

Hydropower and Wind Energy

Two inseparable renewables for enabling the energy transition in Europe





The energy transition on way?

The EU 20-20-20 targets by 2020

- 20% reduction of greenhouse gas emissions from 1990 levels by 2020
- 20% increase of the share of renewable energy sources in energy consumption
- > 20% increase in energy efficiency



Source: European Agency (EEA), EEA Report No 4/2015

The EU energy strategy targets by 2030

- ➤ 40% cut in greenhouse gas emissions compared to 1990 levels
- > 27% share of renewable energy consumption at least
- > 27% energy savings compared with the business-as-usual scenario at least





Breakthroughs in the World of Energy

A number of scenarios have been published for the energy sector to 2020, 2050 and 2100. They all involve technological, political, economic or social breakthroughs.

Energy efficiency

It is central to the necessary reduction of energy consumption in transportation, construction and energy. It requires technological innovations in materials and less energy-intensive products and processes.

- Development of renewable energy Technological, industrial and regulatory break/ throughs must ensure costs that are comparable to other production methods.
- Energy storage and smart grids

They are a prerequisite for large-scale deployment of renewable energies, which are often intermittent, like solar and wind power.







Main key drivers of the energy landscape of the future

- Decarbonisation
 - Decentralisation
 - Digitalisation

Challenges of energy companies

- loss of know-how
- human resources
- cost pressure

>

- strategy requirements
- technical challenges
- environmental aspects
- economical development



Source: http://info1.exlservice.com/hubfs/Imported_Assets/Infosheets





Gross electricity of renewables in EU (2015)



Source: Eurostat 2017, data base 2015





Germany: Wind power production since 2010



WT: Wind turbines

Sources: BMWi, BWE, TSO





Wind power production in 18 European countries 2016



SLIDE 7





Europe: Wind regimes at different weather conditions



SLIDE 8





Bft

12

10

9

8

7

6

5

2



Source: www.wetter.info

Source: www.wetter.info





Overview of prequalified control reserve capacities in Germany (01.2017 - 11.2017)







Timescale of power system operational issues and PSPP operational ranges





🐚 🖪 🛣

釥

Gross Electricity Generation Pumped Storage in EU + CH+NO in 2015

- PSP represent the storage technology with
 - longest life time
 - lowest cost
 - highest efficiency
 for large storage scale.
- In Europe, PSP count for over 97% of the existing electricity storage capacity with an efficiency of nearly 80%.
- Installed turbine capacity of PSP 47,4 [GW] EU-28 50,7 [GW] EU-28 + CH+NO





Pumped Storage Hydro (PSH) one of the best proven available technology

System operation

providing a wide range of ancillary services needed for system operability in the future low-carbon world

Congestion costs

alleviating network congestion costs by storing excess generation in constrained zones for later use, thereby avoiding or deferring investment in network reinforcement

Environmental benefits

avoiding waste of low carbon electricity production during periods of low electricity demand, and avoiding the environmental impact of new transmission infrastructure

Security of supply

the most economical storage technology for the long discharge periods required to contribute to security of supply









Current situation of Pumped Storage Power Plants (PSPP)

ADGADENLAST

Vaterial bei reinen

Stellerkuraung to mpreire "Warum eine V ich einfach nic das Netz finan

um die volatil

RAMELOW KRITISIERT BAAKE WEGEN PUMPSPEICHER-POLITIK



ologien berachteiligt, kritisiert (atterfall Marous Altmann)

>Erfurt (energate) - Thuringens Ministerpraside Bodo Ramelov (Linke) wirft dem Durdeswinschaftsministerium vor. P seeuest zu benachteiligen. Namentlich nennt er ei seiner Krith Wintschaltsstaatssehrettr Rai Baake. "Alle Gesprächsversuche löser bei mit der Eindruck aus, als ob bei Herm Baake eine Aversie speicherkraft da ist", sagle Ramelow Decen I den "MOR". Es homme ihm vor, ala ob her aus der Diskussion um kün technologien kerzusgehalten werden sollter ites se weder aus politischen noch aus virtachaftlichen Gesichtapunktan gerechtfortigt. Statt eicheranlagen zu nutzen, fließe viel Geld in neue Technologien wie Lithium Ioren Daterien, kritisierte Ramelow,

00.06.3017 - 10.57

Zuletzt vurde bekannt, dass der Eilergiekanzen scherkraftverken, die zum Teil in Thümigen steher. Spannaßsahmen und

Pumpspeicherkraftwerke in der Krise Nach Vattenfall kündig RESTRUCTURIERUNG 02.06.2017 - 17:14 LEITET SPARKURS FÜR PUMPSPEICHER EIN Berlin (energate) - Der Energiekonzern Vattenfall seiner Pumpspeicher den Rotstift an. über besteht Einirke EnBW gibt das Milliardenprojekt kraftwerke sind bish gliebleett, Streen is Pumpspeicherkraftwerk Atdorf auf 10.2017 18-39 Ub

eicher des Vattenfall-Ko schreiben schon seit längerem Verlust Vatienfall

Rund 2.500 MW der aktuell betriebener Der Pumpspeicher Niederwartha in Sac



Das Vorhaben steht schon länger unter keinem guten Stern mehr: 2014 zog sich RWE aus der Planung für das Pumpspeicherkraftwerk Atdorf zurück. Von Umweltschützern kommt von jeher starker Widerstand. Jetzt zieht auch der Energieversorger EnBW die Reißleine.

Highly critical ecomonic situation of PSPP Due to reorganisation measures in companies

- and cost pressure continued operation at risk
- Postponement of maintenance measures and replacement investments

Threat of decommissionings!

However, the additional value of pumped storage power plants regarding energy efficiency has not been enough examined and recognised in far-reaching decarbonisation scenarios against the background of partly most cost-intensive sector coupling technologies.



Some recommendations for the ongonig energy transition process

- Labelling ancillary and balancing services including all costs in order to support the establishment of a fair and transparent competitive market.
- Establishing a level playing field for storage and pumped storage hydro versus other storage technologies regarding support mechanisms (R&D, RES, capacity, etc.).
- Facilitating sufficient transmission capacities in order to exploit the full potential of the RES family.
- Harmonising conflicting policy goals as well as the implementation of existing EU directives in the field of water management, renewable energy generation and climate change adaptation and mitigation.
- Recognizing and strengthening the European hydropower market to keep its operational and technological leadership in an increasingly competitive world.











No ideal universal Energy Mix

Most experts agree on a number of points:

- There is no single mix that would be ideal worldwide. Although major international climate summits seek to adopt global objectives, the energy transition is specific to each country or group of countries.
- Energy systems are not very dynamic, which means that an energy transition is a slow process.
- Energy transitions required technological breakthroughs and radical changes in energy used by consumers.







VGB PowerTech e.V. is the international technical association for generation and storage of power and heat (452 members from 33 countries represent a power plant capacity of 433,000 MW).

S VGE PowerTech Hydro

- 74 operators representing about 64,000 MW of installed capacity 3 hydro-equipment manufacturers
- Performing as the collective European platform for operators, manufacturers and suppliers of hydropower plants.
- Being the first address for interested parties in technical, ecological and strategic issues concerning hydropower.
- Functioning as information platform for the hydropower community in Europe.

Mario Bachhiesl Head of Renewables and Distributed Generation Phone: +49 201 8128 270 Fax: +49 201 8128 364 Email: mario.bachhiesl@vgb.org

Individual success through exchange of experience