CLEAN AIR TASK FORCE

Nuclear Energy Orderbooks 101: Enabling Cost-Effective Nuclear Deployment in Europe

EU Member States expect to deploy at least 60 GW of new nuclear capacity by 2050 to meet its climate and energy security goals. But without greater coordination, the bloc risks a fragmented rollout of new nuclear energy: duplicated efforts, spiralling costs, underinvested supply chains, and project delays.

A nuclear energy reactor orderbook – a series of standardised, repetitive builds, preferably grouped at few locations – can significantly cut costs, accelerate timelines, and strengthen supply chains and workforce capacity.

This factsheet outlines how nuclear orderbooks can help Member States deliver reliable, cost-effective nuclear energy while avoiding the inefficiencies of fragmented deployment.

What is an orderbook?

An orderbook is typically defined from the supplier's perspective as a queue of independent orders for a given product or service. For example, the aircraft company Airbus maintains an orderbook for A320neos airplanes to meet demand of various airlines worldwide.

This demand model works well in industries with a broad customer base coupled with a durable demand signal. The nuclear energy industry lacks these conditions, however, requiring a new approach to develop orderbooks at scale. Such an approach includes additional investment and policy levers to support successful large-scale fleet deployment, while sending a clear and robust demand signal to market and supply chains.

What is a nuclear energy orderbook?

When paired with demand aggregation, risk-sharing mechanisms, and regulatory coherence, this industrial model can unlock scalable, secure, and cost-effective deployment of nuclear energy.

Uncoordinated Nuclear Deployment	Coordinated Nuclear Technology Orders
Technology heterogeneity resulting in fewer of any one design being built, leading to fragmented experience with the attendant longer project timelines and increased cost overruns	Technology homogeneity resulting in improved learning rates and cost and schedule performance through depth of experience
Reduced opportunities for scaling efficiencies, reducing overall investor interest and confidence	Increased opportunities for scaling efficiencies, increasing investor interest and confidence
Increased pressure on licensing and regulatory resources	Regulatory maturity due to efficient use of resources
Supply chain pressures due to fragmentation and niche component bottlenecks	Mature nuclear ecosystem and robust supply chain

What are the benefits of nuclear reactor orderbooks?

Orderbooks enable a lower average cost per unit. **Building new nuclear capacity at scale**, on time, and on budget isn't just a matter of science and engineering — **it's fundamentally about robust project management, streamlined supply chains, and strong institutional capacity.** Wright's Law, the "learning by doing" effect by which costs drop by a predictable percentage with each doubling of cumulative production, has driven down prices in aviation, solar panels, and batteries. Yet nuclear construction has largely resisted this learning curve. That resistance stems from (1) design evolution instead of design standardisation and serial replication; (2) fragmented and often adversarial project-management practices; and (3) an underinvestment in construction-process optimisation, from vendor qualification to on-site workflow.

Figure 1. Capital Cost Reductions at Barakah Units 1-4. Barakah (UAE) saw 50% capital cost reductions from Unit 1 to Unit 4 of APR1400s (Advanced Power Reactors). Source: ETI

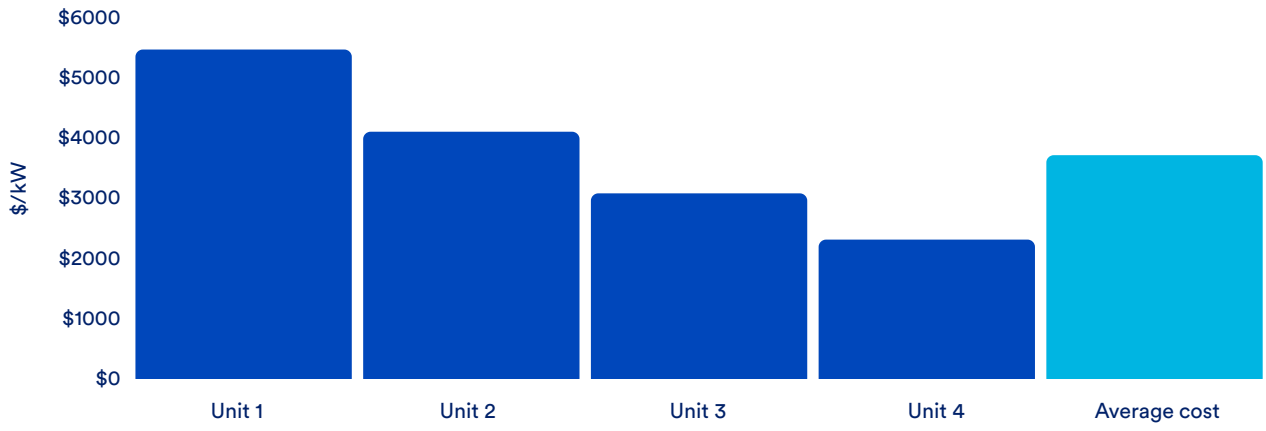
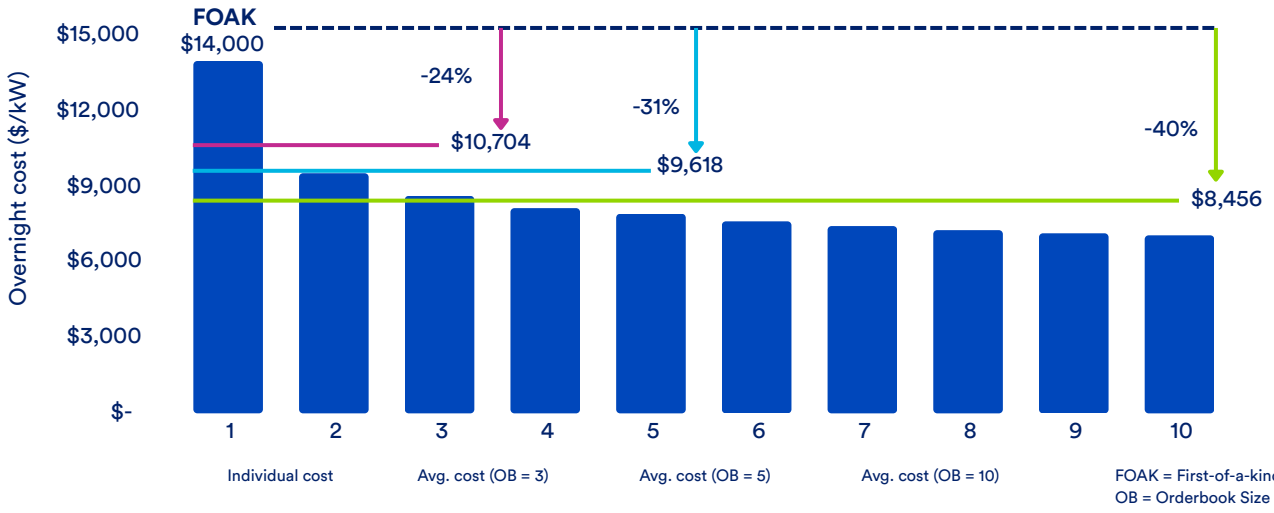


Figure 2. Larger orderbooks enable lower average unit cost; which helps to neutralise first-mover disadvantage. Source: EFI Foundation



How can orderbooks support scalable, secure, and cost-effective deployment of nuclear energy in Europe?

1. Nuclear energy has a key role to play in achieving decarbonisation, industrial competitiveness, reliable grids, and energy security. According to latest EU Nuclear Illustrative Programme, Member States plan to deploy at least 60 GW of new nuclear by 2050.

2. There is a risk of an uncoordinated pipeline of nuclear projects mounting in the EU leading to supply chain bottlenecks and shortage of skilled workers resulting in delayed deployment. Increasing strategic coordination within and across Member States between projects can maximise cost reductions via economy of series. Orderbooks with its potential cost-saving and coordinated action can help Member States deliver on their climate and energy security ambitions.

3. Orderbooks can help EU address some ongoing barriers to deployment that the bloc is facing, such as:
   - Fragmented regulatory frameworks within and across Member States
   - Financing and investment barriers
   - Supply chain and workforce limitations
   - Lack of politically durable supportive policy landscape

Learn more:

- NSI Global Strategy - Nuclear Scaling Initiative (NSI)
- Nuclear Energy: A Clean Firm Power Option for Decarbonising the European Union - Clean Air Task Force
- How Europe can make nuclear energy a key part of its clean industrial future - Clean Air Task Force
- CATF's Recommendations for the PINC Update: A New Vision for EU Nuclear Leadership - Clean Air Task Force