

Water Framework Directive and Heavily Modified Water Bodies

Statement Hydropower

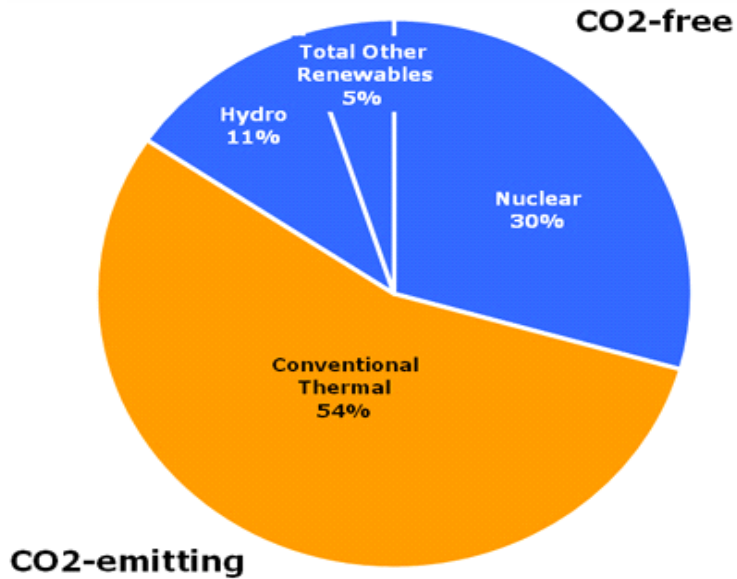


**Otto Pirker / Austria
WG Hydro Eurelectric**

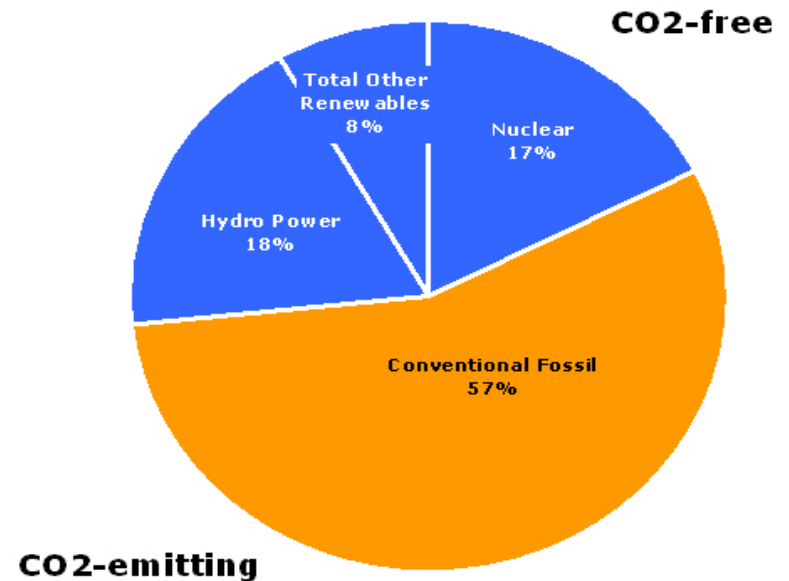
Hydropower in Europe

Generationmix in the European Union (EU-27) 2006

EU-27 Electricity Production 2006 (3 183 TWh)



EU-27 Generation Capacity 2006 (774 GW)

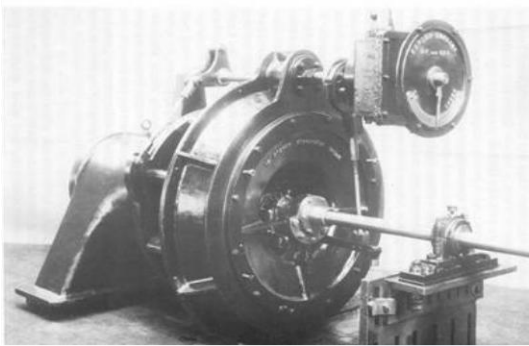


Total net Electricity Production (EU 27)	3.183 TWh
Hydropower Generation 2006	337 TWh
Max Net. Generating Capacity (EU 27)	774.185 MW
Bottleneck Capacity Hydropower	140.321 MW

Quality Hydropower

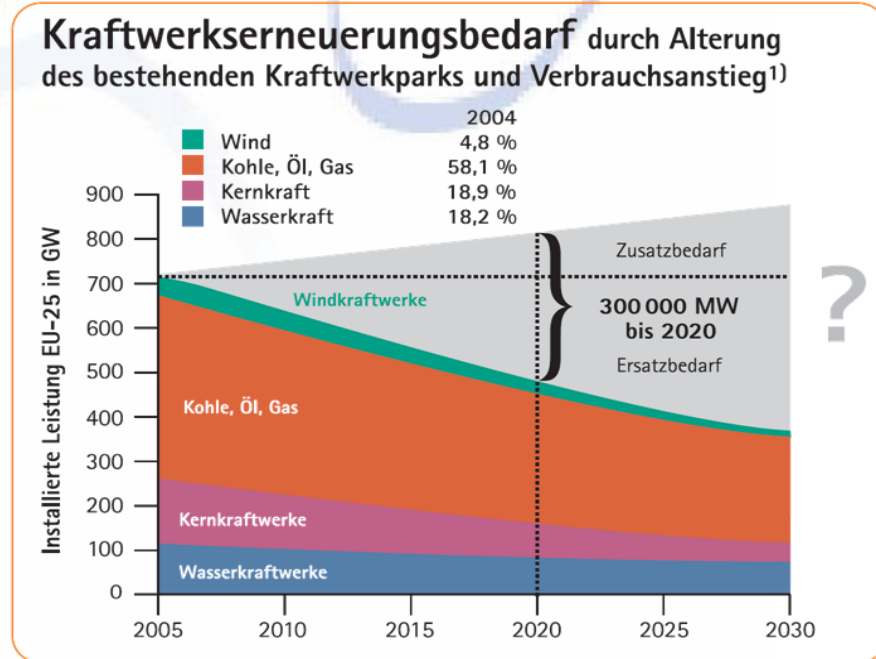


- ❏ 5.000 year old technology
- ❏ Hydro-electric Power plants - more than 100 years of experience
- ❏ Efficiency more than 90%
- ❏ Multipurpose facilities
- ❏ Environmental friendly, CO₂-avoiding
- ❏ Highest availability compared to other technologies
- ❏ Quick response and reserve capacity



Challenges in the near future

- Increasing of electricity demand
- Decommissioning of generation units
- Increase of share of renewables
Energy and Climate Package
- Integration of non-dispatchable
wind energy
- Increasing reserve capacity
- Security of supply



1) Die realen Betriebszeiten der Kraftwerke in der EU-25 sind sehr unterschiedlich. Alterungsverlauf daher nur qualitativ. Quelle: EU - Energy and Transport Outlook

Primary Frequency Control

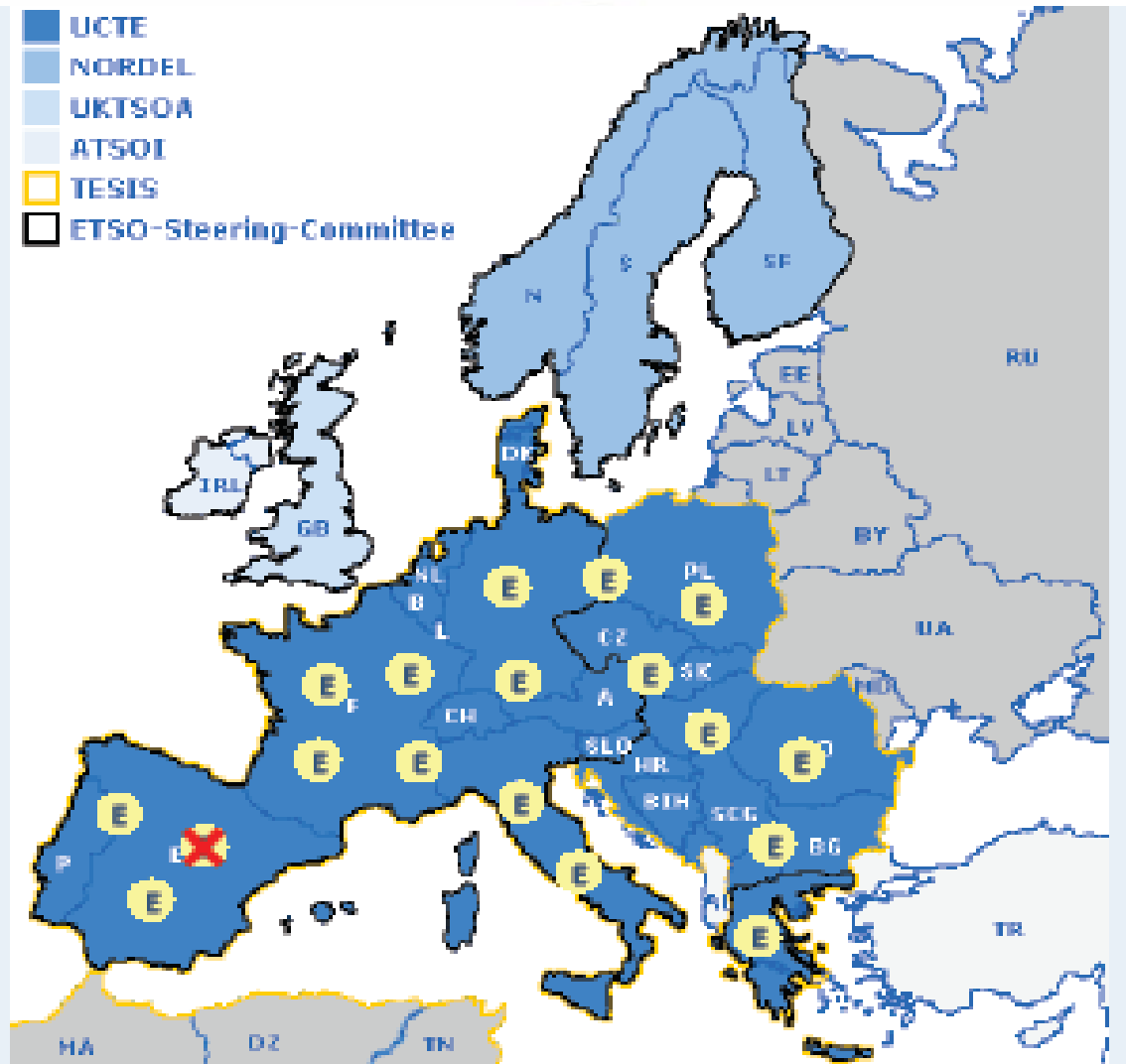
Primärregelung

- Prinzip: Kraftwerksregler

$f < f_{soll} \rightarrow$ Kraftwerksleistung \uparrow
 $f > f_{soll} \rightarrow$ Kraftwerksleistung \downarrow

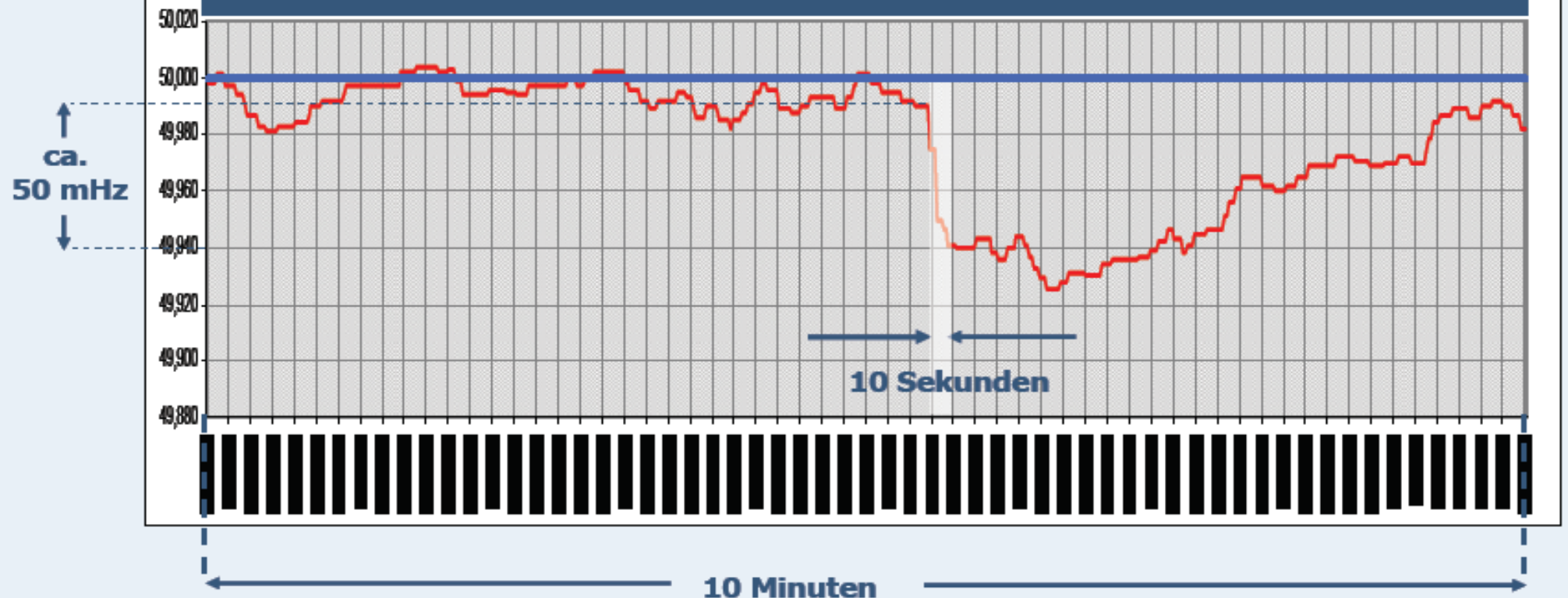
- Kennzeichen:

- automatisch
- nach wenigen Sek. wirksam
- solidarisch



Primary Frequency Control

Beispiel für die Auswirkungen eines Kraftwerksausfalls von 1330 MW auf die Frequenz f ;



Primary Frequency Control

Primärregelung

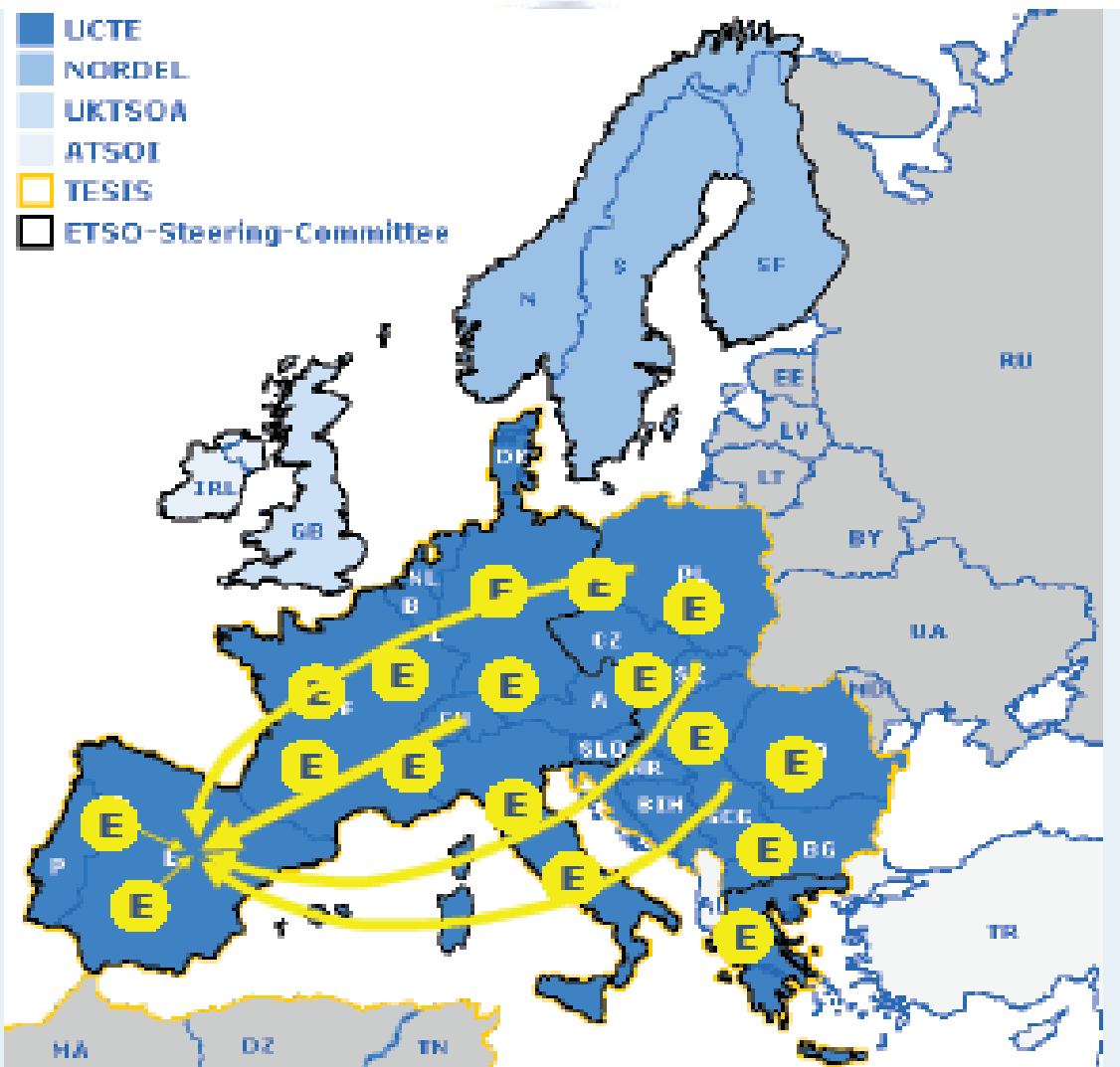
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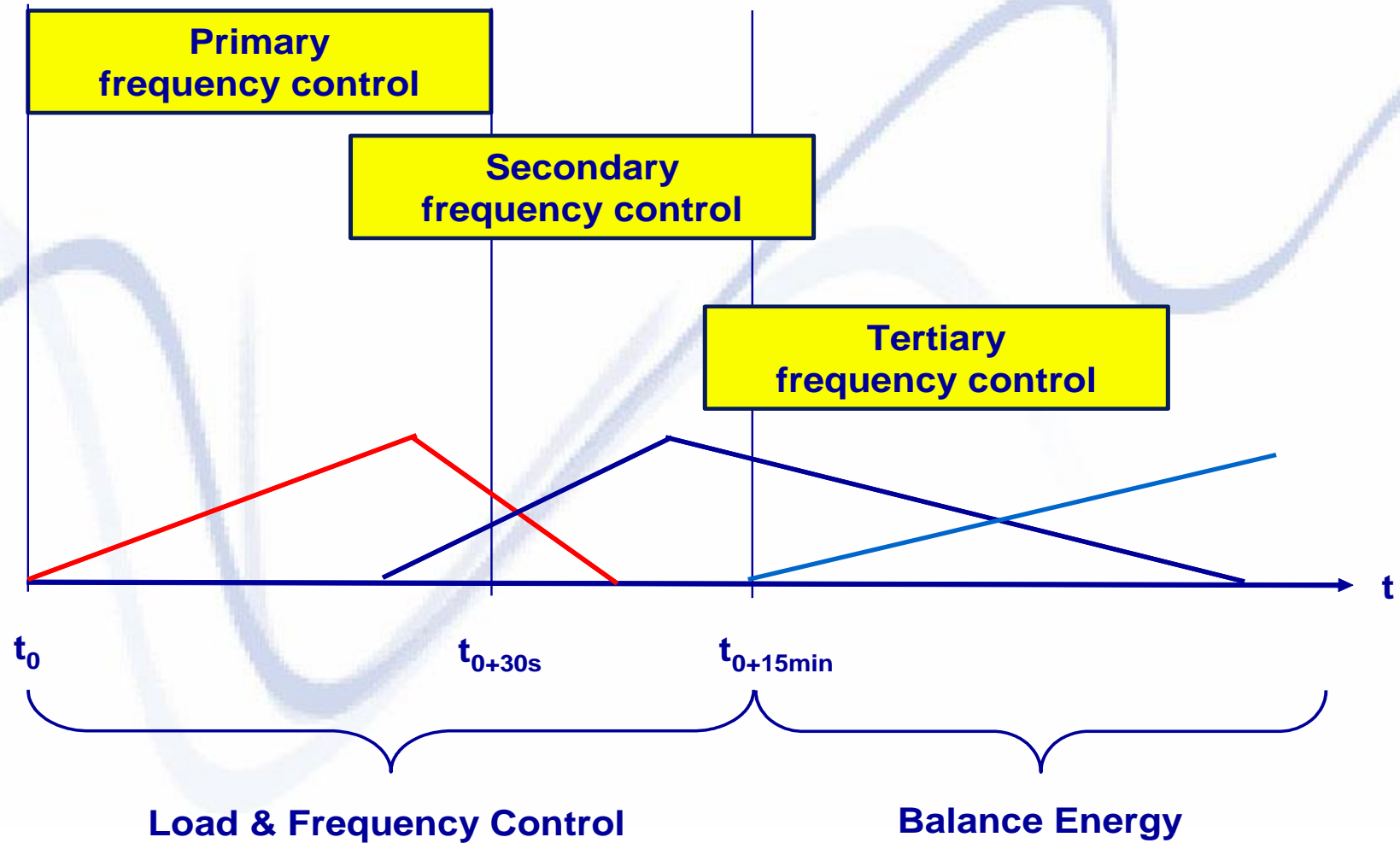
- Kennzeichen:

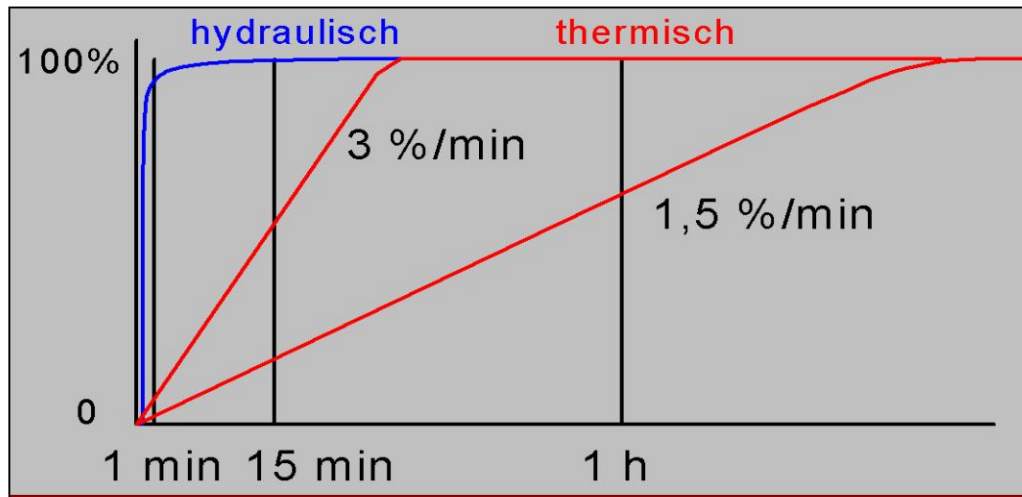
- automatisch
- nach wenigen Sek. wirksam
- solidarisch

➔ Übergabeleitungen notwendig!



Frequency Control

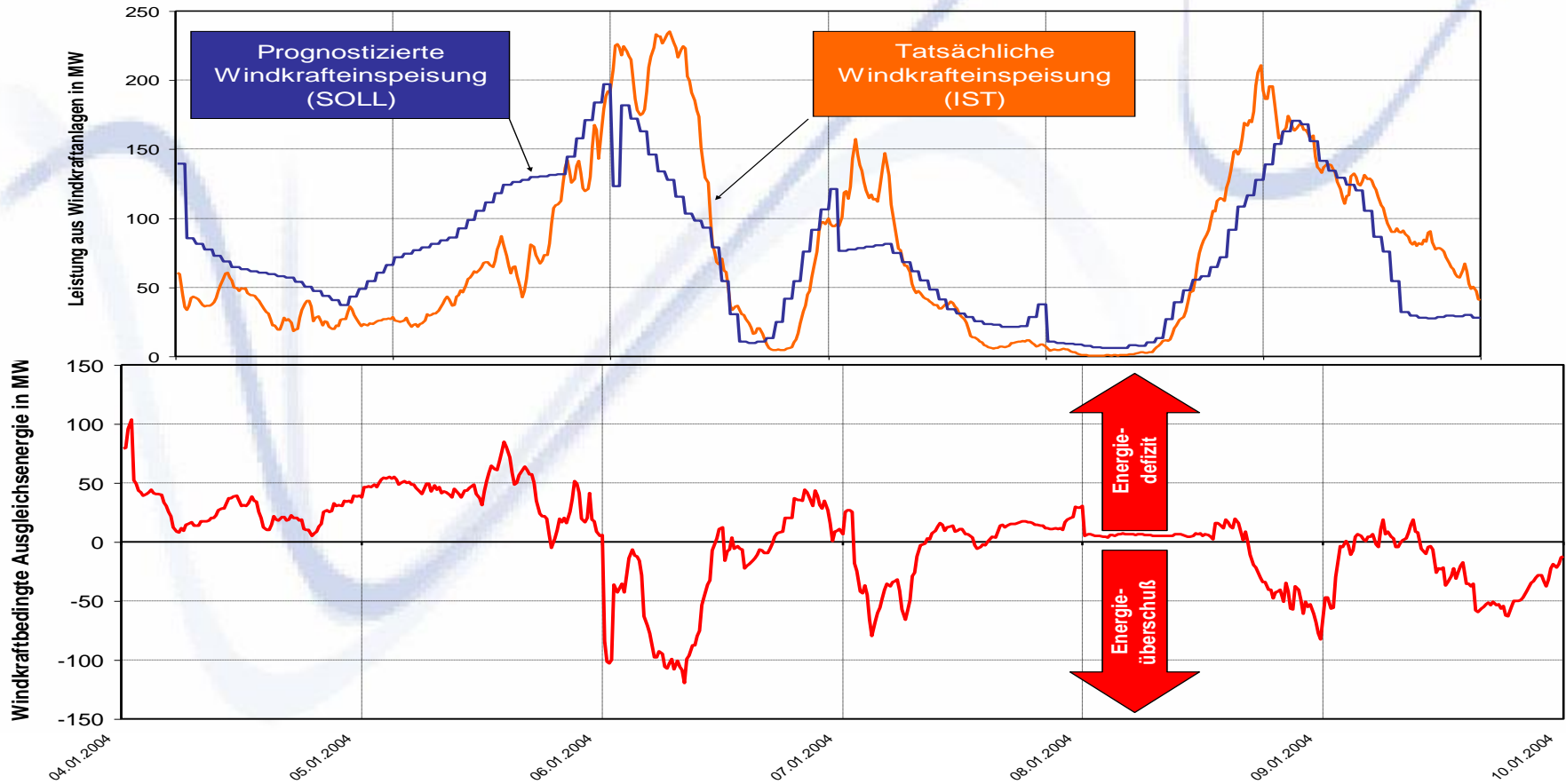




- **Increasing peakload-demand in Europe**
- **Extreme quick response of hydropower compared to other technologies**
- **Ideal for pump-storage-powerplants**
- **Ideal partner for other renewables**



Wind Generation

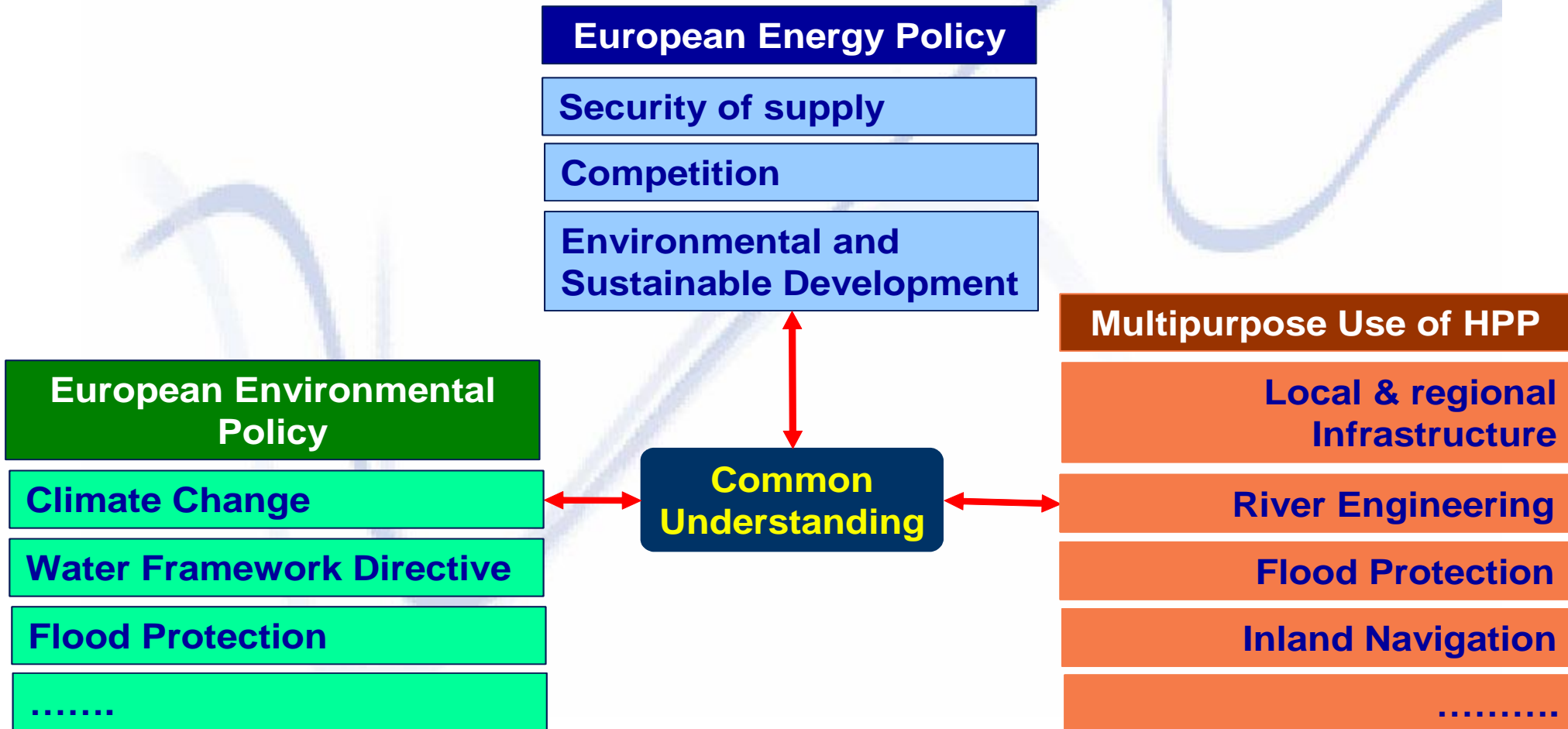


CO₂ avoidance by Hydropower

- ✓ **1 GWh from Hydropower corresponds to approximately 220 t oil**
- ✓ **1 GWh from Hydropower corresponds to approximately 330 t hard coal**
- ✓ **In Europe 2005 (EU 25) 311,2 TWh HP production**
- ✓ **Avoidance of 250 Mio. t CO₂ (based on oil fired power plants)**
- ✓ **Avoidance of 290 Mio. t CO₂ (based on coal fired power plants)**



Policy Framework



Conclusion

- ❏ **Hydropower is the most important renewable in Europe**
- ❏ **Storage and Pumpstorage HPP play an important role in the European Electricity Supply (Security of supply)**
- ❏ **Hydropower is the perfect partner for the development of all other renewable energy source (especially for wind power)**
- ❏ **Common understanding between Hydropower and environmental goals is important**
- ❏ **We have grown systems; different systems need individual solutions**
- ❏ **Optimisation of the Hydropower System (including new plants) under the existing framework is a challenge for the near future**

- ❏ The implementation of the WFD a challenge for the Hydropower industry**
- ❏ The designation of HMWB plays an important role**
- ❏ The definition of GEP crucial**
- ❏ The alternative approach seem to be a chance, because the importance of the hydropower - use must be taken into account**
- ❏ Production losses must be minimized**
- ❏ It is important that the quality of hydropower generation must be maintained**

Thank you for your attention

