

Liberalization of the Electricity Sector in Switzerland

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Presentation Outline

- Legislation Framework
- Swiss Electricity Sector
- Liberalized Market
 - Challenges
 - Fundamentals
 - Competition Area – Consumers
 - Regulated Area – Networks
 - Competition Area – Generation
- Concluding Remarks

- Further Reading
- Researcher's View

Legislation Framework

Time Sequence

Scope of this presentation

Market Opening for all consumers

Transmission system assets owned
by national network company

Referendum about progression of
Market Opening towards all consumers

Market Opening for consumers over 100 MWh/a

StromVV (Strom Versorgung Verordnung)

StromVG (Strom Versorgung Gesetz)



Legislation Framework

Key Components of Market Opening in Switzerland (1/2)

- Unbundling of a transmission
- Forming of a national grid company fully responsible for the system operation and security
- Transfer of the transmission assets ownership on the national grid company within 5 years
- Acquisition of control resources by the national grid company via ancillary services market
- Transparent billing of all components of electricity delivery
- Possibility of a free choice of a supplier for consumers larger than 100 MWh/a

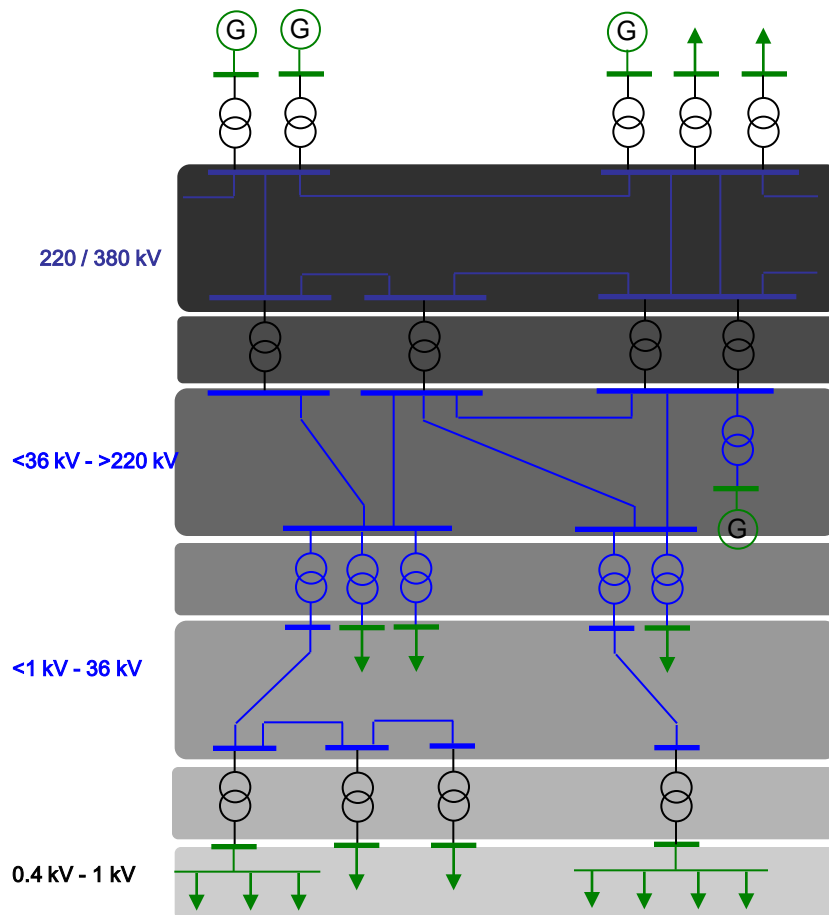
Legislation Framework

Key Components of Market Opening in Switzerland (2/2)

- Costs related to the pure transit of electricity via Switzerland should not be billed to Swiss consumers
- Profit obtained from using Swiss transmission systems (e.g. from cross-border capacity auctions) for transit shall be used for reduction of electricity delivery costs of Swiss consumers
- Electricity prices for regulated consumers (i.e. all smaller than 100 MWh/a and those larger than 100 MWh/a who decided not to change their present electricity delivery contract) shall not increase
- Establishing an entity 'Elcom' with regulatory authorities applying them 'ex post'

Swiss Electricity Sector

Network Levels



Network Level 1 (NE1)

Network Level 2 (NE2)

Network Level 3 (NE3)

Network Level 4 (NE4)

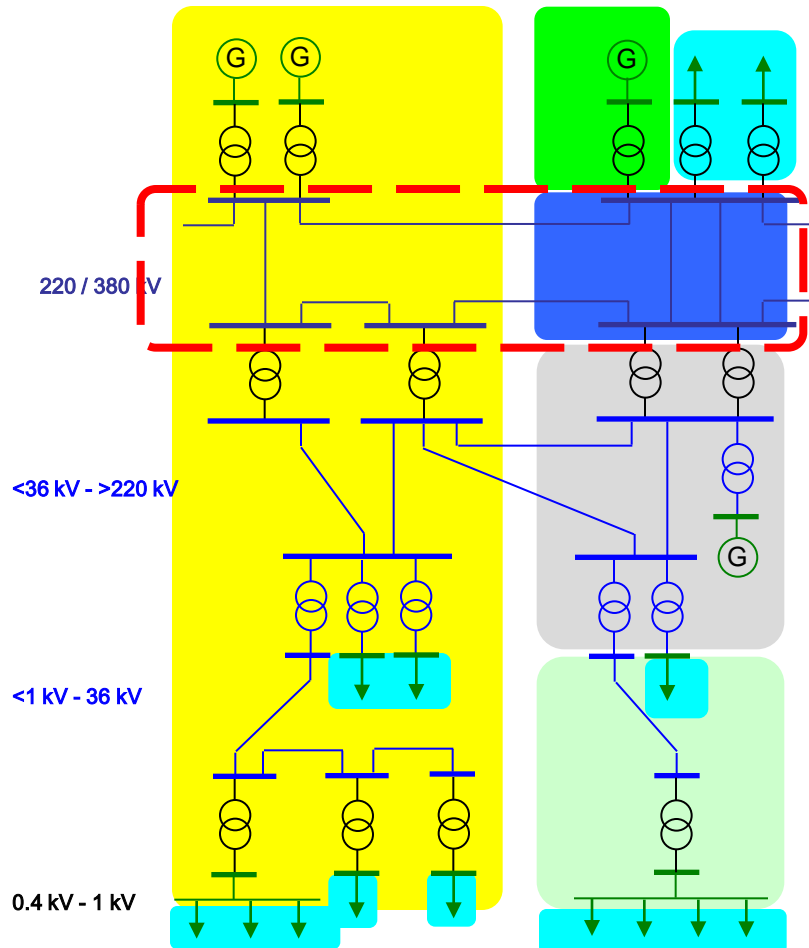
Network Level 5 (NE5)

Network Level 6 (NE6)

Network Level 7 (NE7)

Swiss Electricity Sector

Present Structure



GENCOs – \approx 80 companies with various owners' structures

System coordinator – swisgrid

Vertically Integrated Utilities – e.g. BKW, CKW, EWZ

TSOs – e.g. Atel Transmission Ltd

Regional DISCOs – \approx 30 companies

Local DISCOs – \approx 900 companies

Endconsumers

Swiss Electricity Sector

Power Generation



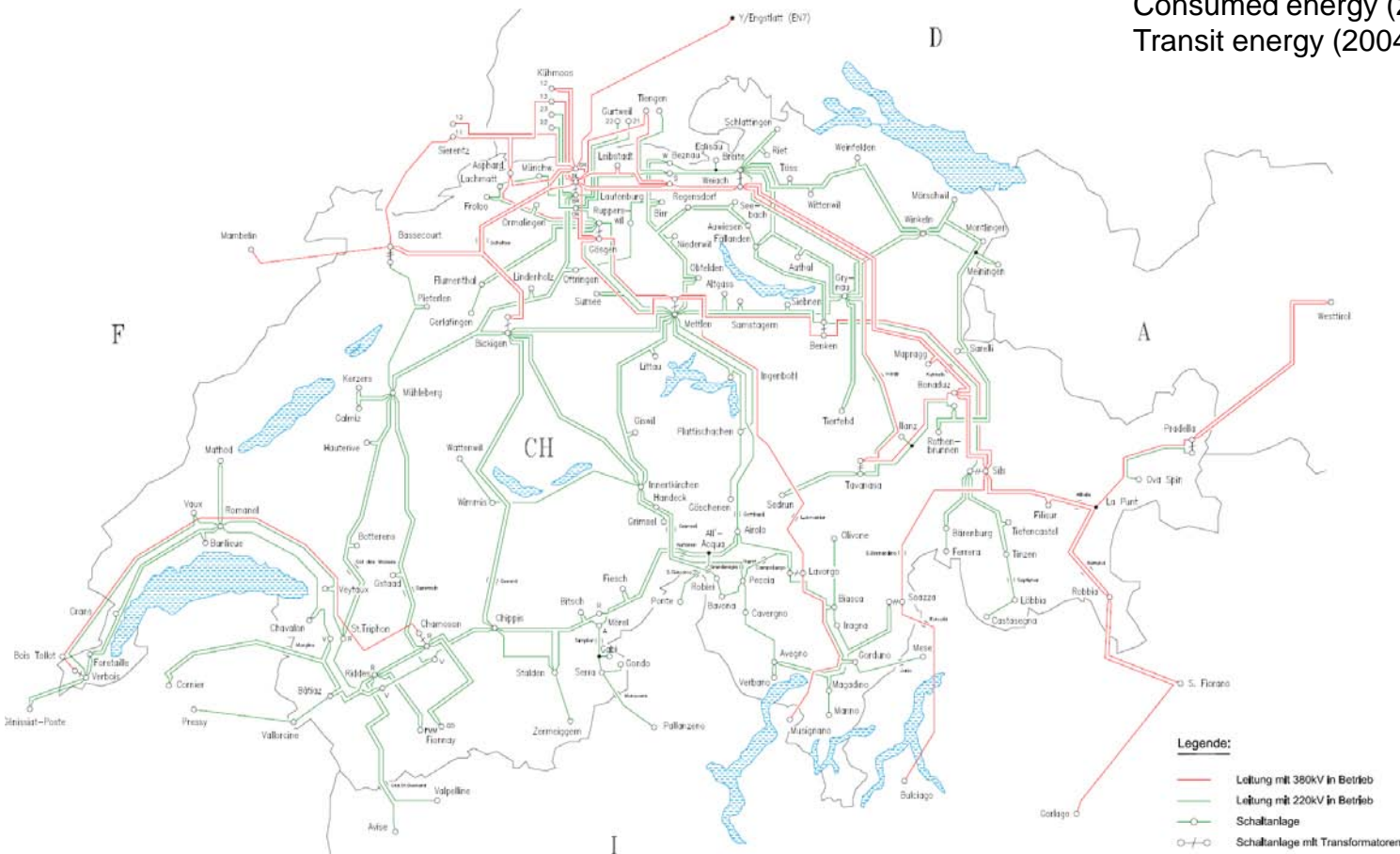
Generation (2005):

38.6 % nuclear
28.5 % hydro storage
27.5 % hydro run-of-river
5.4 % thermal

Swiss Electricity Sector

Transmission System

Consumed energy (2004): ≈ 57 TWh
Transit energy (2004): ≈ 27 TWh



Swiss Electricity Sector

Power System Operation

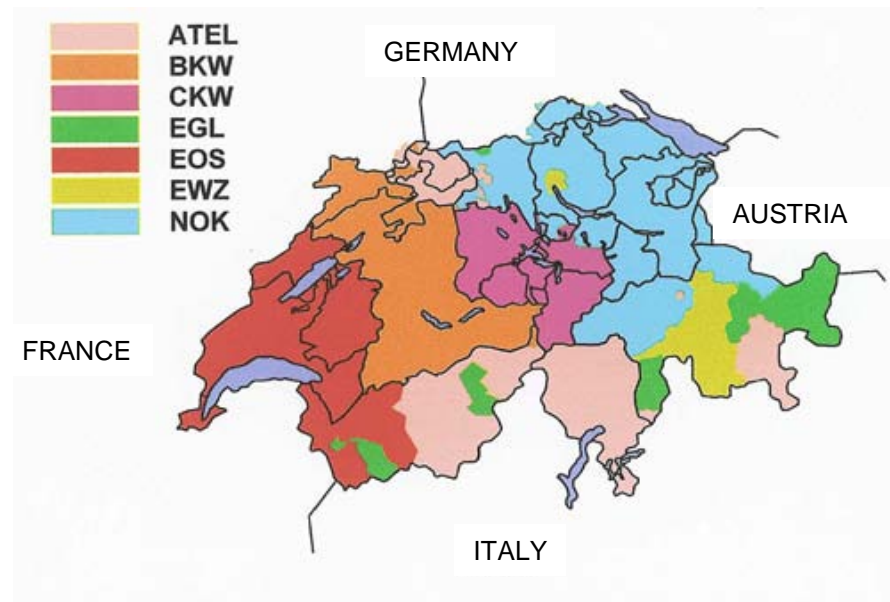
■ Shared responsibility:

■ 7 balancing zones

- Zone operation
- System planning and expansion

■ 1 system coordinator

- Coordinating balancing zones (both security and interchange schedules)
- International representation and coordination with neighboring TSOs
- Auctioning of cross-border capacity



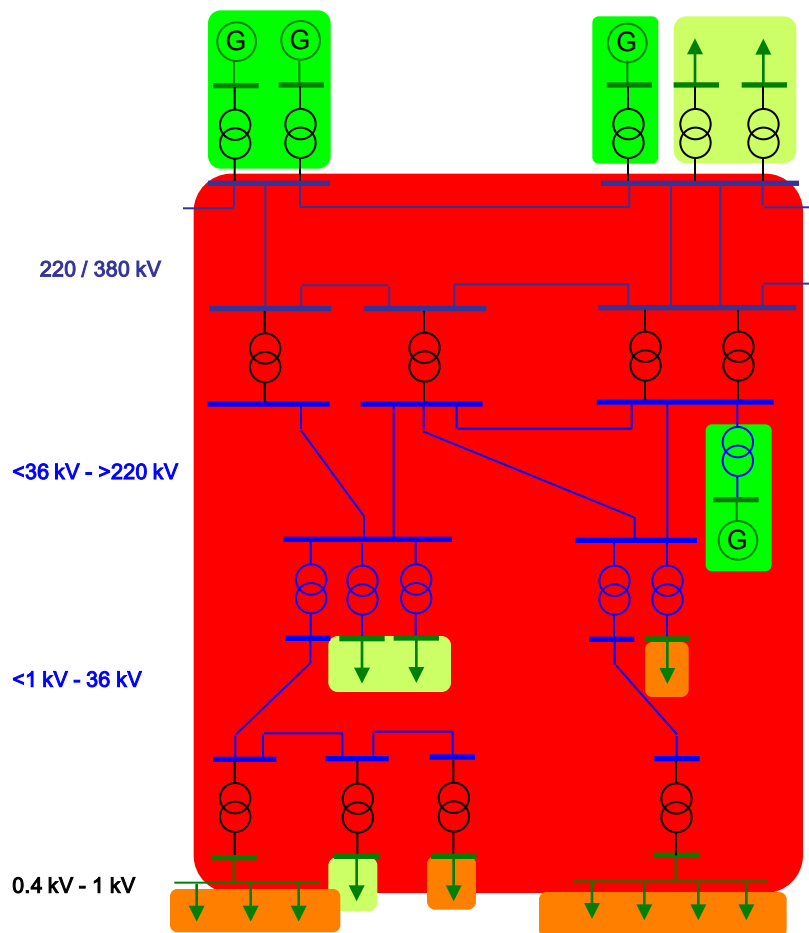
Liberalized Market

Challenges in Liberalization of Swiss Electricity Sector

- Complex ownership relations
- High degree of fragmentation
- Power generation structure
- Complex operation structure

Liberalized Market

Fundamentals



Regulated area – network

Natural monopoly, it has to grant access to network delivery in nondiscriminatory way

Regulated area – all consumers under 100 MWh/a, consumers over 100 MWh/a who decide

Payment for electricity consumption via 'all inclusive' tariff

Competition area – consumers over 100 MWh/a who decide

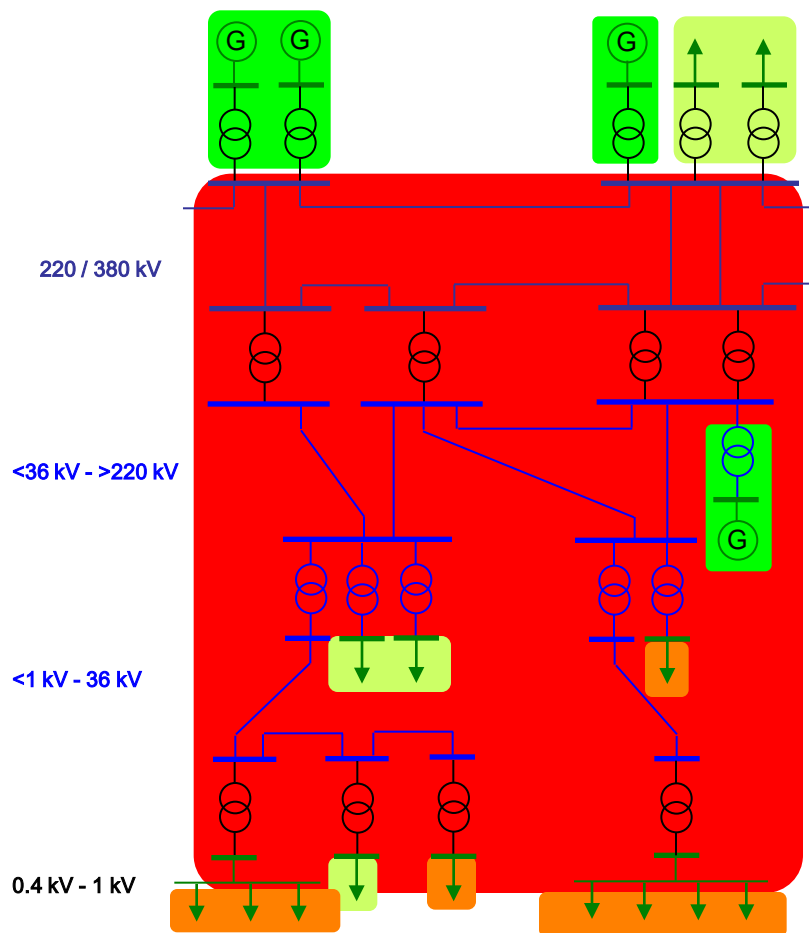
Transparent payment for each category: energy, balancing energy, network usage, losses, network security (ancillary services)

Competition area – generation

Offering and delivering of energy and ancillary services

Liberalized Market

Competition Area – Consumers: Network Usage



Regulated area – network

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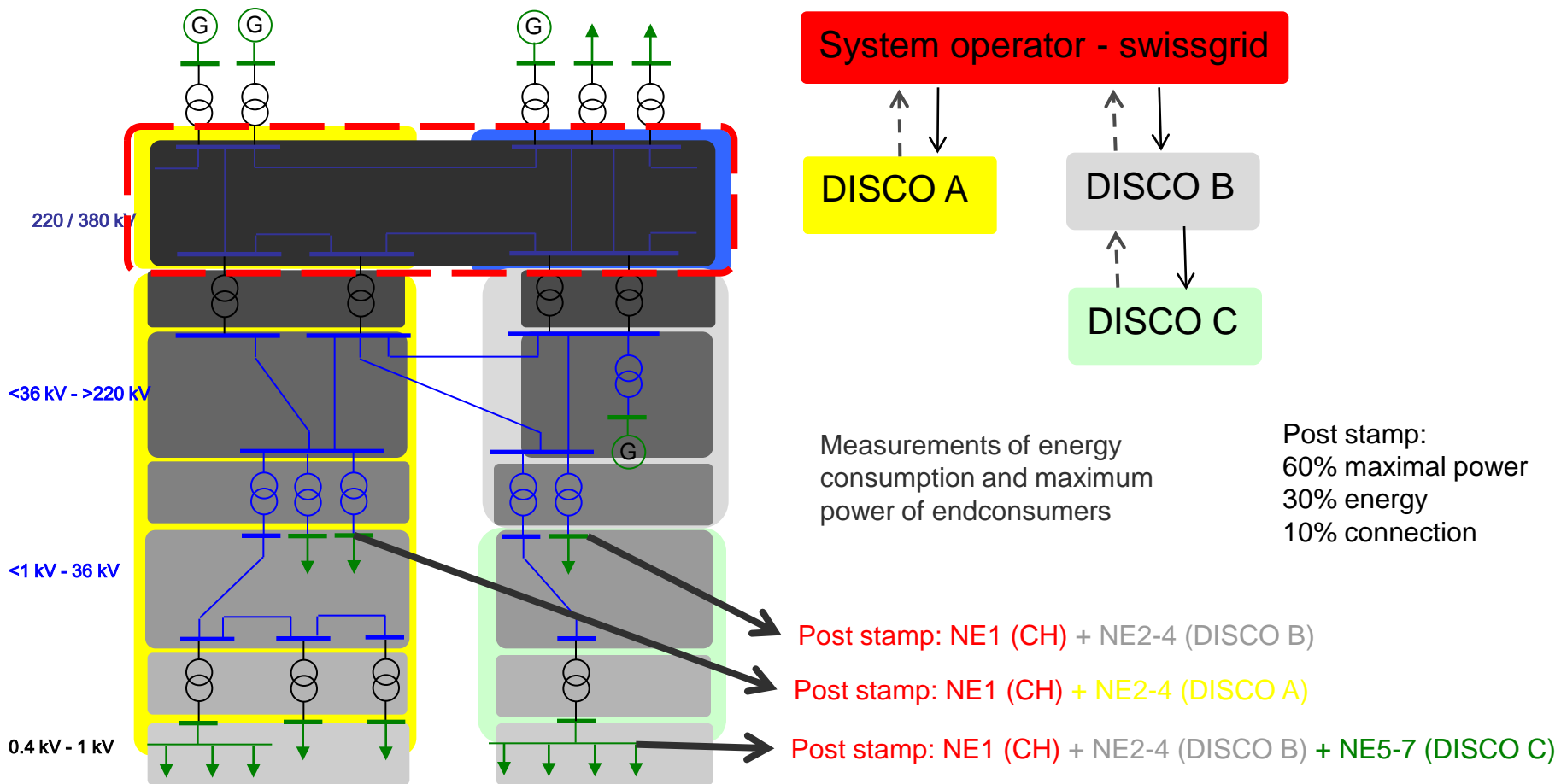
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Competition area – generation

Offering and delivering of energy and ancillary services

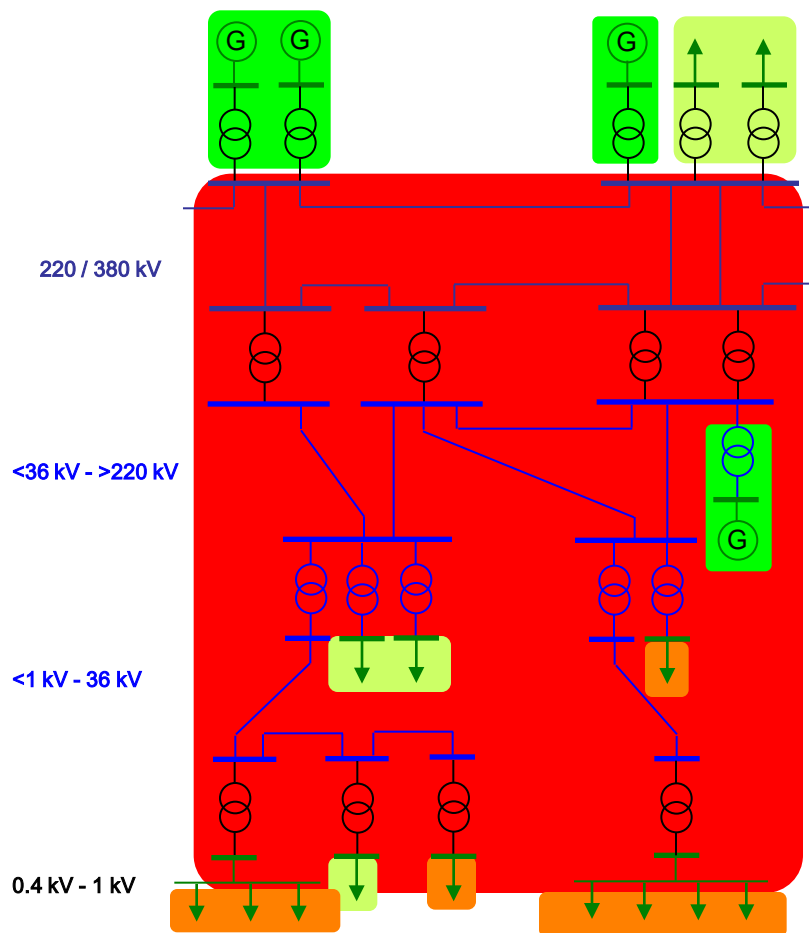
Liberalized Market

Competition Area – Consumers: Network Usage



Liberalized Market

Competition Area – Consumers: Ancillary Services and Losses



Regulated area – network

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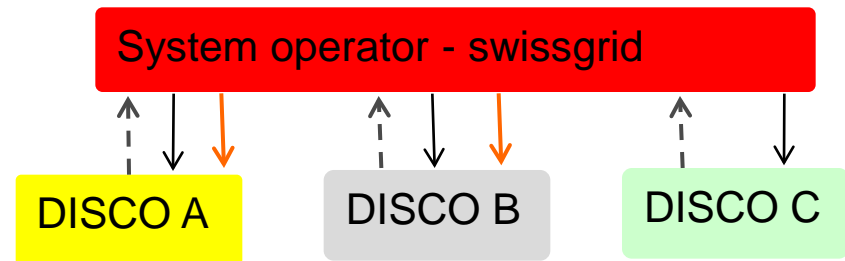
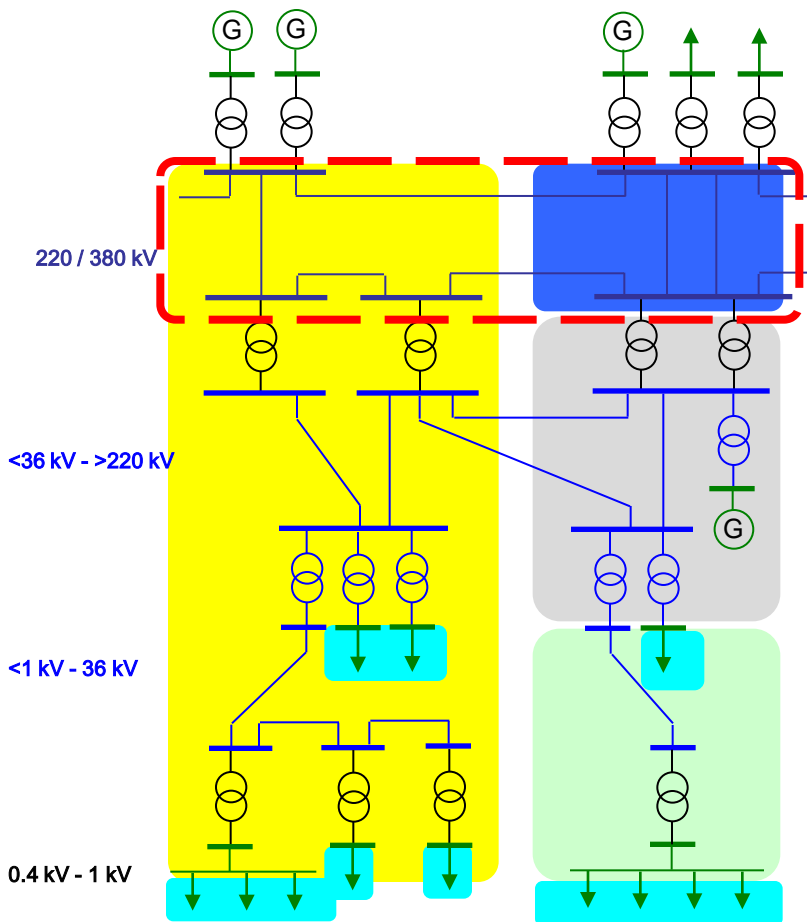
Transparent payment for each category: energy, balancing energy, network usage, **losses, network security (ancillary services)**

Competition area – generation

Offering and delivering of energy and ancillary services

Liberalized Market

Competition Area – Consumers: Ancillary Services and Losses



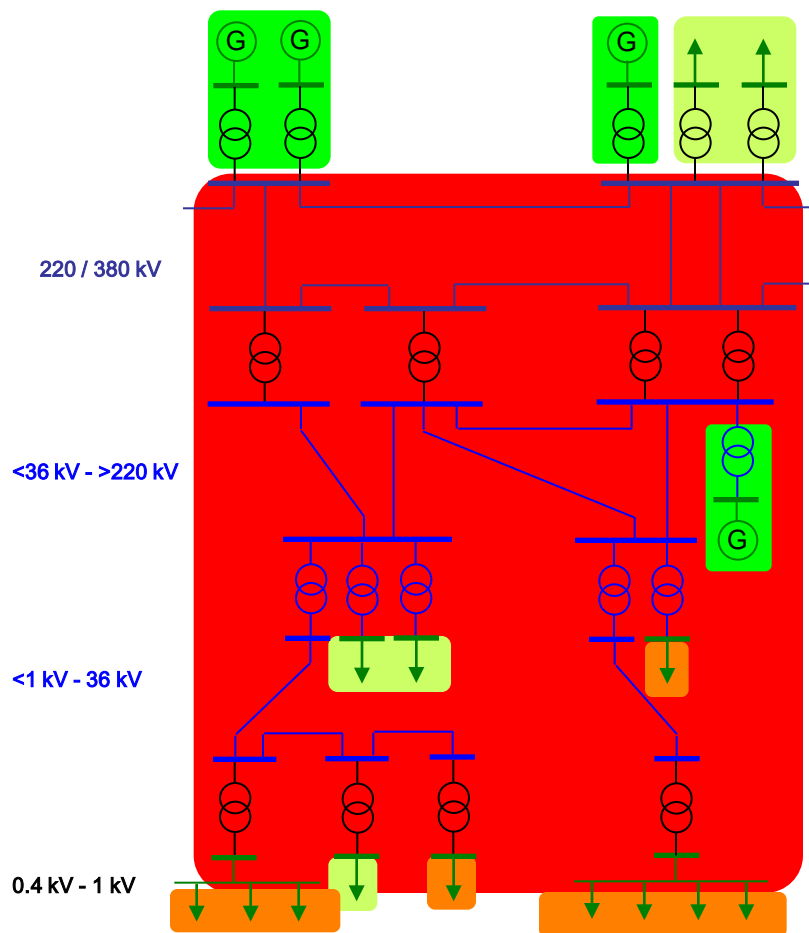
All DISCOs (≈ 900)

DISCOs connected to NE1 (≈ 30)

- Measurements of energy consumption of endconsumers
- Ancillary Services costs
- Active Power Losses costs, based on energy measurements of SO

Liberalized Market

Competition Area – Consumers: Energy and Balancing Energy



Regulated area – network

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Payment for electricity consumption via 'all inclusive' tariff

Competition area – consumers over 100 MWh/a who decide

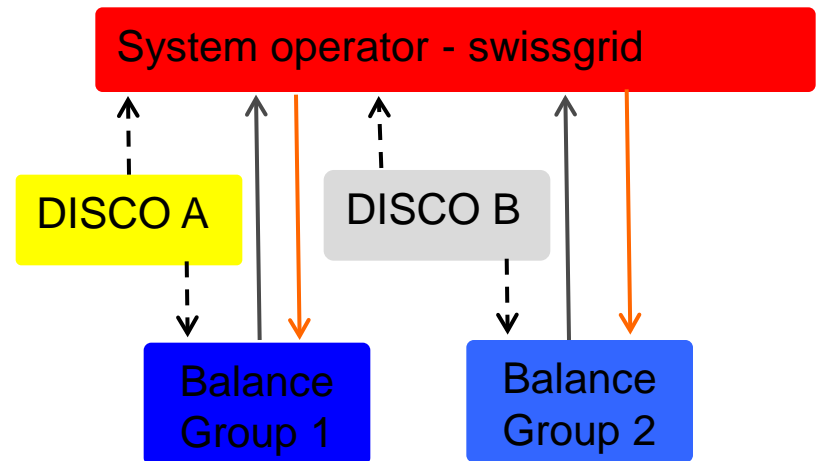
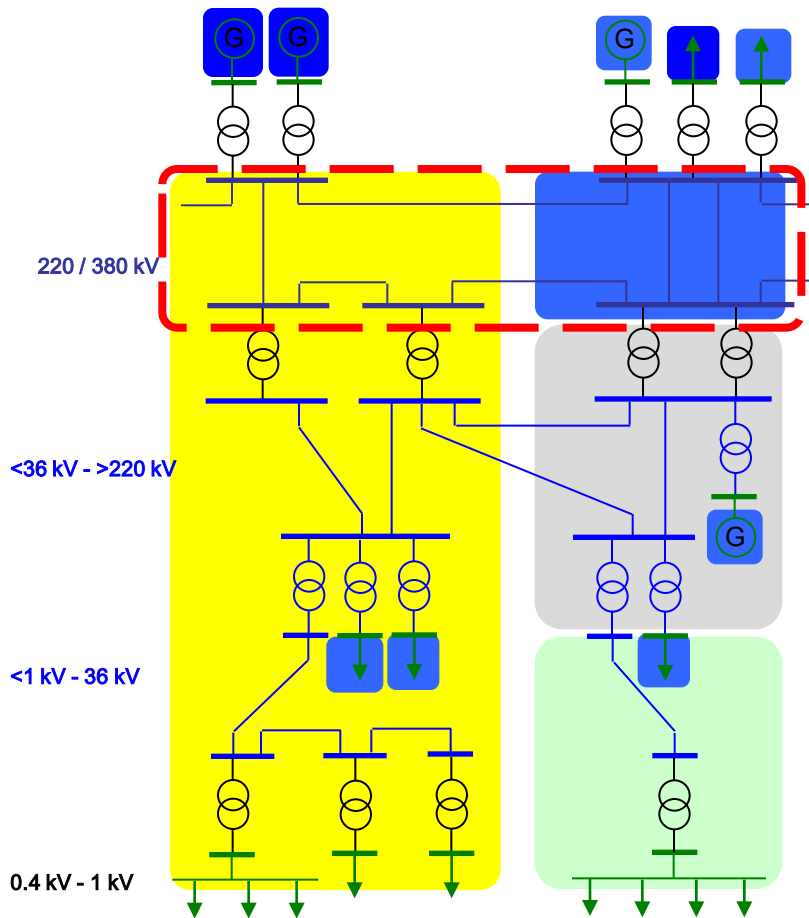
Transparent payment for each category:
energy, balancing energy network usage, losses, network security (ancillary services)

Competition area – generation

Offering and delivering of energy and ancillary services

Liberalized Market

Competition Area – Consumers: Energy and Balancing Energy



All DISCOs (≈ 900)

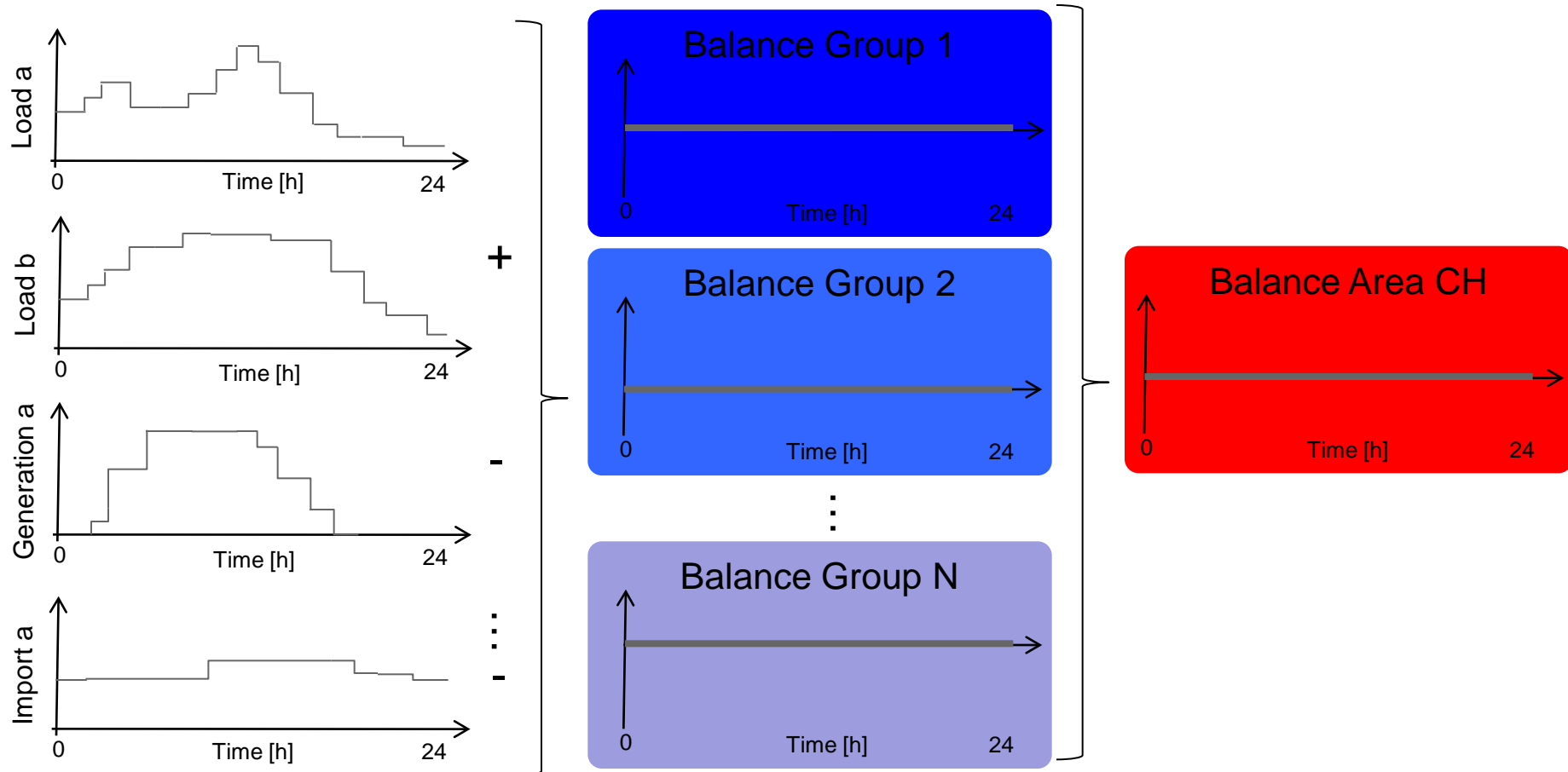
All BGs (≈ ?)

Measurements of energy consumption of endconsumers (time profile !)

Planned Energy Schedule
Balancing energy costs

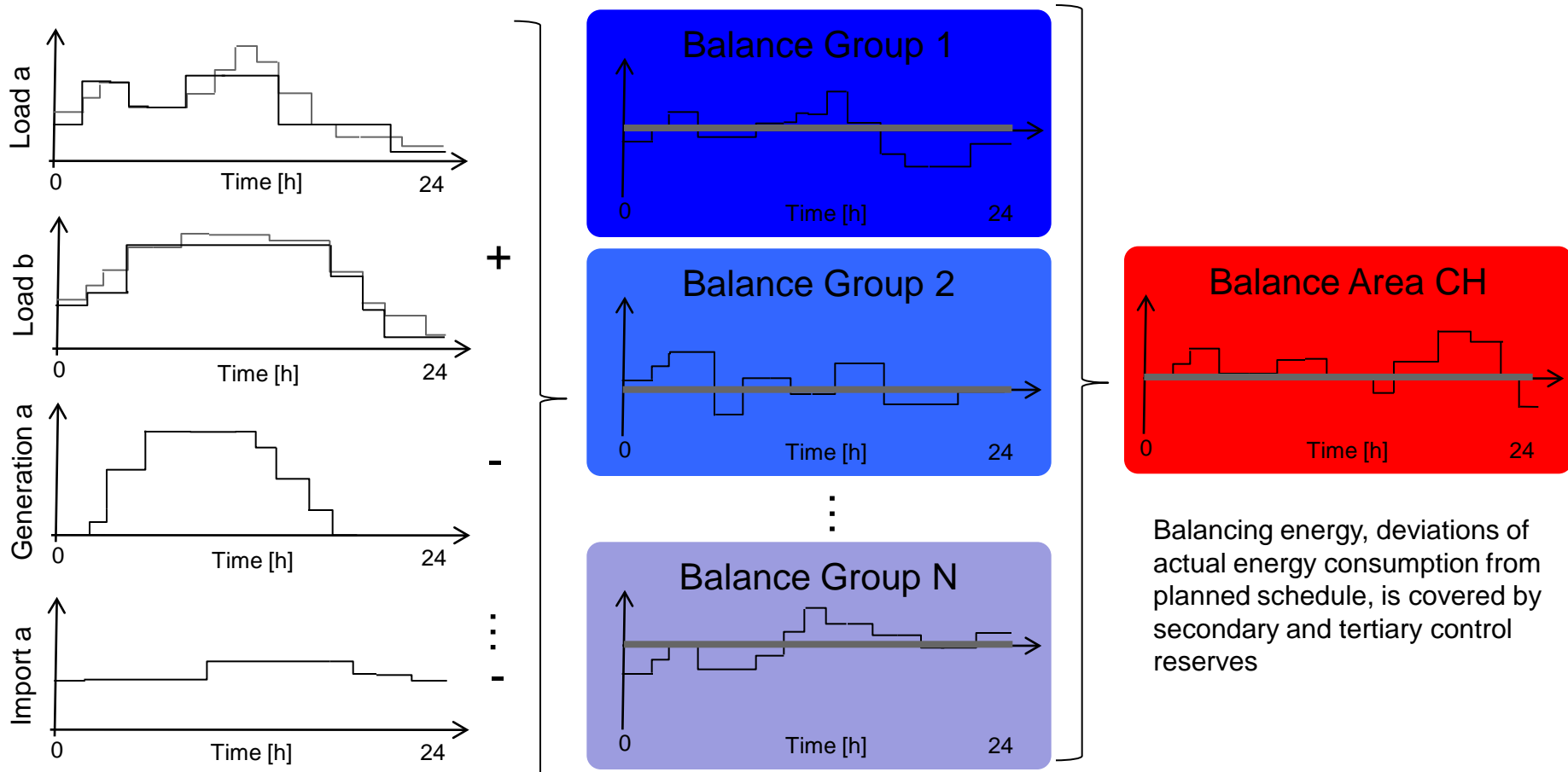
Liberalized Market

Competition Area – Consumers: Energy and Balancing Energy – Planning



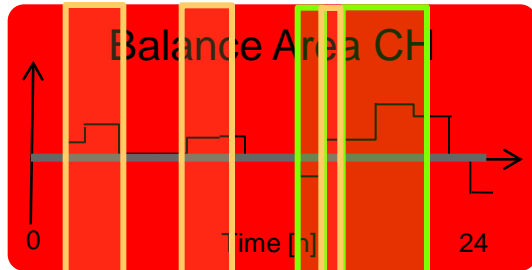
Liberalized Market

Competition Area – Consumers: Energy and Balancing Energy – Actual State



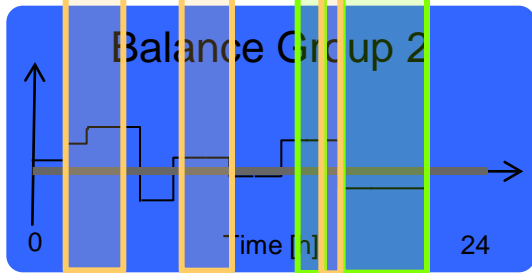
Liberalized Market

Competition Area – Consumers: Energy and Balancing Energy – **Payment Principle**



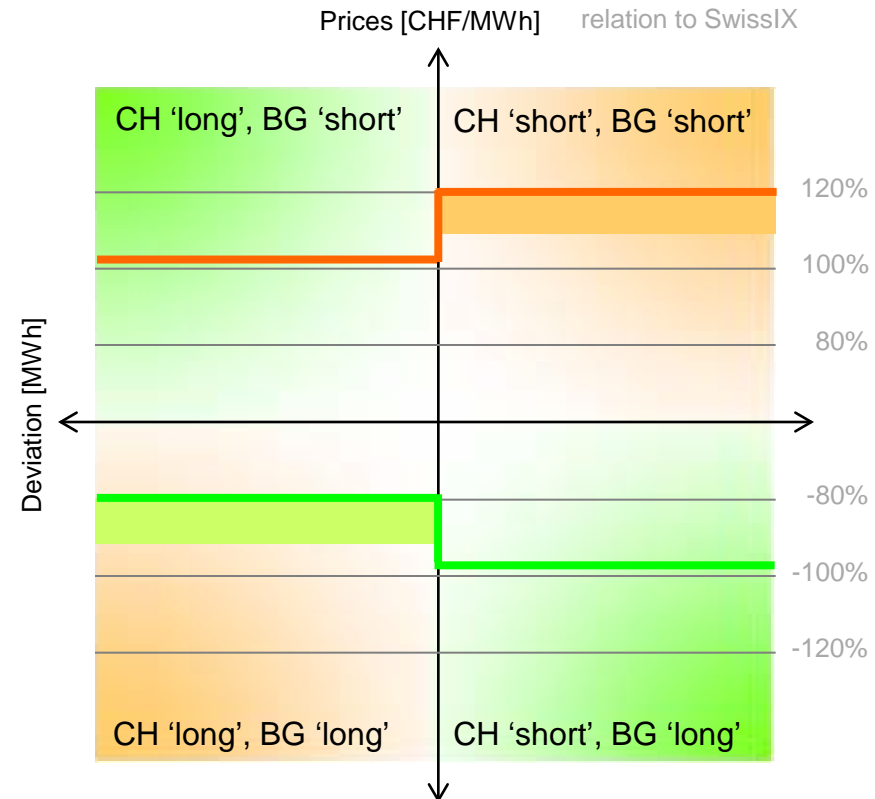
'short' (excess of load)

'long' (excess of generation)



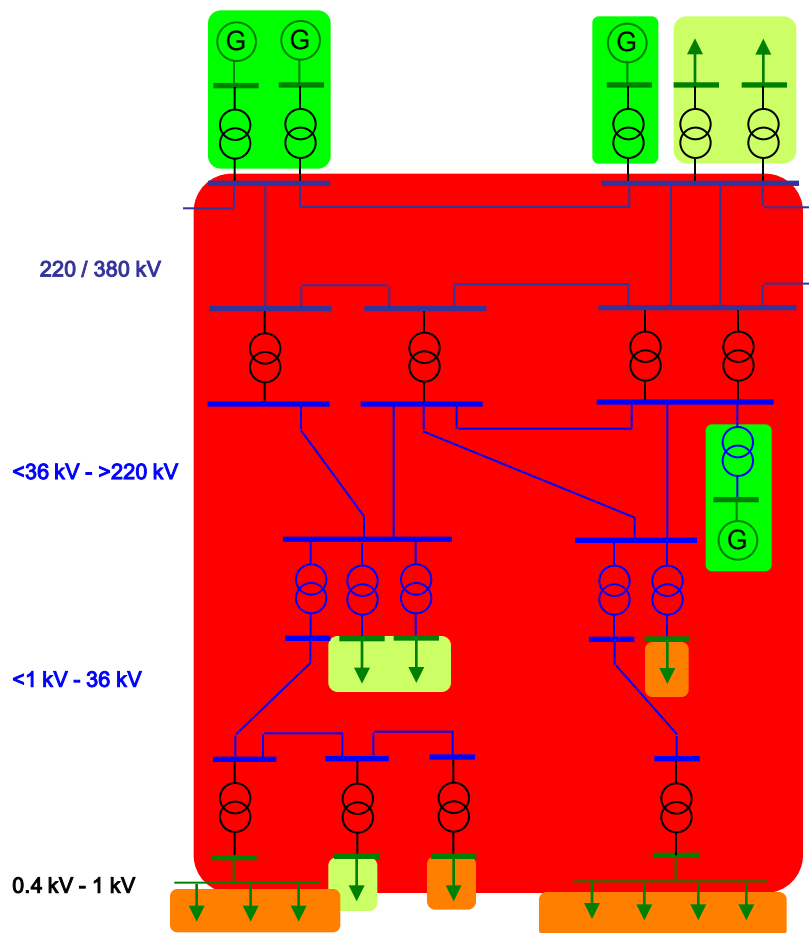
'short' (excess of load)

'long' (excess of generation)



Liberalized Market

Competition Area – Generation: Ancillary Services



Regulated area – network

Natural monopoly, it has to grant access to network delivery in nondiscriminatory way

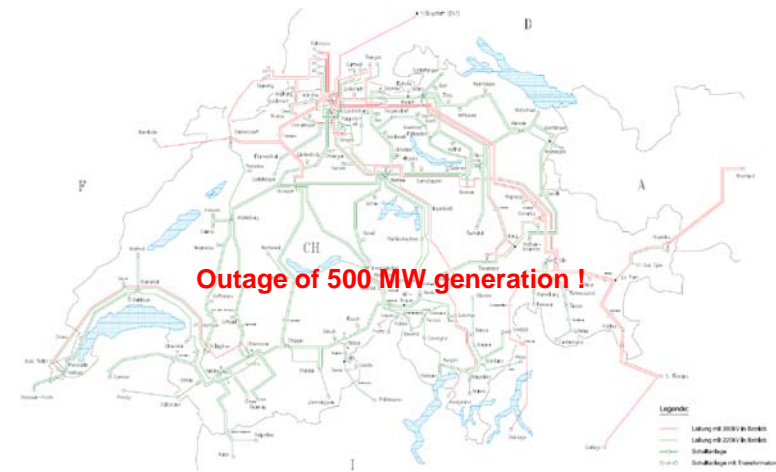
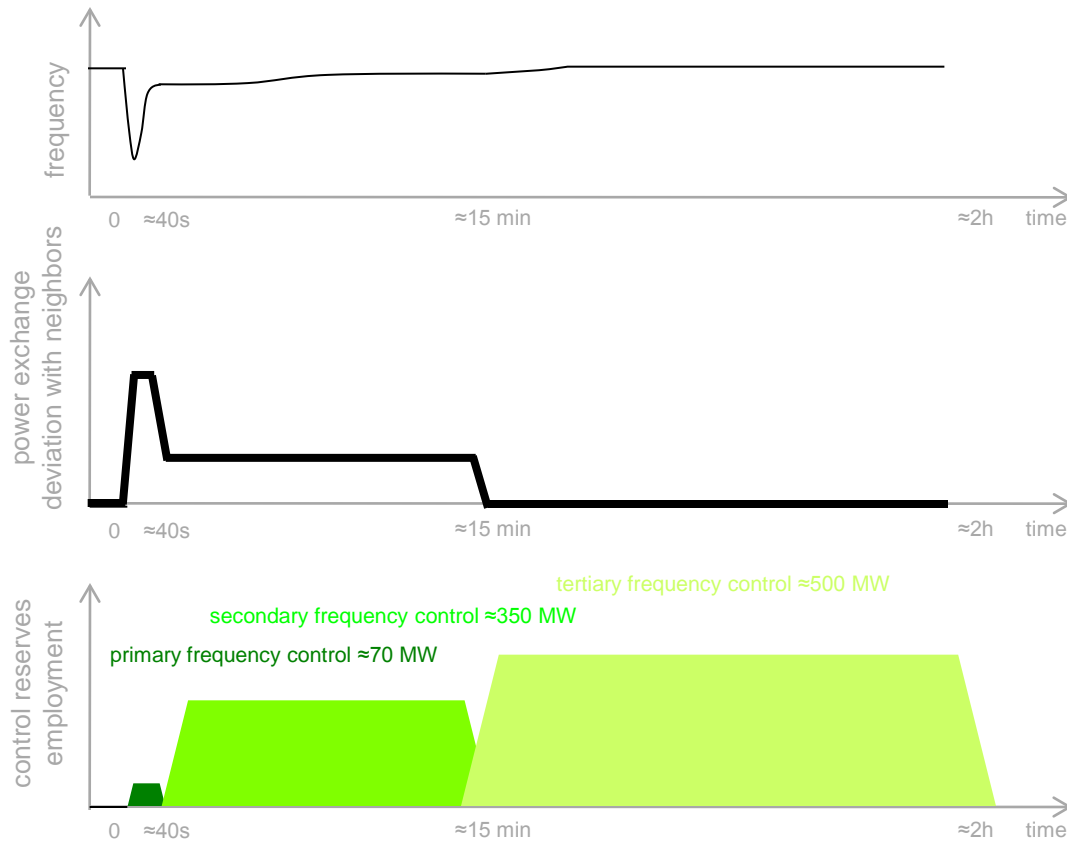
Regulated area – all consumers under 100 MWh/a, consumers over 100 MWh/a who decide
Payment for electricity consumption via 'all inclusive' tariff

Competition area – consumers over 100 MWh/a who decide
Transparent payment for each category: energy, balancing energy, network usage, losses, network security (ancillary services)

Competition area – generation
Offering and delivering of energy and ancillary services

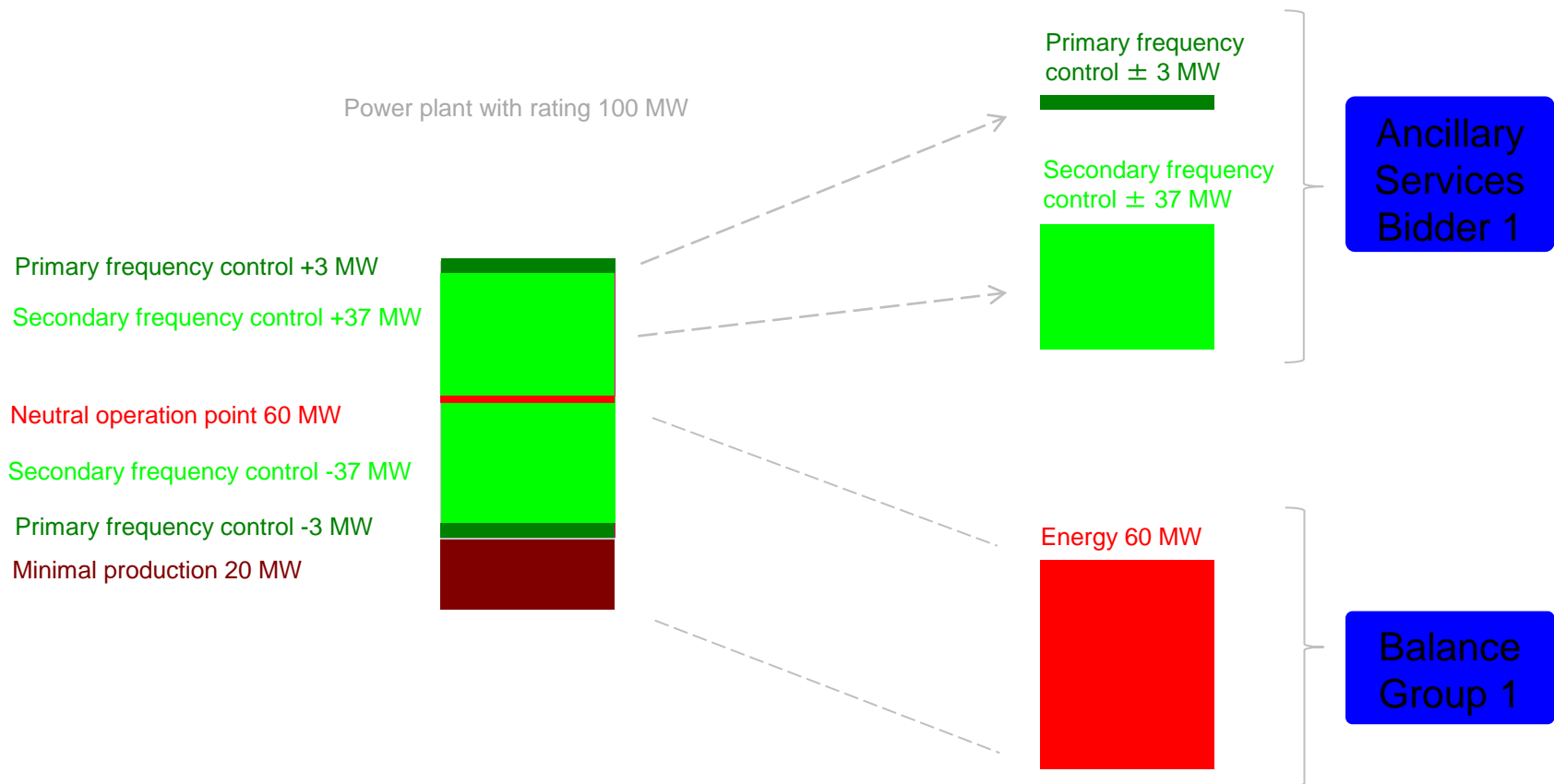
Liberalized Market

Competition Area – Generation: Ancillary Services – Employment of Control Reserves



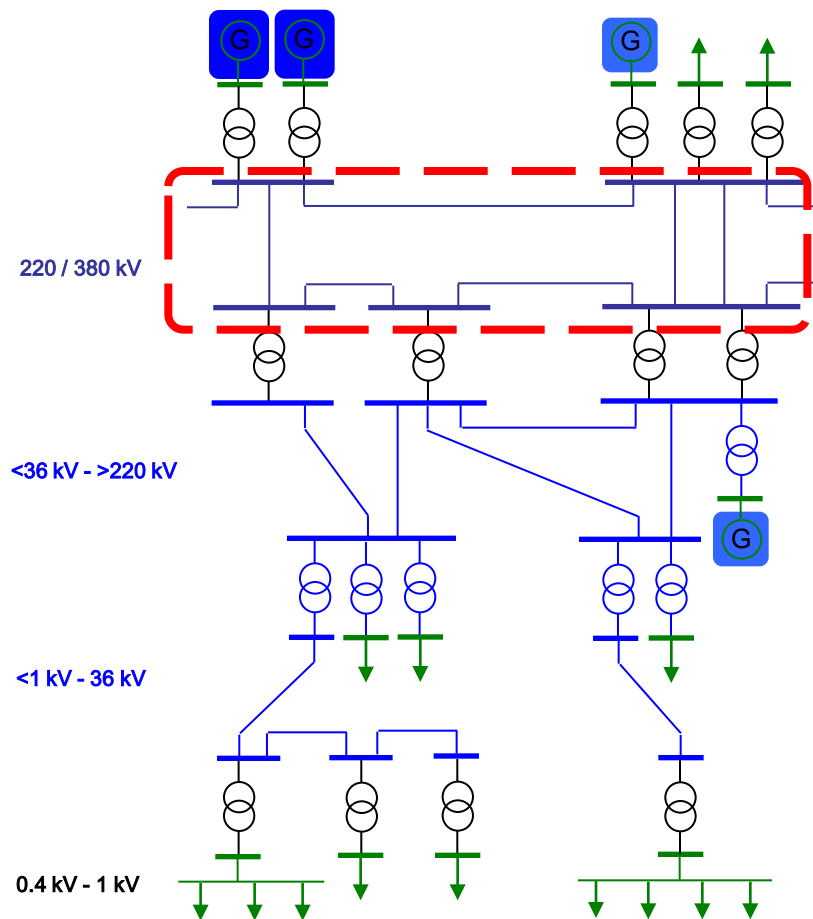
Liberalized Market

Competition Area – Generation: Ancillary Services and Energy Relation



Liberalized Market

Competition Area – Generation: Ancillary Services – Pool Concept



System operator - swissgrid

Ancillary
Services
Bidder 1

Ancillary
Services
Bidder 2

Balance
Group 1

Balance
Group 2

Ancillary services can be offered by a pool of power plants

The pools are linked to balance groups

Liberalized Market

Competition Area – Generation: Ancillary Services Overview

	Primary frequency control reserves	Secondary frequency control reserves	Tertiary frequency control reserves	Voltage control	Coverage of losses	Black-start capability and island operation
Market volume	± 70 MW	± 350 MW	± 650 MW	10 – 20 Mio MVar/a	873 GWh/a (Profile of 80 – 200 MW)	8 – 12 power plants
Minimal bid	± 3 MW	± 10 MW	+ 10 MW - 10 MW	Not relevant	Not defined	Not relevant
Acquisition form	Tender	Tender	Tender	a) Compulsory b) Bilateral agreements	Tender	Tender
Duration	1 Month	1 Month	1 Month	a) As long as generator on grid b) Negotiated	Structured: combination of long-term and short-term	2 Years
Form of compensation	Power for clearing price	Power for clearing price Energy for ± 10 % SwissIX	Power for clearing price Energy for ± 10 % SwissIX	a) Energy for defined price b) Negotiated conditions	Energy for clearing price	Compensation for tests and maintenance

Concluding Remarks

- Legislation (StromVG, StromVV) provides framework for liberalization, this presentation went into details
- Liberalization brings significant changes for all involved parties (utilities, consumers etc.)
- Many efforts required to implement changes (control structure, measurement and data collection infrastructure, high demands on ancillary services – monitoring, availability etc.) in a very short time

Further Reading

Legislation

Stromversorgungsgesetz, StromVG: <http://www.admin.ch/ch/d/sr/7/734.7.de.pdf>

Stromversorgungverordnung, StromVV: <http://www.admin.ch/ch/d/as/2008/1223.pdf>

Network Usage (NE1) and Ancillary Services Tariffs

http://www.swissgrid.ch/activities/swiss_electricity_market/grid_usage_tariffs/

Transmission Code

http://www.swissgrid.ch/activities/market_customer/transmission_code/docs/Transmission_Code_2008_v1_0.pdf

Other relevant documents

http://www.strom.ch/de/internet/branchendokumente_content---1--3289--1132.html

Researcher's View

As Observer ...

Many European countries have already undergone liberalization (experience for SO and regulator) => faster convergence to a settled market model and rules?

Experience of large market participants from abroad => faster adjustment to market conditions, faster convergence of strategies etc?

CHallenges ...

Market liquidity evolution

Power plants scheduling



Discussion