

Position Paper on the Importance of including Flexible and Efficient Conventional Power Generation in the Horizon 2020 Framework Programme

This paper is an initiative of major European energy industry associations who see an important role for flexible and efficient conventional power generation in a low-carbon energy system. We welcome the proposal by the European Commission to increase support for research, development and demonstration in Horizon 2020, to help to achieve the Europe 2020 growth strategy.

In line with the Climate, Energy and Environmental targets of the European Union, the European electricity sector is undergoing a major transition to achieve a carbon-neutral power supply by 2050. As a result, Renewable Energy Sources (RES) and variable RES (v-RES), such as wind and solar photovoltaic (PV) are strengthening their position in the European electricity mix.

According to the Communication of the European Commission on Investing in the Development of Low-Carbon Technologies (SET-Plan), v-RES could provide up to 35% of the electricity produced in the EU by 2020 (20% wind and 15% PV)¹.

However, as v-RES start to be deployed on a large scale, new challenges have emerged. Variable energy output from wind and PV threatens grid stability and hence the security of electricity supply. Furthermore, a stable grid, which is based on reliable balancing options, is necessary to increase the RES share in the system even further.

Therefore to increase power generation from RES in the grid, conventional power plants have to be ready to fill the gaps in a flexible, reliable and efficient way to ensure a secure electricity supply at all time. This way the required grid stability for the security of the whole system can be ensured, when the v-RES are not able to deliver electricity at its full capacity. Examples of these challenges can already be seen in Germany, the Scandinavian countries and Spain².

These challenges were fully understood and addressed when establishing the SET-Plan where Key Enabling Technologies (KET) (necessary to build the energy system of tomorrow) were identified³. As the electricity system must be supported by a broad range of services, many of which are provided today by conventional power generators, Advanced Fossil Fuel Power Generation (KET 9)⁴ will be one of the fundamental requirements of a stable electricity grid helping to meet the EU's climate and energy policy objectives. This is why we believe that this KET should be integrally supported in Horizon 2020.

Call to include Advanced Fossil Fuel Power Generation in Horizon 2020

Conventional Power Generation and some renewable technologies are reliable and dispatchable. The heavy rotating machines at conventional power plants provide the inertia needed to maintain the frequency (50 Hz) of our electricity supply – absolutely crucial for the correct operation of electrical equipment everywhere. It is conventional power generation that meets demand and is always available to stabilise the grid, thus supporting higher integration of v-RES.

¹ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Investing in the Development of Low Carbon Technologies (SET-Plan) page 5 – <http://setis.ec.europa.eu/about-setis/technology-roadmap/Complete%20report.pdf/view>

² Eurelectric's paper: "Flexible Generation: Backing up renewables" (2011)

³ 2011 Technology Map of the European Strategic Energy Technology Plan (SET-Plan) Technology Descriptions http://setis.ec.europa.eu/about-setis/technology-map/2011_Technology_Map1.pdf/view

⁴ idem – Chapter 9, page 69

The challenge is that, as projections show, RES integration will lead to existing capacities of conventional thermal power generators being used for only a quarter to a half of the annual availability. However, they are designed to operate at base load. Part load operation reduces their efficiency and results in suboptimal use of valuable resources and higher emissions. To enable the required flexibility and reliability of conventional power plants further research, development and demonstration is needed to:

- Widen the range of operation by reducing the lower part-load limit
- Reduce part-load emissions
- Increase part-load efficiency
- Maintain ramp-up speed at low load
- Develop components, materials with improved fatigue behaviour, thus mitigating failures due to cyclic operation
- Develop carbon capture processes which are also applicable during highly variable cyclic operation
- Enable wider fuel flexibility towards low-carbon fuels, including the use of syngas as well as hydrogen as an intermediate energy carrier.

More specific examples of R&D developments that could enable the above developments could be to:

- Develop combustion systems optimised for reduced emissions
- Develop flue gas parts for temperatures below acid dew point
- Adapt the boiler to even lower steam throughput, develop technologies for lower steam parameters without efficiency losses

Given that research ranging from modelling to demonstration is required, the research would be performed in cooperation between Universities, Equipment Suppliers as well as Plant Operators, thus guaranteeing the market uptake for the resulting technologies.

We therefore call for advanced and flexible fossil fuel power generation to be included in the Horizon 2020 Framework Programme.

Three possible amendments to the Horizon 2020 text could enable this inclusion by adding the concept of flexibility and efficiency:

- Adding a new point (3.2.5) on “flexible and efficient fossil fuel power generation” to the envisaged Activity 3.2 “Low-cost, low-carbon electricity supply” pursuing the specific Objective of “Security, Clean and Efficient Energy” within Horizon 2020.
- Rephrasing the title of Activity 3.2 “Low-cost, low-carbon electricity supply” to “Low-cost, low-carbon and **flexible** electricity supply”.
- Rephrasing the title of Activity 3.4 “A single, smart European electricity grid” to “A single, smart, **efficient and flexible** European electricity grid”.

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