

Swiss Hydro Power Agenda

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In cooperation with the CTI



Energy

Swiss Competence Centers for Energy Research



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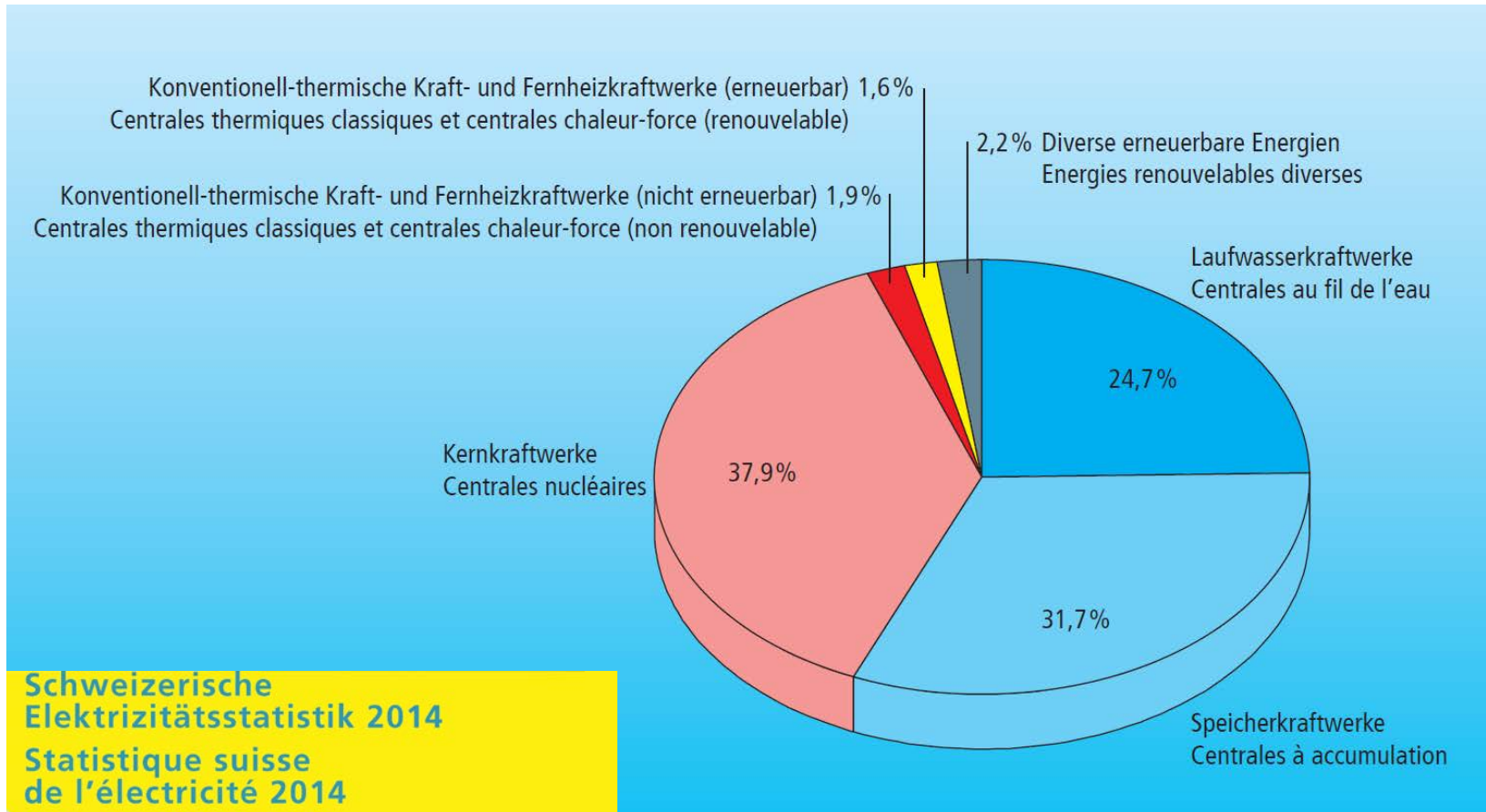
Swiss Confederation

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Scope

- Energy Strategy 2050
- Challenges for Hydropower
- Key Research Directions
- Roadmap

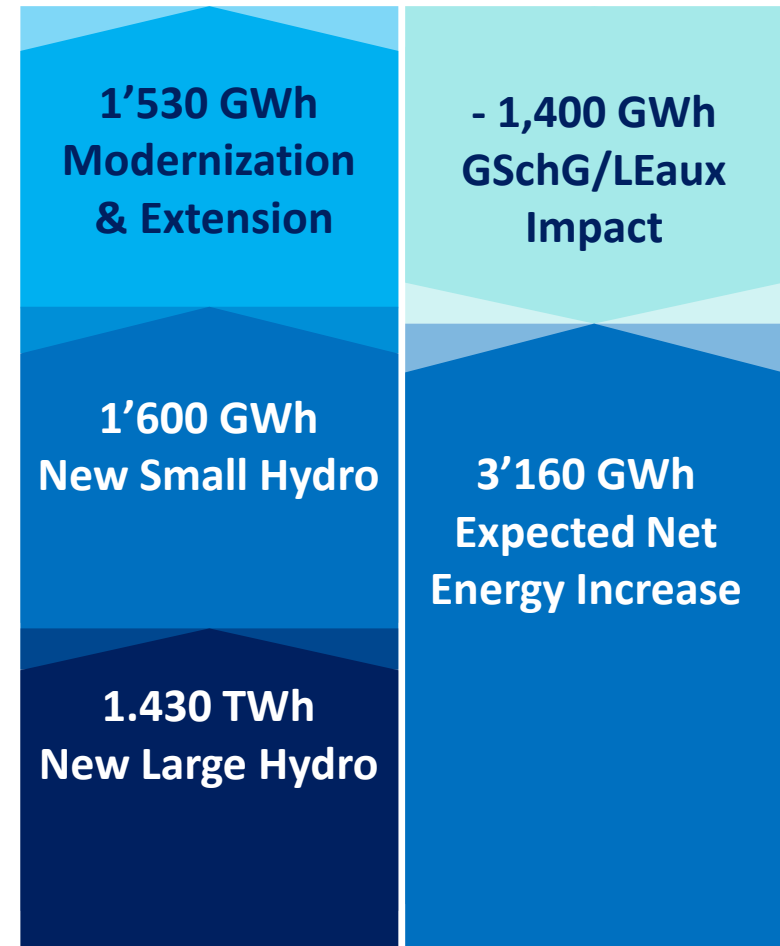
Swiss Electricity Supply in 2014 69.6* TWh (68.3*) TWh in 2013).



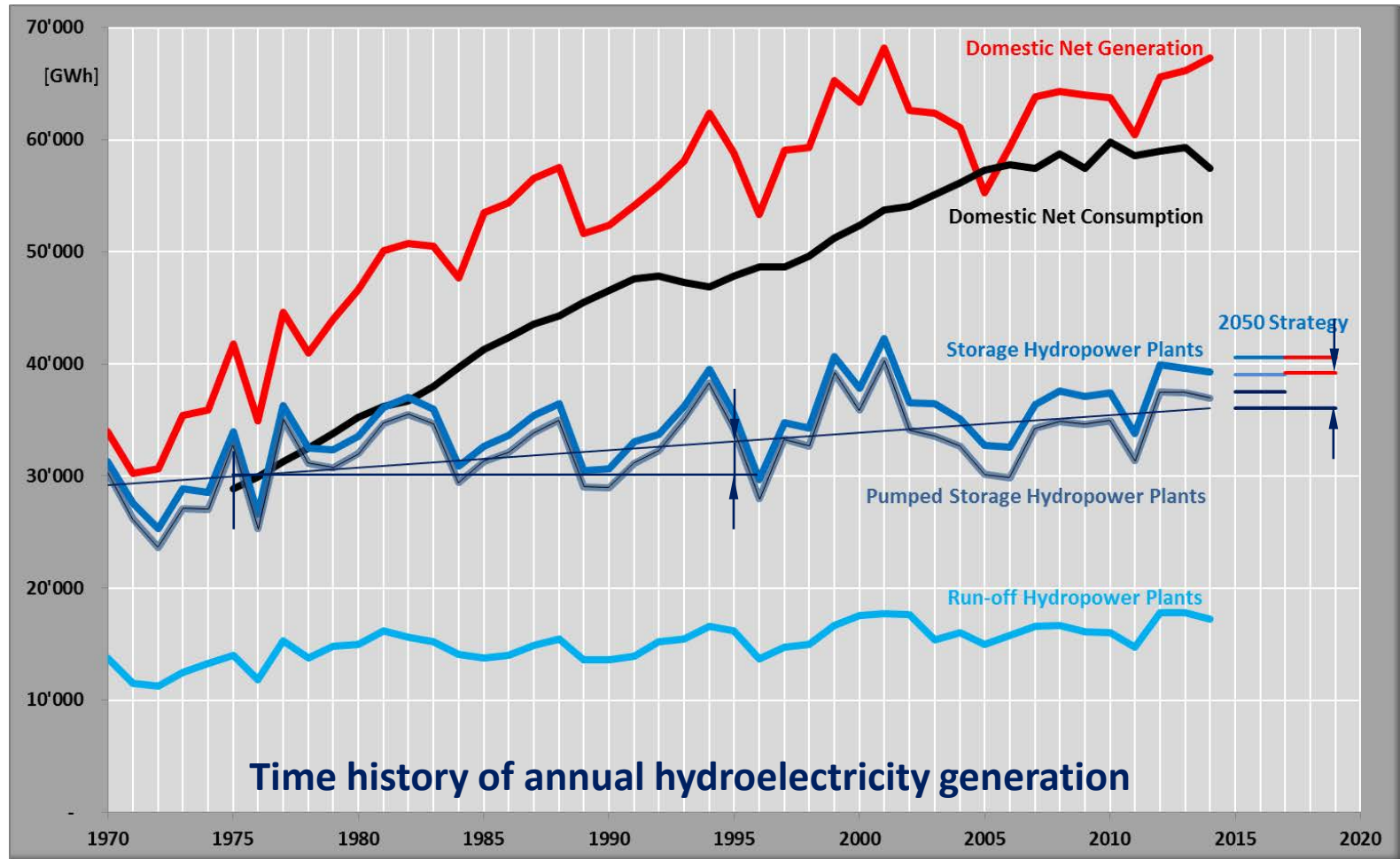
Energy Strategy 2050 for Hydropower

○ Scenario:

- ✓ New Large Hydropower Projects
- ✓ New Small Hydropower plants
- ✓ Modernization and Extension of Existing Hydropower Plant
- ✓ Impact of legal limitations on both minimum environmental flow value and flow change limitation



Energy Strategy 2050 for Hydropower About 20 years of statistical growth



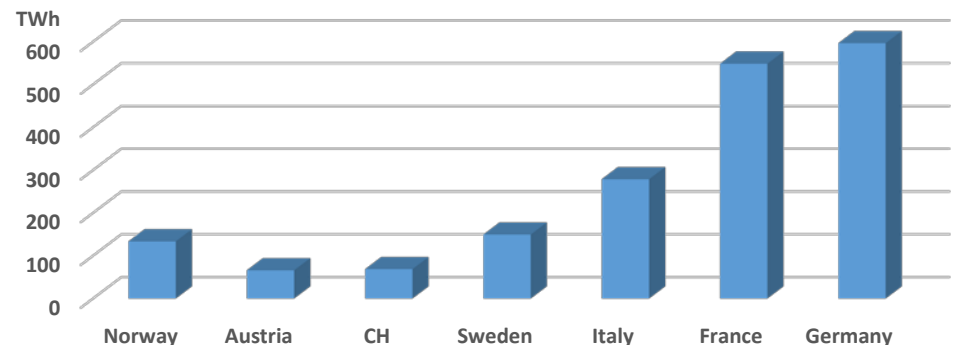
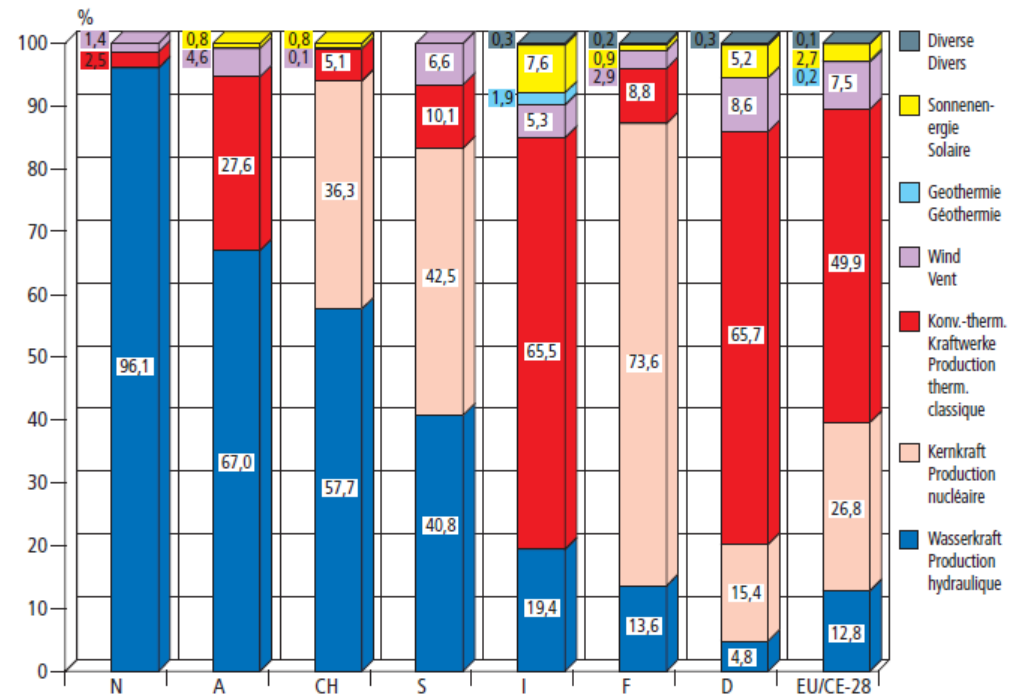
European Electricity Mix

○ Opportunities

- ✓ Grid Interconnectivity
- ✓ Energy Storage
- ✓ Generation Flexibility

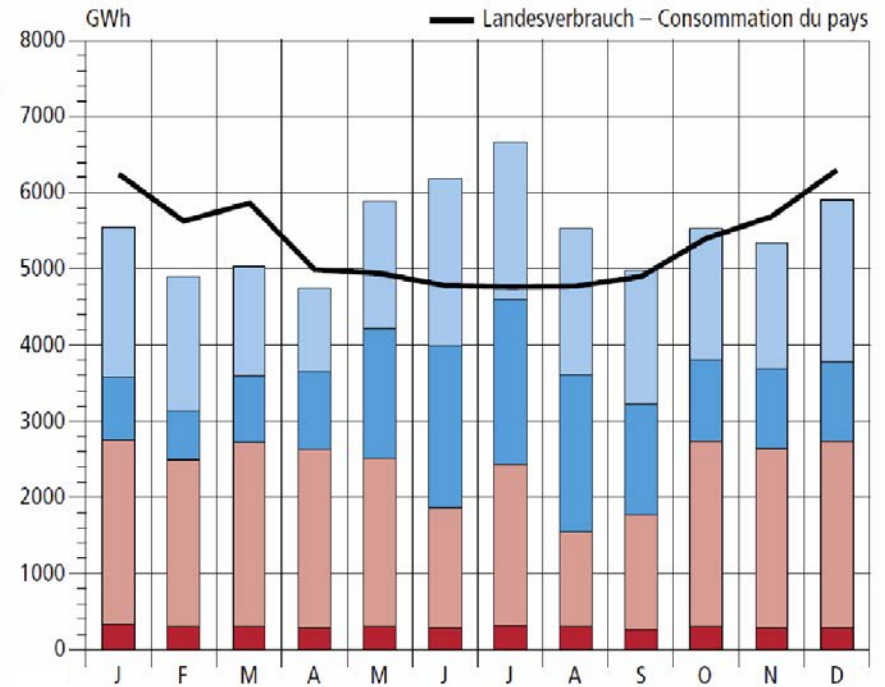
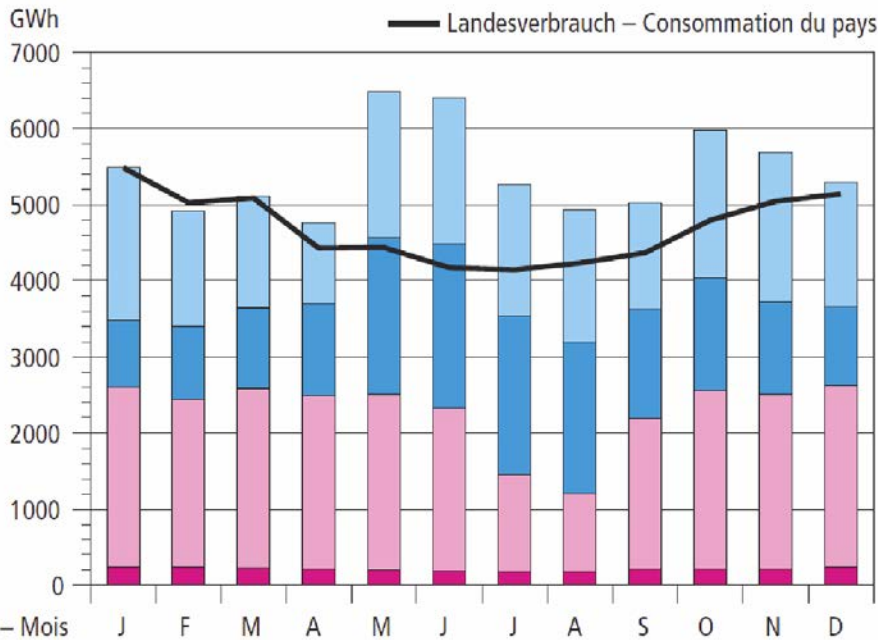
○ Threats

- ✓ Slow EU activity yielding low demand
- ✓ Low cost of both coal and CO₂
- ✓ Hydraulic fees and NRE subsidies



2000: 1 negative month!

2010: 6 negative months!



Speicherkraftwerke
Centrales à accumulation

Kernkraftwerke
Centrales nucléaires

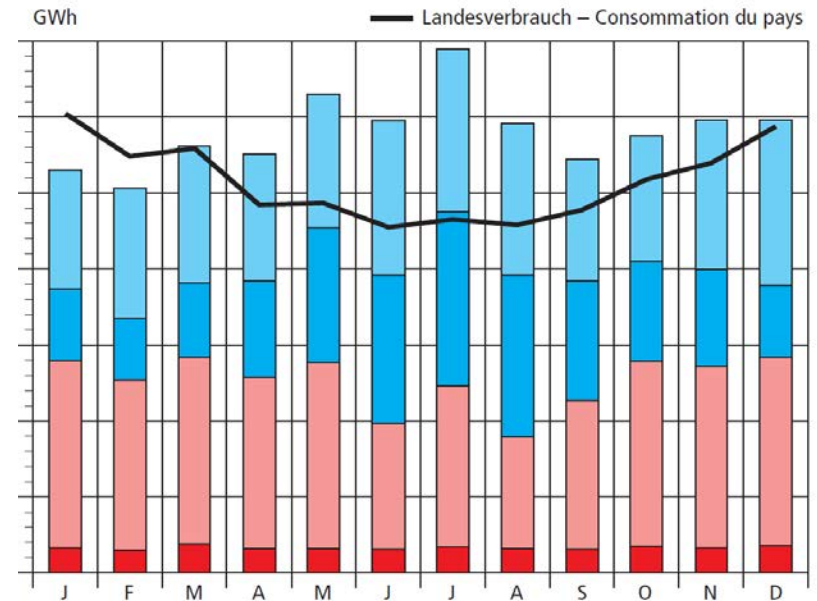
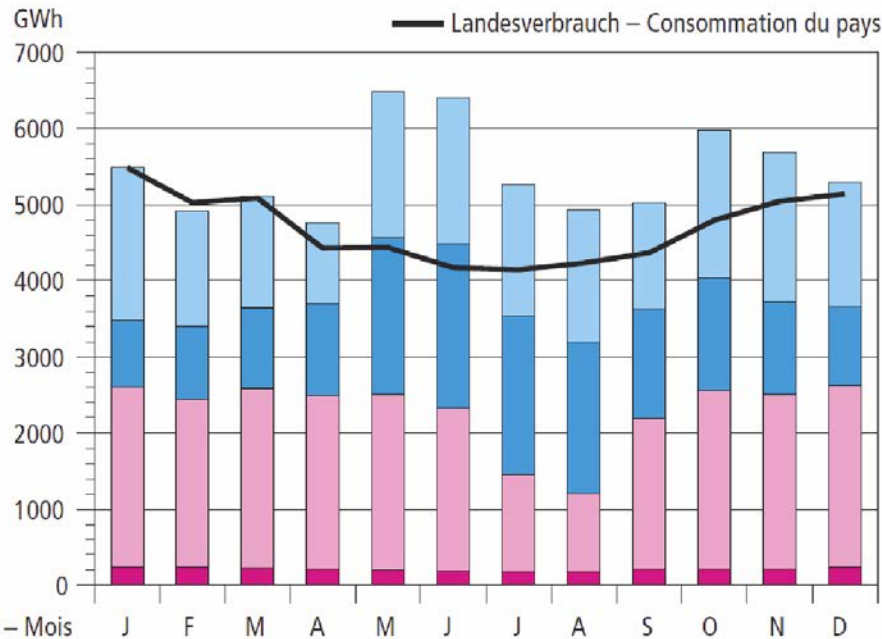
Laufkraftwerke
Centrales au fil de l'eau

Konventionell-thermische und andere Kraftwerke
Centrales thermiques classiques et divers

Source : OFEN/BFE

2000: 1 negative month!

2014: 2 negative months!



Speicherkraftwerke
Centrales à accumulation

Laufkraftwerke
Centrales au fil de l'eau

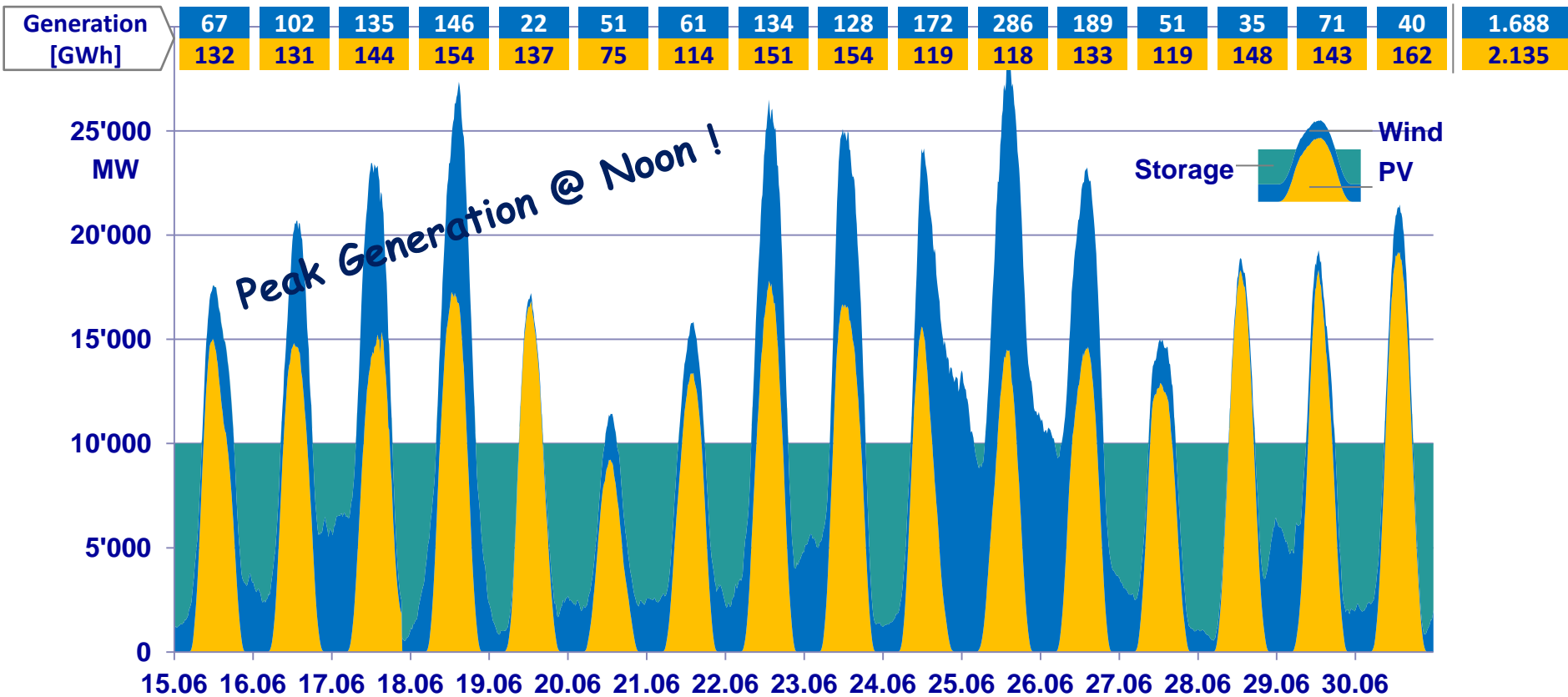
Kernkraftwerke
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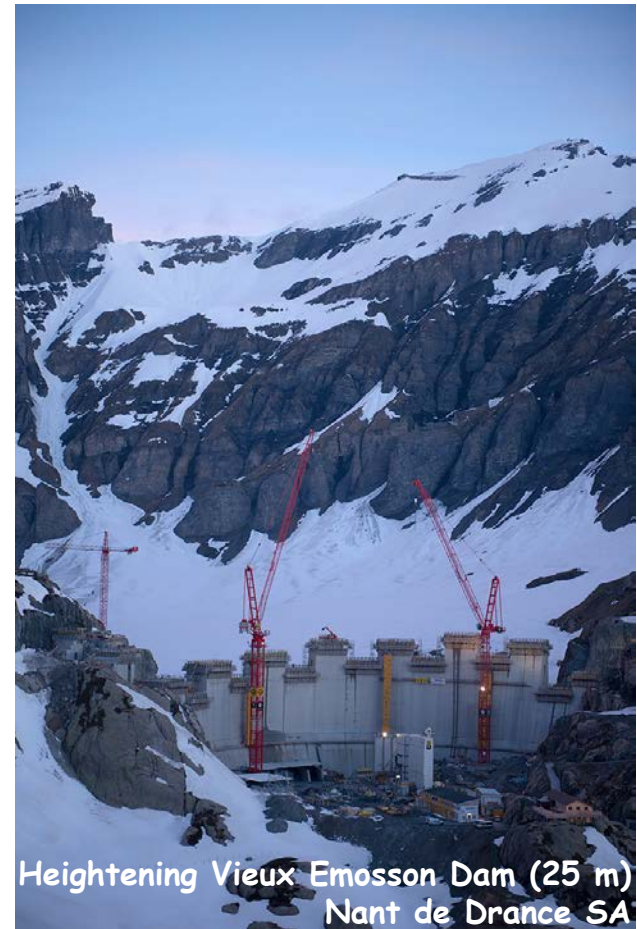
Integration of New Renewable Energy Sources in Europe

○ Needs of Storage & Grid Primary and Secondary Control ?

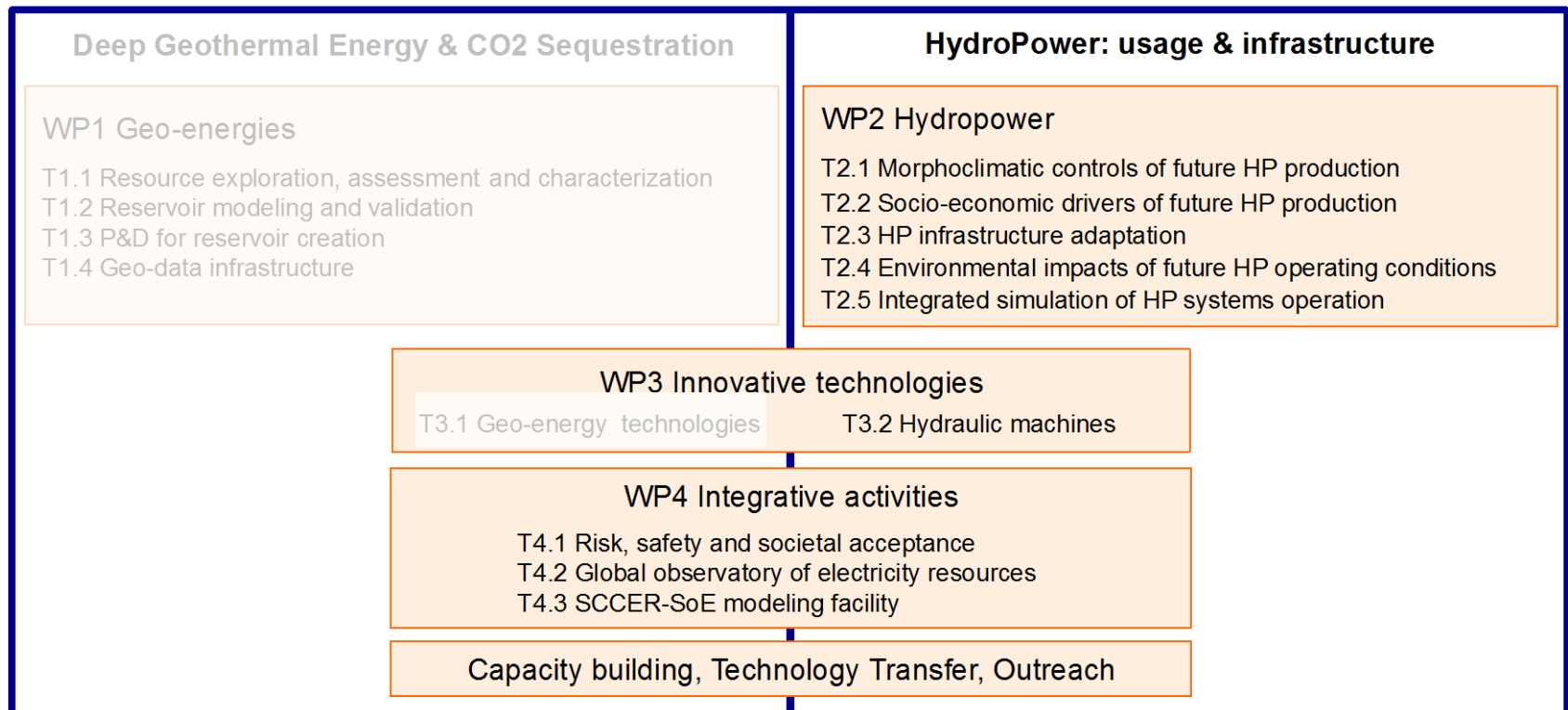


Energy Strategy 2050 Challenges for Hydropower in Switzerland: Flexibility

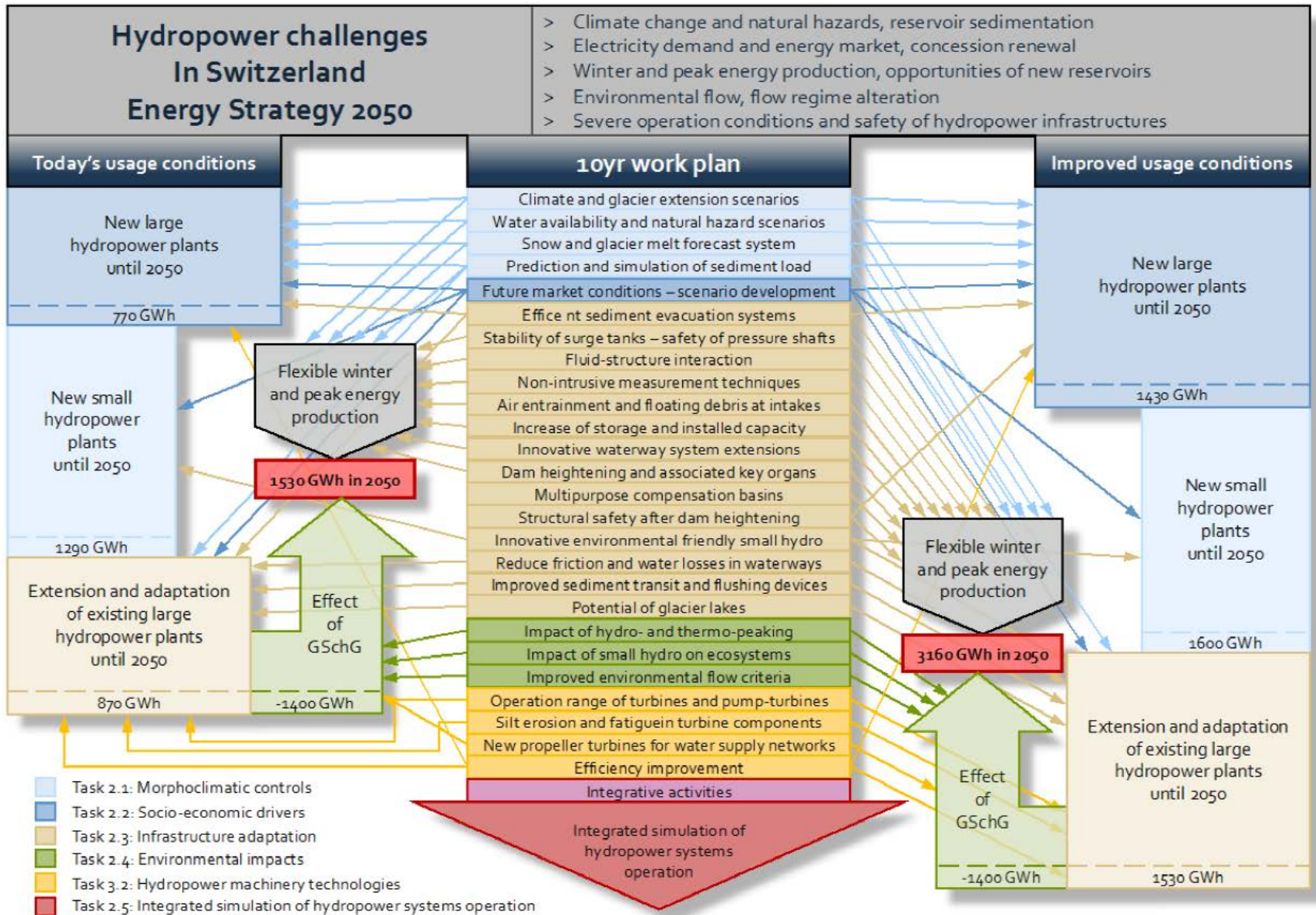
- **Environment:**
 - ✓ Climate change and natural hazards
 - ✓ Reservoir sedimentation
- **Economy**
 - ✓ Electricity demand and energy market
 - ✓ Low cost of both coal and CO₂
 - ✓ Concession renewal, hydraulic fees
 - ✓ Feed-in tariff
- **Business Model**
 - ✓ Winter and peak energy production
 - ✓ Opportunities of new reservoirs
 - ✓ Services to the grid
- **Lex**
 - ✓ Environmental flow
 - ✓ Flow regime alteration
- **Technology**
 - ✓ Severe operation conditions
 - ✓ Safety of hydropower infrastructures



Specific Research Work Packages



Hydropower Agenda



Thank you for your attention



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