

EUGINE position on engines and alternators in the planned Environmental Goods Agreement

EUGINE is the centre of knowledge for engine power plant technology. It represents companies which are all manufacturing in Europe the same technologies: highly energy-efficient and flexible engine power plants and their key components (internal combustion engines, alternators). Its member companies are ABB, Bosch, Caterpillar, Cummins, EC Power, Edina, GE, Liebherr, MAN, Marelli Motori, Rolls-Royce Power Systems and Wärtsilä.

Engine power plants in most cases are composed of 'spark-ignition engines' (**84.07.90**), related 'parts' (**84.09.91**), 'AC generators' of all sizes (**from 85.01.61 to 85.01.64**), and related 'parts' (**85.03.00**) or 'generating sets' (**85.02.20**)

- 1/ They generate electricity and often also additional heat by burning fuel from different sources including many types of biogas (from agricultural waste but also sewage or landfill) or biofuels
- 2/ They are enablers for integrating a higher share of variable renewable energy sources (RES) (wind & solar) into the system by offsetting their variations: engine power plants are extremely flexible (short startup and ramp up times, low minimum load) and are therefore an optimal solution to back-up variable renewables whose output cannot be controlled and depends from weather conditions
- 3/ Their technology is state of the art, only run when really needed (reducing emissions), often replacing old, polluting and less efficient technologies (e.g. old coal power plants), comparably easy and quick to install and modular.

Engine power plants are therefore key to developing a global energy system based on more RES, decentral generation and energy efficiency. They could do even more for the environment if high export duties were removed.

Engines, the natural flexibility ally for variable renewables

A major challenge of future energy systems based on high shares of variable renewable energies (wind & solar) is the provision of flexible backup power when the sun is not shining sufficiently or the wind not blowing enough to match supply and demand. While there are hopes that battery storage may provide this flexibility sometime in the future (with considerable capacity, cost and environmental challenges still to be solved), gas-based power generation (using natural gas as well as other gases, like biogas or hydrogen) can facilitate the integration of variable renewable energy sources without endangering security of supply.

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Transparency Register
ID number 033807913798-84

www.eugine.eu

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As engine power plants can start within one minute and reach full output within five minutes, they represent an optimal solution to provide the flexibility needed in a sustainable way and at minimum cost. Moreover engine power plants represent a modular solution as it is often composed not of only one big genset but of several or even tens of smaller gensets – each of them being able to instantaneously adapt its output to provide the energy needed. Modularity also means that only some gensets can be running, at full load and reach a very high energy efficiency, while the other gensets can be completely turned off until the next peak of demand or decrease of production from variable renewables. At a time of growing variations from variable renewables, this represents a key feature to provide flexibility in a sustainable and cost-efficient way.

Decarbonising the world's economies

The Paris agreement against climate change means that the world's economies need to be progressively decarbonised, including their power sector. To achieve this objective, old, polluting and rigid power plants (coal & oil power plants) have to be replaced by modern, sustainable, energy-efficient and flexible technologies.

The flagship project of the Kiel (Germany) municipal utility shows the possible contribution of engine power plants. In Kiel, the old coal power plant (354 MW) will be replaced by a modern power plant of similar size (382 MW) composed of 20 gas engines simultaneously generating electricity and heat, reaching 90% energy efficiency and reducing annual carbon dioxide emissions from 1.8 million tons to approximately 540,000 tons. This means that switching from a coal power plant to gas engines will decrease carbon dioxide emissions by the following impressive figure: - 70% !

Providing high energy efficiency

Cogeneration (also known as Combined Heat & Power, i.e. CHP) is a global approach for energy production where power plants are simultaneously generating electricity and heat to fulfil local energy needs (in opposition to power plants generating only electricity). It is strongly supported by the European Commission (see article 14 of the Energy Efficiency Directive) as a technological solution to increase energy efficiency and fulfil climate and energy pledges.

Most engine power plants are running in decentral cogeneration applications supplying both electricity and heat (industrial process heat, space heating, etc.) on local level. Thanks to cogeneration, engine power plants can reach energy efficiencies of up to 95%.

Transforming biogas into renewable electricity & heat

Biogas from agricultural waste, landfills or sewage treatment plants can be used to generate electricity and heat. In almost all cases this is done by engines running in cogeneration mode. Engines are key to increasing the share of renewable energy sources in the world's energy mix. Examples:

- The waste of 7000 cows are on average generating enough methane to produce 1 MW electricity and 1,2 MW heat with highly energy-efficient engines and power around 2100 EU households and heat around 1000 EU households.
- A landfill gas - fuelled power plant composed of 10 engines and located in Plessis-Gassot (near Paris, France) generates 17,3 MW electricity and 30 000 MWh/year thermal energy for the local district heating network. Thanks to biogas and cogeneration engines, the equivalent of 2850 homes benefits from space heating and domestic warm water from a renewable source.

Key technology for seasonal storage (Power-to-Gas)

A high share of variable renewable energy sources will also require energy storage, an additional source for system demand/load balance. But batteries and other power storage systems will not be able to store the enormous amount of electricity needed over a longer period of time (seasonal storage). Pumped hydro solutions are geographically limited.

Excess energy generated from renewables can be stored as hydrogen and be used when needed, contributing to the flexibility that the energy mix of the future requires. Green hydrogen produced from excess renewable energy sources via electrolysis will be a key component of a future electricity system dominated by renewables. Hydrogen via Power-to-Gas is the only viable approach to store electrical energy of more than 10 GWh over longer time periods.

As an example, the 'H₂BER' pilot project at the future Berlin Brandenburg airport shows that wind power can be first transformed to hydrogen and then converted into renewable electricity and heat by an engine power plant running in cogeneration mode. Hydrogen-fuelled cogeneration engines represent a very promising solution to make use of excess electricity from variable renewables.

Maintaining the leading role of European companies

The leading global manufacturers for engine power plant technology are based in Europe. They have constantly innovated this technology to make it fit to the needs of a global low-emission energy system. Especially the aspect of cogeneration of electricity and heat and/or cooling with extremely high efficiencies and the multi-fuel option are important features for decarbonising the global energy sector.

Due to its modular approach the technology is easy to transport and install also in remote areas of the world. Furthermore the technology is robust and easy to maintain.

With the leading role of European manufacturers the free access to global markets without import duties not only helps to promote a technology supporting the global energy transition but also supports European jobs and growth. The inclusion of engine power plants consisting of spark-ignition engines, the matching alternators and other parts in the product list of the Environmental Goods Agreement would contribute to both targets.