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INCOSE

SSSE

Welcome to Swissgrid

Swiss Society of Systems Engineering

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Laufenburg
27.03.2013

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Role of Swissgrid

Our task

Swissgrid is the national grid company and ensures secure, reliable and cost-effective operation of the Swiss transmission system.

It has round-the-clock responsibility for the secure provision of electricity and acts in the interests of a competitive economy and a modern society.

Some Facts

- **Swissgrid is Transmission System Operator (TSO)**
- **Swissgrid is responsible for the Swiss Transmission Power System (220kV and 380kV) operation and management.**
- **Swissgrid has several locations in Switzerland (main and business continuety infrastructure)**
- **The company employs around 420 persons of 15 nationalities.**

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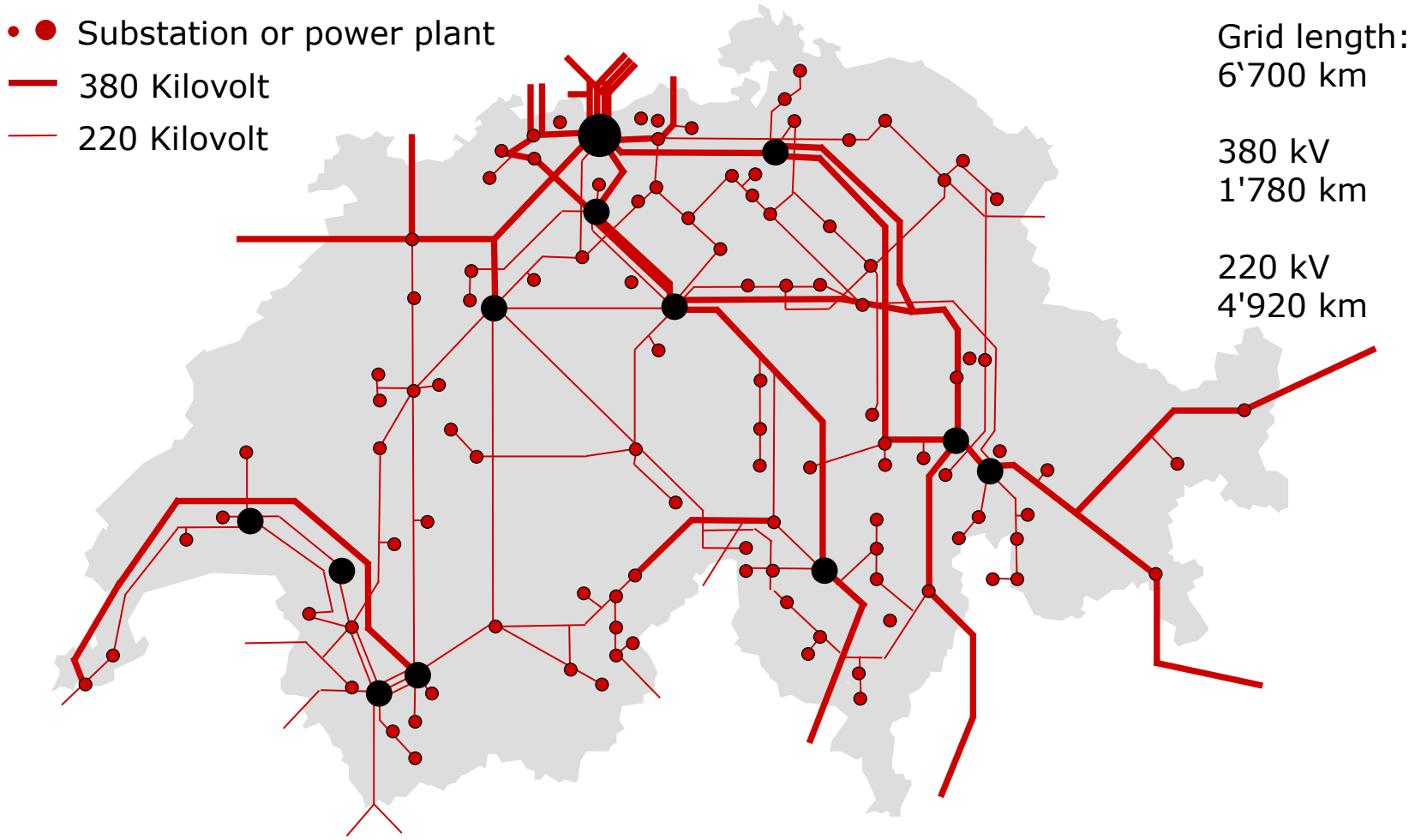
The Swiss transmission system



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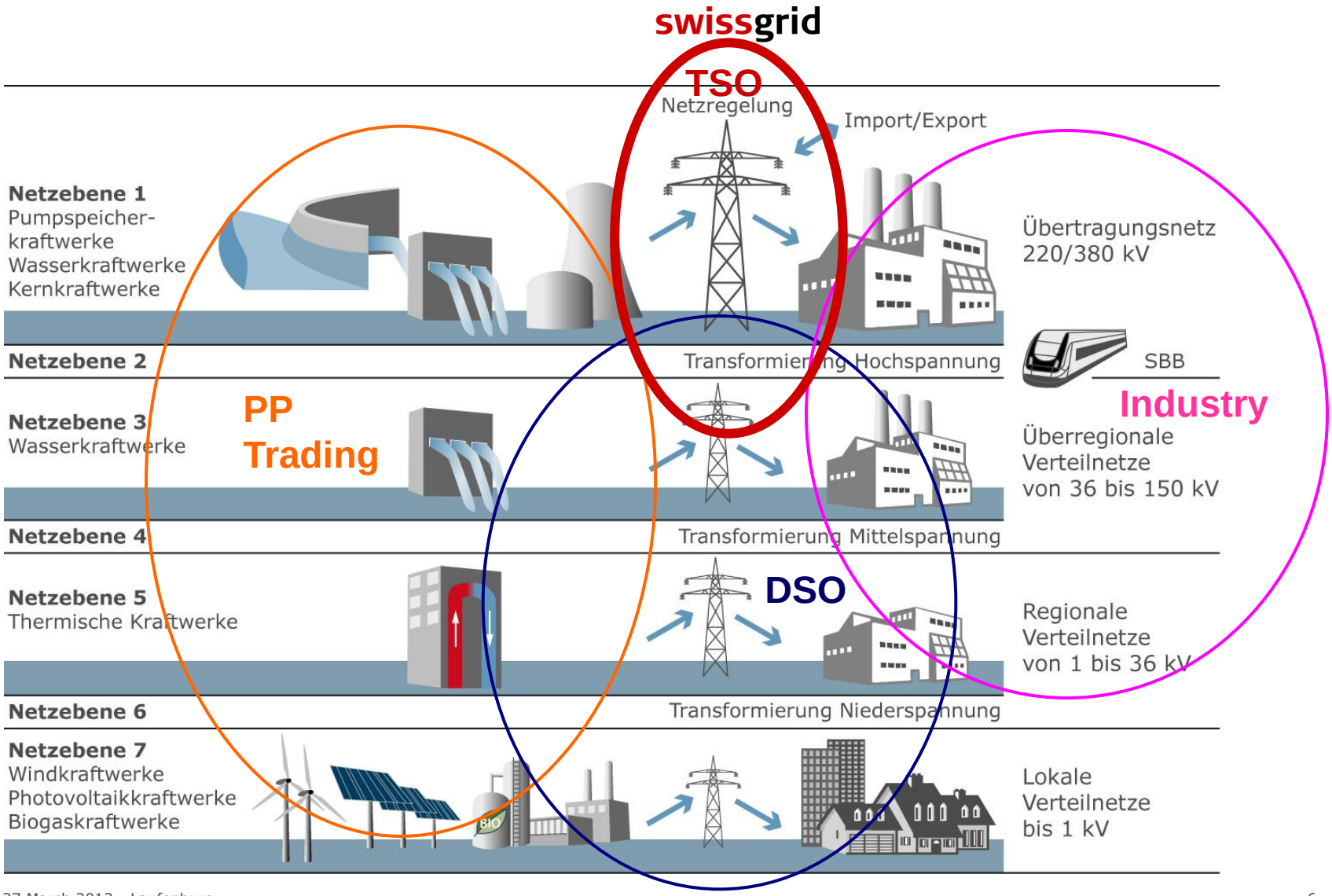
Our Operational Area



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We gain more responsibility!

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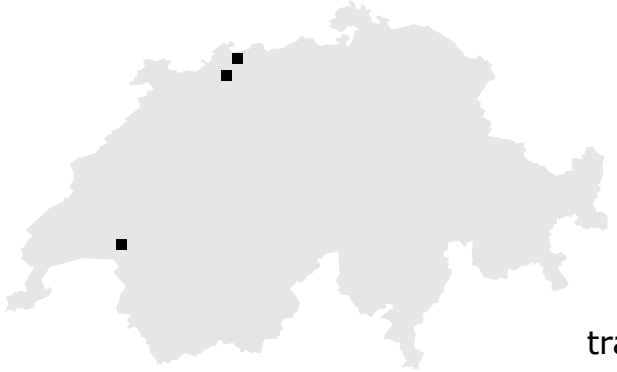
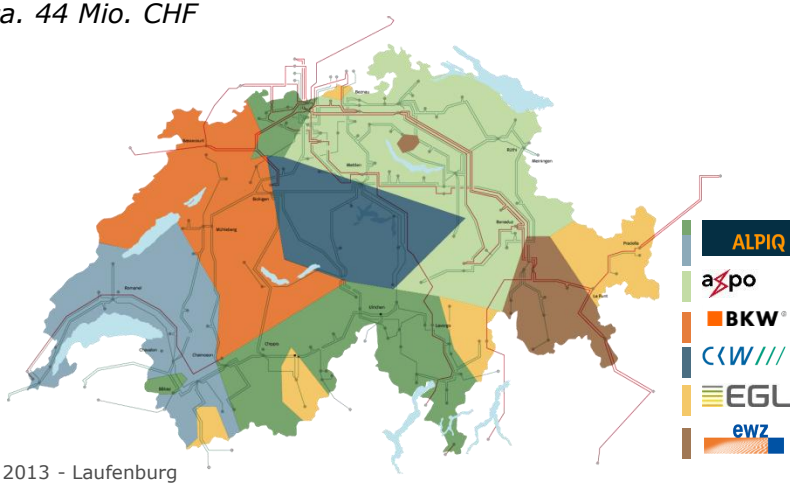
2011



- Operator of the Swiss transmission network.
- Core business: transmission system operation
- ca. 250 employees
- *assets ca. 44 Mio. CHF*

Take over of the transmission network from 25 owners



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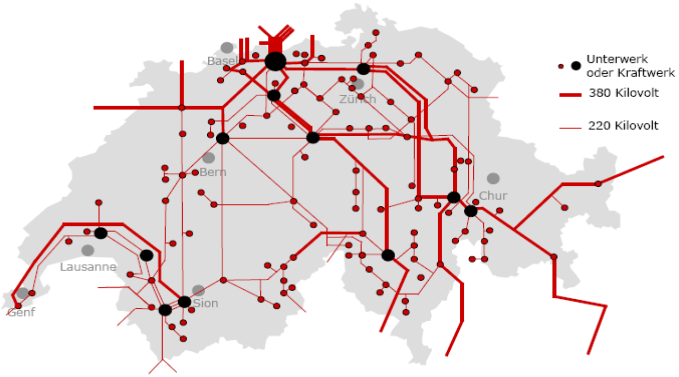
2013



- owner and operator of the Swiss transmission network (130 substations, 6700 km of lines, 15 000 electricity pylons)
- Core business: operation of the grid & asset management
- ca. > 380 employees
- *assets 1,7 Billion CHF*

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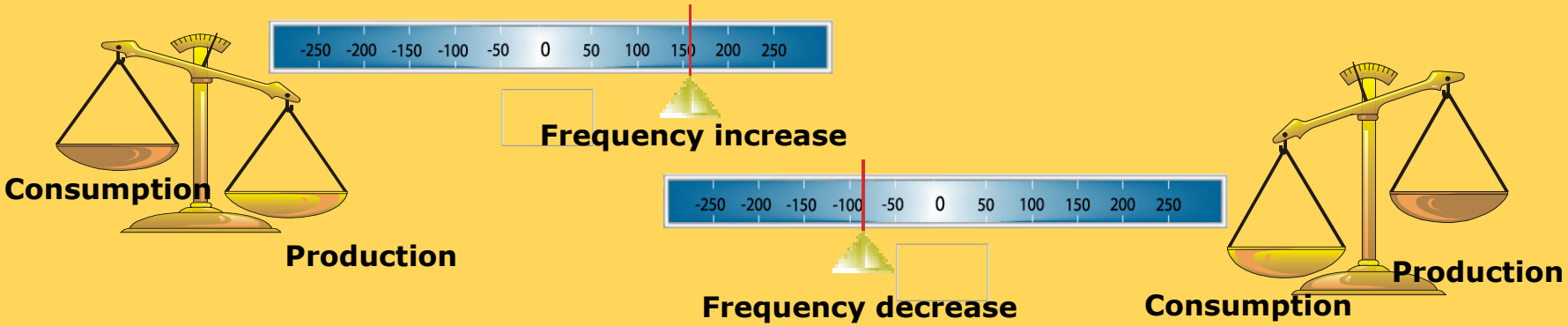
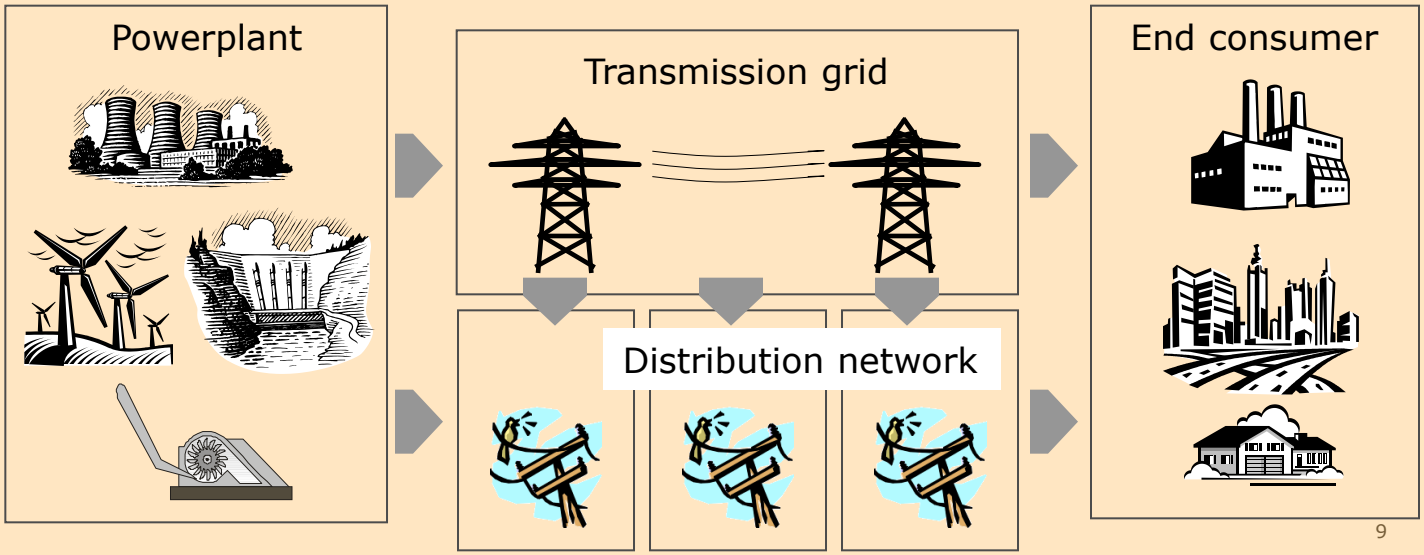
Key Tasks of Transmission System Operator

Two key tasks of System Operation

Production and consumption must always stay in balance



Secure energy transport from producer to consumer



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The measure of all things – 50 Hertz

Swissgrid maintains an overview at all times beyond national borders and can stabilise the grid in a matter of seconds.

System Services (Power and Frequency Regulation)

Primary

- Based upon the online frequency measurements
- Automatic control on the generator

Secondary

- Based upon the measurements sum of the power flows for the Swiss tie-lines
- A matic lo co

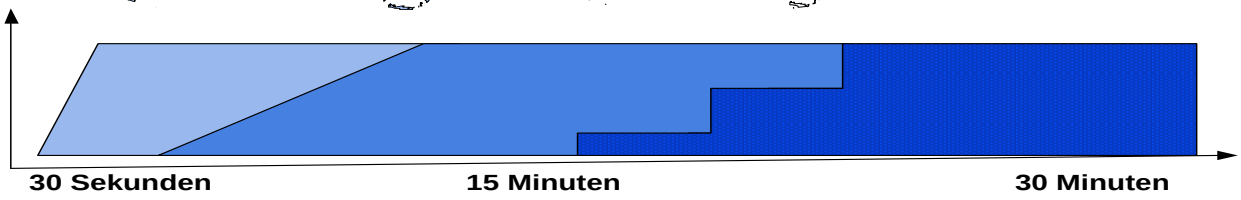
Tertiary

- Is activated to free the secondary regulation reserves
- Manual activation by the specialist via the System Services Application

Market -based

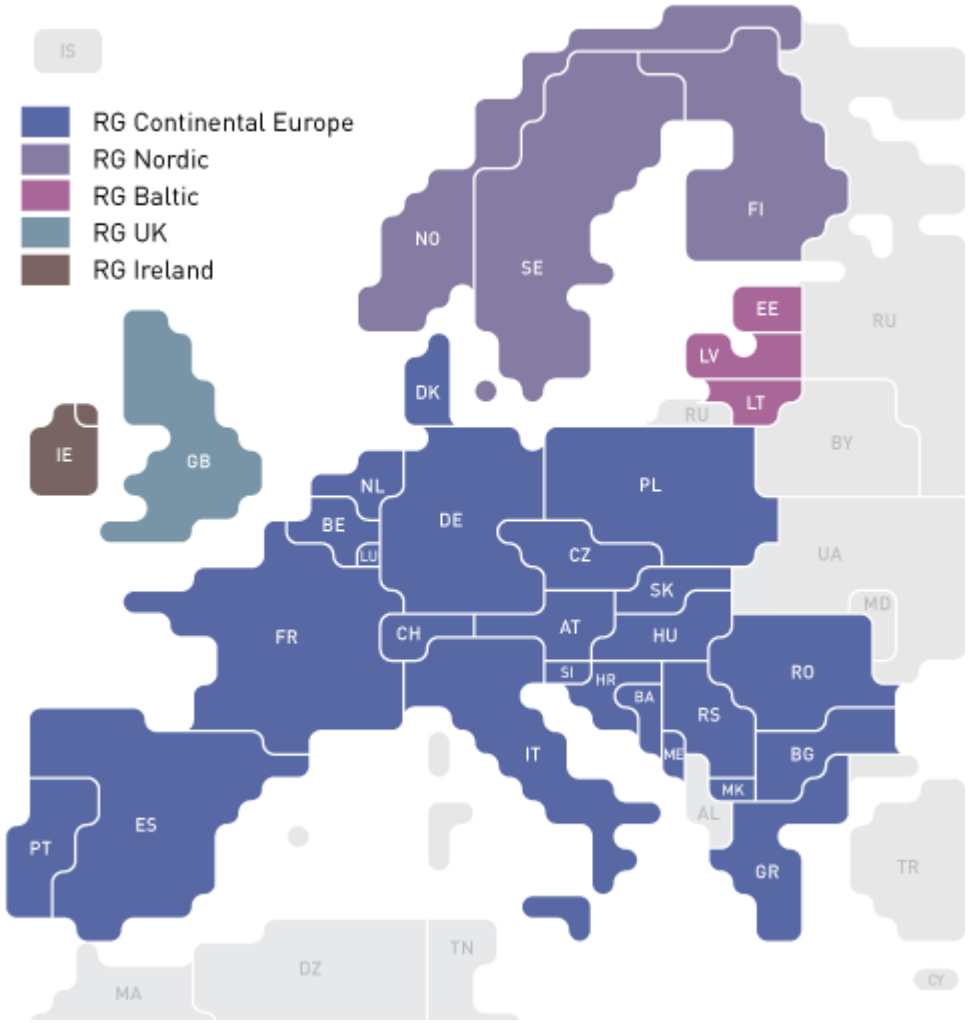
Covers loss of the largest Swiss generator (1200MW)

100% available



Swissgrid and ENTSO-E

- **41** transmission system operators (TSOs)
- **34** European Countries
- **380 TWh** of electricity exchange between member TSOs
- **532 million** customers served by the represented power systems
- **880GW** net generation capacity
- **3,200 TWh** electricity consumption
- **305,000 km** of transmission lines managed by the TSOs



Swissgrid in Europe

- ENTSO-E South Coordinator
- ENTSO-E Continental Grid Frequency Coordinator
- Strong involvement in the process of the integration of Turkey
- Charter member of CASC, member of ENTSO-E
- Provider of main transit-infrastructure to Italy
- Member of the Renewable Grid Initiative

Historical Background

Why Laufenburg - Short History

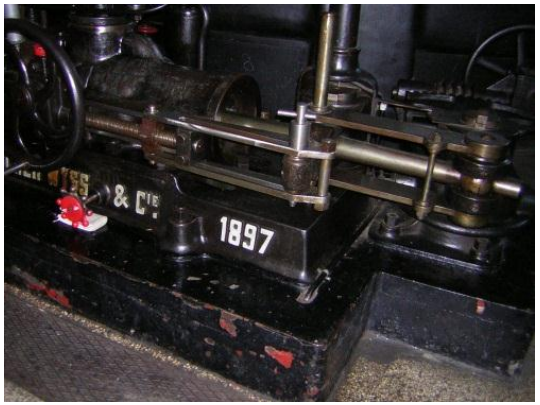
Schaffhausen – Basel:

- 120 km
- 140 m level difference
- 10 power plants
- 730 MW installed power

1894 KWR

Kraftübertragungswerke

Rheinfelden



Upper Rhine River: a Feat of Engineering

Laufenburg

- 1914 – biggest European power plant (40 MW)
- Cross-river dam with power house and turbines included
- 1908 – founding of Kraftwerksgesellschaft Laufenburg (KWL)

Laufenburg – Kernel und Hub of the European Grid

- 1925-1930 – Link between lignite power plants of Rhineland (DE) with hydro power plants of the Vorarlberg (AT) region
- World War II, OECD -> 1951 founding of **UCPTE**
- 1956 – founding of EGL
- 1958, 16-18 April **Star of Laufenburg** – first synchronous interconnection of German, French and Swiss grids (220 kV)
- 1967 – Grid interconnection in Laufenburg on the 380 kV voltage level
- 2000 – founding of Swiss coordinator ETRANS AG for coordinating the operation of the Swiss transmission system and activities within the UCTE.
- 15.12.2006 – **Start of Operation** of the Swiss TSO **Swissgrid**
- 1.07.2007 – EU Electricity Industry Market Opening
- 1.01.2009 – Electricity Industry **Market Opening in Switzerland**
- ...
- 2013: Swissgrid asset owner for the transmission system

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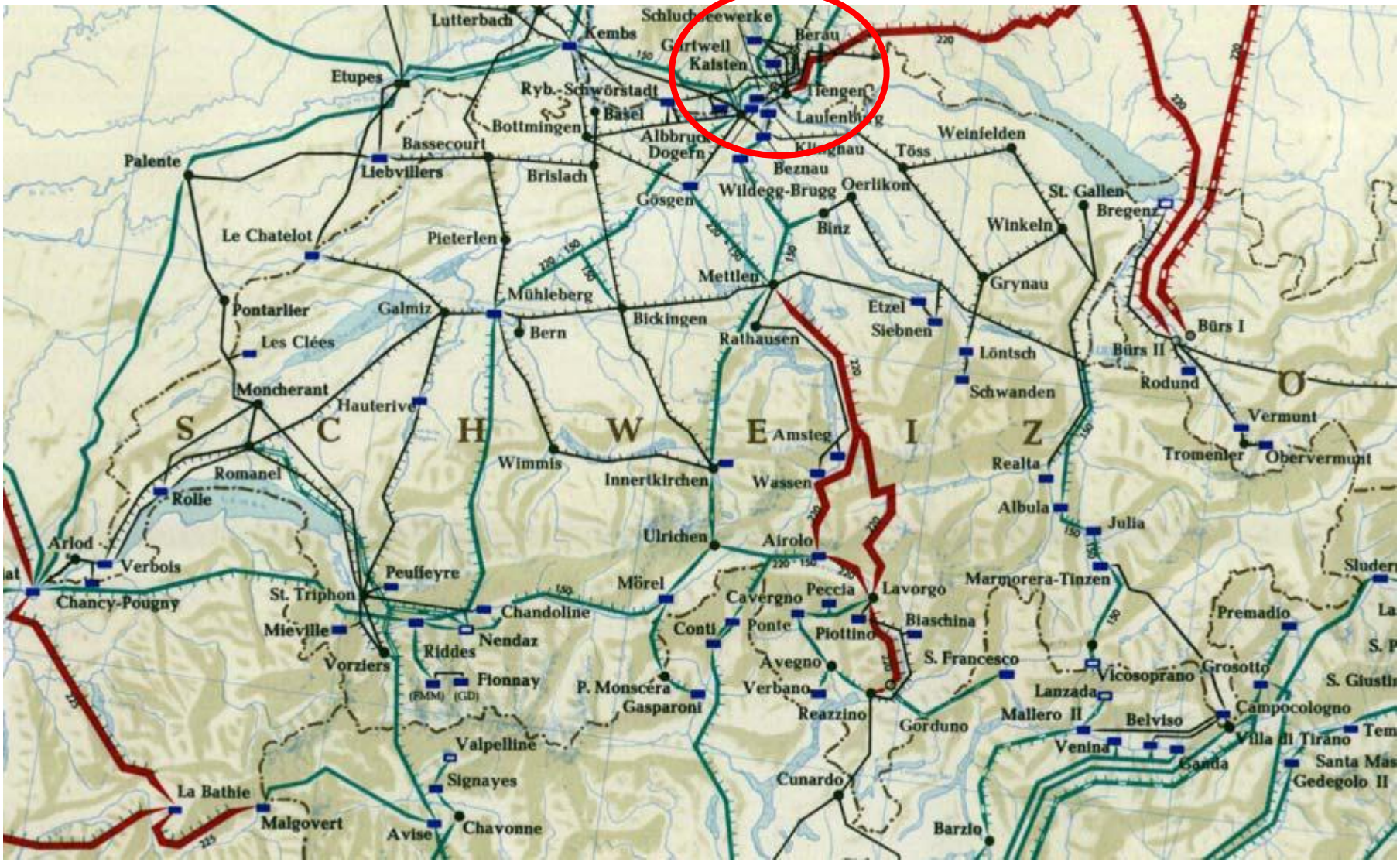
«Star of Laufenburg»



«Star of Laufenburg»

Interconnected power system operation requires: teletransmission of measurements and counter values, accounting, schedule coordination, etc.

The Institute of Electrical and Electronic Engineers (IEEE) honored the «Star of Laufenburg» as a **milestone in the history of electricity**. The interconnection of the German, French and Swiss electricity grids over 50 years ago marked the birth of integrated network operation in Europe. Moreover, the substation's technology at the time set the first global standards in high voltage technology.

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The Future of the Grid

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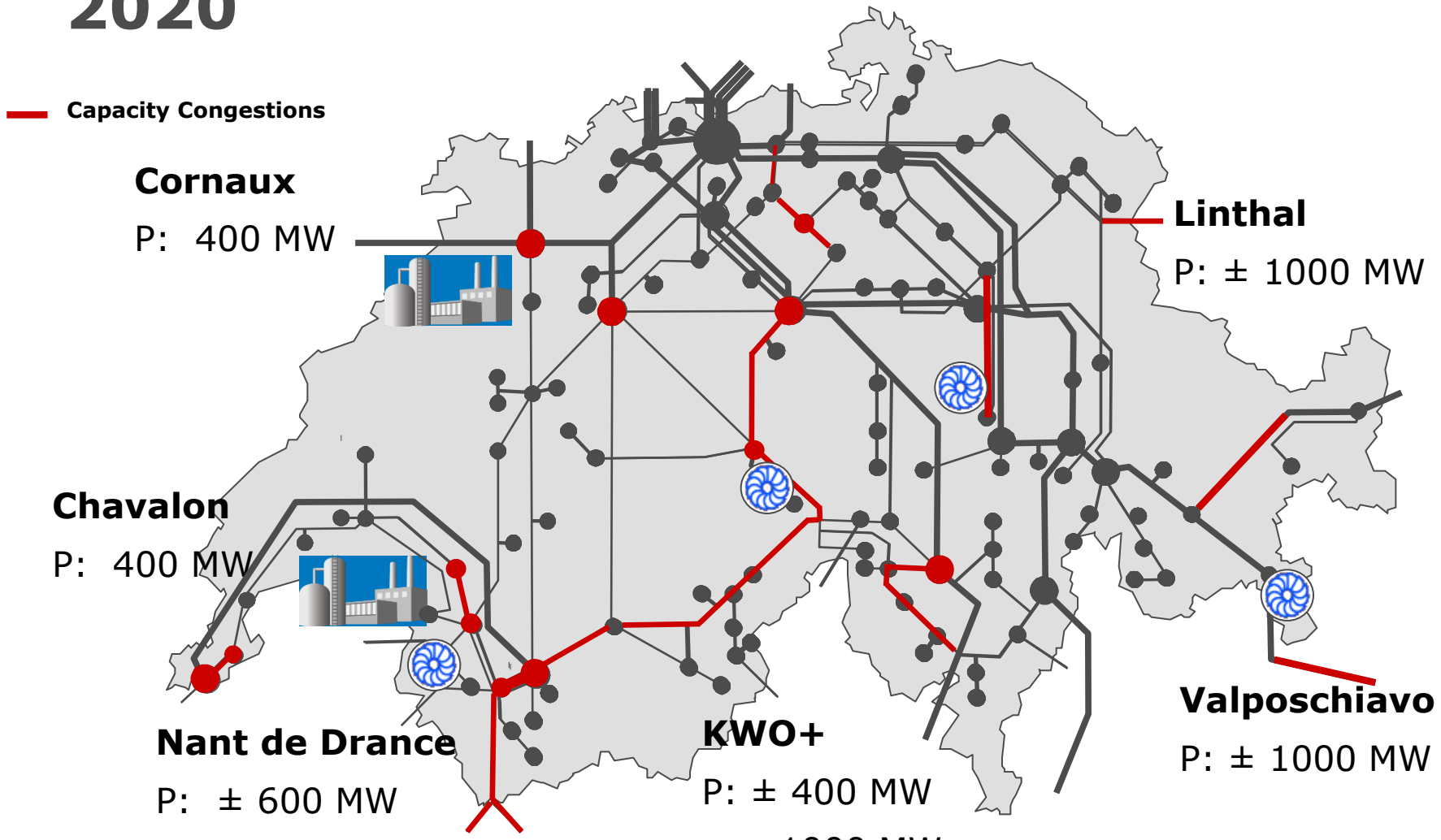
The Challenges for the Grid

- Increasing consumption
- Connection of new power plants
- European-wide load-balancing
- Integration of renewable energies
- Dynamic production patterns

Expansion of production capacity: Power plant projects over 400MW up to 2020

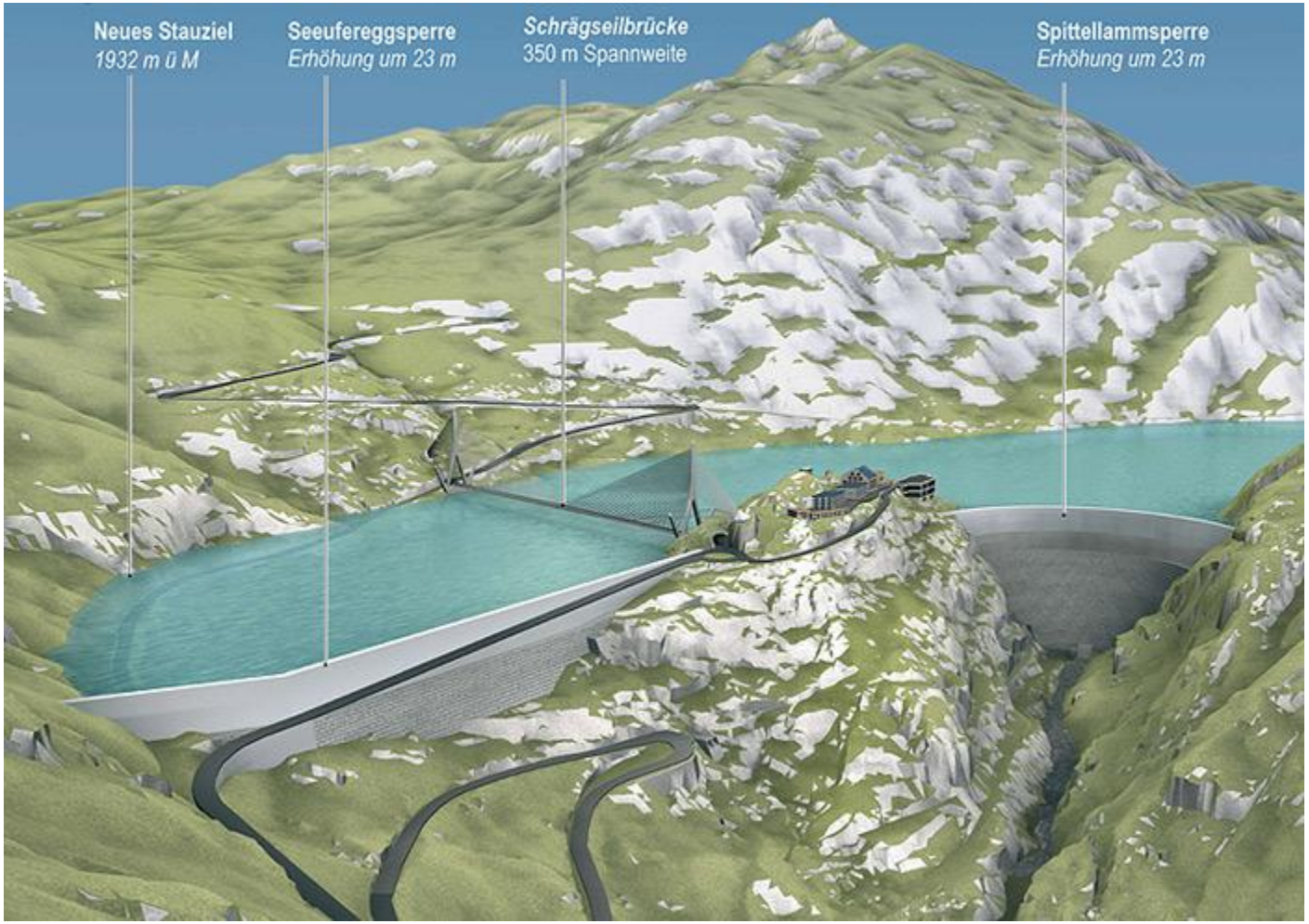


Supergrid:

Chances for Switzerland

Swiss storage capacities as european energy accumulator

Hudro-Powerplant Oberhasli



Middle-term: up to 1500 GWh wind Energy per year

- In the middle-term perspective (2035) 375 wind generators could deliver up to 1500 GWh of the wind energy.
- With this conservative potential estimation could be covered approx. 2.5% of todays Swiss energy consumption.

(Society for the Support of the Wind Energy in Switzerland)

Good chances for the Swiss Mega-Windpark

Visualisation of the planned Altaventa-Windpark

Photo: Keystone/Altaventa AG

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