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Pumped-storage power plants boom worldwide

More than 100 new pumped-storage power plants with a capacity of about 74 gigawatts will be constructed throughout the world by 2020. This boom includes Europe, Asia and North America. The reasons for these many projects vary significantly by region. In the midst of this growth, Central Europe is the only region where new projects are delayed – due to the problems of Germany's turnaround in energy policy.

Today, more than 350 pumped-storage power plants with a capacity of about 152 gigawatts (GW) are operational throughout the world. These power plants are the most effective method to store large amounts of energy. When there is surplus electricity in the grid, it is used to pump water from a lower reservoir into a higher upper reservoir. When large amounts of electricity are needed, this water is drained in a controlled way and turbines produce electricity.

Mathias Zuber, Senior Consultant of ecoprogram GmbH, estimates the investments in the worldwide market for pumped-storage power plants (PSP) by 2020 to amount to 56 billion EUR. When also considering upcoming maintenance measures, this sum even increases to more than 73 billion EUR.

There are different reasons for the worldwide boom. In Asia, large-scale PSP are primarily needed because of the enormous investments in large coal and nuclear power plants. These are comparatively slow and not able to adjust their electricity generation to suddenly changing loads. Pumped-storage power plants, which can adjust to the electricity demand within minutes, are then needed. To stabilise the electricity grid, 20 new large PSP will be constructed by 2020 in China alone.

In North America and Europe, and also in some countries in Asia, renewable energies particularly stimulate investments in pumped-storage power plants. This holds especially true for wind and solar energy. When electricity is produced from wind or sun, the world is, from the electricity industry's point of view, upside down: electricity is not produced when needed but when the weather is fine. Storage capacity is needed to compensate this imbalance.

In the USA, onshore and offshore wind power as well as photovoltaics have resulted in new plans for pumped-storage power plants – for the first time in more than 20 years. Furthermore, about 75 projects for pumped-storage power plants currently have a preliminary permit of the American regulatory authority. If all these projects were realised, North America would become by far the world's largest market.

In Europe, renewable energies especially lead to the construction of new PSP on the Iberian Peninsula and in Central Europe. Germany as the largest national and energy economy plays a decisive role as the development of renewable energies is very advanced there. In Germany, Austria and Switzerland, about 40 large-scale projects are under construction, being planned or concretely discussed. The projects in the Alpine countries also focus on the German market.

At first glance, it seems to be a contradiction that the intense development of photovoltaics currently makes the operation of PSP in Central Europe difficult. But it is true: the photovoltaic plants produce electricity in peak load times around noon, which is exactly the time when pumped-storage power plants have thus far made their profit. As a result, many projects have been postponed.

Renewables indeed result in a larger need for storage capacities; at the same time, however, they take away operating times of PSP on a market where the latter may generate earnings. Furthermore, renewable energies have resulted, as they are prioritised in the grid thanks to the merit-order effect, in an overall lower and less volatile electricity price. Both effects are consequences of the turnaround in German energy policy. At present, they also lead to efficiency problems for other types of power plants (first and foremost gas power plants).

However, this is only a snapshot. According to Mathias Zuber, both the market and political actors have in the medium term no choice but to recreate profitable operating conditions for power plants that can be used quickly and on demand. The energy turnaround will not work technically without these power plants.

The recently published multi-client study “The World Market for Pumped-Storage Power Plants” by ecoprolog analyses the worldwide operator and plant market for PSP and can be ordered at: www.ecoprolog.com

As a respected industry expert, the Cologne consultancy ecoprolog accompanies clients from Germany and abroad in dealing with implementation-oriented management issues with political, technical or economic backgrounds in the environmental and energy technology sectors. We work in the fields of strategy consulting, market and competition analyses as well as multi-client studies.