

R110-T3

ET3 Atypical
Non-Load, Non-Lead
Interventions EJP Summary

Digital Twin and Power Systems

Digitalization



Digital Twin and Power Systems – investment summary

This investment submission seeks funding to develop and enhance NGET's current Digital Twin Capabilities, focusing on Power System Analysis, Modelling, and Building Information Modelling (BIM). These capabilities are crucial to creating a more resilient and compliant electricity transmission network, which supports the UK government's decarbonisation targets.

The UK aims to rely entirely on clean power by 2030 and achieve net-zero emissions by 2050. To support these goals, NGET needs to transform its Power Systems Analysis and Network Modelling capability, integrating advanced tools like digital twins, Artificial Intelligence (AI), and potentially quantum simulation.

Drivers for digital investment

The primary drivers for this digital investment include:

- Net zero: Achieving the UK's goal of relying entirely on clean power by 2030 and being on track to achieve net-zero emissions by 2050 requires accelerating the transition towards a low-carbon society. This involves designing a network that can accommodate future capacity requirements while ensuring readiness to design, develop, and deliver this network efficiently.
- Changing demand: Traditional deterministic and linear processes for network planning are no longer sufficient. A new network modelling approach that can handle increasing demand, uncertainty, and variability is needed. This involves real-time information, future scenarios, and advanced iterative modelling capabilities to design and deliver the most efficient network.
- Mitigate risk: NGET needs a 'sandbox' environment to model theoretical, physical, and functional scenarios before making physical interventions. This reduces costs, informs investment decisions, and mitigates risks.

Options Considered

The investment paper considered several options, with detailed cost-benefit analyses performed for each.

Preferred Solution

The preferred option is a comprehensive approach combining advanced simulation tools, probabilistic modelling, quantum simulation, and digital twins. This includes:

- Power Systems: Concurrently maintain and optimise BAU activities, explore data integration possibilities, and run a discovery period to address next-generation network planning challenges through a cross-industry consortium.
- BIM: Complete rollout across all ASTI and Major Projects, encouraging Joint Ventures to adopt BIM where possible. This includes using BIM for 'sandbox' environments, enabling collaborative design and construction processes.

Timeline

BIM will be rolled out incrementally, starting with the initial adopters in RIIO-T2. Investigation of integration possibilities for current Power System Modelling tools will continue throughout RIIO-T3. The discovery period for advanced solutions will start in RIIO-T2 and continue into RIIO-T3, with the assumption of a reopener for implementation once solutions are agreed upon.

Conclusion

The preferred option is the most cost-effective way to meet strategic needs and align with NGET's Digital Strategy Action Plan (DSAP). It ensures a resilient, future-proof network capable of supporting the UK's net-zero ambitions. This approach provides significant consumer value, improves stakeholder engagement, and enhances the capability to support renewable energy integration. The investment will drive operational excellence, enabling NGET to meet regulatory requirements and deliver a robust, efficient network for the future.

This investment seeks funding for the digital transformation of the end-to-end construction process at National Grid Electricity Transmission (NGET). The goal is to develop a digital construction orchestration platform encompassing a Common Data Environment (CDE), construction materials

management, construction project planning and management, construction project risk management, and cost and estimation management.