The Solution

Modern decentralised engine power plants can provide the future energy system with the necessary flexibility. With their rapid startup capabilities when extra electricity is needed and fast reduction to zero when there is no more demand, engine power plants provide sustainable solutions that enable more intermittent renewables to be integrated into Europe's energy system without compromising the security of supply.

The flexibility of engine power plants is not limited to start and stop times, but includes the choice of the primary energy sources: The majority of applications use low-carbon gas. This can be natural gas, biogas, landfill gas or Liquefied Natural Gas (LNG). Alternatively, biofuels, diesel or hydrogen can be used if the circumstances allow or the system requires it.

Today many engine power plants are also utilised to produce heat in addition to electricity. They can be used for district heating, steam generation, cooling and other purposes. In some cases, cogeneration plants achieve up to 95 per cent efficiency.

Single engines have a power range of up to 20 MW. However, they can be combined in engine power plants in a modular approach, reaching total plant capacities of 500 MW or more.

The modular advantage: Operators can start and stop engines based on power requirements.

The modular principle of engine power plants is ideal to build up a decentralised supply system. It helps to reduce the need for high voltage power lines and makes a valuable contribution to ensuring grid stability.

EUGINE is the centre of knowledge for engine power plant technology and electricity market design. Its members are the leading European manufacturers of engine power plants and their key components. They provide forward looking solutions for flexible electricity generation.

EUGINE works with EU and national institutions in order to help the European electricity system to meet the challenges of today and tomorrow.

efficient

Best form: The efficiency of engine power plants is up to 95 per cent in cogeneration applications.

responsive

Ready, steady, go: The energy supplied by engine power plants corresponds dynamically with actual energy demand.

fast

Flash into action: engine power plants provide energy right away at any time even in emergency situations.

reliable

Green light: engine power plants guarantee a safe and stable power supply everywhere: from vibrant cities to remote locations.

environmentally sound

Flower power: engine power plants operate with very low emission levels and are CO_2-neutral with biofuels.

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European Engine Power Plants Association

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Europe's Flexibility Challenge
tackled by Engine Power Plants

European Engine Power Plants Association

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The Challenge

In recent years, a European policy approach has been developed to address climate change, energy affordability and energy supply security. As a consequence of this policy approach, a transition of the energy system is taking place in the European Union from conventional power generation towards increased shares of electricity produced from renewable energy sources. This organic transition has created new features and challenges for the overall power system.

Intermittent electricity generation
Electricity produced by wind and solar is by nature intermittent, depending on whether the sun is shining and wind is blowing. As a result, increased volatility in the production of electricity (see illustration on the next page) is introduced into the system as are increased production forecast errors.

Decentralised electricity generation
Increasing amounts of decentralised small-scale renewable generation (e.g. household rooftop solar) mean that planning and balancing become more challenging for system operators.

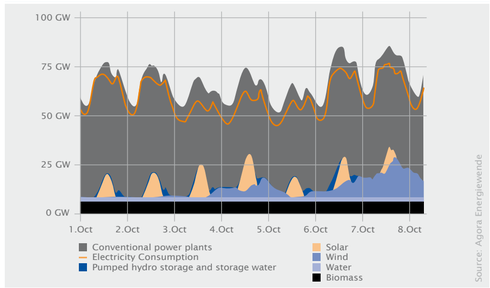
Transportation of electricity
Concentrated large-scale renewable generation at favourable locations (e.g. North Sea for wind power) requires a higher amount of electricity transportation to areas of consumption that are not necessarily close to production, resulting in congestion in existing power grids.

The Flexibility Issue

The European energy system today does not suffer from a shortage in overall supply capacities, nor will it in the medium term. The real challenge of the next years will be the 'flexibility issue': the balancing of production and consumption of electricity in real time. In order to meet and counter this challenge, the power system of the future requires increased flexibility.

Unfortunately, the current electricity market mechanisms were not designed to handle the growing unpredictable variations in electricity supply. Therefore the design of the power market mechanisms has to be adjusted to foster the development of flexible solutions and meet the flexibility challenge.

Power Generation and Consumption in Germany – 1-8 October 2014



Wind and solar power are key elements of Europe's future energy mix – but unfortunately they are not steadily available. As the real data above shows, the gap in electricity supply from renewables and demand can vary by one-third of the total demand. Demand patterns do not match this.
The result: the risk of suboptimal energy supply and the need for flexible balancing solutions. **Fast response times are the key to an efficient electricity market.**

The Four Options

Electricity storage
Electricity can be stored using different technologies. However, due to high costs and technological constraints, electricity storage is still very limited with regard to capacities.

Demand side response
Using incentives, customers shall be motivated to rapidly adjust their electricity consumption to power system needs. However, due to customers' reluctance and the need for a costly rollout of smart metering systems on the consumer side, this is not an optimal solution at the moment.

Network expansion
Better connecting the power grids of regions and countries will allow European supply capacities to be utilised more efficiently and increase flexibility. Interconnectors make it possible to transport power between countries, over long distances. However, challenges like power losses over long distances, financial costs and local resistance towards high voltage lines slow down development and limit flexibility gains.

Flexible generation
Flexible generation capacity can be switched on/off rapidly ('startup time') and power production can be increased or decreased quickly (high 'ramp rates') to match electricity demand in the context of intermittent electricity supply. Due to the fact that flexible generation is already fully available and cost-efficient, **flexible generation already provides the bulk of flexibility needs and will continue to do so in the future.**

European Energy System – The intermittency & flexibility challenges