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Recent developments in undergrounding in the UK

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RGI Cable Workshop 13 & 14 February 2012

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What I will cover

- The **energy challenge** in **England and Wales**

1. **Authoritative report** into electricity transmission **costs**
2. **National Grid's approach to the design and routeing** of new electricity transmission lines
3. **New fund** for addressing the **visual impact of existing overhead lines** in National Parks and Areas of Outstanding Natural Beauty

Major 400kV transmission projects in England and Wales

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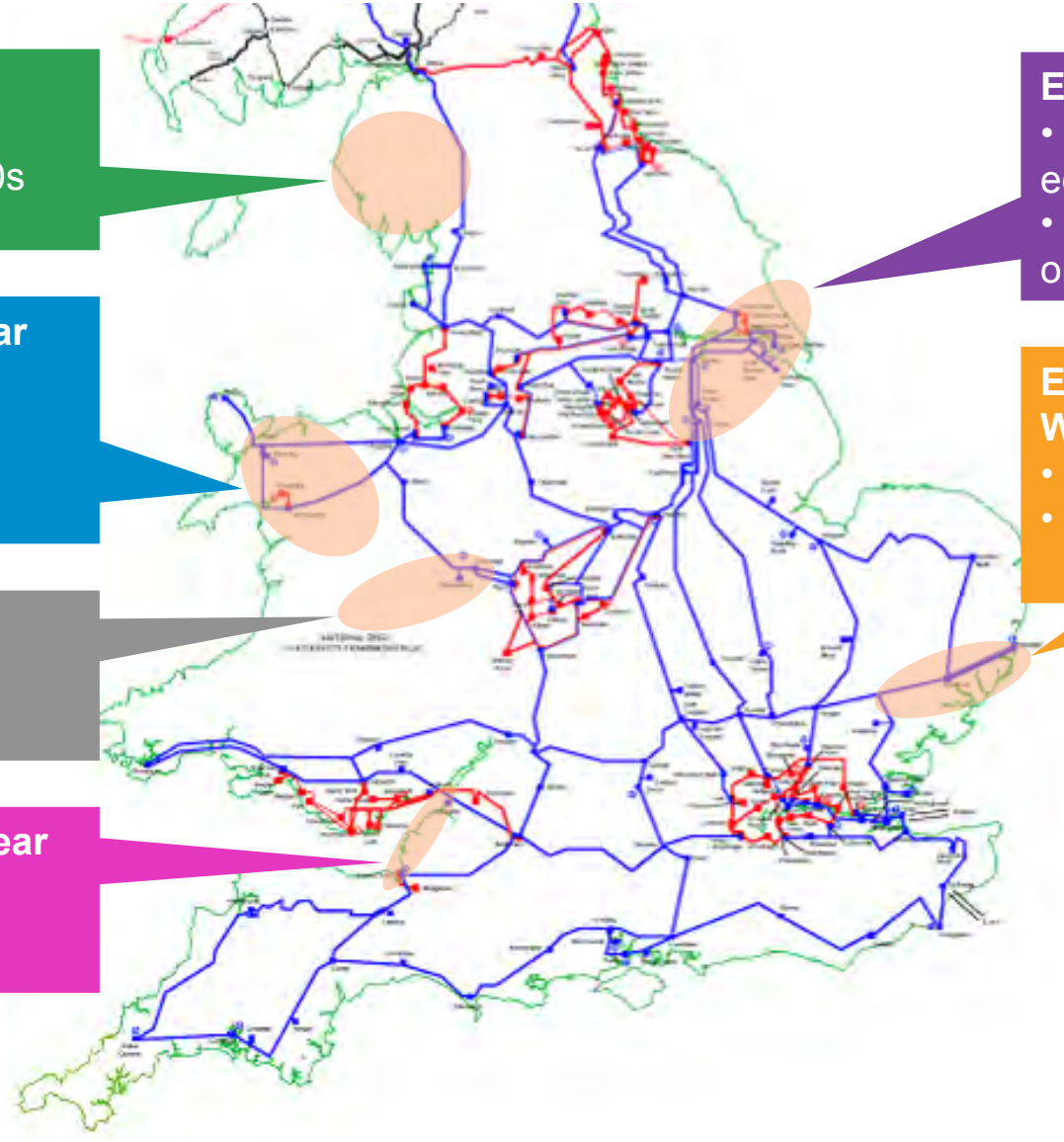
Cumbria Nuclear
- ~200km new line
- Delivery early 2020s

North Wales Nuclear and Wind
- ~30km new line
- Delivery 2017/18

Mid Wales Wind
- ~60km new line
- Delivery 2015/16

Hinkley Point Nuclear
- ~60km new line
- Delivery 2017/18

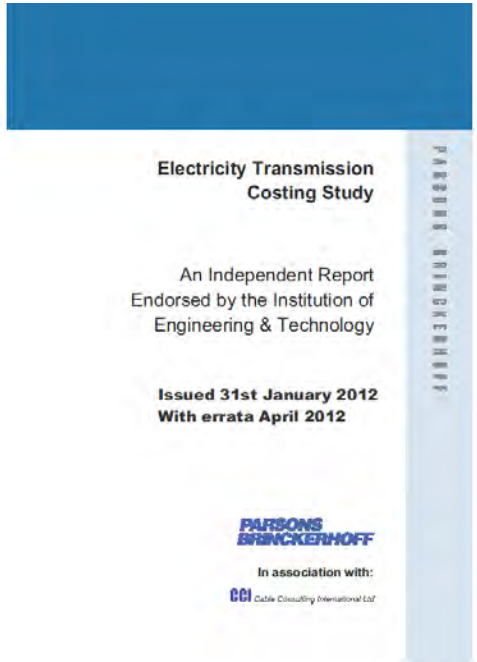


East Coast Wind
- ~60-70km new lines or equivalent
- Delivery 2017/18 onwards

East Anglia Nuclear and Wind
- ~30km new line
- Delivery 2017/18

1. Electricity transmission costing study

- Independent Report by PARSONS BRINCKERHOFF in association with CCI Cable Consulting International Ltd — *Providing power cable expertise around the world*
- Endorsed by IET The Institution of Engineering and Technology
- Funded by nationalgrid
- Published on 31st January 2012
- Requested by Chief Executive of the Government's Planning Inspectorate — The Planning Inspectorate
- Well received as an independent and authoritative reference document by industry and NGOs



Link - http://www.theiet.org/factfiles/transmission-report.cfm

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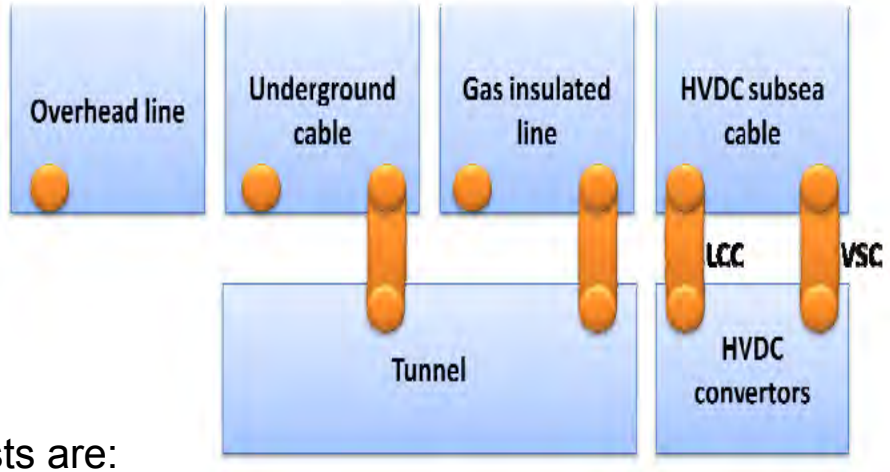
Costing study: findings

- The study included several technologies



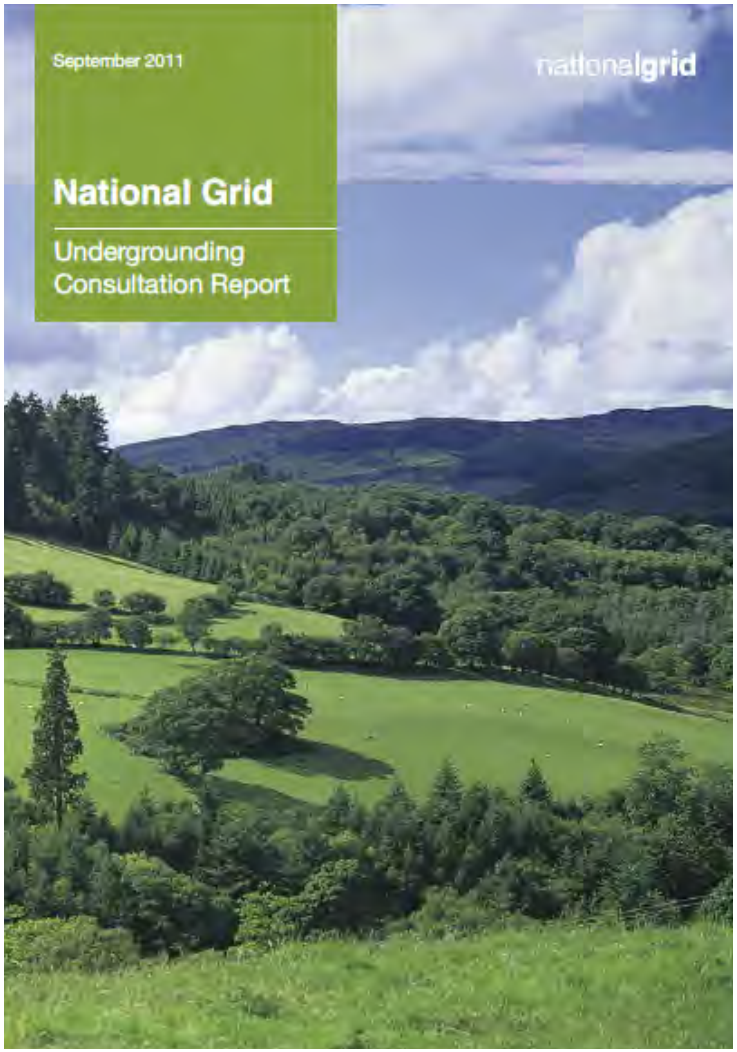
- As an example based on a 75km medium capacity circuit the comparative costs are:

	Captial Build Cost - per km	Total Life-time cost (build and operation and maintenance) - per km
Overhead	£1.6m (€1.85m)	£4.0m (€4.64m)
Underground	£16.7m (€19.36m)	£18.9m (€21.91m)
Cost Difference	**£15.1m (€17.5m)**	**£14.9m (€17.27m)**
Ratio	**Approx. 10:1**	**Approx 5:1**

Figures extracted from IET Report based upon 75km medium capacity circuit
GBR to EUR exhange rate based on £1 to €1.16

- Ratios can be misleading
- Excludes social or environmental costs – out of scope

2. National Grid's consultation on undergrounding policy



- Decision in 2010 that existing policy was no longer fit for purpose
  - criteria-based – hard to apply to new generation of projects
  - did not take account of public consultation.
- Consultation between **Dec 2010 and July 2011**
- **1,113** people registered on the consultation website to receive updates
- **100** stakeholders took part in the workshops
- **608** people completed the online questionnaire
- **378** letters, emails and calls were received with feedback
- The majority of responses came from residents in **major project** areas
- Consultation report issued **14 September 2011**

The results: a new approach to design and routeing of new electricity lines

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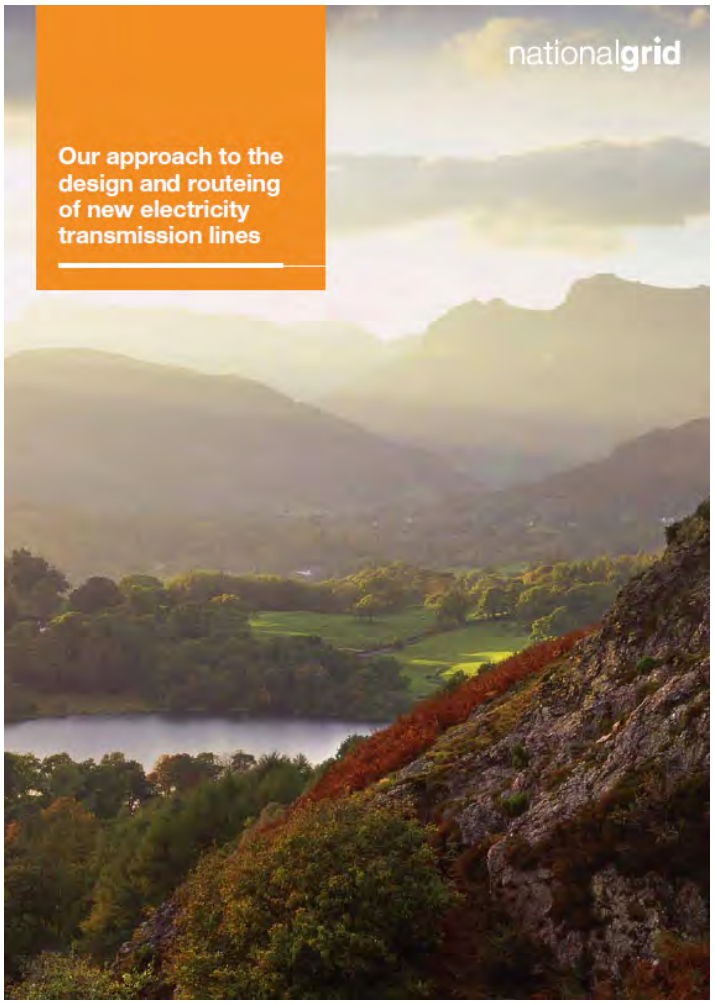

- An approach to **routeing lines** – wider than undergrounding
- A **process** rather than a policy
- Recognises **environmental** and **social** impacts as well as system and cost issues
- Early and meaningful **engagement** with stakeholders and communities to understand local considerations
- Options appraisal methods to be applied on a **case-by-case** basis – no preference for overhead or underground solutions
- Greater emphasis on **mitigating visual impact** – recognise that not all sites that are valued or important are in designated areas

The results: a new approach to design and routeing of new electricity lines

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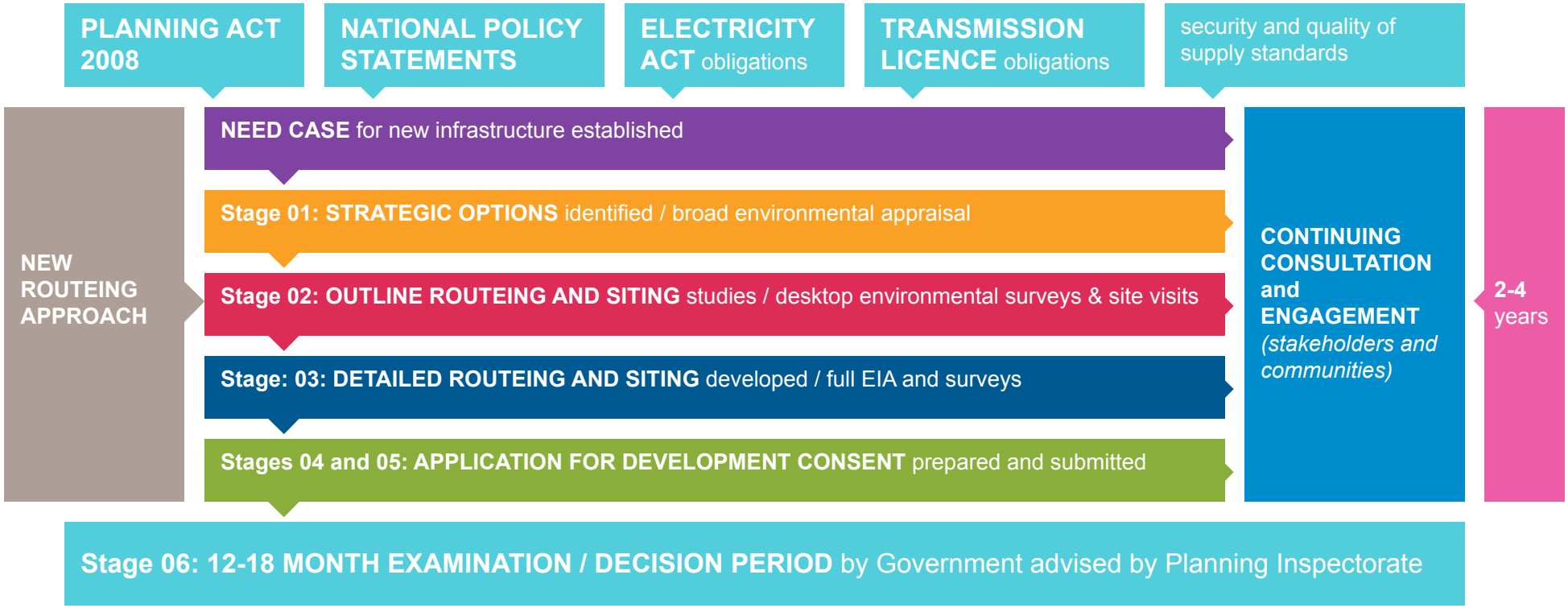

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The new approach : key principles

Greater focus on mitigating visual impact

Sensitive routeing of overhead lines

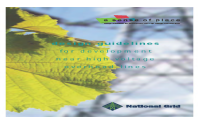
Screening and **landscaping**

Rationalisation of **existing lines**

Alternative **pylon designs**

Placing new lines **underground**

Improved urban design around existing lines **'Sense of Place'**



3. Proposed new fund for addressing visual impact of existing transmission lines

- Based on a consumer willingness to pay survey
- A specific fund from the UK regulator
- Initially set at £500m
- For an 8 year period, starting on 1 April 2013
- Applies to National Parks and Areas of Outstanding Natural Beauty only
- Expenditure could apply to undergrounding
- National Grid has to develop:
  - An agreed policy for using the fund
  - Setting out how it involves stakeholders

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Summary

- A significant energy **challenge in England and Wales**
- **UK now has the benefit of an accepted authoritative** report into electricity transmission costs
- National Grid's new **approach to the design and routeing** of new electricity transmission lines being used for new projects
- New fund for addressing the **visual impact of existing overhead lines** in National Parks and Areas of Outstanding Natural Beauty

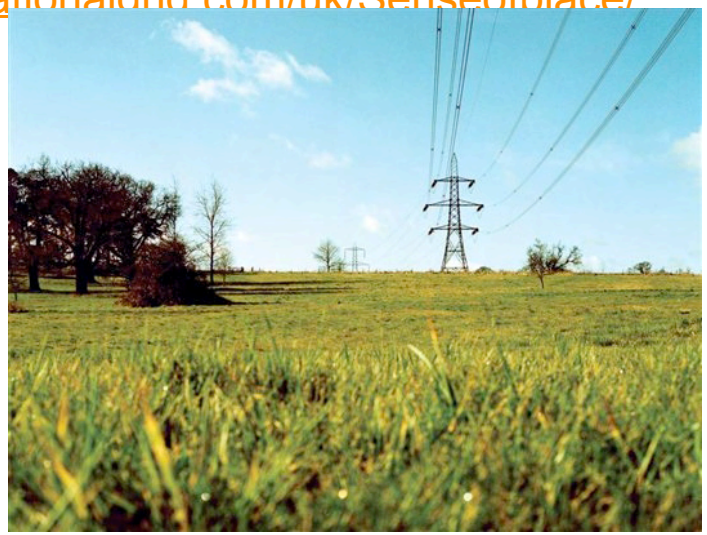
Links

- IET Transmission Costing Report –

  http://www.theiet.org/factfiles/transmission-report.cfm

- National Grid: *Our approach to the dsign and routeing of new electricity transmission lines* - https://www.nationalgrid.com/NR/rdonlyres/E9F96A2A-C987-403F-AE7D-BDA07821F2C8/55465/OurApproach.pdf

- National Grid: Sense of Place - http://www.nationalgrid.com/uk/Senseofplace/



Contact

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Appendix

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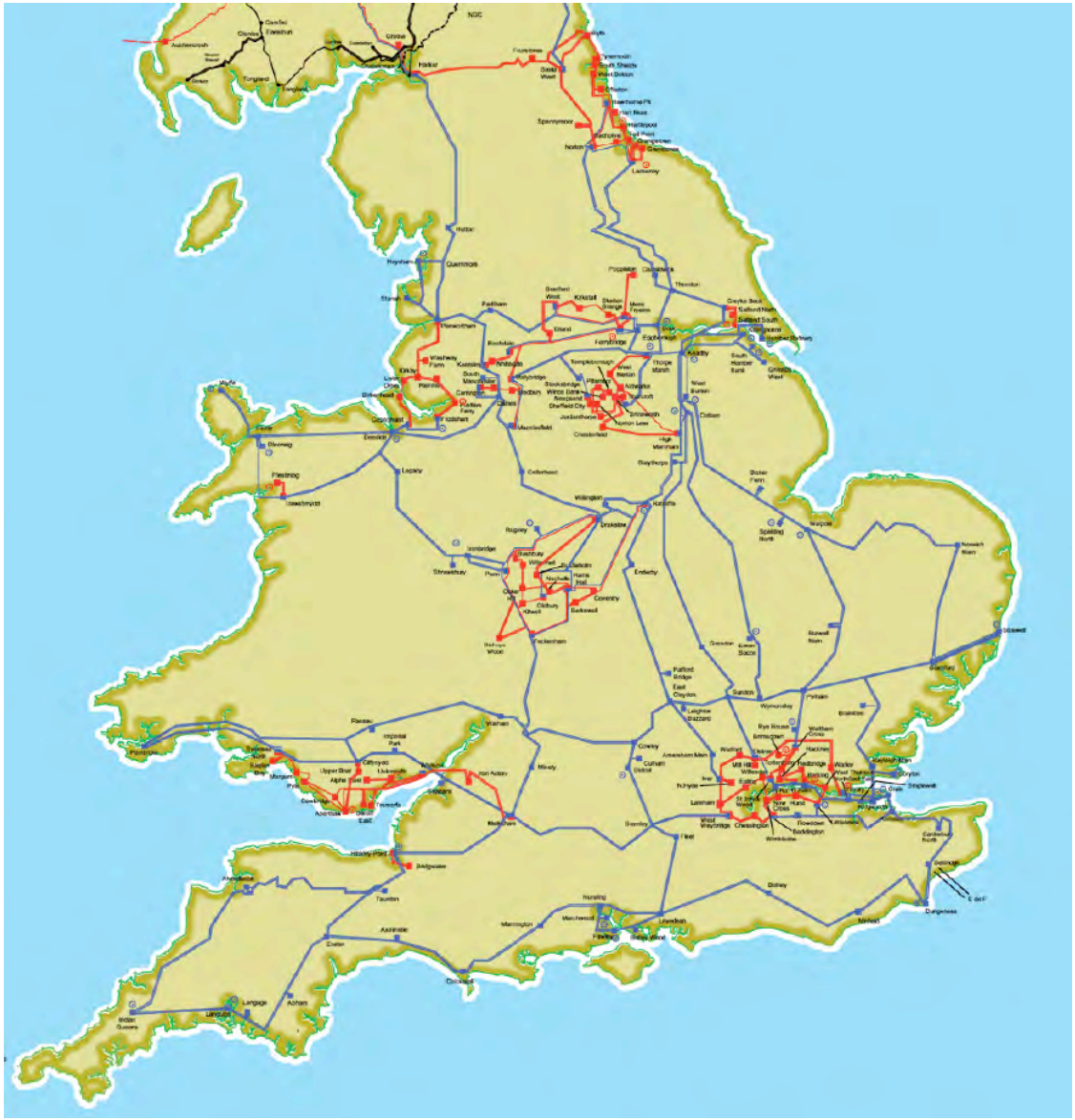
275kV and 400kV electricity network



- 84 major power plants connected (80GW installed capacity).
- Peak demand – 54.43GW (daily cold winter)
- 88,000 pylons across the UK
- approx 7,200 km of overhead line, approx 675 km of underground cable, and 337 substations at 244 sites.
- The largest centre of electricity demand is around London.

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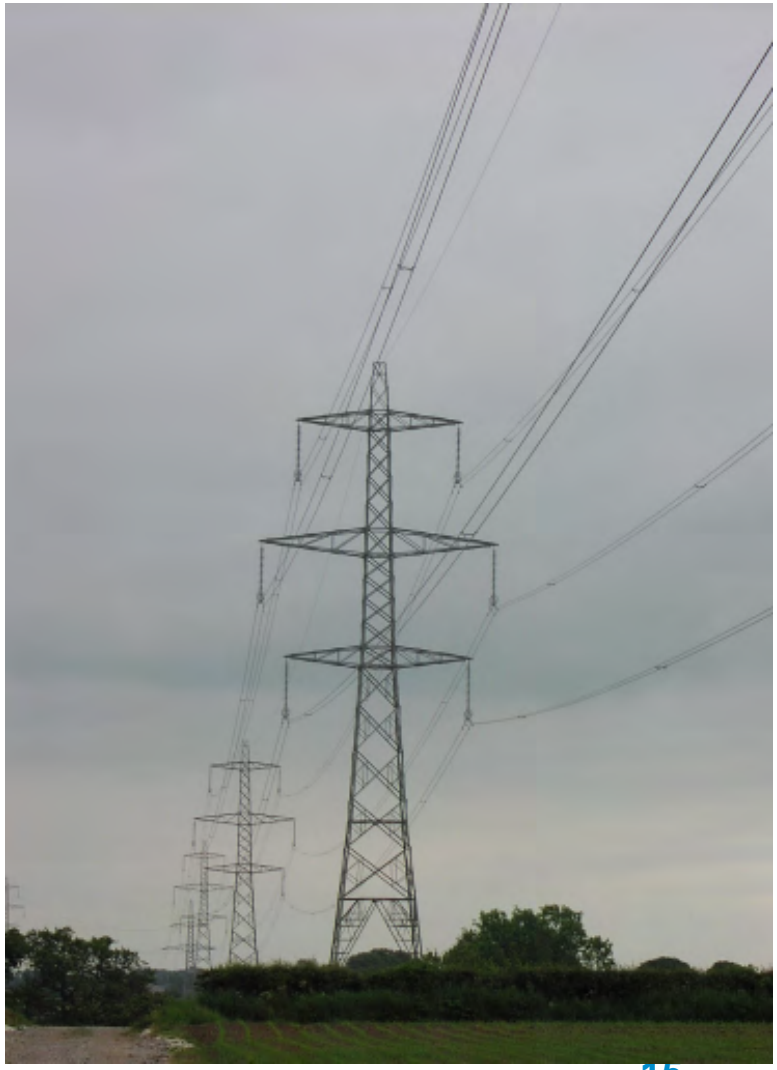
The pylon design competition

- 88,000 pylons in the UK, including 22,000 on National Grid's network
- The familiar steel lattice tower has barely changed since the 1920s.
- The competition was run by the RIBA, the Department of Energy and Climate Change and National Grid.
- 250 entries
- Huge public interest in the competition
- 6 shortlisted designs
- £10,000 prize fund



Pylon design competition winner

- The T Pylon
- Bystrup – architecture, design & engineering
- *Judges - "This proposal postulates simple vertical and horizontal members. It has a classic appearance and elegance, yet its starting point is a pure engineering response".*

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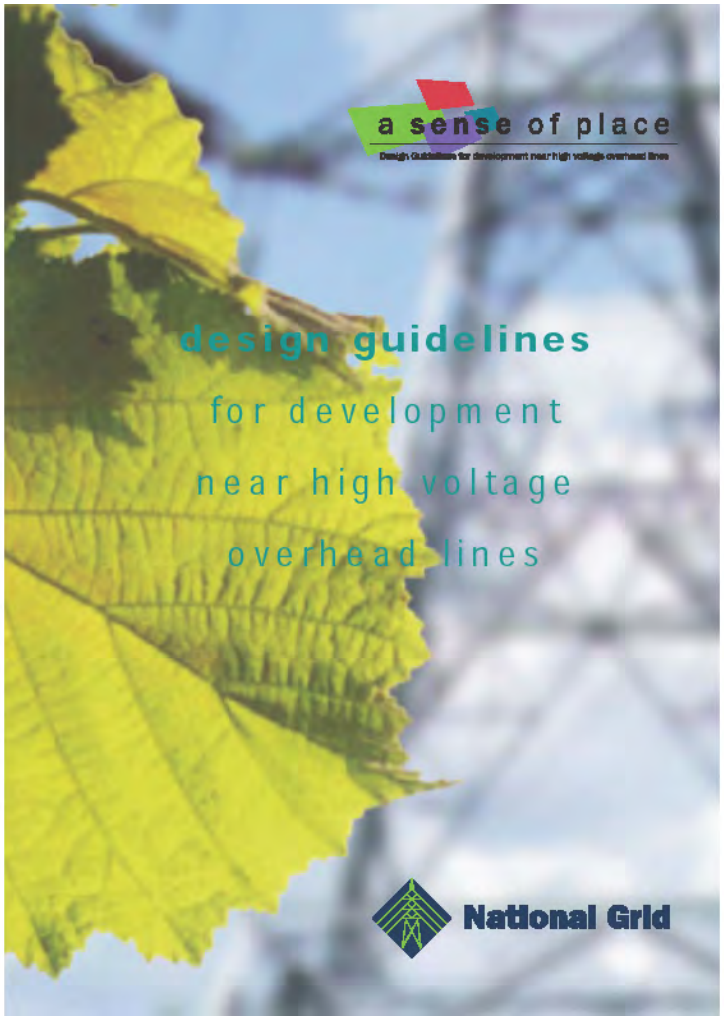
‘Sense of Place’



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Comparison with National Grid figures

- Broadly in line with our own analysis of costs
- Cost sensitivities, e.g. terrain, route length, power capacity
- National Grid is technology neutral
- Figures below based on 'Med' capacity

Case Study 75Km Route	**Build (Captial)**		**Lifetime**	
	Report per Km	National Grid per km	Report per km	National Grid per km
Overhead	£1.6m (€1.85m)	£1.6m (€1.85m)	£4.0m (€4.64m)	£4.8m (€5.56m)
Underground	£16.7m (€19.36m)	£18.8m (21.79m)	£18.9m (€21.91)	£20.8m (€24.10)
Cost Diff	£15.1m (€17.50m)	£17.2m (€19.94m(	£14.9m (€17.26)	£16.0 (€18.54)
Case Study 15Km Route	**Build (Captial)**		**Lifetime**	
	Report per Km	National Grid per km	Report per km	National Grid per km
Overhead	£1.7m (€1.97)	£1.6m (€1.85)	£4.1m (€4.75)	£4.8m (€5.56)
Underground	£17.4m (€20.16)	£18.0m (€20.85)	£19.3m (€2.36m)	£19.2m (€22.24)
Cost Diff	£18.19 (€18.19)	£16.4m (€19.0)	£15.2m (€17.61m)	£14.4m (€16.68)

GBR to EUR exhange rate based on £1 to €1.16