

# Electricity Transmission Technologies

A comparison of costs and characteristics.

As an essential part of the country's action to limit global warming, the UK is decarbonising its electricity system and electrifying the use of energy for heating, transport and industry. Access to this cleaner, more affordable, secure supply of energy requires the biggest programme of electricity transmission development in two generations.

An independent report published by the IET provides a rich body of information on the characteristics and relative costs of different network infrastructure technologies.



"This comprehensive examination of the costs associated with electricity transmission network technologies represents a significant contribution to the ongoing public debate surrounding our energy infrastructure and the future of electricity transmission in the UK." Mike Reader MP

Chair of the All-Party Parliamentary Group on Infrastructure

£/MWkm - Units used to compare lifetime costs

 $\pounds$ /MWkm have been used to compare lifetime costs for typical applications. One MWkm is the capability to transfer one megawatt of power over a distance of one kilometre.



### Onshore or offshore

Using offshore submarine cables to enhance the transmission network's capacity to transfer power from one location to another can reduce the need for onshore network development but does not eliminate it. Network capacity is still needed to get power to where it's used.

Scan here to read the full report 

## Non-cost characteristics

Technology selection is influenced by a variety of cost and non-cost factors. Each of these is described in the report for a wide range of technology options. Precisely how they influence the selection of a technology or mix of technologies is context and project specific.

Criterion	Description
Environmental	Direct and indirect impact on the local environment during both construction and operations, including the extent to which the local environment can be restored or enhanced after construction. Includes geology, soil, water, ecology, cultural heritage and noise, each particular to where the technology is proposed for deployment.
Carbon	Embodied carbon content during construction and operations.
Local impact	Direct and indirect impact on local communities during construction and operation. Includes visual impacts and the need for space to be maintained around the installation.
Technology readiness	Considers both the technology readiness level (TRL) and also GB experience.
Technology adaptability	Ease of adapting the technology to different deployment contexts or changed needs on the power system.
Technology resilience	Considers resilience to extreme weather such as high wind speeds and flooding, and the ease of making repairs.
Programme	Considers pre-construction logistics and timeline including the need for planning consents, as well as manufacturing and construction programme duration.



### Policy considerations

The development of network infrastructure is undertaken in line with established Government Policies and guidelines and the transmission owners' legal obligations under their licences, underpinned through legislation and regulation.

- National Policy Statements National Policy Statement for electricity networks infrastructure (EN-5) for England & Wales<sup>1</sup>, National Planning Framework 4 for Scotland.<sup>2</sup>
- **Electricity Act 1989** To develop and maintain an efficient, co-ordinated and economical system of electricity transmission.<sup>3</sup>
- Planning Act 2008 The approach to consenting electricity transmission.<sup>4</sup>
- Town and Country Planning (Scotland) Act 1997, as amended -Key legislation relevant to grid development in Scotland.<sup>5</sup>
- Holford Rules Guidelines on overhead line routing.<sup>6</sup>
- Horlock Rules Approach to designing and siting substations.<sup>7</sup>

#### For further analysis please see section 5 of the report. Links below correct as of February 2025.

- $\label{eq:linear} $$ https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf $$$
- <sup>2</sup> https://www.gov.scot/publications/national-planning-framework-4
- <sup>3</sup> https://www.legislation.gov.uk/ukpga/1989/29
- <sup>4</sup> https://www.legislation.gov.uk/ukpga/2008/29/contents
- <sup>5</sup> https://www.legislation.gov.uk/asp/2019/13/contents
- <sup>6</sup> https://www.nationalgrid.com/sites/default/files/documents/13795-The%20Holford%20Rules.pdf
- <sup>7</sup> https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf

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