A large, dark, conical cooling tower of a nuclear power plant dominates the center of the image. The background is a twilight sky with soft orange and blue hues. In the foreground, there are silhouettes of reeds or grasses along a body of water. The overall mood is serene yet industrial.

Nuclear & Energy

Shaping the energies of the future

by Loris Mazza, Partner

“ *2018 confirms the increasing demand for safer, cleaner and cheaper energy; this drives a technological and economic competition & synergy between fossil, nuclear and renewable sources of electric power.* ”

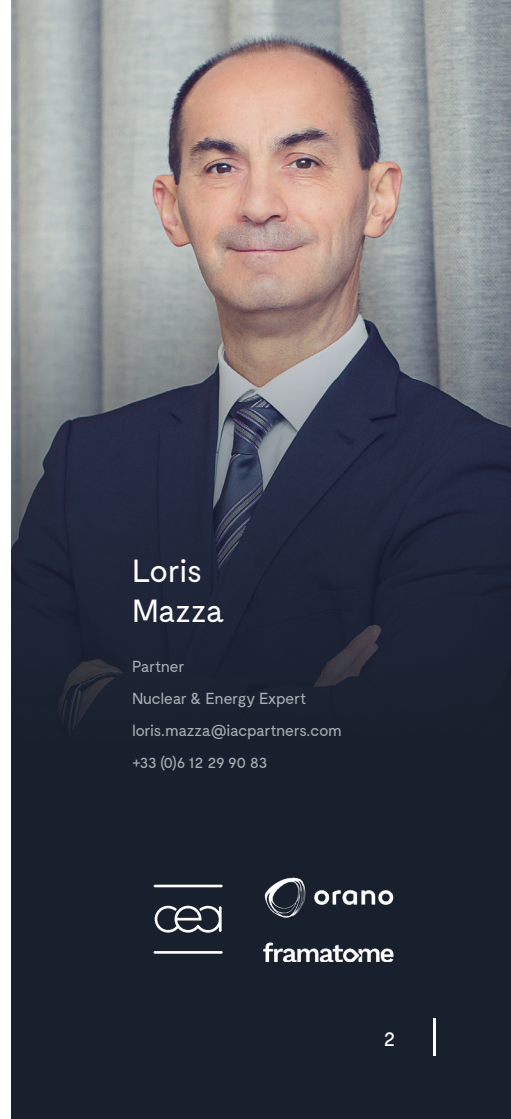
According to the IEA (International Energy Agency) the worldwide yearly consumption of electric power has doubled since 1990 to reach 23000 TWh. Main drivers being emerging countries' needs, the digital transition and a progressive shift from thermal engines to electric vehicles.

Emerging countries need additional power to support their development, while mature countries focus on replacing fossil with alternative energies for environmental concerns. Based on the political, economic and geographic context, every country is adapting its mix of energy sources to cover increasing electric power needs; smart grids are supporting the strong flexibility required by these mixed arrangements.

Nuclear remains, so far, the only non-fossil technology capable to mass

produce electric power at a Levelized Cost of Energy (LCoE) close to gas/oil/coal and independently from geo-climate conditions; the biggest challenges remain to be convincing in terms of environmental risks and to limit the currently very high investment levels and time-to-turnkey for operators.

For the green renewable technologies, mainly wind and solar, the challenge is to increase output and continuity of supply, to bring their LCoE down and become less invasive for the environment; for example, COLAS is developing solar carriageways for the highways. Innovations are underway, but the major next step is to convince authorities to adopt these solutions with still poor investment/performance ratio.



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Perspectives

Major transformations are ongoing in the energy sector with different trends between mature and emerging countries. Mature countries' consumption growth is reduced; the main focus is on replacing old fossil with new renewable energy power plants to reduce carbon footprint. Developing countries need strong additional power generation to support their growth; they are increasingly

investing in renewable energies, but on the other hand are continuing to invest in nuclear and fossil energies.

The Power Grid of the future has to integrate a mix of different energies and adapt to evolving needs. Flexibility is key and the development of storage systems will continue to improve the combination of supply stable (fossil, nuclear) and weather depending (wind, solar) energies.

⌘ Nuclear

It will stay stable/declining in mature countries, shifting to renewable, but will strongly grow in emerging countries; Conversely, emerging markets are investing in nuclear plants, with China aiming at becoming a world leader, focus will be costs (LCoE) and safety.

☀ Photovoltaic

It will also grow, both in number of projects and in scale. In the mid to long term, solar energy is expected to gain in competitiveness (current LCOE at ~100\$/MWh) and bypass wind energy by 2025 in terms of installed base.

⚡ Wind

It will grow driven by environmental pressure pushing for quick projects' commissioning. Given large footprint requirements from wind turbines, growth will mainly come from offshore projects.

2017-2040 Challenges

1 billion

In 2017, the number of people without access to electricity reached the below 1 billion level.

China

In 2017, China was the major country contributing to the global growth in energy contribution.

20%

Renewable Energy Directive in EU targets **20%** of renewable technologies in the energy mix by 2020, raising it to **32%** by 2030.

Two thirds

Renewable energies are expected to represent **two thirds** of global investments in power plants to 2040.