

Future Regulation Needs for Swiss Hydropower.



CEE Inaugural Conference ZHAW
«Future Electricity Markets between Liberalization and Regulation»

Dr. Silvia Banfi Frost, 13.9.2017

Content.

Current situation

- ✓ Importance of hydropower
- ✓ Power markets
- ✓ Today's regulation

Challenges

- ✓ Re-Investments
- ✓ Renewal of concessions

Regulation needs

- ✓ CO₂-prices
- ✓ Incentives for investments
- ✓ Water fees

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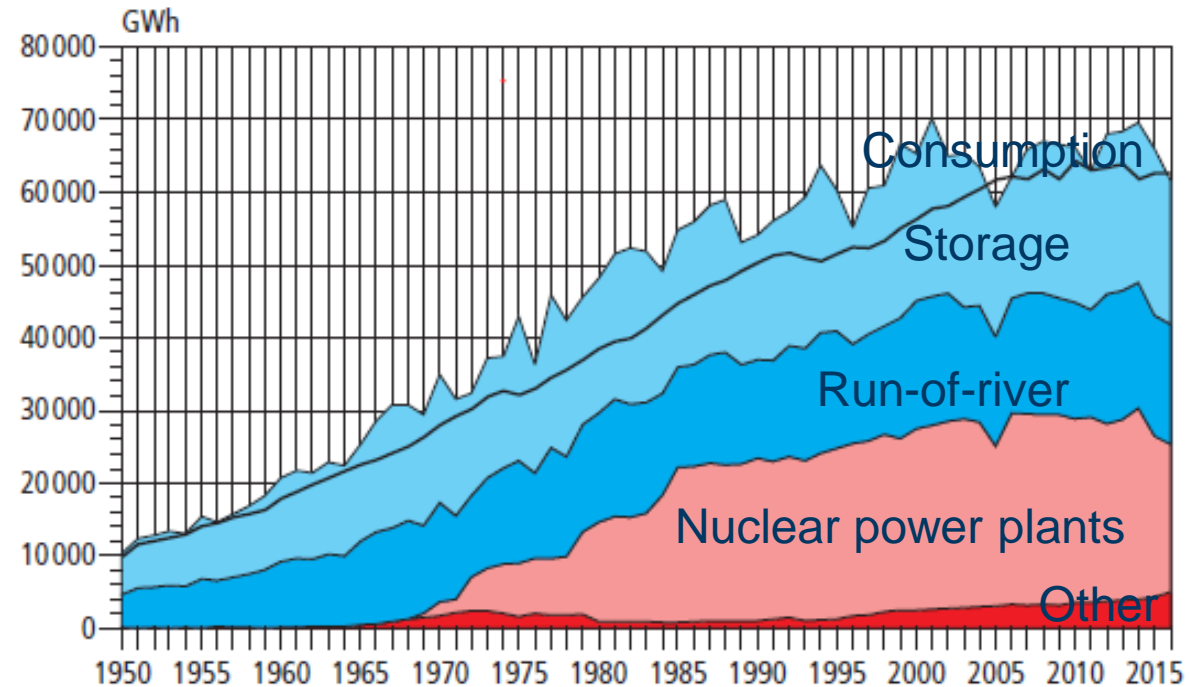
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Strategic importance of hydropower in Switzerland.

Hydropower in Switzerland:

- accounts for around 56% of domestic power production
- renewable energy and CO₂ free, with limited external costs
- flexible and storable; seasonal and daily storages allow for production optimizations
- Potential for additional plants is very limited

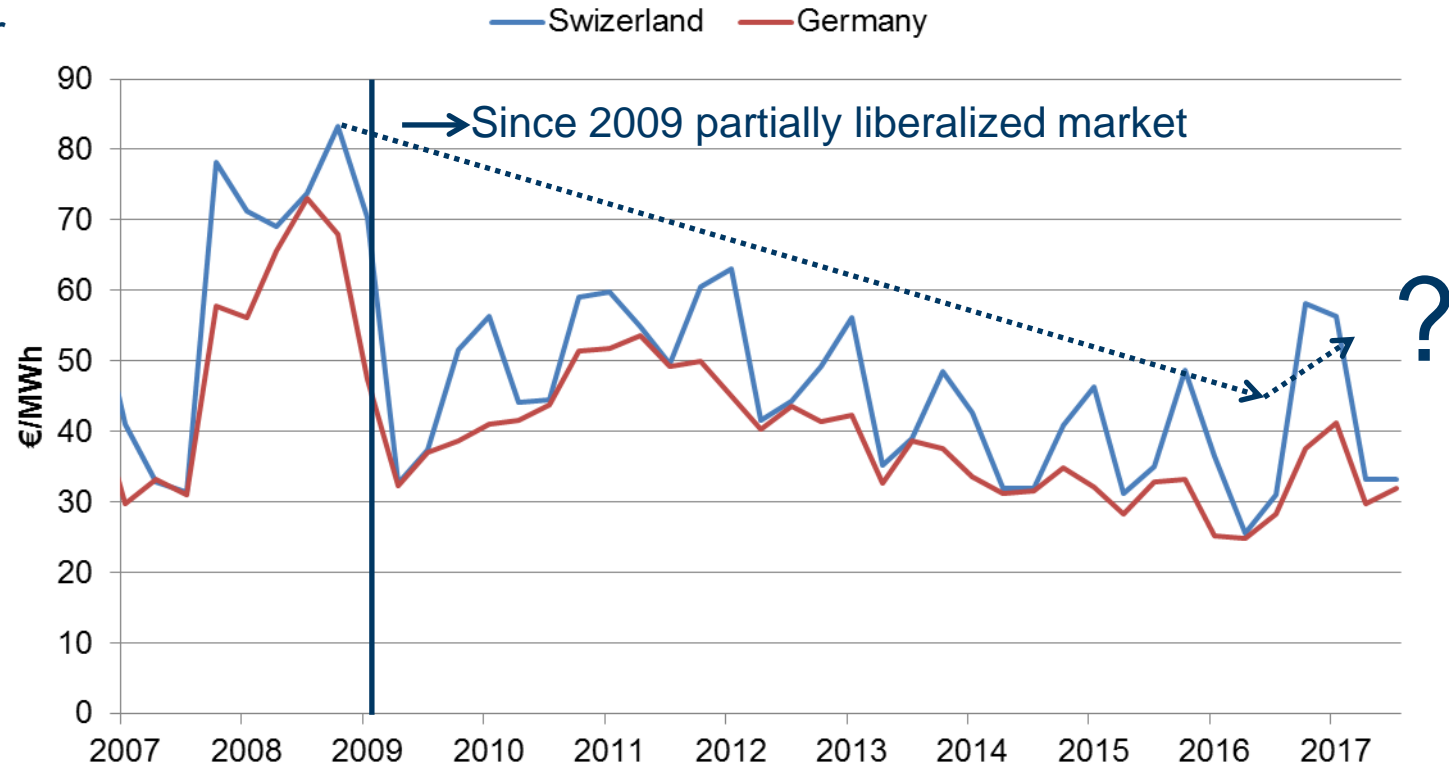


Schweizerische Elektrizitätsstatistik 2016

- **Long-term political goal: Maintain the hydropower production at 37.4 TWh on average.**

Development of spot prices.

- Since 2009 a large share of hydropower plants has to compete on European power markets.
- Decrease in power prices due to fall of commodity prices, low CO₂ prices, increased share of renewable energies
- Last months slight recovery of prices.

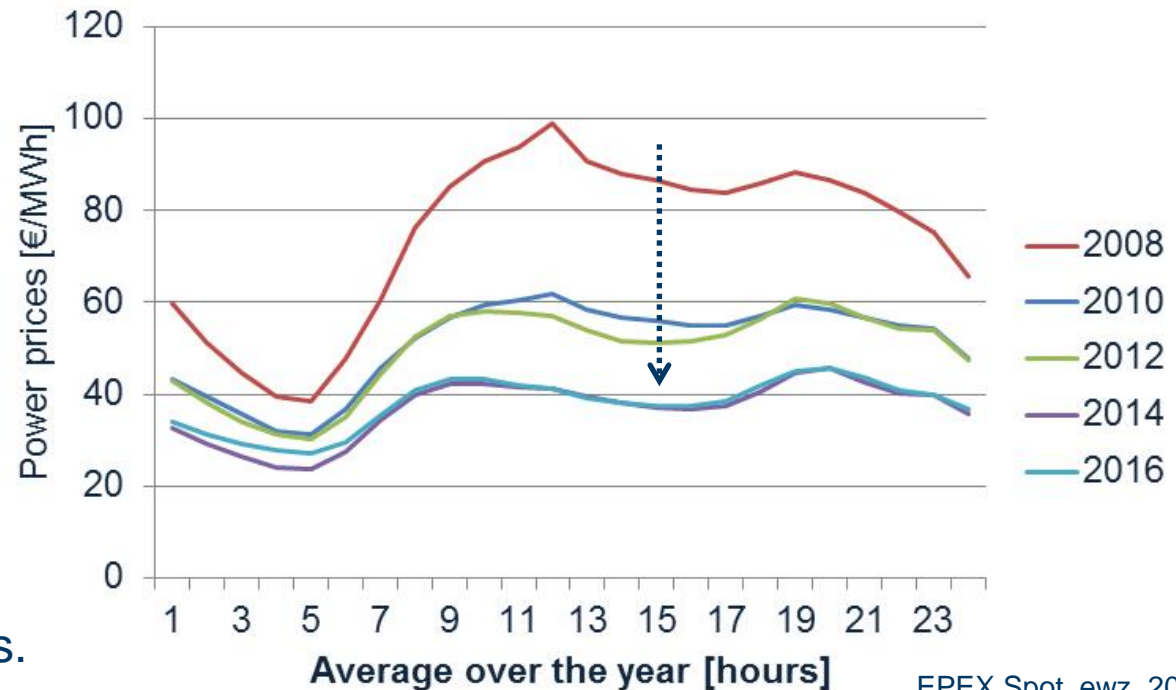


EPEX Spot markets, 31.8.2017, ewz

➤ Price reduction since 2009 affects profitability of power production.

Spreads and pump-storage plants.

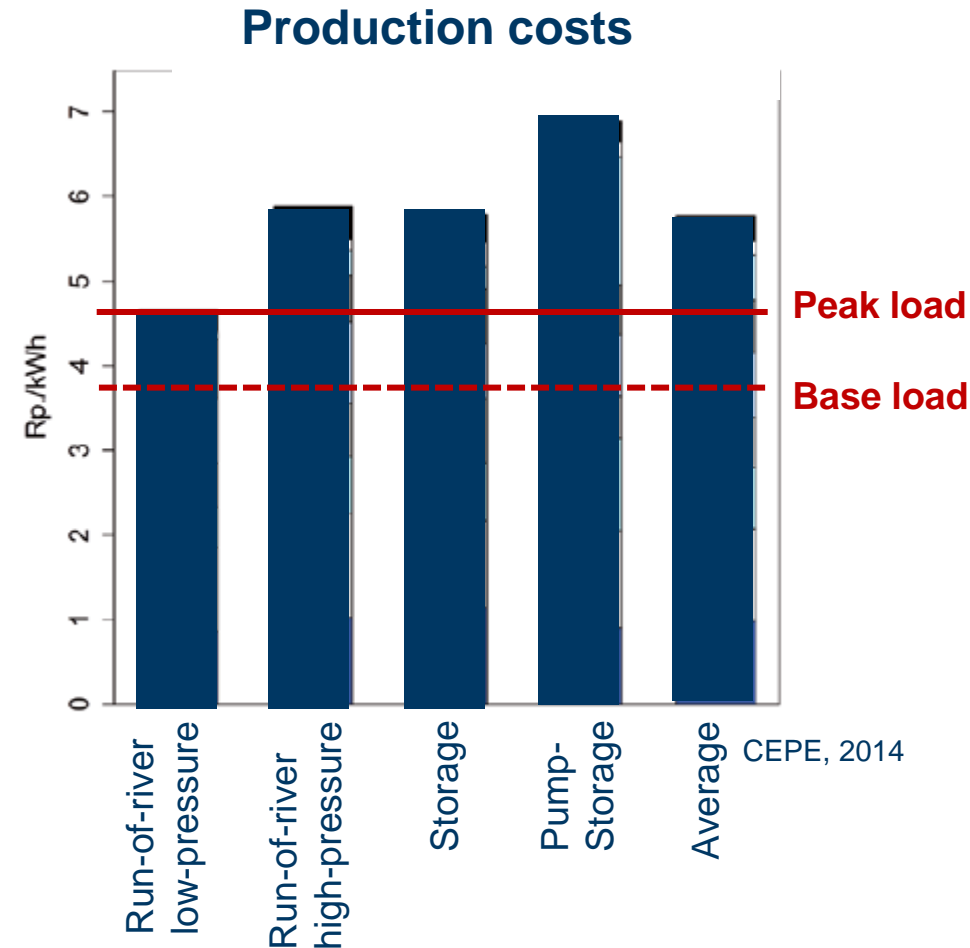
- Since 2008 the spread between peak and off peak hours decreased significantly.
- Prices in peak-hours decreased more than in off-peak-hours due to the increase in solar power production.
- The decrease of time-spreads affects the business case of pump-storage hydropower plants.



➤ **Reduction of price spreads since 2008 affects the business case of pump storage plants.**

Costs of hydropower plants.

- Many large hydropower plants are so-called “Partnerwerke”: In exchange for the electricity, owners pay overall production costs to the plant.
- Total costs can't be covered by selling the electricity to the market (but variable costs are mainly covered).
- Investments in maintenance and renewal are postponed due to persistent low energy prices.



➤ Power prices cover variable costs but not overall production costs.

Today's regulation of hydropower.

New regulations with the energy law (in effect from 1.1.2018)

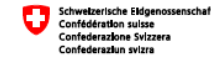
Different support mechanisms for hydropower plants

- Subsidies of max. 1 ct/kWh for plants with operational deficits (“Marktprämie”)
- Financial support for unprofitable investments in new plants and in plant extensions
- Feed-in premium combined with direct marketing
- Equal treatment of environmental and economic interests

Funds are limited, measures are temporarily restricted.

In addition:

- discussion for a new regulation of water fees is ongoing
water fee = price for the exploitation of hydropower



Ablauf der Referendumsfrist: 19. Januar 2017

Energiengesetz (EnG)

vom 30. September 2016

Die Bundesversammlung der Schweizerischen Eidgenossenschaft,
gestützt auf die Artikel 64, 74–76, 89 und 91 der Bundesverfassung¹,
nach Einsicht in die Botschaft des Bundesrates vom 4. September 2013²,
beschliesst:

1. Kapitel: Zweck, Richtwerte und Grundsätze

Art. 1 Zweck

¹ Dieses Gesetz soll zu einer ausreichenden, breit gefächerten, sicheren, wirtschaftlichen und umweltverträglichen Energieversorgung beitragen.

² Es bezweckt:

- a. die Sicherstellung einer wirtschaftlichen und umweltverträglichen Versorgung und Verteilung der Energie;
- b. die sparsame und effiziente Energienutzung;
- c. den Übergang hin zu einer Energieversorgung, die stärker auf der Nutzung erneuerbarer Energien, insbesondere einheimischer erneuerbarer Energien, beruht.

Art. 2 Richtwerte für den Ausbau der Elektrizität aus erneuerbaren Energien

¹ Bei der Produktion von Elektrizität aus erneuerbaren Energien, ausgenommen Wasserkraft, ist ein Ausbau anzustreben, mit dem die durchschnittliche inländische Produktion im Jahr 2020 bei mindestens 4400 GWh und im Jahr 2035 bei mindestens 11 400 GWh liegt.

➤ **With enduring low prices further support mechanisms are needed for new investments in hydropower.**

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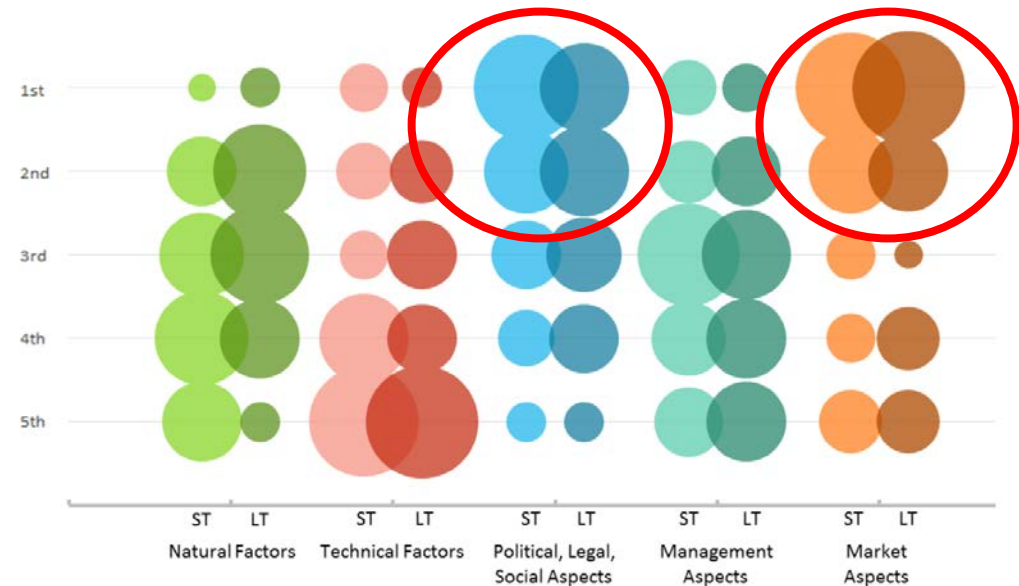
Regulation needs

- ✓ CO2-prices
- ✓ Incentives for investments
- ✓ Water fees

Overview challenges.

Most important challenges in the short and long term:

- **Market** ⇒ prices, spreads, costs, water fees
- **Regulation** ⇒ market design
- Natural factors, like climate change
- Management
- Technical factors ⇒ competing technologies, for example batteries

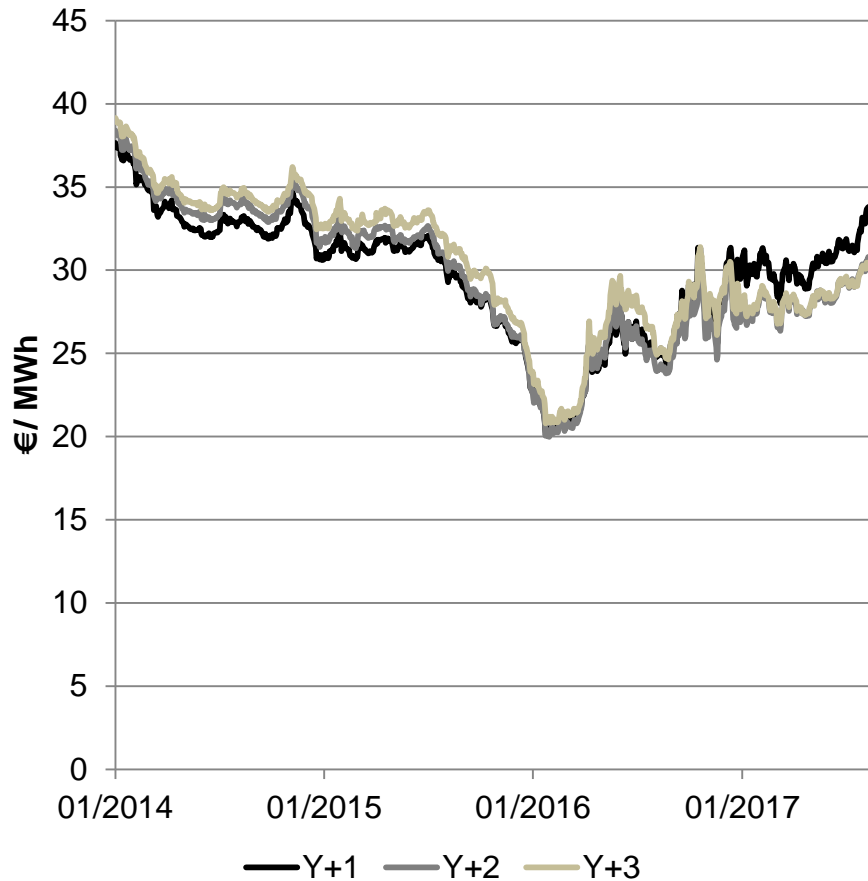


NRP 70, Barry et al. 2017

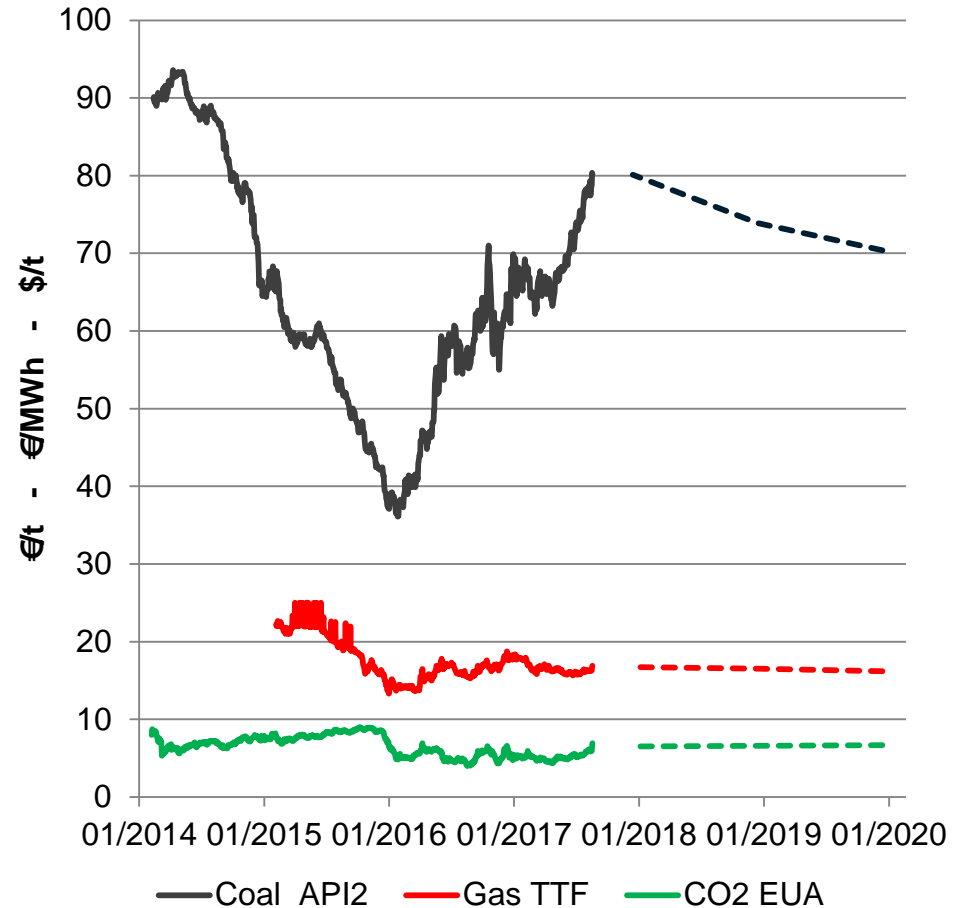
➤ **The main challenges are related to market outcomes and design.**

Middle term prices.

Futures Germany Baseload



Futures coal, gas EUA

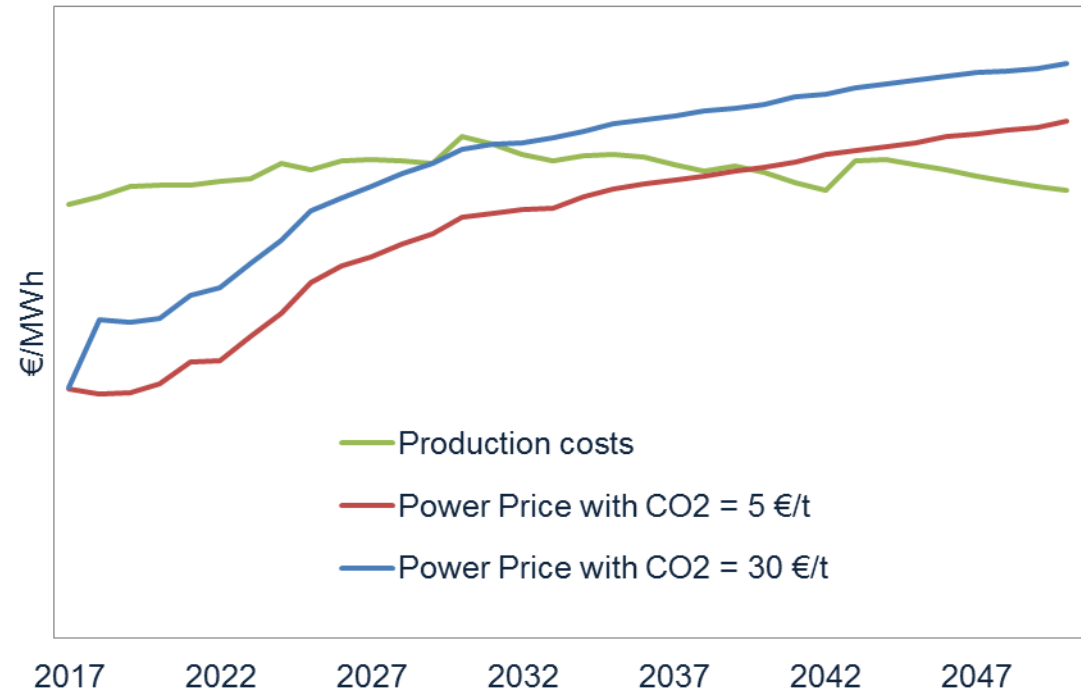


Reuters, ewz, 2017

➤ Electricity price expectation are stable – commodity prices show sideways trend.

Long-term price expectations.

- With the expected price development, today's investments have a negative contribution to the company's value (also assuming high CO₂ prices).
- Power plants will be renewed and concession extended only if this is economically profitable for owners (reasonable return on equity).
- Large uncertainty in forecast of market prices and spreads.

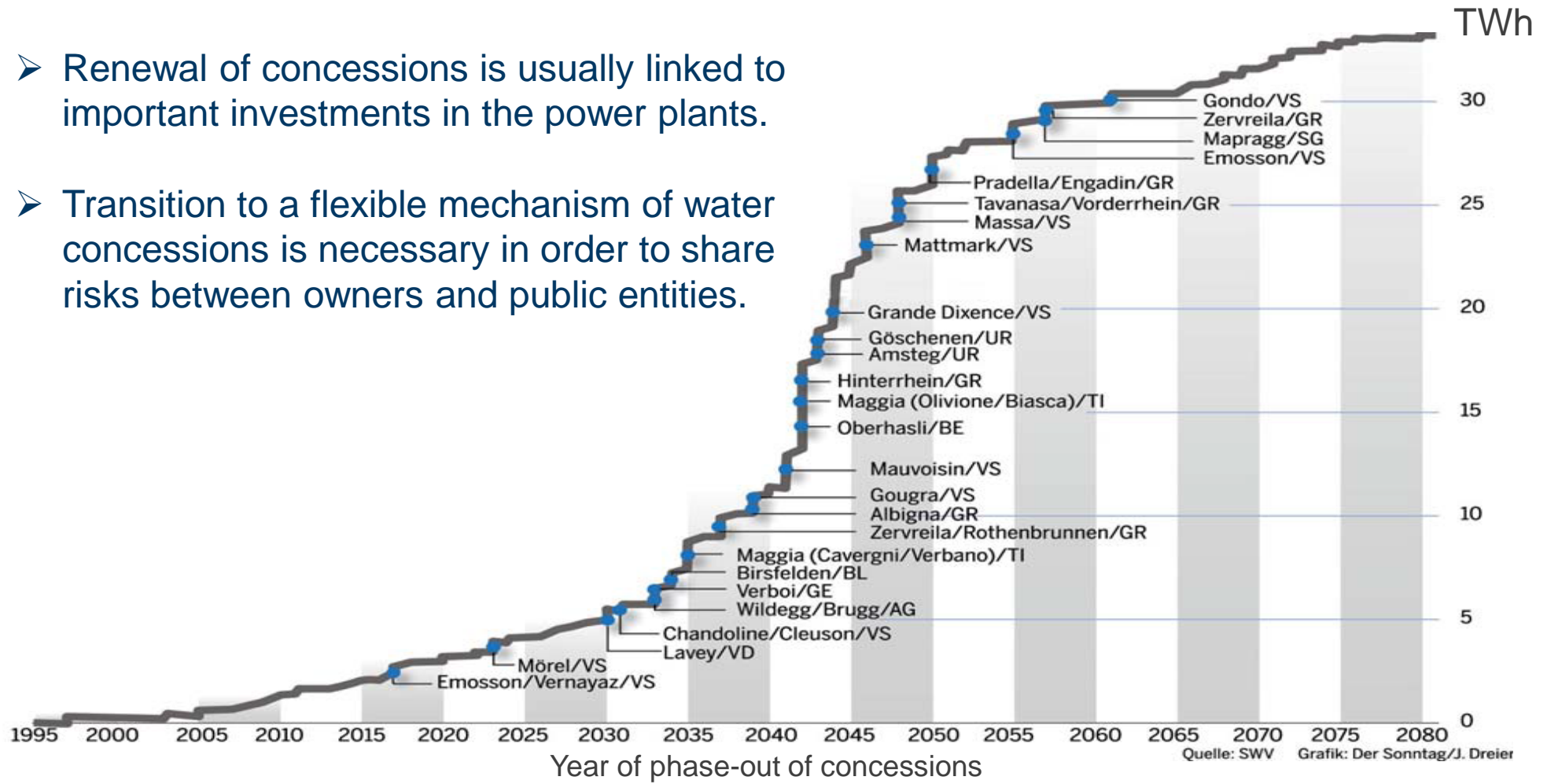


ewz, 2017

➤ **Given current price forecasts owners need incentives for (re-)investments in hydropower plants.**

Renewal of water concessions increase sharply after 2030.

- Renewal of concessions is usually linked to important investments in the power plants.
- Transition to a flexible mechanism of water concessions is necessary in order to share risks between owners and public entities.



- Renewal of concession is associated with important investments in plants.

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Overview of (possible) hydropower regulations.

Market prices - revenues	Capital costs	Production costs
CO ₂ - price	Capacity mechanisms	Flexible water fees
Ancillary services	Investment subsidies	
Market premium		
Feed-in premium		
Obligations for captive customers		

The discussion for new regulations and market mechanisms that complement the energy-only market is usually motivated by **security of supply**.

➤ **Currently several proposals for new regulation of hydropower are discussed.**

Overview of (possible) hydropower regulations.

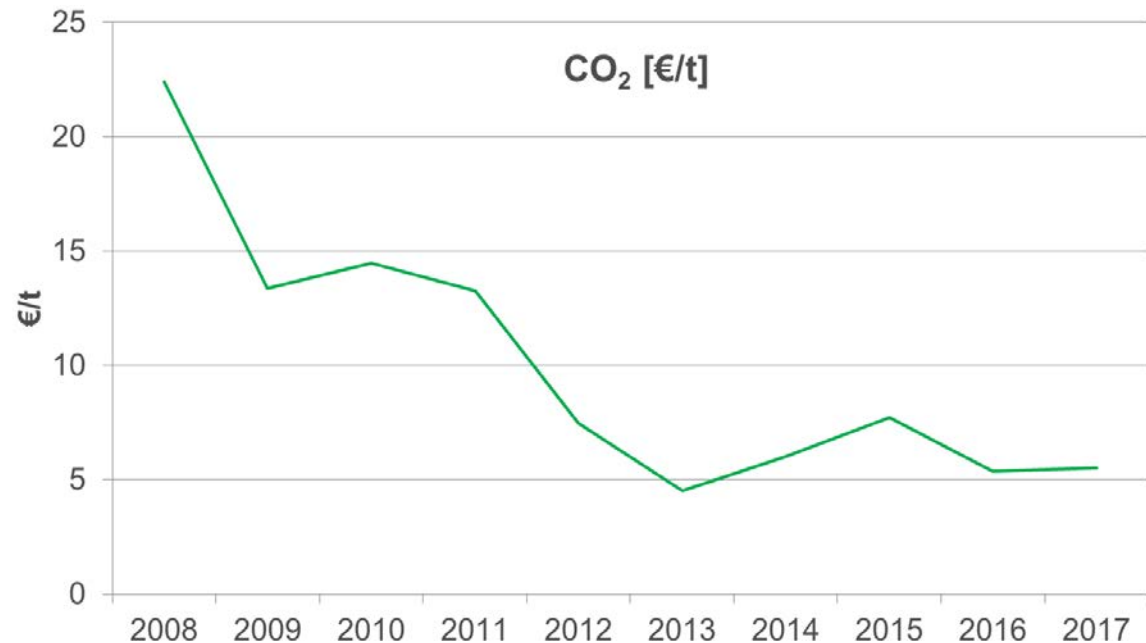
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Effect of a stringent climate policy on power prices.

- Power price decrease since 2010 was mainly driven by a decrease of commodity prices and of European Emissions Allowances prices (EUA).
- High EUA prices impact the merit order and support CO₂-free power production technologies as hydropower.
- With this mechanism power prices still provide correct market signals.
- Implementation has to be at European level.



➤ **First best market option, but implementation depends on European energy policy.**

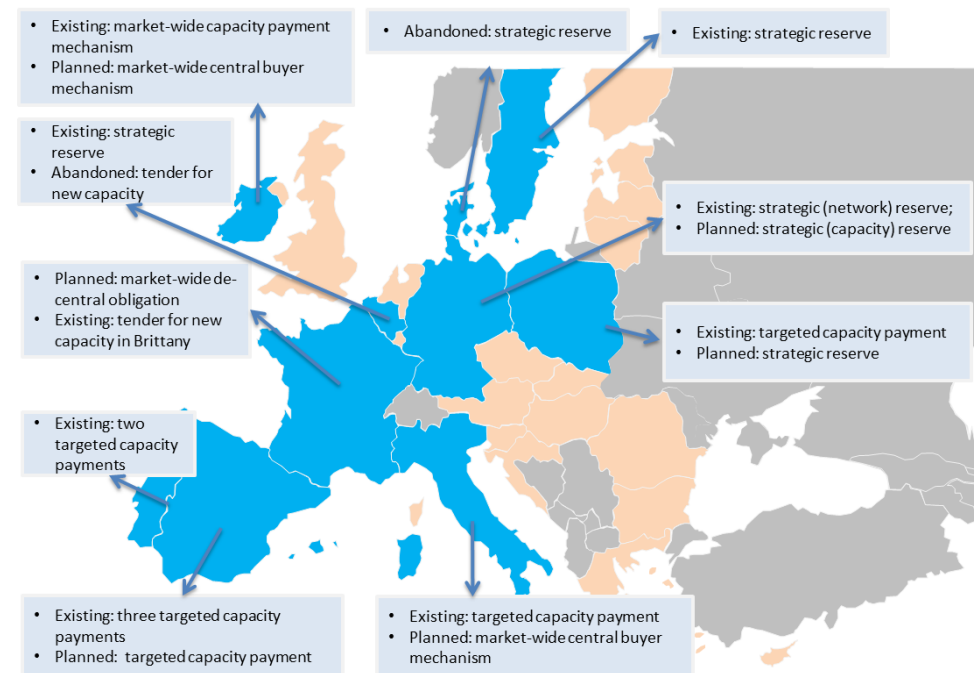
Capacity mechanisms.

Capacity mechanisms:

- offer additional rewards to capacity providers for their availability
- support investment maintaining existing capacity or investing in new capacity

Goal: Increasing security of supply.

- Electric utilities owning hydropower plants are remunerated for building, renovating and continuing operating hydro plants.
- Additionally, a remuneration can be foreseen for retaining water in the reservoirs until the end of winter.

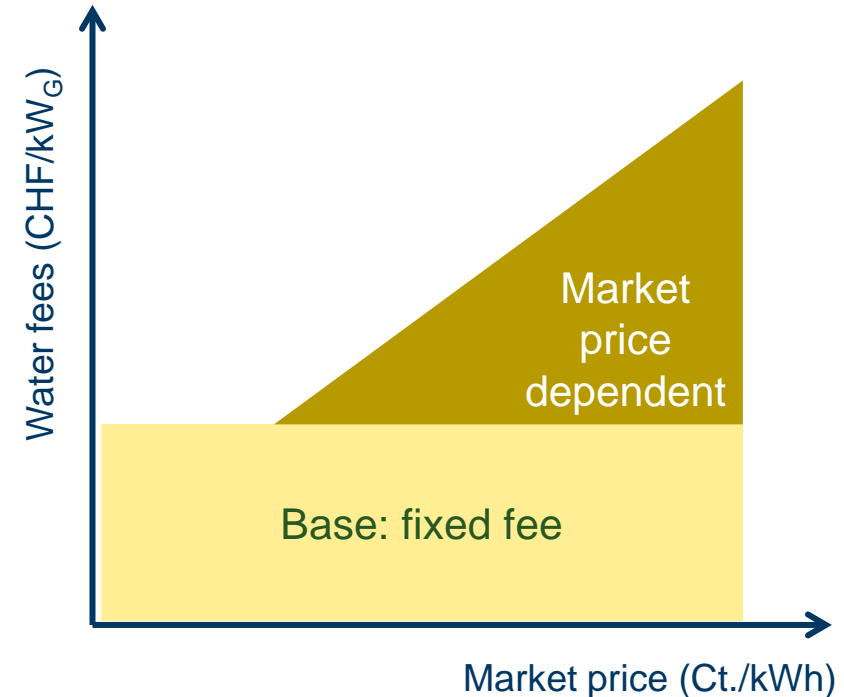


European Commission, 2016

➤ **Capacity mechanisms address the problem of “missing money” and of security of supply.**

Flexible water fees.

- Compensation for usage of hydro resources.
- Today's water fee ceiling is fixed at 110 CHF per kW (around 1.6 ct/kWh).
- New regulation of water fees from 2019 is currently at consultation. Proposal for temporary arrangement until 2022.
- In the long term, level of water fees should also depend on electricity market prices.
- Proposal by power sector: fixed fee is paid by the community, dependent fee by plant owners.



➤ **The water fee as a payment for the use of the resource hydropower has to be linked to the economic value of the resource.**

Conclusions - long-term perspectives of hydropower.

- From a strategic point of view hydropower plants have a strategic importance and are seen as a «critical asset» for the security of supply. Its importance will increase after the nuclear phase-out.
- If the phase of low power prices will last for a longer period, owners will not invest in the retrofit of hydropower plants. Profitability is too low.
- Improvements of the long-term competitiveness can be reached by:
 - Compensation for the provision of capacity (in addition to the energy-only prices)
 - Reducing costs through a flexible water fee
 - But the economic best solution would be a stringent European climate policy with EUA prices reflecting external costs of CO₂-emissions.



Questions?

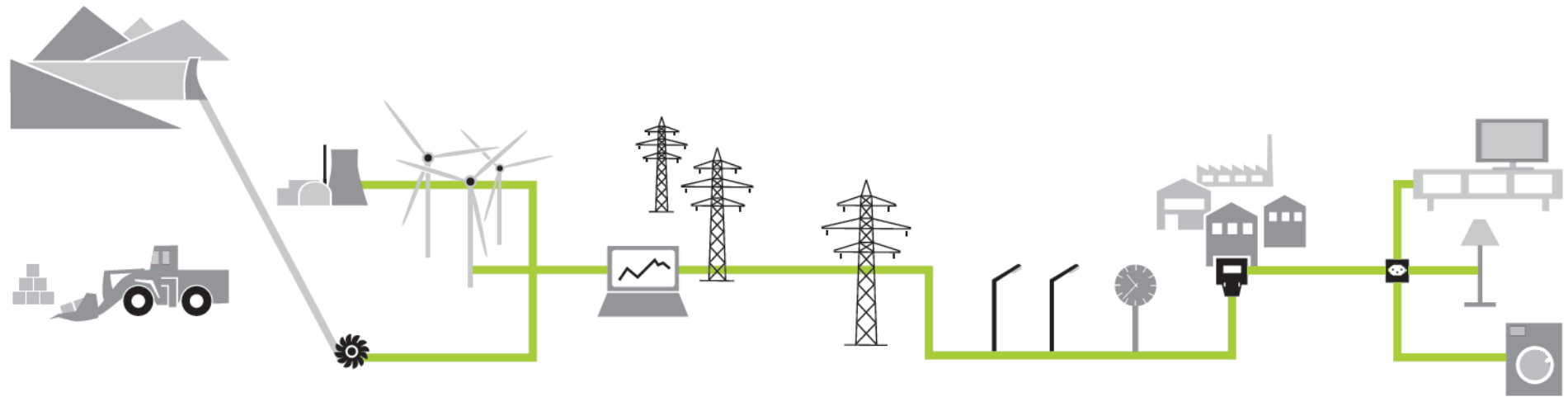


Ein Unternehmen
der Stadt Zürich

ewz

Status at ewz.

We have an integrated view on power systems.



Generation

- 5.6 TWh from:
- hydro 54%
 - nuclear 40%
 - wind/solar 3%
 - biomass/waste 3%

Trading

- Power 1.9 TWh
- GOOs
- EICertificates

Distribution

- 414 km overhead grid

Sales

- 224 000 customers in Switzerland
- 238 GWh of thermal energy supplied

ewz is the municipal utility of the city of Zurich, supplying the city of Zurich and parts of Grisons with power since 1892.

Key figures.

Fiscal year 2016	
Overall performance	859 million CHF
Earnings before interests and taxes (EBIT)	68.2 million CHF
Net result	68.5 million CHF
Power production	4,827 GWh
Production mix	49% Hydropower, 42% Nuclear power, 7% Wind/solar, 2% other
Customers	about 227,500
Heating and cooling sales	318 GWh
Telecom	191,800 broadband connections
Employees	1,189 (thereof 225 women)

Status at ewz. Production portfolio.

- Windkraft
- Wasserkraft
- Kernkraft
- Kehrichtverbrennung
- Biomasse
- Photovoltaik und Sonnenenergie
- Wärmecontracting
- Energie-Contracting
- Glasfasernetz Telecom
- Verteilnetz

Europa



Schweiz



Status at ewz.

Long-term production strategy.

