

The logo for EOS (Energie Ouest Suisse) features the letters 'EOS' in a bold, white, sans-serif font on a blue rectangular background. A green swoosh underline is positioned below the letters. Below the blue box, the text 'ENERGIE OUEST SUISSE' is written in a smaller, white, sans-serif font.

EOS

ENERGIE OUEST SUISSE

Horizon 2030 : the key R&D challenges in the electric utility industry

Hans Schweickardt, CEO – Energie Ouest Suisse (EOS)

Lausanne, 2nd of July 2007 – Powertech 07



Agenda

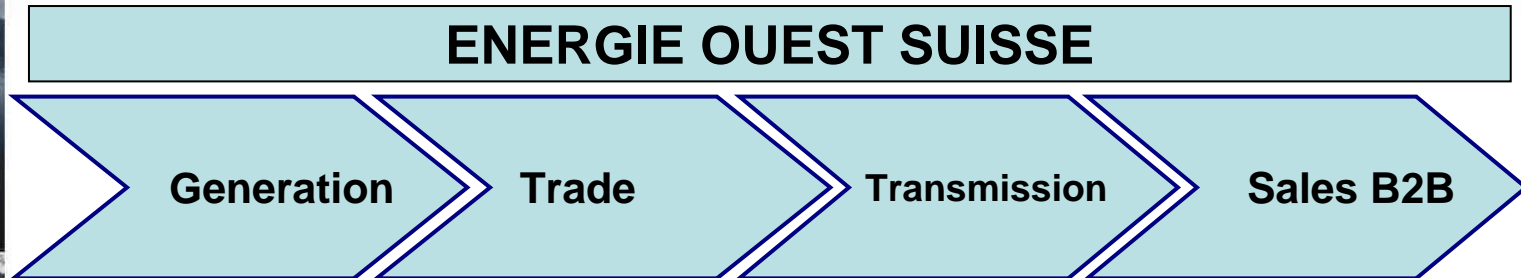
1. Introduction Energie Ouest Suisse (EOS)
2. Energy market developments
3. Future developments and opportunities
4. R&D challenges
5. General remarks and conclusion



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EOS's profile & value chain



- Vertically integrated energy company, active across the entire value chain except for end consumers.
- 85% of the power generation based on renewable (hydro power).
- Transmission and trading for delivery to wholesale markets.
- Operations in Switzerland, Germany, France, Italy and UK.



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Key European energy market developments

Liberalization, security of supply and sustainability

Global markets developments

- Increasing demand and low price sensitivity
- Instability and vulnerability of infrastructure
- Increasing awareness of climate change

EU market developments

- Liberalization, competition, uncertainty**
- Security of supply**
- Environment sustainability**

Local market developments

- National champions, regulations & regulators
- Access to market + integration of markets
- Different values drivers, tax, subsidy schemes

Key issues



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Three areas of opportunity for tomorrow

- Key EU market developments are : liberalization, security of supply, sustainability.
- Important question is how these topics will affect the market ?

Liberalization

Security of supply

Sustainability

What future options will EU liberalization offer ?

How will supply - demand effect EU market ?

How will Europe cope with reduction of emission ?



Three areas of opportunity will define tomorrow's operations :

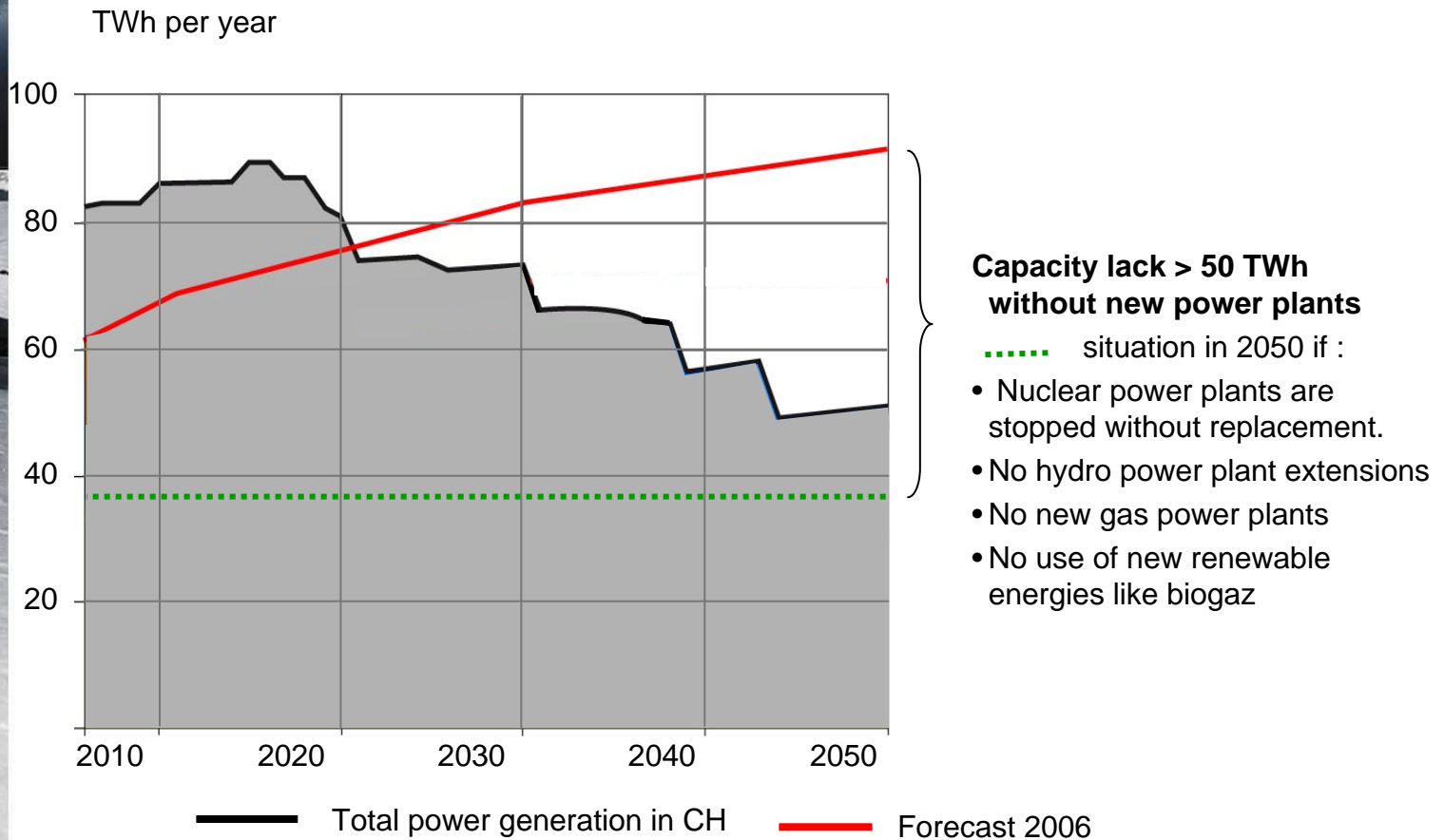
Reduction of energy consumption

Development of renewable energies

Power generation with efficient processes

Security of supply - situation in Switzerland

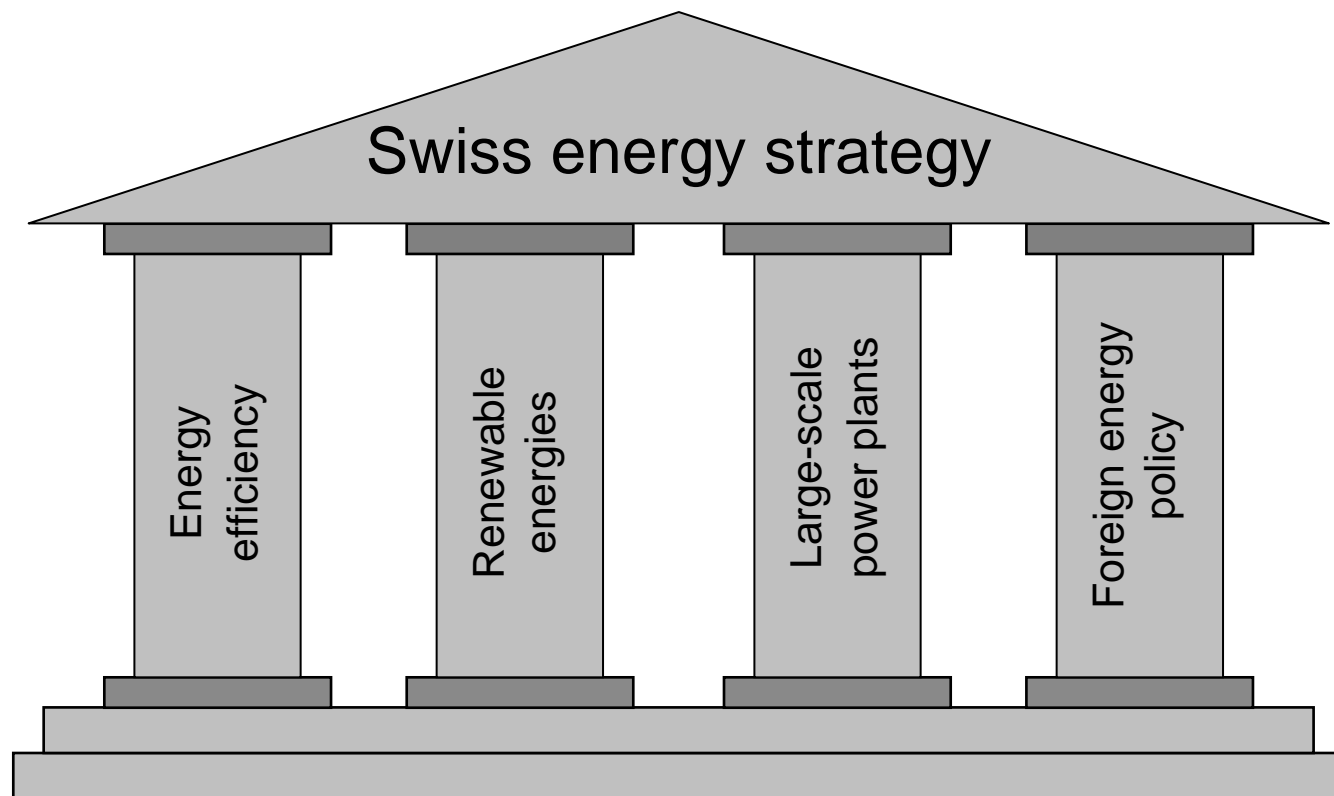
Important gap between generation and consumption



source: AES

New Swiss energy strategy

21st of February 2007 - decision of the Swiss government about the future energy strategy.





Situation in Switzerland (1)

Energy efficiency

- Not under real control of the electricity industry.
- Consumer, industry and government challenged.

Renewable energies

- Important but limited potential.
- 5.4 TWh until 2030.



Situation in Switzerland (2)

Large-scale power plants

- Nuclear is a must but difficult to realize in the short term.
- Intermediate solution is inevitable, i.e. CCGT.
- Unfortunately CCGT is politically blocked.

Foreign energy policy

- Switzerland is a part of Europe and needs to align itself.
- A long and painful process.



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The key R&D challenges for electric utilities Strategy

Major pillars of the Swiss government's energy strategy

Energy efficiency

Renewable energies

Large-scale power plants



R&D challenges for electric utilities are in line with this strategy

Reduce energy consumption :

Electricity as a key element for maximum efficiency of energy systems

Foster renewable energies :

Advancement of established technologies like hydro power and improved cost efficiency of new renewable energies

Power generation with efficient processes:

Combination of minimal impact on the environment and competitiveness.



The key R&D challenges for electric utilities

Research needs

Power production : Environmental friendly and competitive

- **Hydro power** : optimize usage
- **New renewable energy** : bridge the gap in cost of production
- **Fossil Energy** : mitigate CO₂ – emissions
- **Fission** : guarantee safety of existing nuclear power plants
- **Next generation technologies** : geothermal & solar power, fission, fusion

Electric grids : Stability and security of supply

- **Organization** of management and control of large power systems
- **Structure and capacities** of the European interconnected network

Energy storage : Cope with increasing intermittent production

- **Optimization** of pump storage plants – still the best storage available
- **Development** of new technologies

Use of energy : Electricity as a key element for maximum efficiency

- **Efficiency increases** at every stage of the power system
- **Intelligent usage** of electricity



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The key R&D challenges for electric utilities

General remarks and conclusion

Successful R&D must contribute to a sustainable energy future

- Fulfils ecological, economical and social requirements alike.
- Ensures security of supply.

Technological aspect of innovation in electricity is not sufficient

- Analysis and holistic assessment of future energy systems.
- Valuation of the technical, ecological and economical potential of new power technologies.

R&D issues are not limited to individual countries or disciplines

- International cooperation of the best research institutes to use synergies and avoid duplications.
- Formation of interdisciplinary teams to facilitate comprehensive approaches.

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