National Grid

Electricity Transmission Cost Study: How does the independent report compare to National Grid's view?

The Report

On 31 January 2012, the Institution of Engineering and Technology and Parsons Brinckerhoff published a report into the costs of new electricity transmission infrastructure.

The report analyses the costs of installing and maintaining new high voltage transmission circuits under the ground, under the sea and overhead.

The Infrastructure Planning Commission requested this report so it can be used as a point of reference to inform their evaluation of planning applications for new electricity infrastructure to connect future power sources to the national grid.

National Grid's View

The findings of the report are broadly in line with our own analysis. We welcome the publication and believe it will be a very valuable addition to the public debate. As a company, we are neutral to the type of transmission technology we use – be it overhead lines or undergrounded cables. The decision on method is made on a case by case basis after consultation with the authorities and communities involved.

In deciding on the technology that is used, we recognise that there is a balance to be struck between the visual impact of our proposals and the costs which will ultimately be paid for by customers. When we published our "Approach to the design and routeing of new electricity transmission lines", we gave a commitment to place greater emphasis on the visual impact of our proposals whilst continuing to balance this with the associated costs of different methods. Ultimately it will be the Government and planning authorities who will decide, on behalf of society, where the balance should sit.

Summary of Findings

The report finds that the cost of installing new power connections underground, using existing technologies, is always more expensive than installing overhead lines. The report also identifies factors that have an impact on costs - such as terrain, route lengths and power capacity.

The report's remit purely relates to engineering costs. Although it does acknowledge the aesthetic, human and environmental impacts, it makes no analysis of these areas.

The report also says that using ratios as a means of comparing the costs between overhead and underground lines can sometimes be misleading or confusing. This note explains why that is and provides a comparative breakdown of the figures used by National Grid and those in the report.

Why does the report say that ratios can be misleading?

There are several different ways of measuring the difference in costs between different technologies. For example, some estimates take into account only capital build costs, while others use life-time costs (which include build costs plus operation and maintenance costs, and the value of power losses over the 40 year life of the transmission line).

The report finds that, excluding build costs, the cost of operation, maintenance and energy losses over the life of the connection is broadly the same for undergrounding and overhead lines. However, the report also concludes that the capital build costs on their own vary greatly – undergrounding is approximately 10 times more expensive to build than overhead lines.

When the two amounts are combined and the total cost over the life of the connection (build costs and operational and maintenance costs) is calculated, undergrounding costs around five times more than overhead lines.

This is illustrated in the table below:

	Capital build cost - per km	Total Life-time cost (build and operation and maintenance) - per km
Overhead	£1.6m	£4.0m
Underground	£16.7m	£18.9m
Cost Difference	***£15.1m***	***£14.9m***
Ratio	***Approx. 10:1***	***Approx. 5:1***

Figures extracted from IET Report based upon 75km medium capacity circuit

Comparison between National Grid and the report figures

In the numbers that we submitted to the IET/PB report, the capital cost ratio indicated that undergrounding was around 11 to 12 times more expensive than overhead lines. This is broadly in line with the findings of the report. Our own calculations on total life time costs are also broadly in line with the report's findings.

We have at times said that the capital cost of undergrounding can be up to 17 times as expensive as overhead lines. This is towards the upper end of the range of possible costs of undergrounding compared to overhead lines and applies to more complex underground projects such as in urban areas or where there may be obstructions to negotiate.

By way of example, the tables below show the National Grid calculations next to those concluded by the report, highlighting the similarities in both calculations. Figures are based upon a medium capacity connection with two circuits, each with a 3190 MW rating.

Case Study 75km Route	Build (Capital)		Lifetime	
	Report per km	National Grid per km	Report per km	National Grid per km
Overhead	£1.6 m	£1.6m	£4.0m	£4.8m
Underground	£16.7m	£18.8m	£18.9m	£20.8m
Cost Diff	***£15.1m***	***£17.2m***	***£14.9m***	***£16.0m***

Case Study 15km Route	Build (Capital)		Lifetime	
	Report per km	National Grid per km	Report per km	National Grid per km
Overhead	£1.7m	£1.6m	£4.1m	£4.8m
Underground	£17.4m	£18.0m	£19.3m	£19.2m
Cost Diff	***£15.7m***	***£16.4m***	***£15.2m***	***£14.4m***

Ultimately, the report recognises that a variety of different factors will influence the costs on individual projects. Overall the figures in the report are broadly in line with the costs National Grid has quoted in the past.

Conclusion

Calculating the cost of different transmission methods can involve taking into account many different factors and assuming different levels of impact. However, National Grid's figures broadly agree with the conclusions of the IET report, and we welcome this valuable addition to the debate.

The report states that cost ratios can be misleading. For this reason, it advises that alternative technologies should be compared by reference to the absolute difference between their respective costs.

Our position remains neutral on the technology used for transmission connections. Decisions are made on a case by case basis after consultation with the authorities and local community. One of our main priorities is to make sure that as much information on costs, such as that used in our own calculations and that contained in the report, is made available to the public. We hope that this enables a better understanding of how we come to our conclusions, and how we balance the visual impact of new transmission lines with the cost to the electricity consumer.