

EUROPE WITH “RENEWABLE GAS-READY” TURBINES

BY RALF WEZEL AND SÒNIA CLARENA BARÓN, EUTURBINES

Europe’s energy and climate ambitions

Following the Paris agreement on climate change from 2015, the European Union (EU) committed to deliver its share to keep global warming “well below 2 degrees”. This means reducing greenhouse gas emissions of the whole economy by 40% in 2030 (compared to 1990) and at least 80-95% by 2050. A climate-neutral target by 2050 is currently being considered.

Consequently, being one of the biggest emitters, European countries are rebuilding their energy systems. By 2030, the share of renewables in energy shall reach at least 32%, which translates into 57% renewables in the electricity mix. In the draft long-term strategy^[1] published at the end of 2018 by the European Commission, a full decarbonisation of the power sector by 2050 is foreseen, while, at the same time, the electrification of additional sectors, like transportation, is expected.

In 2018, renewables accounted for 32.3% of the EU electricity^[2]. While only 16% came from wind and solar, their capacities will grow strongly—as opposed to limited growth rates for the other main renewable sources, hydro and biomass. The bulk of future European electricity will therefore be generated with variable wind and sun, requiring a growing need for system flexibility.

The European energy system today is characterised by overcapacities. Renewables benefit from feed-in guarantees and are followed in the merit order curve by lignite, hard coal and nuclear power. Gas plants are at the end of the curve, which is why a considerable number of flexible gas plants in EU countries are not operating today. The EU energy system can easily handle today’s flexibility needs. However, once countries have phased out highly polluting capacities, they will need gas plants—existing and new—to provide the necessary share of dispatchable power and heat.

Investors and the stranded asset discussion

Most EU Member States regard gas power plants as a transitional technology, which will be needed for some time, but which is not compatible with a fully decarbonised energy system. This makes governments as well as investors wonder, whether investments in gas power generation are future-proof.

This concern is further enhanced by growing “sustainable finance” considerations, denying the compatibility of investments in gas infrastructure—including power plants—with sustainability.

Without demonstrating how gas power plants fit into a 2050 system with close-to-zero carbon-emissions, the pressure on investors and operators of power plants to avoid stranded investments and to no longer invest in gas power generation will increase.

Therefore, the European turbine industry, organised within EUTurbines, has complemented the storyline on the advantages of a coal-to-gas switch with a natural-gas-to-renewable-gas switch.

EUTurbines members’ commitment

For most policy makers, gas turbines are tied to “fossil” gas; similarly, they mistakenly link steam turbines with coal.

Right: Official presentation of the commitments in Brussels on January 23. From left to right: Zuozhi Zhao (Siemens), Evan McAvoy (Solar Turbines), Emmanouil Kakaras (MHPS), Michael Ladwig (EUTurbines President), Daniela Gentile (Ansaldo Energia), Harald Stricker (MAN Energy Solutions), Andrew Lammas (GE).



Our Commitments

Right: #PowerTheEU: the gas turbine industry's commitments to drive the transition to renewable-gas power generation.

Explaining that gas turbines need a combustible gas—be it fossil or renewable—requires great efforts and a bold and simple message. Our message: If you want to achieve full decarbonisation and need dispatchable power, we have the solution: turbine technology with renewable gases!

Technically, this can easily be achieved via the use of synthetic methane or defined qualities of biomethane. However, Europe's discussion strongly focuses on hydrogen. Accordingly, our industry commitment specifically addresses the use of hydrogen.

The result: EUTurbines members declared that already today, renewable gases in the form of synthetic methane can be used, that by 2020 natural gas blended with up to 20% hydrogen can be utilised and that, by 2030, customers will be able to acquire turbines operating with hydrogen only. In addition, retrofit solutions for existing turbines shall be developed.

The commitments^[3] have been signed by the manufacturers' CTOs as a visible signal that the industry is serious.

Why now?

Most gas pipelines will not accommodate a share of 20% hydrogen by 2020, but the figure was necessary to demonstrate that the turbine industry will be ready when the gas network operators provide new gases.

Over the next two years, the EU plans a gas market reform. There are critics—NGOs and within the renewables sector—that question the continued need for a European gas grid and support a full electrification—also of the heating and transport sectors. Without a connection to the pipeline, the gas turbine technology would become obsolete.

The alternative: the decarbonisation of gas. Discussions have already started, and for policy considerations, it is essential to be sure that the main gas consumers—like power plants—are able to handle the new (renewable) gases. The commitments reassures legislators and operators that a decarbonised energy system, efficiently coupling the gas, electricity and heat networks, can be achieved and that investments in gas infrastructure and power plants are future-proof.

What about the combustion challenges?

It is obvious that using hydrogen or blended natural gas, creates challenges for the turbine's combustion system. These include safety, emissions and efficiency areas—but

they will be properly addressed. It will need time and cause costs—but all turbine manufacturers have started developing solutions.

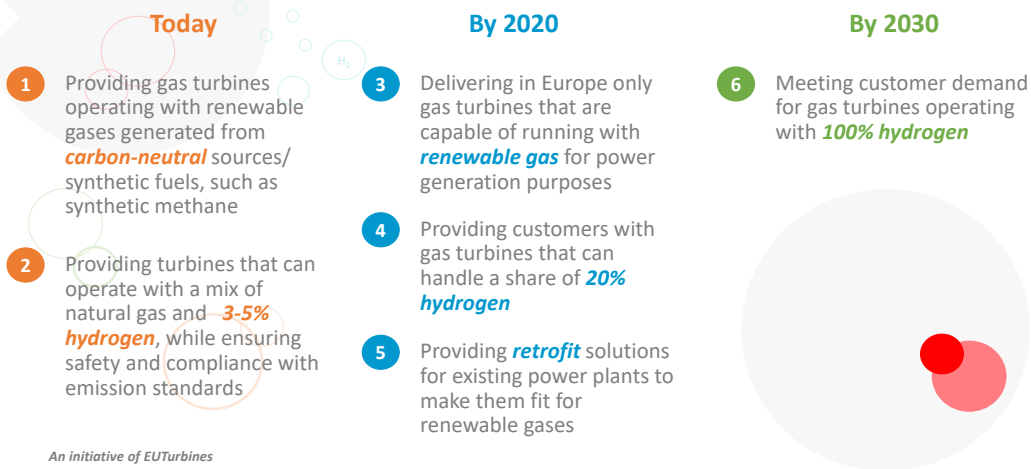
The biggest challenge arises from variations in the gas composition, which seem very likely in a system where increasing amounts of "green" hydrogen from power-to-gas will be injected. A mix of measures, from early and structured information from the grid to blending skids and fast reacting burner adjustments will be needed—together with some agreed limitations at the pipeline's exit point.

The way forward

The commitments are accompanied by several policy requests, from financial support for R&I and large-scale demonstration to the provision of the necessary quantities of renewable gas.

A predictable schedule for the network transformation is key: to adequately adapt its technology, the turbine industry needs to know whether blended gas pipelines or separated grids for methane and hydrogen will be preferred in the transitional period.

While it will take time until customers demand specific hydrogen-based turbines, it is essential to be prepared. The proven capability of turbines to operate with renewable gases - whenever they become available - and solutions to retrofit existing and newly built plants to make them "renewable-gas ready" are essential. Only this will build the trust of policy makers that our technology and a decarbonised energy system are not only compatible but complement each other. ♦



An initiative of EUTurbines

1. "A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy" ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_en.pdf
 2. The European Power Sector in 2018 - Up-to-date analysis on the electricity transition" by AGORA Energiewende. www.agora-energiewende.de/en/publications/the-european-power-sector-in-2018/
 3. www.powertheeu.eu