The China’s Pilot: When Robustness Backfires

The Pilot project offers a clear example of the pitfalls that can arise when large-scale energy infrastructure lacks strategic flexibility. Conceived by a Chinese corporation in 2018 and implemented in 2021, the project aimed to showcase the technical feasibility of floating offshore wind power in sea waters along China’s southern coast. Located in Guangdong Province, the demonstration involved the deployment of a single 5 MW turbine on semi-submersible floater at a water depth of 30 meters. The 90-meter width by 30-meter height floating foundation was engineered to withstand extreme oceanic conditions, designed to resist wave and wind in typhoon that statistically occur only once every 50 years.

This emphasis on robustness, combined with a compressed development timeline, resulted in an excessively expensive project, with a levelized cost of electricity (LCOE) estimated at over €300 per MWh, more than double the European benchmark. This high cost is particularly striking given China's comparative advantages in steel production and lower labor costs relative to European countries.

Driven by concerns over the extreme typhoon conditions common to the South China Sea, the engineering team prioritized survivability over modularity or scalability. Unfortunately, despite this conservative design philosophy, the project experienced critical failures soon after commissioning. Shortly after the turbine became operational, water intrusion was detected within the floating platform due to design flaws, forcing the system offline. After the issue was rectified, a subsequent typhoon damaged the submarine dynamic power cable, leading to another prolonged shutdown.

What was originally intended to be a flagship demonstration of China's floating wind capabilities ended in operational setbacks and cost overruns. This case underscores the value of incorporating real options and flexibility into the planning and execution of complex infrastructure. A more adaptive design strategy, coupled with a longer development timeline and incremental deployment, could have reduced both technical risk and overall costs, aligning the project more closely with sustainable innovation practices in the energy sector.