitude of  
policy measures



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# Computable general equilibrium model



# Data & Model

- • **Single country CGE for Switzerland:** recursive dynamic, myopic behavior, labor leisure choice (flexible labor supply), mobility of capital (international and between sectors), international trade -> armington approach, bottom-up approach for electricity production  
-> **effects on welfare, GDP, employment**
- • **Swiss Input-Output-Table 2008:** 66 sectors, energy use, CO2 emissions  
-> **structural effects, analysis of tax exemptions**
- • **Household disaggregation:** 16 households  
-> **distributional effects**
- • **Swiss tax system:** all major taxes covered: income tax, VAT, capital tax, labor tax (social contributions)  
-> **analysis of different tax reimbursement systems**
- • **Forward calibration** up to the year 2050 to the CO2 emissions of BAU scenario  
-> **same «base line» for all expert groups**

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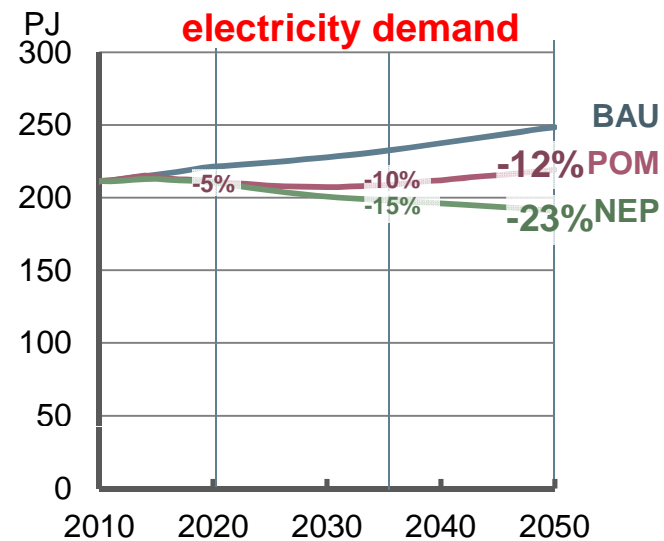
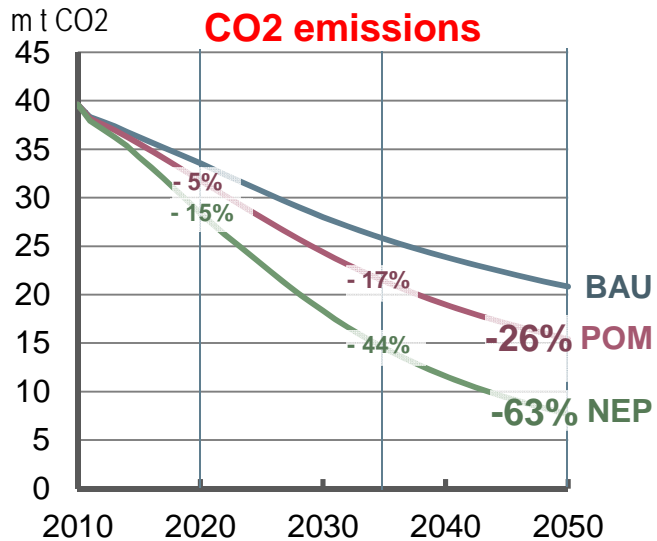
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# Scenarios: **POM** **NEP**

**POL**itical **M**easures = moderate targets  
**New Energy P**olicy = ambitious targets

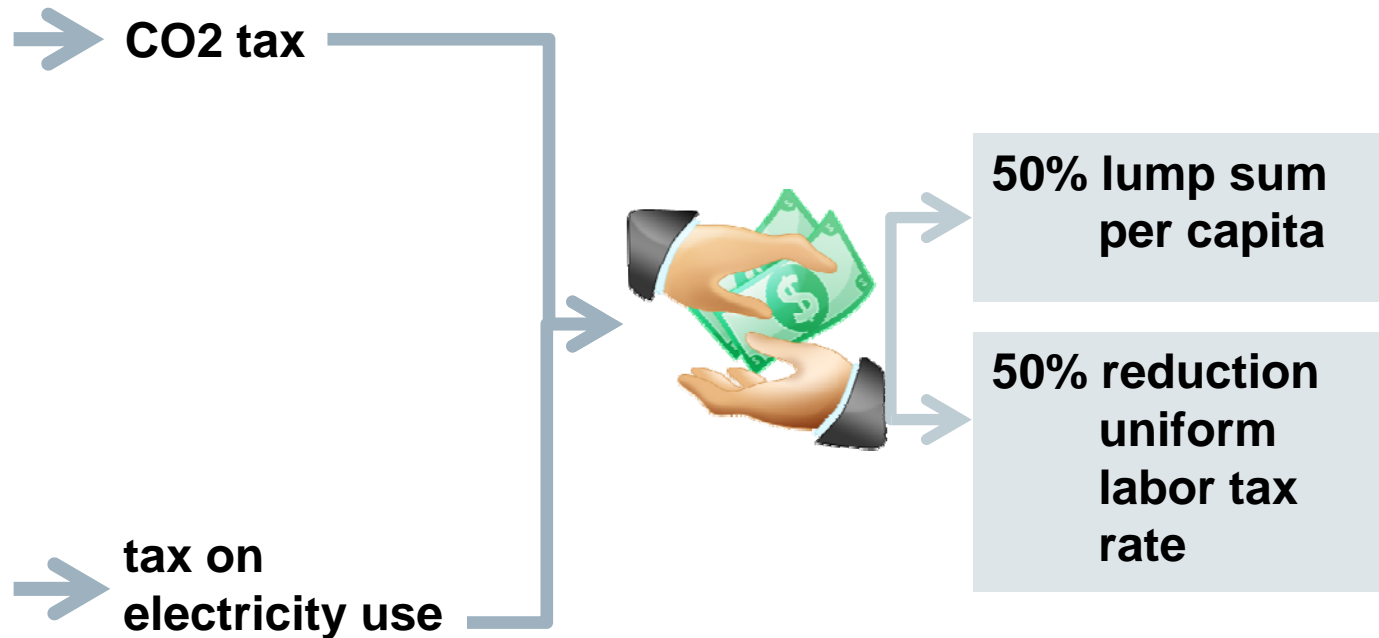
## Exogenous targets



## Incentive taxes

## Tax revenue

## Reimbursement



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# Level of CO2 and electricity tax

	Scenario POM			Scenario NEP		
	2020	2035	2050	2020	2035	2050
<b>exogenous</b> reduction target compared to BAU						
<b>CO2 emissions</b>	-5%	-17%	-26%	-15%	-44%	-63%
<b>Electricity demand</b>	-5%	-10%	-12%	-5%	-15%	-23%
<b>endogenous</b> tax level						
<b>CO2 tax</b> [CHF/t CO2]	70	140	210	150	540	1'140
<b>Electricity tax</b> [% electricity end user price]	11%	23%	22%	12%	31%	40%

- **High taxes are necessary to meet ambitious targets**
- **Switzerland faces high marginal CO2 abatement costs compared to most OECD countries**

# Impacts on economy & household welfare

impact on economy & welfare

impacts considered

Environmental  
Dividend



reduction of external costs  
(internalisation of external costs)

estimation of avoided external costs (**secondary benefits**)  
without:

- costs of climate change
- nuclear risks

Economic  
Dividend



tax reimbursement  
-> Reduction of existing tax distortion

Growth  
Dividend



endogenous growth effects (innovations, first mover advantages)

# Impacts on GDP and employment

	Scenario POM			Scenario NEP		
	2020	2035	2050	2020	2035	2050
<b>Impacts on GDP compared to BAU</b>						
<b>GDP level</b>	-0.2%	-0.5%	-0.6%	-0.4%	-1.8%	-2.7%
<b>GDP growth rate</b>	-0.05%	-0.03%	-0.02%	-0.07%	-0.09%	-0.08%
<b>Impacts on employment compared to BAU</b>						
<b>employment level</b>	-0.1%	-0.2%	-0.2%	-0.2%	-0.6%	-0.7%

- **Moderate (POM) to noticeable (NEP) negative impacts on GDP**
- **Only moderate negative impacts on employment due to reduction of labor taxes**

# Impacts on household welfare

	Scenario POM			Scenario NEP		
	2020	2035	2050	2020	2035	2050
<b>Impacts on household welfare</b> compared to BAU						
<b>Welfare excl. "secondary benefits"</b>	-0.06%	-0.13%	-0.16%	-0.01%	-0.49%	-0.92%
<b>"secondary benefits"</b>	0.08%	0.17%	0.22%	0.21%	0.43%	0.52%
<b>Welfare incl. secondary benefits</b>	0.03%	0.03%	0.06%	0.19%	-0.06%	-0.42%

- **Moderate POM targets: small welfare gain**
- **Ambitious NEP targets: moderate welfare loss**

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## ...behind the big picture

- **Substantial structural effects:** NEP 2050 with exemptions for EITE sectors:

GDP: - 2.7%



sectoral output effects: from **-30% to +20%**

- **Distributional effects:** NEP 2050 with proposed tax reimbursement:

Welfare: **-0.4%**



welfare of household groups: from **-2.1% to +0.3%**

- **Sensitivity Analysis:** Robust results, but huge uncertainty

NEP 2050:



	Base case	from	to
CO2 tax [CHF/t CO2]	1140	900	1800
Electricity tax	40%	20%	90%
Welfare	-0.90%	-0.70%	-1.30%
Employment	-0.70%	-0.50%	-1.20%



## **There's no such thing as a free lunch...**

- **the Swiss Energy Strategy 2050 is not a growth programme...**
- **...and no employment programme...**

## **...but at least the lunch is «digestible»...**

- **...the Swiss economy can cope with the negative impacts of the Swiss Energy Strategy 2050...if the transformation to an incentive tax system is successful.**

Paul Krugman

«The truth is that there is no credible research suggesting that taking strong action on climate change is beyond the economy's capacity.»