Promoting Renewable Energy Technologies: Beyond Traditional Financial Incentives, Energy Strategy 2050

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Harvard Kennedy School, April 7th, 2014
Switzerland: Europe’s Electricity Hub

Cross-border capacities of Switzerland
- ~ 28‘000 MW
- ~ 20% of continental Europe
- ~ 10‘000 MW usable (NTC)

Physical cross-border flow of Switzerland
- ~ 80 TWh p.a.
- ~ 10% of continental Europe

Electricity consumption of Switzerland
- ~ 60 TWh p.a.
- ~ 2.5% of continental Europe

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Swiss energy mix in 2012

Breakdown of end consumption by energy source (2012)

- Oil-based combustibles: 19.3%
- Engine fuels: 33.9%
- Electricity: 24.1%
- Gas: 12.9%
- Other sources: 9.8%

Source: 2012 SFOE Swiss overall energy statistics
Proportion of consumption to overall end energy use by utilisation category (2012)

- Mobility (domestic): 30.3%
- Room heating: 33.0%
- Process heat: 12.2%
- Lighting: 3.4%
- Hot water: 5.8%
- Air-conditioning, ventilation, household technology: 2.8%
- Information & communication, entertainment: 1.3%
- Drives, processes: 9.0%

SFOE: Swiss overall energy statistics (2012)

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Renewable Electricity Production: Starting Point in 2012

Hydropower, 57.15%
Non-Renewable Power, 39.90%
Waste, 1.65%
Biogas, 0.20%
PV, 0.49%
Biomass, 0.48%
Wind, 0.13%

65'608 GWh

New renewable energies: 1935 GWh (3%)


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Electricity consumption by client category (2012)

- Trade and industry: 32.2%
- Households: 31.1%
- Services: 26.9%
- Transport: 8.1%
- Agriculture, horticulture: 1.7%

SFOE: Swiss electricity statistics (2012)
Energy Policy
Three Guiding Principles

1. Federalism
   • Art. 89 Constitution: "domestic and renewable energy… economising and rational use of energy…"
   • Split federal and cantonal remits: e.g. buildings = cantonal remit.

2. "Subsidiarity": i.e. voluntary action and self-regulation first, state regulation as last resort if voluntary action fails

3. Direct democracy: Referendum and Popular Initiative. 7 votes at federal level since 2000:
   • 2000: rejection of 3 proposals for promotion of renewables
   • 2001: rejection of energy "incentive" tax/ ecological tax reform
   • 2002: rejection of Electricity Market Law
   • 2003: rejection of two nuclear phase-out proposals
   • 2012: climate policy, SUV ban
   • 2013/14: new nuclear plant
   • 20??: Fixed operational lifetime of nuclear plants
   • 20??: Electricity efficiency
   • 20??: Energy tax instead of VAT

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Nuclear and Energy Policy: before and after Fukushima

- **Nuclear Energy Law (2005)**: Nuclear Power Plant NPP licence subject to facultative referendum. 3 NPP licence applications filed. Referendums were foreseen for 2013.
- **13 February 2011**: Consultative referendum in Canton Berne on new Mühleberg NPP: 51.2% in favor.
- **11 March 2011**: Fukushima accident
- **14 March 2011**: Federal Council (Gov’t) suspends licensing procedure for new NPPs
- **25 May 2011**: Gov’t decides nuclear phase-out (i.e. no replacement after end of NPP lifetime). Decision endorsed by both Houses of Parliament.
- **June 2013**: Parliament adopts FiT surcharge increase and FiT exemption for energy-intensive industries
- **5 September 2013**: Gov’t adopts legislative package for Energy Strategy
- **2014/early 2016**: Parliamentary debate, entry into force
Energy Strategy 2050: Two Phases

Energy Strategy 2050

Phase 1
- Coordinated Swiss Energy Research Action Plan
- Initial Package of measures
- Parliamentary Initiative 12.400
- Electricity Grid Strategy

Phase 2 (from 2021)
- Transition from promotion (subsidy) system to fiscal steering mechanism

2050 Energy Perspectives

Negotiations with EU on Electricity Agreement

Second stage of market liberalisation (full opening)

Revision of Electricity Supply Act

Already adopted

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Energy Strategy 2050: Reinforcing Energy Efficiency

Adopted (Parliamentary Initiative 12.400)

- Covenants for electricity-intensive industries (20% of FIT exemption re-invested in efficiency measures)

Planned

- CO₂ tax rate to rise from CHF 36/tCO₂ to CHF 84/tCO₂, ⅓ earmarked for Building Refurbishment Programme, ⅔ recycled
- Building Refurbishment Programme: From currently CHF 300M to CHF 525M as of 2015
- Tightening building codes (insulation and systems)
- System audits, incentives for replacement of fossil and direct electric heating/water boilers
- Efficiency tenders for projects with unviably long pay-back: from CHF 19M to CHF 50M by 2020
- Efficiency standards for cars, energy-using products, motors
- Transport: „Climate cent“ replaced by fuel importer obligation to offset 5-40% of emissions surplus
- Utility savings obligations (>30 GWh p.a.), possibly White Certificates
Success story: Reduction of the energy use of new buildings in Switzerland

Energy use per square meter of new buildings in Switzerland

Liters heating oil-equivalents per m²

- Av. new building 1975: 22
- Legal max. 1992: 12
- Legal max. 2000: 9
- Minergie standard 1998: 4.2
- Legal max. 2008: 4.8
- Minergie standard 2009: 3.8
- Minergie-P standard: 3

Zero- and Plusenergy buildings

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Efficiency Policy: CO2 Tax on Stationary Fuels (Current)

- Recycling per Capita: CHF 600 million
- Recycling based on labor cost
- Buildings Refurbishment Programme: 1/3 of revenue (CHF 200 million)
- Exemption if compliant with agreed target

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Energy strategy 2050: More financial support for innovative building refurbishments with energy saving measures

After refurbishment by Viridén+Partner AG this building from the 1960s produces more energy than it consumes. (Winner European Solar Prize 2013)

More examples of buildings producing more energy than they consume:
www.energie-cluster.ch → Wissenstransfer → Innovationsgruppen Plusenergiegebäude → Datenbank
Bringing Renewables to the housing sector

Cantonal energy laws

- Cantonal energy laws: not more than 80% of the total energy consumption for heating and hot water production come from not-renewables sources
- The cantons are free to decide which sources they accept and promote
- The contribution from the CO2-tax that goes to the individual cantons is a result of the impact and success of the decisions and programs of the previous year
- 2013: in more than 80% of all new constructed houses a heat-pump was installed

Promotion of heat-pumps

- Starting a testcenter for HP at a technical university, all new types have first to be tested before market entry
- Labeling of the drilling and installation companies
- Courses for different branches around the heat pump sector
- Promotion and information of a national Agency PHPS together with the cantons
Energy Strategy 2050: Renewables and Demand Targets

Electricity from RES (excl. Hydro)
- 2012: 1.9 TWh
- 2020: 4.4 TWh
- 2035: 14.5 TWh

Large Hydro
- 35.4 TWh (2012) => 37.4 TWh (2035)

Final Energy Demand
- 2000: 855 PJ
- 2012: 882 PJ
- 2020: -16% vs 2000
- 2035: -43% vs 2000

Electricity Demand
- 2000: 52.4 TWh
- 2012: 59.0 TWh
- 2020: -3% per capita vs 2000
- 2035: -13% per capita vs 2000

Energy Demand
- 2020: -16% per capita vs 2000
- 2035: -43% per capita vs 2000

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Partly adopted* (Parliamentary Initiative 12.400)

- Reducing waitlist (ab. 30,000 projects = 9.7 TWh): increasing surcharge cap (0.6 ¢/kWh => 1.5 ¢/kWh as per 1 April 2014* => 2.3 ¢/kWh)
- Total appropriations increase from CHF 210 million to CHF 720 million

- Optimization of Feed-in Tariff (FiT) system:
  - Contracts for difference for dispatchable units to match production and demand
  - Small PV (<10 kW) get upfront investment grant*
  - Right to auto-production/self-supply*
  - Max.15 years, premium set by auctions, net metering
  - Very small hydro disqualifies

- Surcharge exemption for electricity-intensive consumers (>5/10% of gross added value) if 20% re-invested in efficiency*

- Renewables declared national interest, streamlined permitting, cantonal spatial plans

- 0.1 ¢/kWh for geothermal guarantee, 0.1 ¢/kW for renaturation of rivers

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Renewable Energy: Financial support

Transformation towards feed-in Premium

Transformation of the established fixed FiT towards a FiT feed-in Premium system.

Purpose:

- future incentive for producer to feed in electricity at times when needed in the grid
- better system and market integration of subsidized power plants
Energy R&D
• Additional CHF 202M for 2013-2016 (+25%)
• Pilot & demonstration funding doubled to CHF 10M p.a.
• 10-year „Lighthouse“ Programme: CHF 5M in 2013, CHF 10M 2014-22
• Creation of “competence centers” (efficiency, networks, storage, renewables, mobility, biomass)

Grid Strategy
• Draft legislation in autumn 2014 (clarification of powers, streamlined procedures, public acceptance, smart meters)

“SwissEnergy” Programme
• Awareness-raising, training & education
• Funding to increase from CHF 26M to CHF 55M in 2015
Switzerland provides financial support for innovative energy-technology projects. Example: TOSA

This electric passenger bus (TOSA) is about to recharge its battery within seconds at a bus station. The charging station is placed above the bus.

→ Film and article in German and French: www.bfe.admin.ch/infoclips

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Energy cities – European Energy Award
- Local and regional initiatives are very popular
- More than 200 «energy cities» are labeled (gold, silver)
- Energy-management-system for municipalities with requalification every 3rd year
- Competition and exchange of experiences on communal level
- Involvement of public administration, schools and local utilities

Citizens initiatives
- Local and regional initiatives – national network established
- Support for our ES 2050 – showing it is possible
- Hundreds of local initiatives and good financial performance (tax-reduction)
- Intensive collaboration with the professionals

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FONTAVIS: Institutional investments in Swiss clean energy and infrastructure

Biomass

Water power

Energy infrastructure
- District heating system
- Transmission grid
- Distribution network
- E-mobility

Energy efficiency

New renewable energy

Source: FONTAVIS
FONTAVIS: Institutional investments in Swiss Clean energy and infrastructure

Investments of 70 Million Swiss francs in 5 portfolios:

Types of equity investment
- Equity: 67%
- Mezzanine: 33%
- Borrowed capital: 0%

Energy source
- Biomass: 30%
- Water power: 0%
- Energy efficiency: 27%
- Energy infrastructure: 30%
- Other renewable energy: 13%

Types of energy
- Heat: 57%
- Power fuel (mobility): 0%
- Electricity: 19%
- Distribution network: 24%

Source: FONTAVIS

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Swiss energy technology highlights
Solar Impulse plane: with solar energy around the world

Source and Link to Youtube Film: “Across America 2013: Golden Gate Flight“

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Thank you for your kind attention!

www.energiestrategie2050.ch
www.bfe.admin.ch