



School of  
Management and Law

# Disentangling the Effects of Swiss Energy and Climate Policies



Building Competence. Crossing Borders.

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# Motivation and Contribution

- **Motivation**

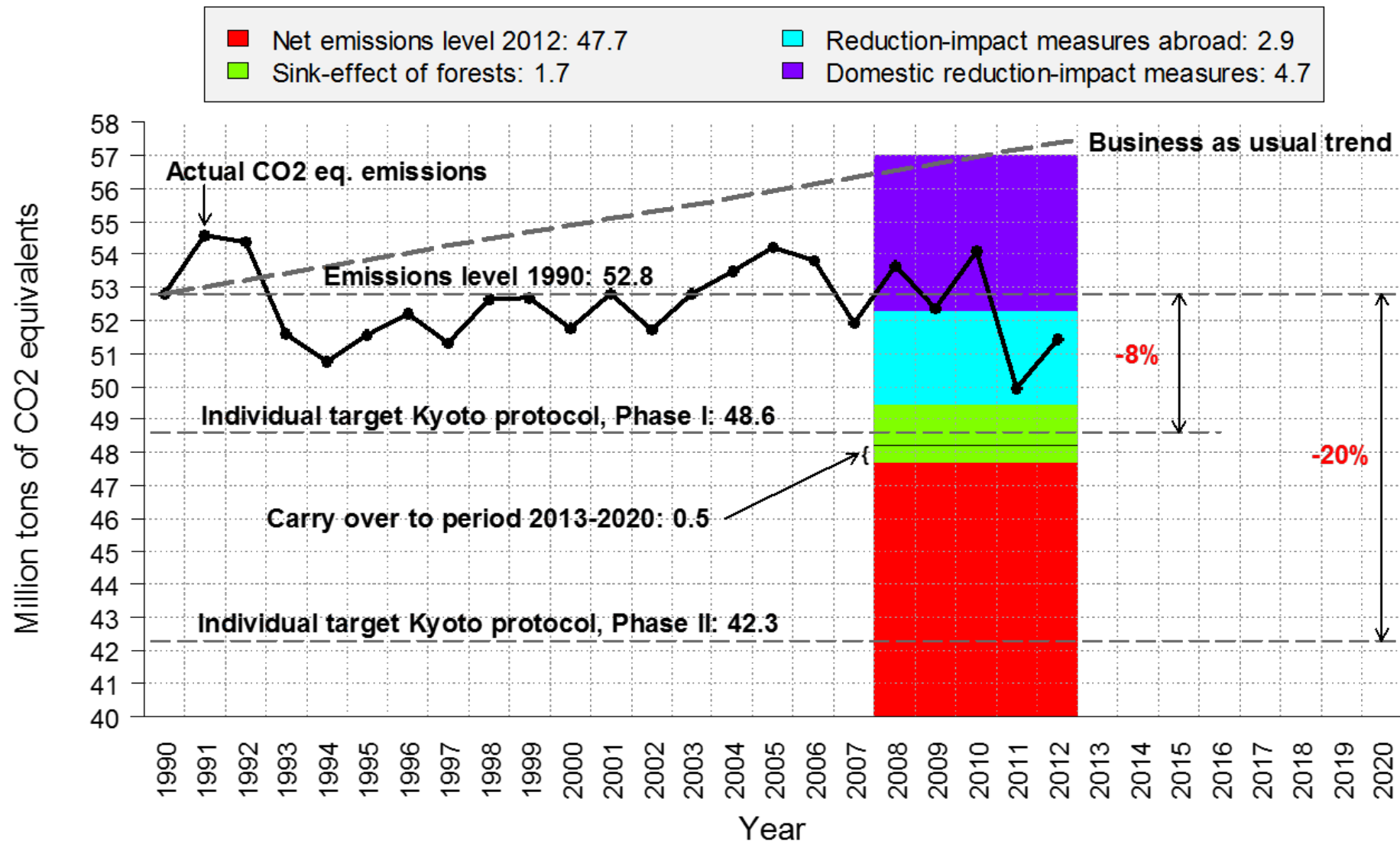
- **Swiss Energy Strategy 2050** including Phase-out of Nuclear, many policies are in implementation or in the pipeline
- **Swiss Kyoto Targets** (Second Commitment Period, Paris Target), ambitious targets

- **Contribution**

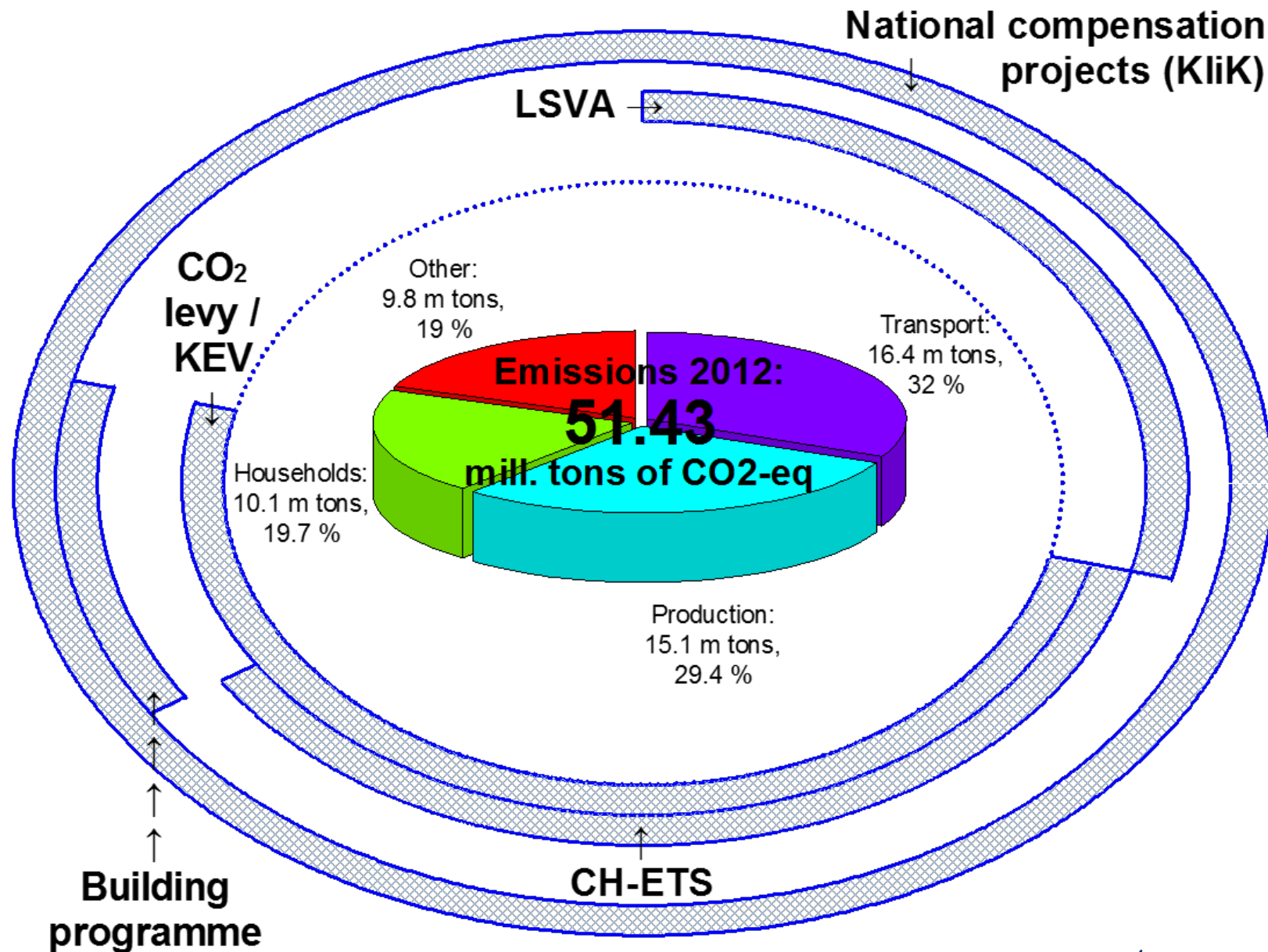
- **Disentangling effects** and understanding complex linkages and inter-temporal effects
- **Qualitative evaluation** of likelihood of achieving or targets (effectiveness) and of efficiency
- **Literature review** on Swiss energy and climate policy evaluation and detection of research gaps

# Past Emissions, Future Targets

## Contributions of greenhouse gas emission reductions in Switzerland, 2008-2012



# Swiss Energy and Climate Policy by Targeted Sector



# CO2 Levy on Heating and Process Fuels

- **Start:** 2008
- **Financing:** Levy on heating and process fuels, rate raised if annual target is exceeded (see table below)
- **Exemptions:** for emissions intensive and trade-exposed companies which commit to emission reductions targets
- **Revenue recycling:** Levy used to finance building programme (1/3) and refunded to households and firms

	2008	2009	2012	2014	2016	2018
CHF / ton CO <sub>2</sub>	12	24	36	60	72-84	96-120
Extra Light heating oil CHF / l	0.0318	0.0636	0.0954	0.159	0.1908	0.2226 - 0.318
Natural Gas CHF / kg	0.03072	0.06144	0.09216	0.1536	0.18432	0.215 - 0.3072

Source: Swiss Confederation

## Cost-reflective Feed-in Tariff (KEV)

- **Start:** 2009 (installations built from 2006 eligible)
- **Aim:** Enhance renewable update by funding gap between electricity price and renewables, granted for 20-25 years
- **Financing:** Network surcharge levy
- **Exemptions:** No levy for companies which commit to target agreement on energy efficiency and invest 20% of savings

Technology	Number of Installations 2013	Total Production hours 2013	Production MWh 2013	Tariff paid 2013 CHF / kWh
Biomass	212	3,025	580,451	0.1947
Photovoltaic (10-30 kW)	6164	797	139,278	0.4691
Wind (2-3 MW)	17	1,734	51,217	0.1887
Small Hydro (<10 MW)	334	4,299	617,927	0.1551
Geothermal*	0	6,000-8,000		0.40
TOTAL	6727	2,570	1,388,874	

# Swiss Emissions Trading Scheme (CH ETS)

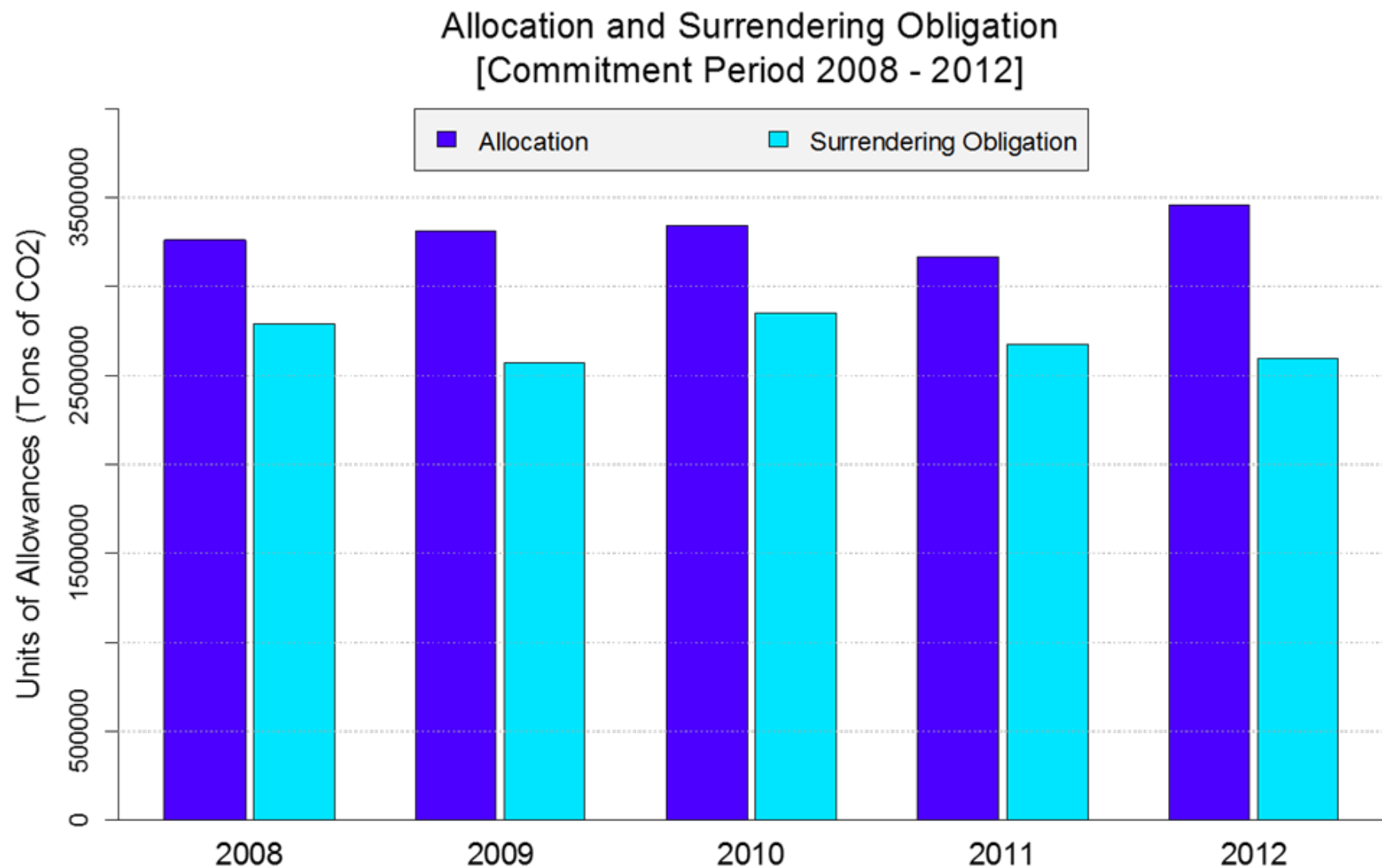
- **Start:** 2008 (Phase I: 2008-2012 and Phase II 2013-2020)
- **Coverage:** Phase I: 450 companies; Phase II: 35
- **Allocation:** Phase I: negotiation; Phase II: EU benchmarks  
=  $\text{Benchmark} \times \text{activity rate} \times \text{adoption factor} \times \text{reduction factor}$
- **Banking (Carry-over):** CHUs and international credits from Phase I in Phase II (1.6 Million units)

## Adoption and reduction factor for Swiss Allocation Formula.

Year	2013	2014	2015	2016	2017	2018	2019	2020
Adoption factor	0.8	0.7286	0.6571	0.5857	0.5143	0.4429	0.3714	0.3
Swiss reduction factor	99.91%	98.55%	97.17%	95.78%	94.38%	92.96%	91.54%	90.09%
EU ETS reduction factor	94.27%	92.64%	90.98%	89.30%	87.61%	85.90%	84.17%	82.44%



# Surplus in Phase I CH ETS

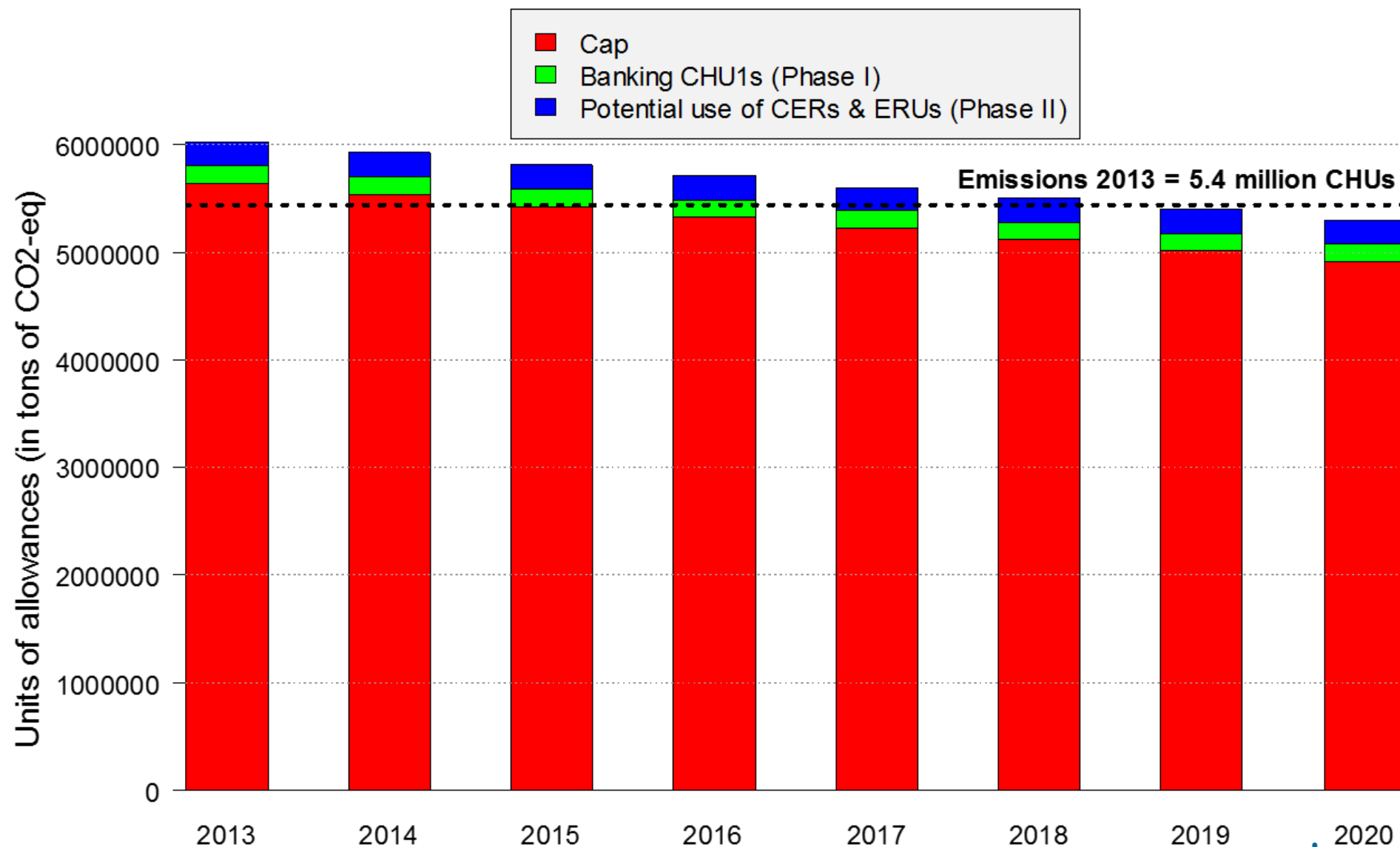


Source: Swiss Emissions Trading Registry [ N = 445 ]



# Estimated Scarcity CH ETS Phase II

Estimated scarcity Swiss ETS, Phase II, 2013-2020



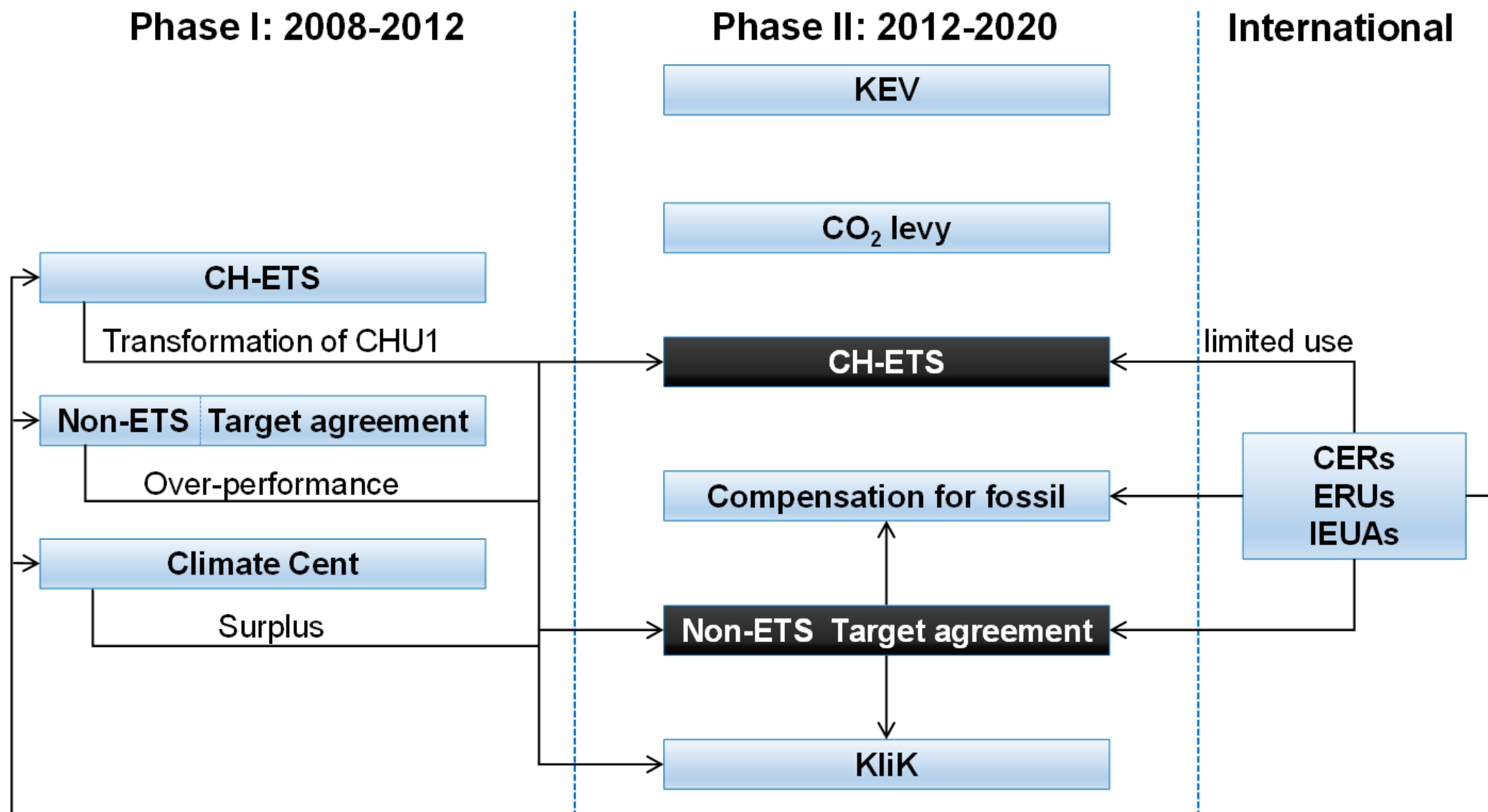
# Target Agreements

- **Start:** 2008 together with CH ETS
- **Aim:** CO2 targets to be exempted from CO2 levy and energy efficiency target to be exempted from KEV, if eligible
- **Type:** Up to 2012 voluntary since 2013 “quasi voluntary”, choice to participate leads to legally binding commitment
- **Targets:** set on the basis of economic viable measures based on three models:
  - 15% reduction in 2020 based on 2012 (CH ETS Phase I)
  - Individual target if first time participation
  - Smaller companies list of measures
- **Implementing agency:** EnWA and Cleantech Agentur Schweiz
- Coordination of targets (CO levy, CH ETS, Cantonal)

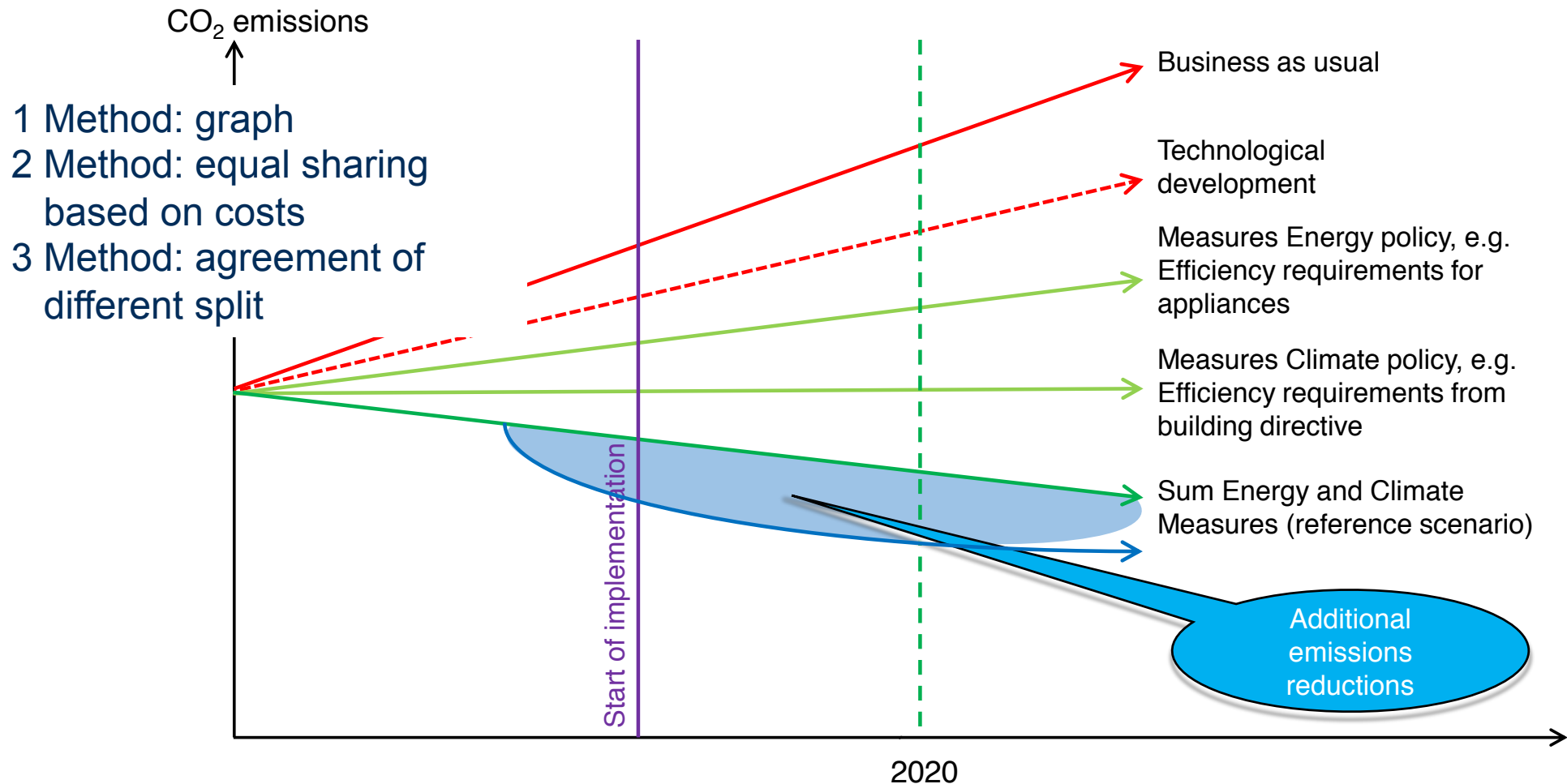
# National Compensation Projects (Climate Cent, KliK)

- **Start:** 2005 (Climate Cent), 2014 (KliK)
- **Aim:** Partly Compensation of CO<sub>2</sub> emissions from transport
- **Type:** Up to 2013 voluntary; since 2014 obligation
- **Coverage:** fossil fuel producers and importers for financing and all sectors for projects
- **Financing:** Levy on diesel and petrol (Climate Cent: 0.015 CHF/l; KliK up to 0.05 CHF/l)
- **Exemption:** CO<sub>2</sub> levy
- **Targets:** range from 2% (2014-15) up to 10% in 2020
- **Eligibility:** Climate Cent allows international units (up to 15 Mill.), KliK doesn't allow international units unless banked
- **Costs:** International units (around 15 CHF/unit)  
substantially lower cost than national emissions reductions

# Swiss Policy Mix: Linkages and overlaps



# Evaluating effectiveness: Overlaps and Double Counting



## Assessment:

- Criteria: Ability of achieving emissions reductions within Switzerland (Targets) and international
- **Switzerland: intertemporal links** between Phases and **overlap** between policies prevent from summing up the single policy achievements, particularly **additionality** of offsets
- **International: leakage** effects and **additionality** of offsets may reduce impact

# Evaluating Efficiency: Prices,

	Price CHF / ton CO <sub>2</sub>	Costs CHF / ton CO <sub>2</sub>
CO <sub>2</sub> levy	60 (Maximum: 120)	-
Building programme (Konferenz kantonaler Energiedirektoren)	-	126, 185
CH ETS ( <a href="http://www.bafu.admin.ch/emissionshandel/05545/12435/index.html?lang=de">http://www.bafu.admin.ch/emissionshandel/05545/12435/index.html?lang=de</a> )	12, 20, 40.25	
Target agreements: CO <sub>2</sub> exemption from CO <sub>2</sub> levy for non-ETS companies (KliK Jahresbericht 2013)	-	100
Obligation for compensation for transport fossil fuel importers KliK (KliK Jahresbericht 2013)	6.25 (Max: 20.8)	58 – 168 (Mean: 109)
Heavy vehicle fee	93	-

## – Assessment:

- Criteria: Achieving given reduction target at least cost
- **Price and abatement costs vary** between policies, this is reducing efficiency since in sectors with higher abatement costs emissions will be reduced to a lower extend as if financed in sectors with lower abatement costs

# Conclusions

- Swiss Policy mix is **complex** many overlaps and interlinkages
- **Climate** policies and policies of the **energy** strategy **compete**
- **Effectiveness:**
  - Complex temporal-interlinkages and overlaps between policies make it difficult to calculate achievements of targets
  - Non-additionality of national and international offset projects may reduce actual emissions reductions
- **Efficiency:**
  - Divergence of prices of different policies leads to inefficiencies
  - Harmonisation of prices should be key objective to achieved by differentiating endowment of emissions rights and redistribution of revenues
- **Research gaps** identified: Independent ex-post analysis of CO2 levy, CH ETS, Offset schemes (KliK), Target agreements is lacking.



**THANK YOU VERY MUCH FOR YOUR ATTENTION !**

