



Mine-water Energy Toolkit

Private Wire Connections

Summary

The high input cost of grid electricity in the UK is a major barrier to the development of renewable heat energy infrastructure projects.

A solution to this problem is to incorporate on-site electricity generation for mine-water energy projects or to purchase electricity directly from a renewable energy producer such as a wind farm, often by way of a direct physical connection from the generator to the heat infrastructure.

This section looks at the steps to be taken in developing this type of private wire connection. Appendix 8 contains details of a specific case study.

Key Points

1. Conduct a comprehensive study to assess the feasibility of connecting the energy project to the intended destination. This will involve examining the current power demand, evaluating the prospective site for the mine-water energy project, assessing the technical feasibility of connecting to a private wire, and estimating potential costs.
2. Undertake detailed Front End Engineering Design (FEED) works to ensure full understanding of private wire network design, route, connections, voltage levels, substation configuration, contracts arrangement, safety measures, regulatory framework, planning and techno economic modelling outputs.
3. Evaluate expansion opportunities. Explore the potential of integrating the new connection into an extensive private wire network. This involves assessing the possibility of incorporating the connection into existing infrastructure, as well as opportunities for expanding connections to other estates, public services, and commercial buildings.
4. Identify new/existing sources of electricity. Open discussions with the generator/developer about a private wire off-take. Progress discussions to a non-legally binding Heads of Terms and then into a legally binding Power Purchase Agreement.
5. Commence early engagement with key stakeholders including connection customers, utility providers, Local Authority Planning Department. This is an essential initial and ongoing activity to secure buy-in.
6. Obtain Letters of Support/Intent from proposed connection customers. These letters are not legally binding, but it forces the potential customers to assess and declare their level of interest in the concept, and provides some evidence of engagement for potential funders.
7. As the concept develops, Heads of Terms should be arranged with the potential customers which will cover pricing principals and outline technical standards. This will later develop into a supply contract.
8. The route has the potential to cross multiple landowners. Identify landowners using the Land Registry. Local authorities, planning consultants and surveyors are familiar with this process.
9. Negotiate easements with landowners, who may ask for payment.
10. Develop a techno-economic model for the private wire network. This includes performing an Engineering, Procurement, and Construction (EPC) Request for Budget Quotation exercise, encompassing cost estimation for the entire project, route planning, setting network operating conditions, arranging cable schedules, planning transformer and substation configuration, and metering arrangements.

11. Develop the concept design of a combined heat and power Energy Centre. This involves planning for components such as transformers, power distribution boards, heat exchangers, and control and instrumentation panels. This task also includes planning the stepping down of property connections to meet varying consumer demands.
12. Understand private wire electricity supply regulatory framework and potential compliance impacts including supply from power sources which have Renewable Obligation Accreditation.
13. Discuss with the Local Authority the need for permissions for construction and environmental assessments.
14. Develop necessary legal documents, such as EPC Contract documents, with legal counsel. Also, conduct a detailed assessment of how compliance can be ensured against the regulatory framework.
15. Assess potential network adoption. Evaluate the possibility of adopting the existing Distribution Network Operator (DNO) network and associated substations as an alternative to installing a completely new private wire network. This involves engaging with the DNO to assess the feasibility and costs of a potential transfer of network ownership.
16. Where possible consider dual heat and power networks to develop a pathway for future net zero, include as a key deliverable in construction design for EPC.

Key Actions

Action	Timeline
<p>1. Undertake Mine-water Heat Power Supply (Private wire Network and DNO back-up) Front End Engineering Design Study to include</p> <ul style="list-style-type: none"> • Identification of Mine-water Heat Energy Centre, abstraction and return pumping, supplementary heat source integration, Heat Substation flow and return, balance of plant, control systems power requirement with 8760 annual hours demand profiling. • Confirm Private Wire and as required DNO connection route with development of GIS OS tile detailing Renewable Power Generator location, HV cable route, Energy Centre, Private Wire LV offtaker locations. • Identification of renewable and low carbon power connection for private wire supply including power 	8 months

studies, voltage supply, protection engineering and connection route.

- Undertake contractual discussions to execute Heads of Terms for Renewable Power connection Power Purchase Agreement.
- Develop Energy Centre, Heat Substation HV/LV Single Line Diagrams and Functional Specifications including Procurement Schedules (Cable Schedules (Cable Sizing), Transformer, Switchgear, Protection Engineering and Renewable/Low Carbon Generator integration (if applicable)
- Develop outline PWN route trench and trefoil details
- Undertake Phase 1 Ground and Soil investigations with trial pits and targeted cores to inform next steps in the detailed design and projects costings / Techno Economic Model.
- Engage with suppliers who can provide Design & Build and Operate & Maintain services suppliers through Invitation to Tender and managed Request for Proposal process.
- Confirm Regulatory and Legislative requirements and considerations.

2. Planning Application, early engagement with LPA including LFFA (Lead Local Flood Authority), develop application with supplementary studies i.e. Ecology, Archaeology, Noise, FRA etc.

3. Engage with Environment Agency or Natural Resources Wales and undertake assessments for water resources and mine-water related activities

4. Engage with Distribution Network Operator for Renewable Generator Connection and back-up import see link

<https://www.energynetworks.org/operating-the-networks/connecting-to-the-networks/>

<ol style="list-style-type: none">5. Develop Techno-Economic Model including CAPEX, OPEX, REPEX, REVENUES inputs6. Develop Project Delivery Governance Structure (Roles, Responsibilities, Organogram).7. Develop indicative DBOM Form of Contract for EPC	
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