# The green future for gas turbines

*Gas turbines have a key role to play in stabilising affordability, security and sustainability in Europe's energy sector, argues Christer Björkqvist of ETN Global.*

Switching gear towards a rapid energy transition that considers affordability, security of energy supply as well as environmental sustainability has never been more important.

Europe's energy crisis, accelerated and intensified by the war in Ukraine, has led to a seemingly permanent shift in the world context for energy supply, with the potential to become a global energy supply crisis.

In response, decisive actions and regulatory changes for the energy sector have been taken by the European Commission and European governments.

These actions and regulatory changes, reflected in the European Commission's REPowerEU Plan as well as in the Winter Preparedness Package, outline available tools and strategic measures to reduce the dependency on Russian-supplied fossil fuels, mainly natural gas.

A priority response to this is the provision of new gas imports, resolving the associated impacts on existing infrastructure and planning new infrastructure requirements.

Other areas of focus are fuel diversification; setting minimum mandatory gas storage levels; accelerating the implementation of renewable energy supplies; and energy efficiency measures.

The gas turbine industry can play a significant role in supporting and contributing to the strategic objectives, but such a role is not yet fully reflected in the Plan.

To enable the rapid growth in renewable energy options while energy storage infrastructure remains low will require the maintenance of substantial flexible and dispatchable power capacity to meet demand peaks and offset intermittency, the only serious contenders for which are gas turbine systems.

Gas turbines offer high efficiency, rapidly dispatchable power combined with reliability, operational flexibility and well-established low-emission credentials as well as ability to use low-carbon and hydrogen fuel blends.

These attributes offer important decarbonisation opportunities in the energy transition, a clear path towards a dispatchable zero-carbon technology suited for a wide variety of applications along with the opportunity of additional efficiency increases through sector coupling.

The responsiveness and dispatchability of gas turbines, combined with the existing gas infrastructure and seasonal energy storage solutions, provide security of supply and grid stabilisation for large-scale integration of intermittent renewable energy.

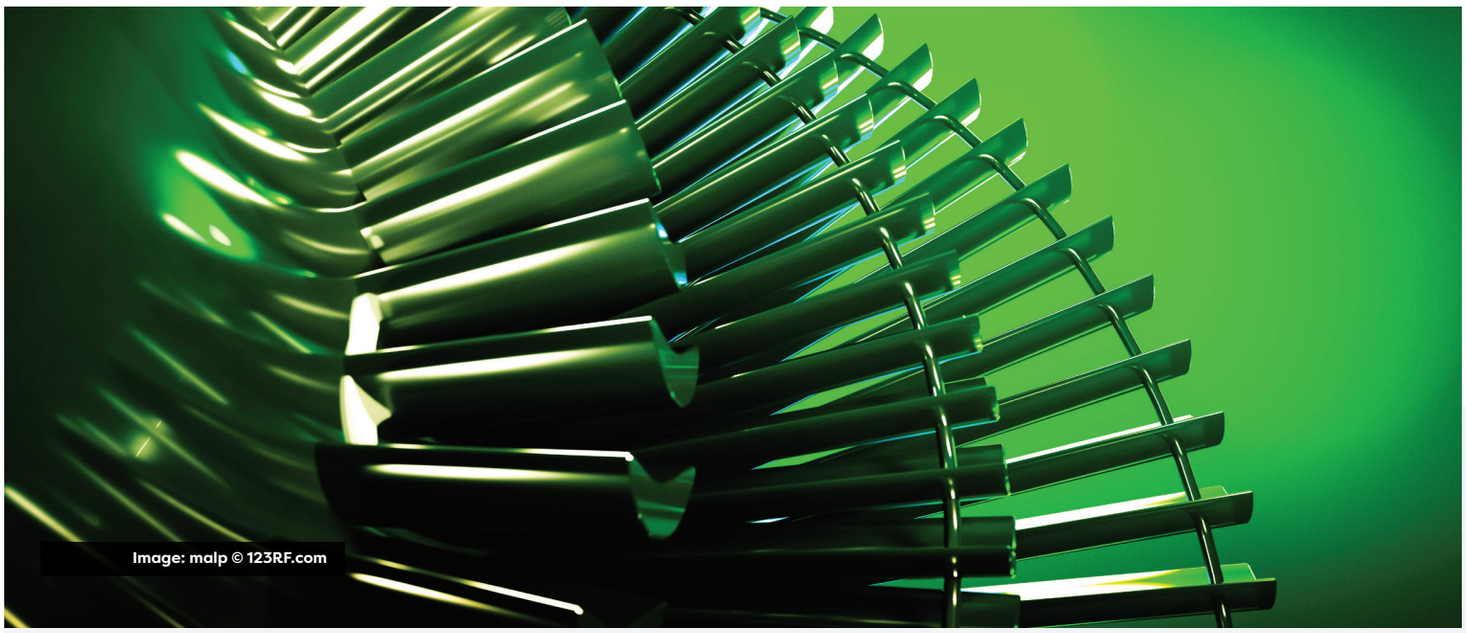
Hydrogen, in particular, is increasingly seen as an attractive option to decarbonise power for air, land and sea applications. Also, hydrogen has greater potential for lower NOx emissions than hydrocarbon fuels.

ETN Global, as an established international association representing the entire gas turbine value chain – including end-users in the gas, power, and industrial sectors – has highlighted to the European Commission and Member States how European energy systems and industry could become more resilient and efficient; and the significant role the gas turbine industry can play to meet urgent short-term power and heat needs, while maintaining progress on the long term 'net-zero' priorities. In the short-term several measures have been proposed.

When it comes to power and heat generation, focus should be placed on plants that provide critical energy services – such as grid stability, critical heat supply, critical infrastructure, essential transport services – that run on natural gas and other suitable fuels.

Focus should then also be on the most efficient power plants – those which can be incentivised to operate at full capacity/maximum efficiency in combined cycle configuration – to ensure the maximum output for the minimum fuel used.

This could save 2 to 5bcm p.a. compared to current practice, for the same power/heat supply.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The gas turbine and end-user community could incrementally save a further 0.1 to 0.2bcm p.a of gas by improving the efficiency, through equipment upgrades, of the existing gas turbine fleets for power generation, heat, and industrial processes.

These upgrades are achievable in scheduled maintenance cycles if appropriate regulatory mechanisms are adopted to incentivise them. This will also bring a CO2 saving benefit to support European decarbonisation ambitions.

To further reduce the dependence on Russian natural gas, beyond that possible through the expansion of indigenous conventional/unconventional sources and increased imports, the gas turbine community could reduce its dependence on natural gas supplies, saving 5bcm natural gas p.a., if alternative fuels are used in the short term.

This would exploit the fuel flexibility of gas turbines, either through their existing dual-fuel capabilities or by retrofitting them for the use of liquid fuels, biogas, or other process-derived gases.

These solutions can be implemented quickly where alternative fuels are available and any necessary operating permit amendments are applied.

Beyond those urgent short-term measures which will save a significant amount of natural gas, the gas turbine community can and should also play a strategic role in the decarbonised energy future, providing carbon-neutral dispatchable power by using hydrogen and other clean gases for power generation, heat, and industrial processes.

The existing gas turbine fleet can be retrofitted to use high levels of these clean gases with the natural gas supply being completely replaced in some cases; in 2030 this could potentially save a further 30bcm p.a. while delivering 150TWh electricity per year.

For this, Hydrogen to Power & Heat and Clean Gases to Power & Heat projects need to be incentivised in addition to incentives for the production and transport of these clean gases.

Only when clean gas production and demand are well coordinated and balanced can the EU start to take advantage of this new clean and innovative energy industry.

Additionally, post-combustion carbon capture and -storage (CCS) could be fitted to gas power plants to provide energy efficient, clean power in the short- to medium term.

The current energy supply crisis has shown that focusing on conventional renewable growth alone is insufficient for the EU to create a resilient and carbon-neutral energy future, due to the intermittency of most renewable energy technologies and the slow growth of large-scale energy storage options.

If rapid progress is to be delivered, more carbon-neutral dispatchable power and heat production is required to balance electricity grids, to meet demand peaks and to offset the intermittency and supply variability of most renewable options.

To achieve this, we need a diversified clean fuel production portfolio to reduce excessive dependence on single energy sources in the future.

Such clean fuels, along with all additional indigenous conventional and unconventional gas supplies are also essential for the rapid scale-up of hydrogen production through steam methane reforming combined with CCS, which is essential to meeting European net-zero targets.

However, for the gas turbine community to deliver these solutions, the required regulatory framework needs to be a priority for the current and future actions of EU policy makers.

The short-term urgency to ensure security of supply will unfortunately in several countries require the rapid deployment of available, more polluting options, such as coal-fired generation.

While this is a necessary emergency response to protect EU economies and societal well-being, we cannot afford this to continue beyond the early stages of the response due to the well-established climate impacts. It is essential that our future climate is not penalised by this crisis.

The rapid provision of a fit-for-purpose regulatory and incentivisation framework is required for the faster development of carbon-neutral dispatchable energy solutions.

This will enable the EU to bring forward its carbon neutral targets by some years, so that the absolute CO2 emissions over the period to 2050 remain as set out in the plan established prior to the war between Russia and Ukraine or may even be further reduced.

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