10 Key Take-Aways

from the Energy Brainpool Study on Flexibility

European Engine Power Plants Association

The strongly growing need for more flexibility in a power system dominated by variable renewables is now widely recognised. What is less well-known is that the system will require different types of flexibility to remain reliable and stable and, thus, will need several flexibility options. Engine power plants are a key solution thanks to their short reaction time and ability to quickly adapt to the load needed at any given moment.

"Flexibility needs and options for Europe's future electricity system" is the title of a new study published by the consultancy Energy Brainpool, an independent market specialist for the energy sector. The study segments the flexibility demand and compares the available solutions with the future needs. Furthermore, the demand for flexibility in 2030 is simulated and policy recommendations are formulated.

Here are the 10 most important things we learned from the study:

1. **Different purposes require different types of flexibility**: Flexibility needs range from short-term to medium-term and seasonal balancing. Short-term balancing of supply and demand needs solutions with very short lead-time and an availability up to hours. The mid-term challenge of compensating forecast errors for wind and sun needs a longer availability. Seasonal balancing needs, ensuring electricity during typical winter weeks with little sun and wind, will also grow and require delivery periods up to weeks.

2. **There is no single flexibility option meeting all these needs efficiently**: Flexible generation, demand-side management and storage solutions all have specific characteristics making them suitable for only a limited range of the flexibility needs. Reaction times, duration of the energy provision and costs for specific use cases are the main differentiators.

3. **Flexibility in power generation will be growingly limited by "must-run" capacities**: With further growing variable renewable energy source (vRES) capacities in the system, the moments will increase when very little conventional power ("residual load") will be needed. More often, the required power will fall below the minimum operation level, needed by traditional power plants to ensure a stable operation ("must-run capacity"). Technologies offering close-to-zero must-run levels, like modular engine power plants, offer the most efficient flexibility to the system.

4. **In systems with high shares of wind & solar, operators will pick and choose flexibility technologies according to the specific situation:** Gas engine power plants are the best choice at moments when fluctuating steerable load is needed and

low costs and short reaction times are key. Only during few hours of steady high utilisation rates, traditional power plants optimised for a high full-load efficiency have advantages, while demand-side management and batteries are best if needed only for a short period and for a low residual load.

5. **Power-to-gas/-liquids in combination with gas infrastructure and power plants** is the only flexibility option that could cater to all types of flexibility needs, from short-term to seasonal. However, the technology converting excess energy from wind and sun into storable green gases and burning them carbon-free when needed, requires a steep learning curve to reach economic viability.

6. **Denmark leads the way in flexibility demand**: Already today, steep changes of up to 50% of the total steerable power generation per hour are needed to compensate for the fluctuating availability of vRES – with a growing tendency. In 2030, during some hours, this will have increased up to 90% of thermal generation which will need to be ramped up within an hour, as the simulation shows.

7. **Similar trends are forecasted for all examined EU countries:** Simulations for France, Italy, Germany and Spain show that, on the way to 2030, these countries will follow the path of Denmark and require up to 30% of the feed-in of thermal generation to ramp up and down quickly.

8. **In 2030, a peaking plant in Germany will perform over 700 start-stop cycles**: The simulation already includes all existing and planned storage and import/export capacities. For 2015, the average number of cycles was 38 and the maximum 130. So, flexible plants with low must-run capabilities – as engine power plants are – will be key for a successful integration of more vRES.

9. **Efficiency in supplying flexibility is the key:** It is not the full-load efficiency of a power plant that will be more and more relevant, but the efficiency in a specific operating mode. Thermal power plants will need to constantly start up, adapt and shut down again. Engine power plants are champions in technology when it comes to this behaviour: excellent start-up capability, wide operating range, short reaction time, while minimising unnecessary operations and emissions.

10. **The market must quickly repay available flexible capacity:** Today's capacity mechanisms support static base-load generation, even though the system does not need it anymore. Liberalised and liquid short-term energy-only markets are the best option to incentivise investments in flexibility.

The full study is available at www.eugine.eu

Contact

Brussels Office
Boulevard Reyers 80
1030 Brussels - Belgium
Phone: +32 (0)2 706 8297
E-mail: info@eugine.eu

Head Office
Lyoner Str. 18
60528 Frankfurt am Main - Germany
Phone: +49 (0)69 6603 1936
E-mail: info@eugine.eu

European Engine Power Plants Association

Visit www.eugine.eu for more information