

**Abstract:** In a post-emergency period, when most countries have finally restarted their social and productive activities, triggering a new growth in the world energy consumption, there is an increasing awareness that we are at a critical crossroads on the way towards sustainability. The European commitment to carbon neutrality by 2050 and the US return to the Paris agreement, as opposed to the postponement of peak coal consumption by large economies such as China and India, urge us to completely re-think our approach to energy, and re-design our generation, transmission, and consumption patterns with a more holistic perspective. Within this context, offshore systems have a major role to play, not only for the emerging relevance of ocean renewables, but also because traditionally polluting and energy-intensive offshore activities are embracing more sustainable energy paradigms through electrification and digitalization. In fact, the implementation of a trans-national “Super Grid” will finally require the integration of large-scale offshore renewables, loads and storage systems with the onshore power grid, demanding new approaches for their joint design, operation, and control. This talk will discuss the status, perspectives and challenges faced by offshore networks, stressing their peculiarities compared to land-based power grids. It will address the pivotal role of power electronics, digitalization, and real-time information exchange in creating the innovative design and control approaches enabling offshore isolated or grid-connected energy systems to cope with the harsh environment and demanding operating conditions, while still providing premium support to human activities.