Cigré – Italian National Committee & SC C3

ENVIRONMENTAL ISSUES OF HIGH VOLTAGE TRANSMISSION LINES FOR RURAL AND URBAN AREAS

Hector Pearson

National Grid, UK

Convenor of Cigré WG B1/B2/C3.13

My presentation

Klaus Fröhlich (Cigré President) - Public acceptability is an issue for electricity utilities everywhere

Especially true for transmission companies

- I will describe the work of a Cigré Joint Working Group
  - Current practice in routeing new lines
  - and in dealing with how development is sited around lines

- Then I will focus on visual impact:
  - 2 case study examples from the UK:
    1. Approach to routeing new overhead lines
    2. Visual Impact Provision (VIP)

nationalgrid

Introduction

The relationship between overhead lines and communities is often contentious.

Communities often do not want new overhead lines built near them

Communities and NGOs often want overhead lines to avoid certain rural areas

TOs will probably want to site new transmission lines away from existing towns and houses, yet developers and builders may want to build new urban development and houses near existing overhead lines, thus creating homes and communities near overhead lines

Objectors to projects may often give examples of practices in other countries to justify their position. The TO then having to research these alleged ‘best practices’.

cigré

Cigré Joint Working Group

- examined these issues of routeing and siteing of HV electricity lines, in relationship to built development and natural areas.

- comprises members from Cigré Study Committees:
  - B1 – Insulated Cables
  - B2 – Overhead Lines
  - C3 – System Environmental Performance

- will produce information relating to electricity companies' policies and practices worldwide.

Scenarios

The JWG decided to create 4 scenarios, and ask TOs to respond to them.

The scenarios were:

1. How do companies route new high voltage overhead electricity lines near existing built development?
2. How do companies deal with the location of new built development near existing high voltage overhead electricity lines?
3. How do companies route new high voltage overhead electricity in protected rural areas? (protected for environmental reasons)
4. How do companies mitigate the visual impact of proposed high voltage overhead electricity lines in protected rural environmental areas?

Scenario 1 – screen shot

- Each country was asked to respond to the scenario, giving as much information as possible.
- 8 questions.

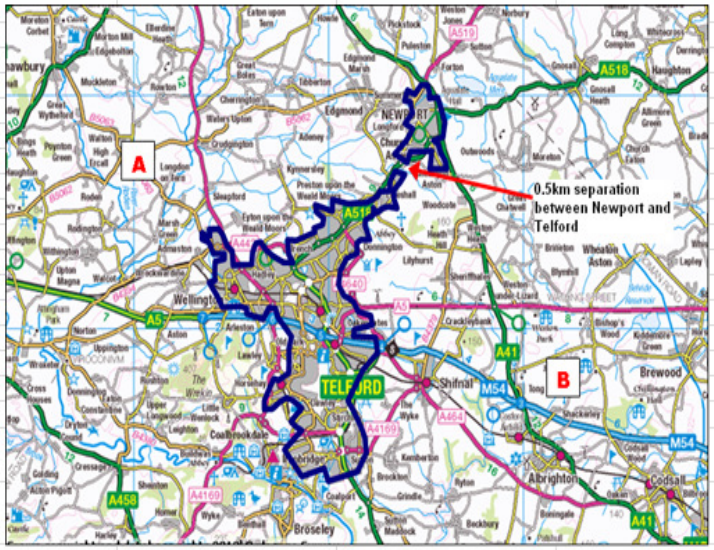
CIGRE JWG B1/ B2 / C3.13 SCENARIO AND RESEARCH QUESTIONS – V. 3

1) Approaches to the routeing of new high voltage overhead electricity lines near existing built development

This Part seeks information about what approaches countries and/or electricity infrastructure developers have adopted when routeing new high voltage overhead electricity lines near existing built development **(such as existing residential, commercial or industrial buildings)**.

Scenario:

- A new overhead electricity transmission line (above 110kV) is required between point A and point B.
- The separation distance (open fields) between the towns of Telford and Newport is 0.5km
- The straight line distance between point A and B is 20km



Country:	England and Wales
Company:	National Grid

	Questions	Answer
Q1	Routeing: Are there any legal, Government policy or other requirements that prescribe how new high voltage overhead electricity lines should be routed near existing development?	Government National Policy Statement for Electricity Networks Infrastructure (EN-5) includes guidance on routeing new overhead lines (the Holford Rules) *'Approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach and the substation, carefully assess the comparative costs of undergrounding'.* Some local authorities in their development plans have a policy stating no overhead lines can be built in their area. National Grid would strongly oppose this policy and seek it to be removed.

Countries who responded

- Australia
- Austria
- Belgium
- Brazil
- Canada
- China
- Croatia
- Czech Republic
- Denmark
- England & Wales
- Finland
- France
- Germany
- Ireland
- Italy
- Japan
- Korea
- Netherlands
- New Zealand
- Norway
- Portugal
- Slovenia
- South Africa
- Spain
- Sweden
- Switzerland
- USA

nationalgrid

Analysis of information

- Now working on ‘sector’ analysis, looking at how each country deals with:
  - Visual impact
  - EMF
  - Audible noise
  - Clearances to buildings etc
  - Rights of way
  - Planning or permitting regulations
  - Company policy
  - Natural protected areas
  - Undergrounding

Analysis of information

- Now working on ‘sector’ analysis, looking at how each country deals with:
  - **Visual impact**
  - EMF
  - Audible noise
  - Clearances to buildings etc
  - Rights of way
  - Planning or permitting regulations
  - Company policy
  - Natural protected areas
  - Undergrounding

Visual impact

- The JWG found that visual impact is seen as very important in how utilities route overhead lines.
- Yet, out of the 27 countries surveyed, 19 do not have a legal requirement to minimise visual impact. So it depends on company processes and practice.
- Yet, most countries and companies do not have ‘official’ guidance on visual impact.
- Mostly they rely on EIA as their ‘tool’ for managing visual impact.

Visual impact

- I now want to turn to the UK, where visual impact is by far the biggest issue, in the opinion of the public.

- I will focus today on 2 case studies from National Grid in the England & Wales

1. Approach to new line routeing
2. Approach to considering visual impact of existing lines.

nationalgrid

1. Routeing new transmission lines

1. In 2010, we recognised that our existing policy on when to use underground cable for new lines was out of date.
   - We had many new sources of generation to connect
   - Harder and harder to get consent to build new lines
2. So we consulted the public on what our new policy should be.
3. We also consulted key environmental organisations

cigré

nationalgrid

1. Routeing new transmission lines

The public and stakeholders told us:

- We should have a process for **routeing new lines** – not a policy on undergrounding
- That we should recognise **environmental** and **social** impacts as well as system and cost issues
- That there should be early and meaningful **engagement** with stakeholders and communities to understand local considerations.
- That there should be greater emphasis on **mitigating visual impact** – recognising that not all sites that are valued or important are in designated areas

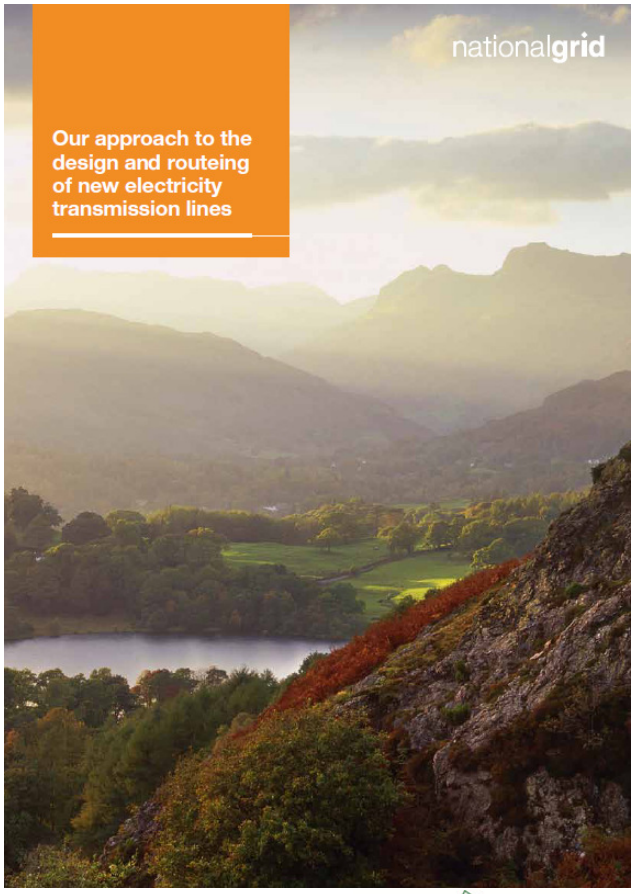
cigré

1. Routeing new transmission lines

So that is what we did.

- In 2012, we published *Our approach to the design and* ***routeing of new electricity transmission lines***
- Backed up by using Options Appraisal methods on a **case-by-case** basis
- No preference for overhead or underground solutions
- Give greater weight to **mitigating visual impact**

Our approach is now in full use.



1. Routeing new transmission lines

> We have no inherent preference for either overhead or underground approaches and we will always seek to deliver the best balance.

2. Approach to considering visual impact of existing lines

Visual Impact Provision (VIP) Project

Visual Impact Provision

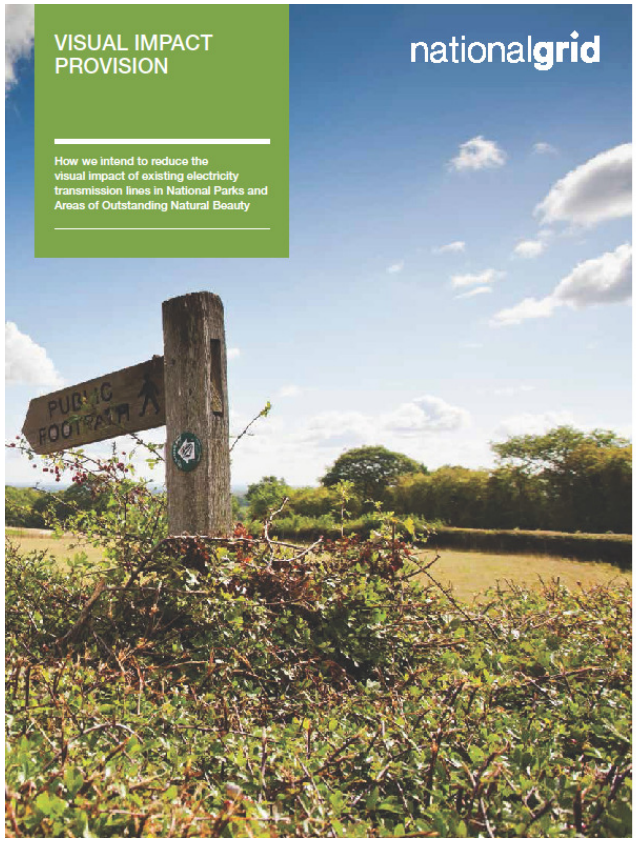
Background

- Survey of consumers – requested by ofgem
- Consumers willing to pay more for TOs to mitigate the visual impact of **existing** electricity infrastructure in nationally protected landscapes in Great Britain
- nationalgrid and ofgem have agreed a provision of **£500M (€680M)** from 2014 – 2021.
- This provision can only be spent on **existing** lines through **National Parks** and **Areas of Outstanding Natural Beauty**
- So can apply to 571km of 275 & 400kV overhead lines in these areas

Visual Impact Provision

Our Policy:

- We prepared a draft policy on how we would use the £500M provision
- Consulted on the draft policy from July – Sept 2013
- Policy approved in March 2014
- Set up a **Stakeholder Advisory Group** to help National Grid set the priorities for spending the £500m
- Appointed an **independent chairman** for the Stakeholder Advisory Group
- Committed to substantial engagement with organisations and communities
- Decisions to be based on a set of Guiding Principles



The Stakeholder Advisory Group

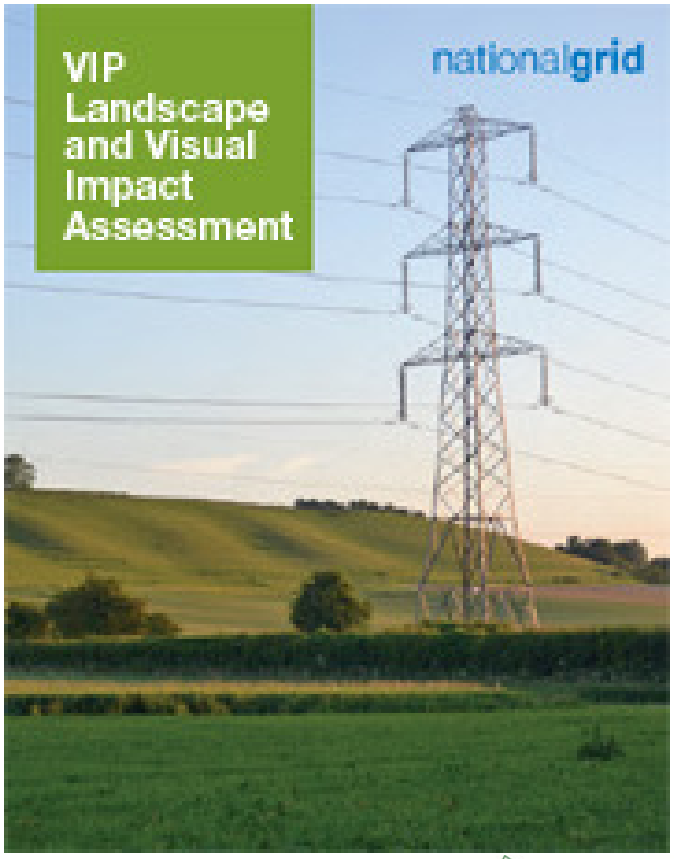
Landscape and Visual Assessment Methodology

We published a **Landscape and Visual Assessment methodology** which was used for assessing and ranking all the overhead lines.

Employed 2 landscape architect firms to assess & rank all 571km of our lines in National Parks and AONBs.

A shortlist of the worst affected areas will be taken forward for further assessment, to look at the potential for undergrounding the line or section of line.

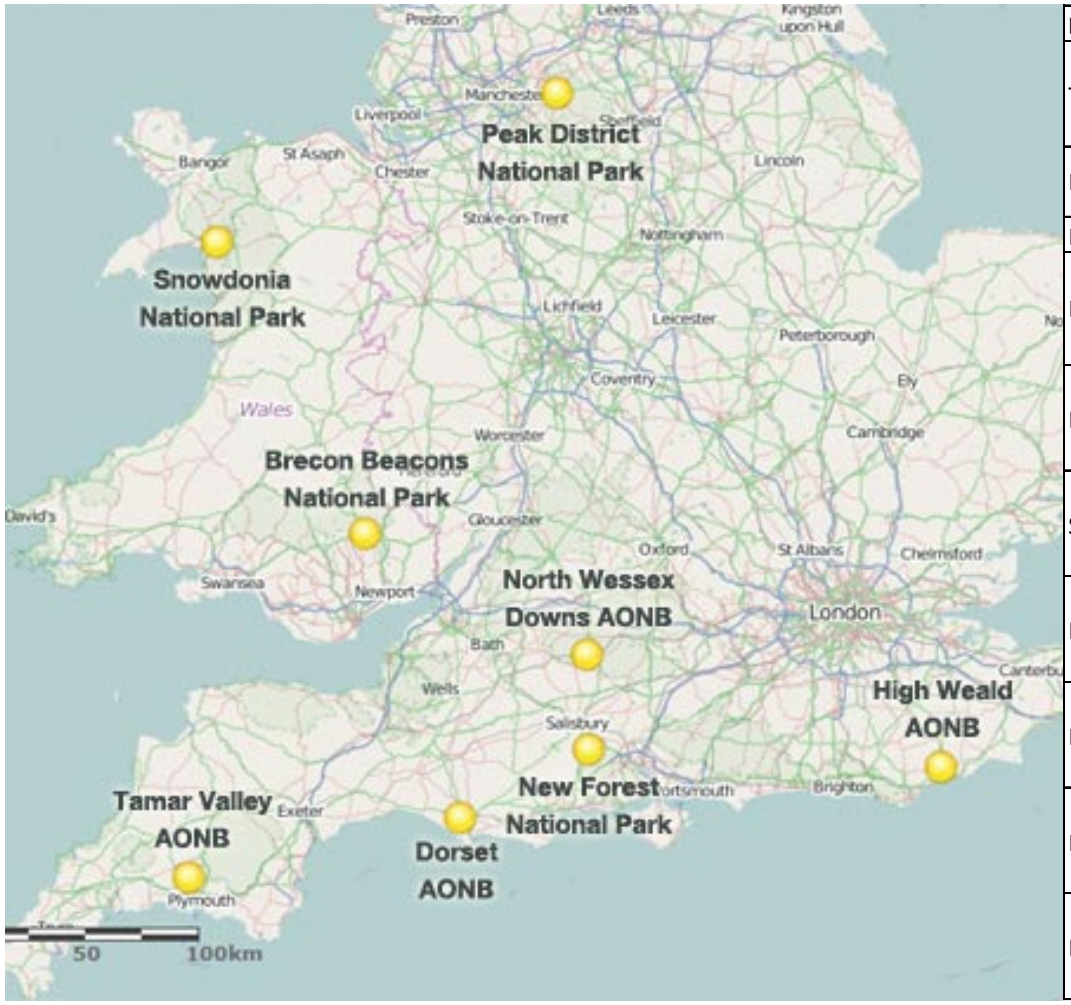
For the rest, less intrusive mitigation options such as tree screening will be considered.



VIP short-list:

sections with the highest landscape and visual impact

nationalgrid



Designation	Substations	Tower numbers
Tamar Valley	Landuph to Langage	004 - 0019
Peak District (West)	Stalybridge to Thorpe March	211 - 238
		200 - 210
Peak District (East)		156-164
Dorset (LUC)	Chickerell to Exeter	170 - 177
		195 - 210
Brecon Beacons (Gill)	Pembroke to Walham	181-199
Snowdonia (Gill)	Pentir to Trawsfynydd	014-032
High Weald (LUC)	Dungeness to Ninfield	118 - 133
Dorset (LUC)	Chickerell to Mannington	025 - 039
New Forest (LUC)	Fawley to Mannington	058 - 068
North Wessex Downs	Bramley to Malksham	82 -104

nationalgrid

Widespread national coverage

Plan to bury power lines will cost £7m per pylon

Article | Pictures

Ben Webster Environment Editor
Last updated at 10:10PM, November 10 2014

Electricity pylons are to be removed from beauty spots for the first time, with the power lines buried underground at a cost of £7 million for each structure.

It emerged yesterday that a £500 million National Grid scheme will result in 65 pylons being dismantled across Britain. That equates to fewer than 1 in 20 of the 1,500 pylons in national parks and areas of outstanding natural beauty.

National Grid, which owns the electricity transmission system, said that the figure of £7 million per pylon was due to the need to negotiate with landowners and dig wide trenches, in some cases measuring up to 20 metres across, to bury the power lines.

The budget for the eight-year scheme will be borne by electricity bill payers, and is expected to cost the average household 22p a year.

The scheme comes 60 years after Sir John Betjeman, in his poem *Inexpressi* as charact

Yesterday where pyl The sectio Snowdoni outstandir the North

National Grid's £500m plan to move biggest and ugliest pylons underground

Eight national parks and areas of outstanding natural beauty o shortlist, and £24m set aside for measures in other areas

Damian Carrington
The Guardian, Sunday 9 November 2014 14.23 GMT
Jump to comments (134)

Fishpond Bottom in the Dorset countryside has its beauty marr power lines. Photograph: Global Warming Images/Rex Features

The "biggest and ugliest" electricity pylons slicing through uty spots are set to be torn dow

ate ways to remove pylons fron g the high-voltage transmissior

i miles) of pylon lines running th anding natural beauty (AONB) i eas are in the Snowdonia, Peal ons national parks, and the Dor Vessex Downs AONBs, totalling

re the biggest and ugliest ones, id Chris Baines, an environment takeholder advisory group. "Und but we also have to make sure ase. It can leave quite a scar thi

d requires a 50-metre-wide tren to accommodate the six lines o lical sites can also present obst s to less obtrusive locations. In land, the 50-metre-tall pylons m ve wooded slopes behind them

0m to electricity bills over eight onal Grid says is equivalent to 2

Pylon free parks

The shortlist protected rural areas in the running for funds to remove pylons

GUARDIAN GRAPHIC

Feasibility studies will be completed within a year, after which the final list of pylon-removal projects will be ready to go ahead. "There will be three or four of these shortlisted sections that are chosen for the full belt-and-braces disappearing act," said Baines. Analysis conducted for the stakeholder group deemed 4km of Tamar Valley pylons to have by far the greatest visual impact and that project is being fast-tracked; 12km of pylons along the Woodhead Pass in the Peak District are also a priority.

High-voltage lines cross 30 national parks and AONBs and George Mayhew, director of corporate affairs at National Grid, accepts those not shortlisted are likely to be disappointed: "I suspect all 30 sites would say our infrastructure has an impact." He said there would be a £24m fund available to pay for other measures in those areas, such as planting woods to obscure the view of pylons or filling in gaps in hedgerows.

The pylons to be removed were all erected in the 1950s and 60s when less consideration was given to their visual impact. The £500m bill for the scheme, approved by the regulator Ofgem, results from the cost of putting the lines underground: £20m-£22m a kilometre, compared with £2m for pylon lines. But Baines said: "These are particularly special places. No one would argue it would not be hugely beneficial to not have these pylons in these places."

The shortlist was welcomed by Ingrid Samuel, historic environment director at the National Trust: "We know it can be a big challenge for modern infrastructure to work in harmony with the landscape but it can be done when people work together to find the best solution."

Are electricity pylons really such a blot on the landscape?

There is plenty to appreciate about these lattice-work leviathans, but the National Grid is bowing to pressure to bury them instead

Oliver Wainwright
theguardian.com, Tuesday 11 November 2014 09.23 GMT
Jump to comments (299)

'Since the first pylon was erected outside Edinburgh in 1928, these skeletal giants have received a tirade of abuse.' Photograph: Andrew Milligan/PA

"Encase your legs in nylons, Bestride your hills with pylons, O age without a soul," moaned John Betjeman in 1966, railing against the twin evils of the modern age as he saw them: tights and electricity transmission towers.

While the Campaign to Protect Rural England might not share his distaste for synthetic stockings, it has kept alive his fight against the hated pylon, exerting a level of pressure that has finally seen the National Grid cave in. This week it announced that it will spend half a billion pounds on burying the "biggest and ugliest" of the country's pylon network – paid for by a rise in electricity bills.

But before they start digging mass graves for our spindly steel sentinels,

Snowdonia's beauty would be 'enhanced' in pylon project

A pylon sits on the landscape with former slate quarrying village Rhosgadfan in the background

Removing 160ft (50m) tall pylons from Snowdonia will significantly enhance its natural beauty, say officials.

The National Grid shortlisted the national park, and the Brecon Beacons, to have electricity pylons replaced with underground cables.

The £500m project will remove the towers from 65 areas across Britain over eight years, costing the bill payer 22p a year.

Snowdonia authority's Jonathan Cawley was "very positive" about the scheme.

"It will have a direct and significant impact in enhancing the beauty of the park," the director of planning and cultural heritage said.

"Walkers and climbers will be positive about this.

"The pylons detract from the natural beauty - if they could be removed, that's quite exciting, really."

Related Stories

- National Grid plans to bury cables
- Fears over pylons in beauty spots
- Power plans meet pylon opposition

We all profit if beauty comes before pylons

Alice Thomson

Last updated at 12:01AM, November 12 2014

Post a comment
Print
Share via
Facebook
Twitter
Google+

National Grid's decision to bury cables underground shows that businesses can marry principle with making money

Stephen Spender called them "Pylons, those pillars/ Bare like nude giant girls that have no secret". When pylons first appeared in 1928, they were more vilified than wind turbines. Their creator, the architect Sir Reginald Blomfield, named these skeletal metal giants that bestrode the countryside after the pointed gateways to Egyptian temples.

Rudyard Kipling, John Galsworthy, Hilaire Belloc and John Maynard Keynes all wrote heated letters to *The Times* warning readers about the malevolent invaders they said were desecrating bluel
const
100,
over
proc
our g
invas

Fron
Man
one a
nin
azi
tu

National Grid unveils plans to bury cables underground

By Roger Harrabin
BBC environment analyst

Pylon cables will disappear from some of the most beautiful areas of England and Wales as part of a move by National Grid to reduce the impact of energy transmission on the landscape.

The wires will be put underground - at higher cost, but lower visual impact.

Twelve stretches of pylons in eight areas of countryside have been shortlisted for the beauty treatment.

The move follows a consultant's report identifying the ugliest overhead lines in the land.

Countryside groups welcomed the move - but stressed that all new power projects must consider the impact on the landscape from the outset.

The protests against new wind farms drew National Grid's attention to the public dislike of pylons in the landscape.

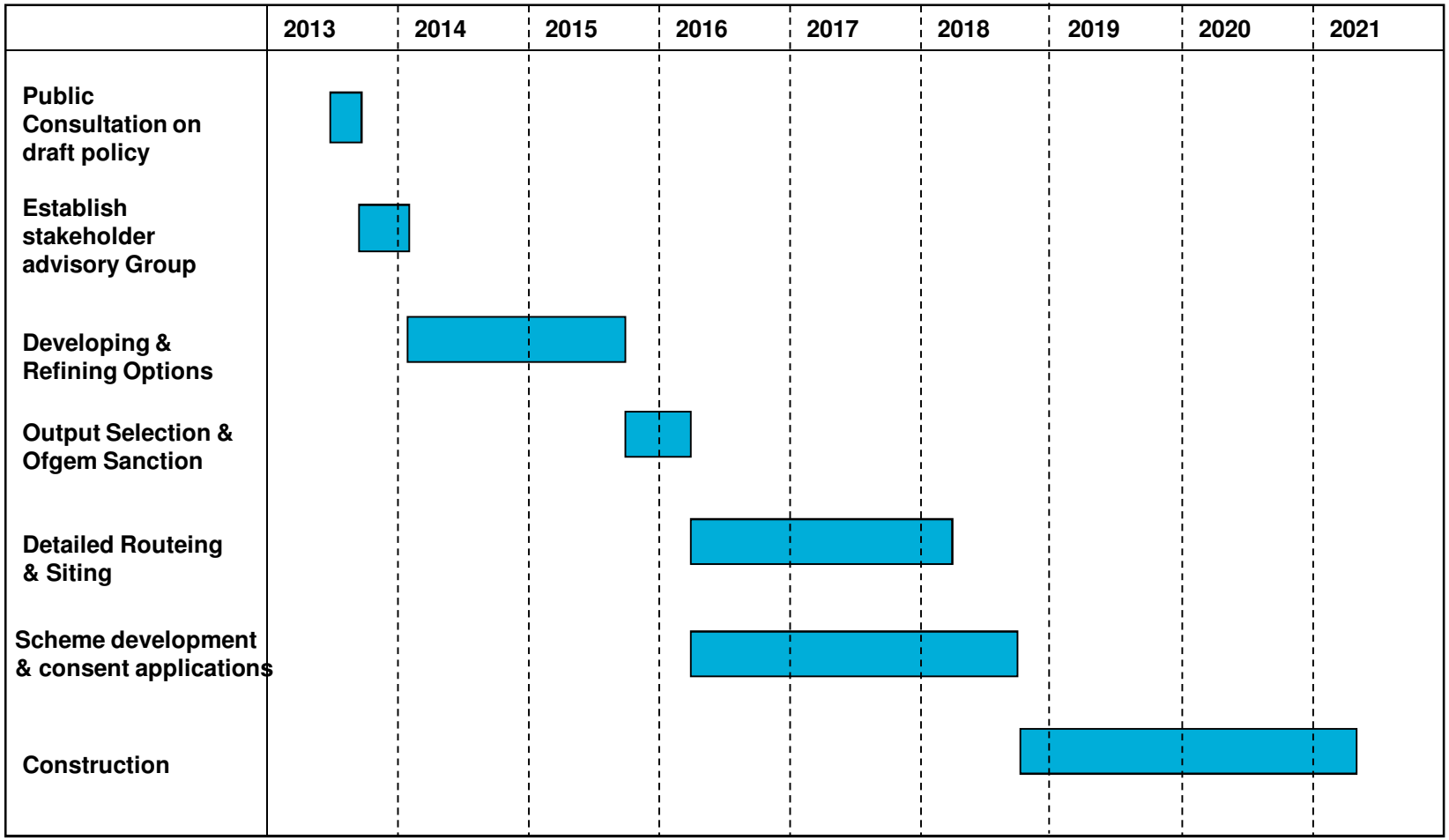
It has responded by setting aside £500m, made available by energy industry regulator Ofgem until 2021, to bury high voltage cables, or screen them, or re-route them away from beauty spots.

Among the contenders for early investment are sites in four national parks: the New Forest, Brecon Beacons, the Peak District and Snowdonia and four areas of outstanding natural beauty in Dorset, the High Weald, the North Wessex Downs, and the Tamar Valley.

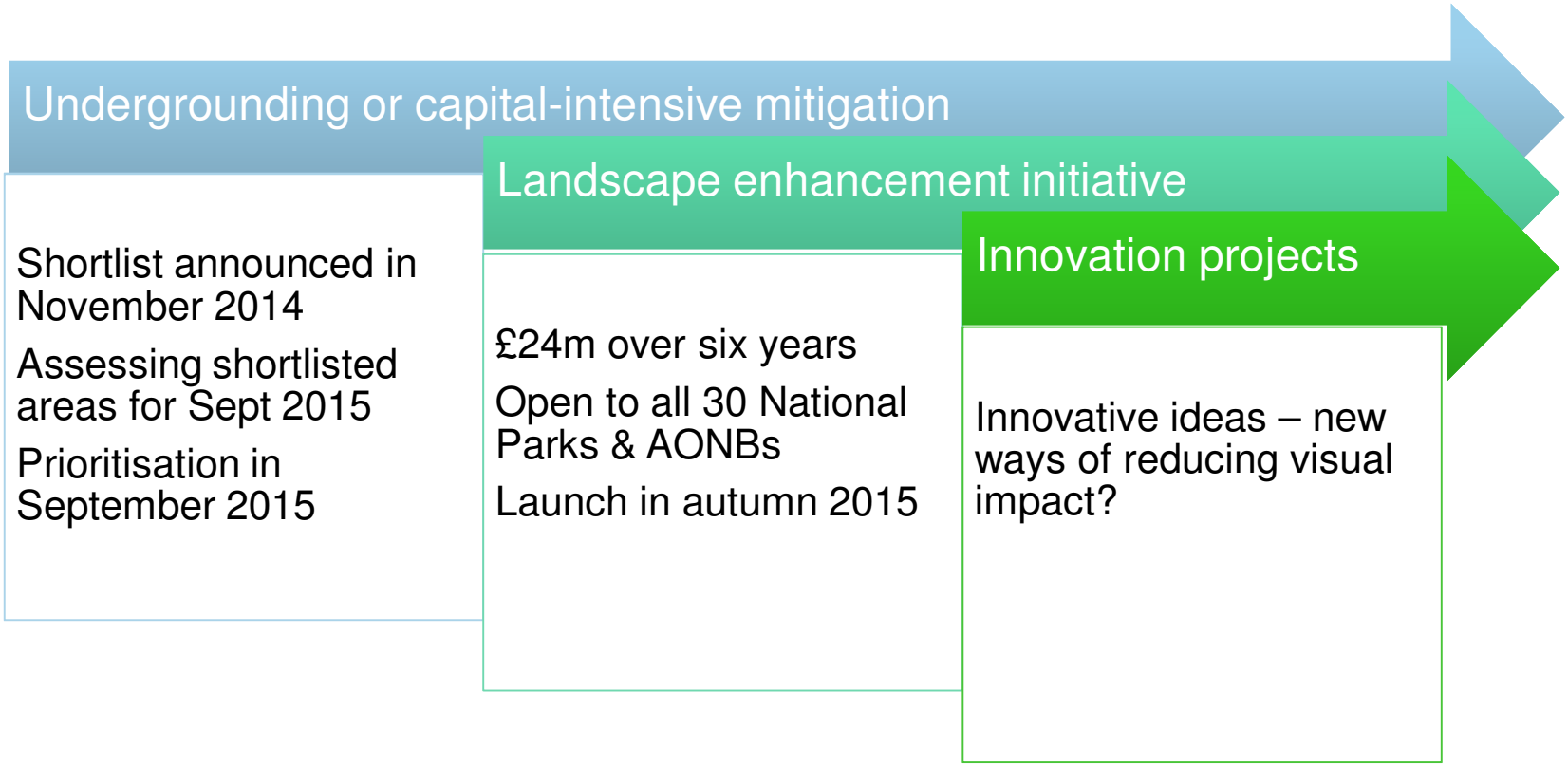
Energy

- Who are the "big six" energy firms?
- Energy bills: Where does my money go?
- Where does our power come from?
- How smartphones can cut energy bills

VIP Programme



What next?


Undergrounding or capital-intensive mitigation
Shortlist announced in November 2014
Assessing shortlisted areas for Sept 2015
Prioritisation in September 2015
Landscape enhancement initiative
£24m over six years
Open to all 30 National Parks & AONBs
Launch in autumn 2015
Innovation projects
Innovative ideas – new ways of reducing visual impact?

Visual Impact Provision

www.nationalgrid.com/vip

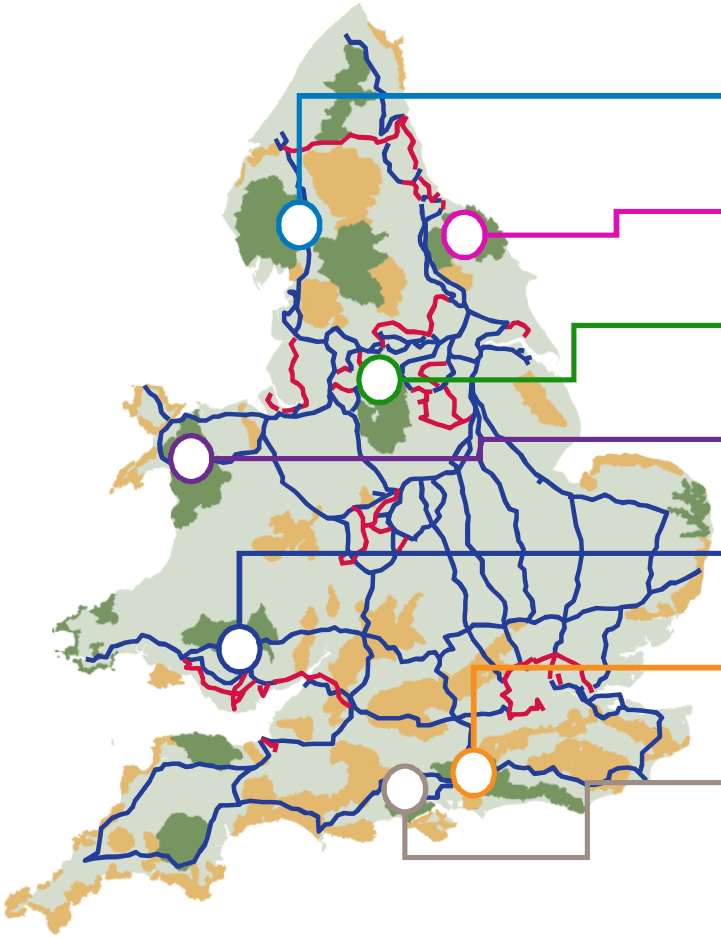
Conclusion

- Stakeholders and consumers matter
- Involve them
- They give us our licence to operate
- Listen to them

Reserve Slides

nationalgrid

Our Lines in National Parks



Lake District | 3.5 km

North York Moors | 0.8 km

Peak District | 12.8 km

Snowdonia | 53.1 km

Brecon Beacons | 17.3 km

South Downs | 65.3 km

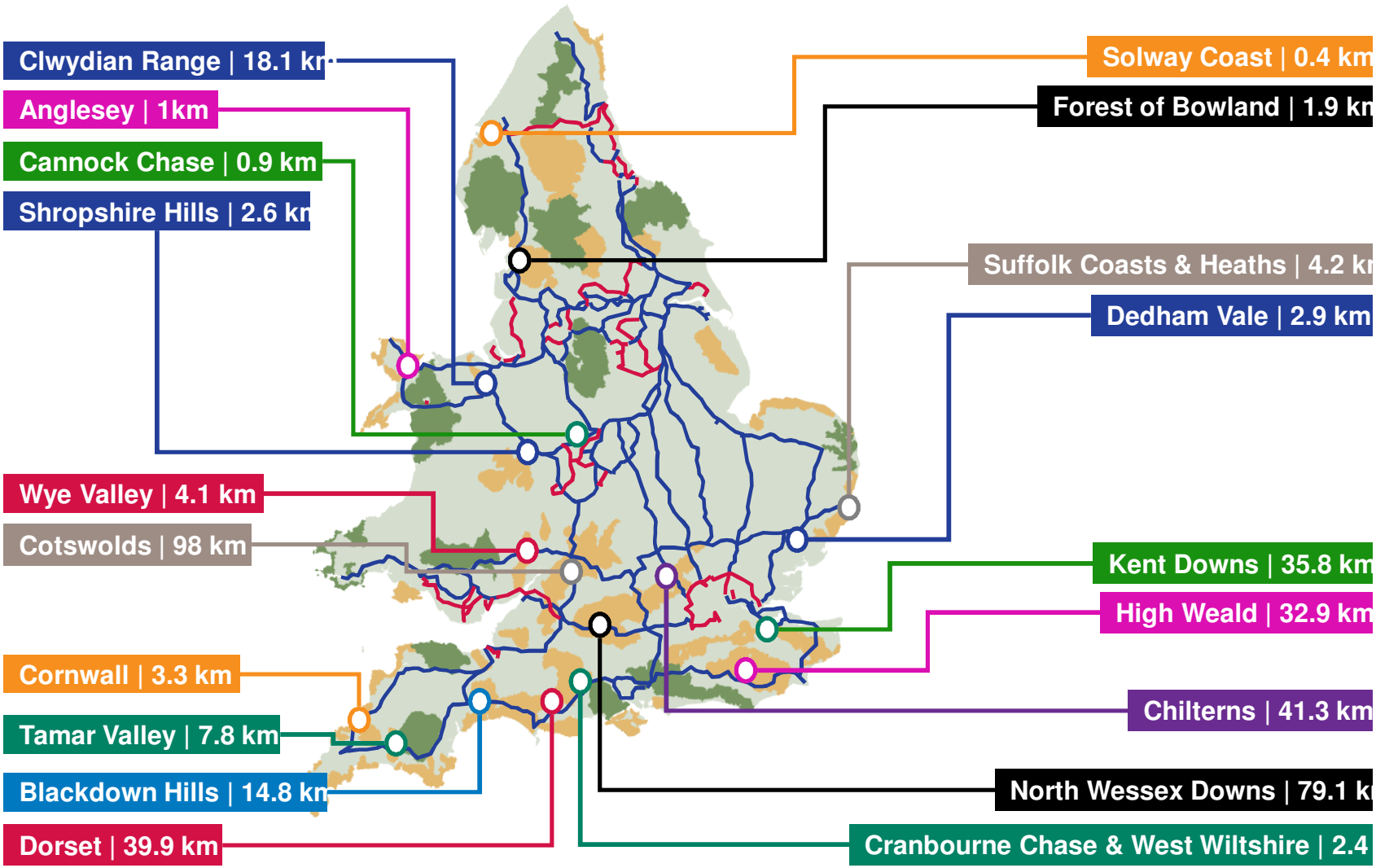
New Forest | 27 km

400kV transmission lines
275kV transmission lines
National Parks
AONBs

Source:
www.nationalparks.gov.uk

cigré

Our Lines on AONBs



Guiding principles

“We will work with stakeholders to decide how to treat existing National Grid electricity infrastructure to bring the most benefit from the Visual Impact Provision.

Candidate schemes will be selected with reference to the Guiding Principles below.

- **Result in greatest landscape enhancement benefits.**
- **result in greatest opportunities to conserve and enhance natural beauty, wildlife and cultural heritage whilst avoiding unacceptable environmental impacts**
- **result in greatest opportunities to encourage public understanding and enjoyment of the protected landscapes, including positive socio-economic impacts;**
- **Are technically feasible in context of the wider transmission system**
- **Are economical and efficient**

As these principles may sometimes conflict with one another and each scheme is likely to perform differently against them, we will need to carefully balance the choices we make, with the help of stakeholders, against the Guiding Principles.”

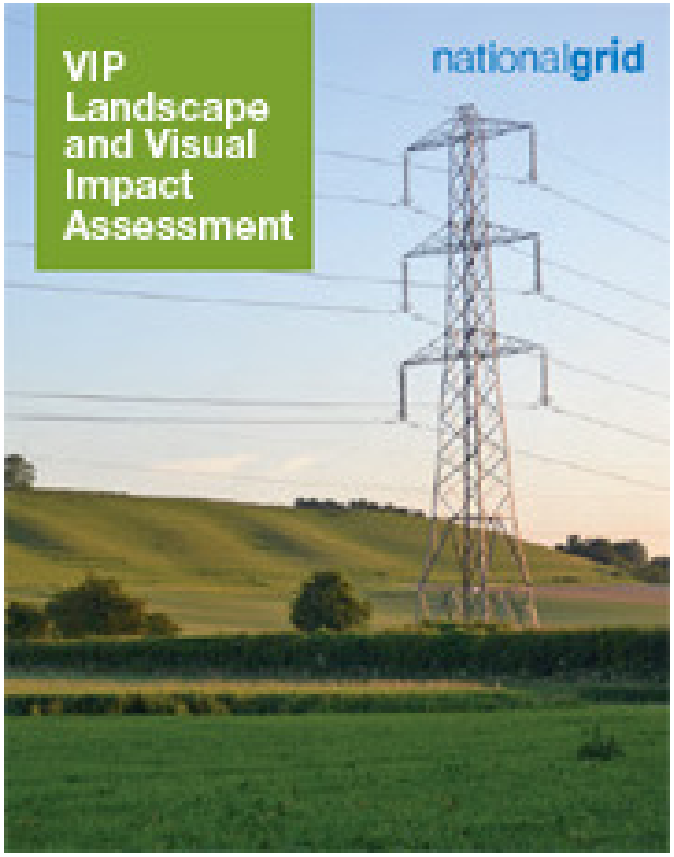
Progress

Stakeholder Advisory Group:

- **Has met 5 times**
- **Has approved the landscape & visual impact assessment methodology, and endorsed the results – published in Nov 2014**
- **Initiated & approved the Landscape Enhancement Initiative (£24m for locally derived small scale projects)**
- **Has considered the process they will use to make decisions at September meeting**

Local stakeholders:

- **Met groups of local 'technical' stakeholders in each of the short-listed areas**
- **Public drop-ins in the short-listed areas**



Scenario 1

- For each question a scenario was developed, and questions created.
- Each country was asked to respond to the scenario, giving as much information as possible.
- Some screen shots:

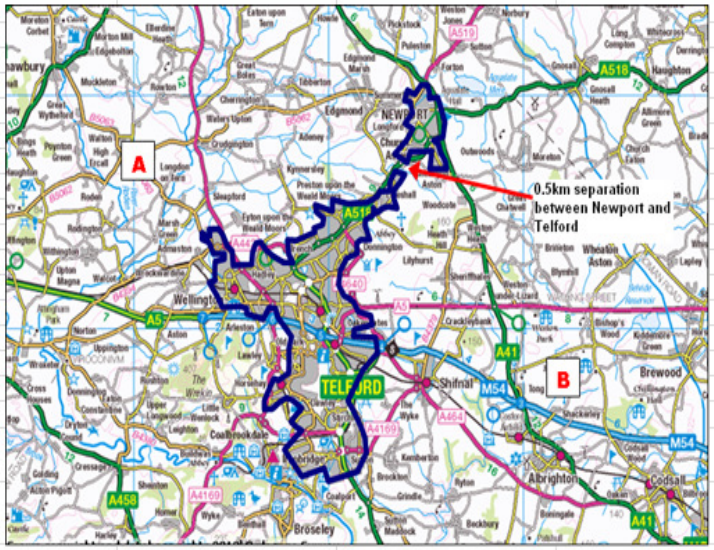
CIGRE JWG B1/ B2 / C3.13 SCENARIO AND RESEARCH QUESTIONS – V. 3

1) Approaches to the routeing of new high voltage overhead electricity lines near existing built development

This Part seeks information about what approaches countries and/or electricity infrastructure developers have adopted when routeing new high voltage overhead electricity lines near existing built development **(such as existing residential, commercial or industrial buildings)**.

Scenario:

- A new overhead electricity transmission line (above 110kV) is required between point A and point B.
- The separation distance (open fields) between the towns of Telford and Newport is 0.5km
- The straight line distance between point A and B is 20km



Country:	England and Wales
Company:	National Grid

	Questions	Answer
Q1	Routeing: Are there any legal, Government policy or other requirements that prescribe how new high voltage overhead electricity lines should be routed near existing development?	Government National Policy Statement for Electricity Networks Infrastructure (EN-5) includes guidance on routeing new overhead lines (the Holford Rules) *'Approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach and the substation, carefully assess the comparative costs of undergrounding'.* Some local authorities in their development plans have a policy stating no overhead lines can be built in their area. National Grid would strongly oppose this policy and eek it to be removed.

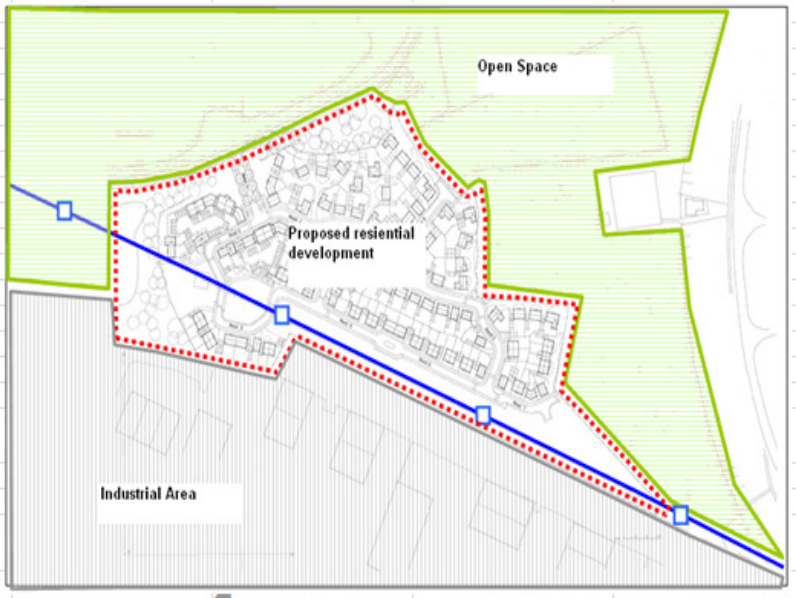
Scenario 2

CIGRE JWG B1/ B2 / C3.13 SCENARIO AND RESEARCH QUESTIONS – V. 2

2) Approaches to locating new development near existing high voltage overhead electricity lines

This Part seeks information about what approaches countries and/or electricity infrastructure developers have adopted when new development (such as residential, commercial or industrial buildings) are proposed near existing high voltage overhead electricity lines.

- Existing overhead electricity transmission line (110kV and above)
- Proposed residential development
- Industrial Area
- Open space



Country: England and Wales

Questions	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
	Are there any legal, Government policy or other requirements that prescribe how new built development near existing high voltage overhead electricity lines should be	If there are no such requirements, what factors are taken into account by the authorities when planning/locating new development near existing high voltage overhead electricity	Are there any statutory or non-statutory separation distances for how far new development should be located away from existing high voltage overhead electricity lines?	If there are no statutory or non-statutory separation distances, what factors would generally be taken in account when deciding how far new development should	Are there any legal, Government policy or other requirements to minimise and/or mitigate the visual impact of existing high voltage overhead electricity lines when new development	If applicable, who is responsible for mitigating and/or minimising such visual impacts? The developer or the overhead line owner?	Are there any legal, Government policy or other requirements to remove existing high voltage overhead electricity lines when new development takes place in nearby or place the lines	If applicable, who is responsible for funding the removal and/or undergrounding of existing overhead lines near new development?

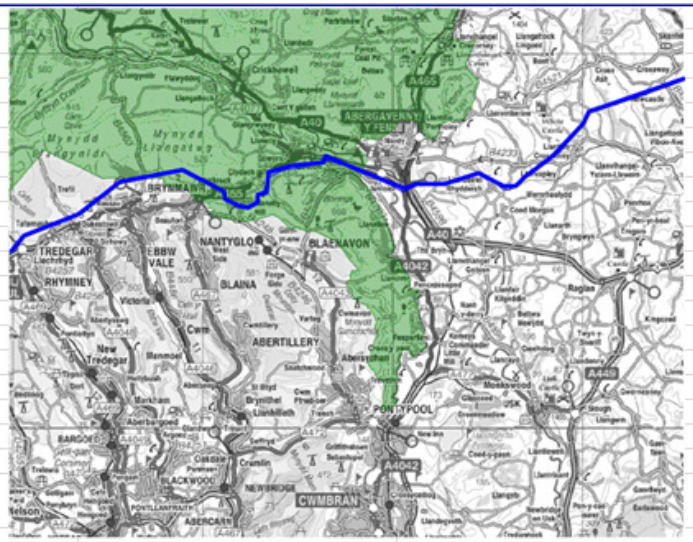
Scenario 4

CIGRE JWG B1/ B2 / C3.13 SCENARIO AND RESEARCH QUESTIONS – V. 2

3) Approaches to mitigating the visual impact of proposed high voltage overhead electricity lines in National Parks or other environmentally designated areas

This Part seeks information about what approaches countries and/or electricity infrastructure developers have adopted in terms of mitigating the visual impact of proposed high voltage overhead electricity lines in National Parks or other environmentally designated areas.

- Proposed overhead electricity transmission line (110kV and above)
- National Park or other environmentally designated area



Country: England and Wales

Questions	Q1	Q2	Q3	Q4	Q5
	Are there any legal, Government policy or other requirements to minimise and/or mitigate the visual impact of proposed high voltage overhead electricity lines in National Parks or other environmentally designated areas?	If there are no such requirements, in what circumstances would the visual impact of proposed high voltage overhead electricity lines for National Parks or other environmentally designated areas be minimised and/or mitigated and how?	Are there any legal, Government policy or other requirements to underground proposed high voltage overhead electricity lines in National Parks or other environmentally designated areas?	If there are no such requirements, in what circumstances would proposed high voltage overhead electricity lines in environmentally designated areas generally be re-routed or placed underground?	If applicable, who is responsible for funding the undergrounding of proposed overhead lines in National Parks or other environmentally designated areas?

Analysis of Information

- Summary tables were prepared for each scenario, setting out a summary of each country's position and practice (from the information they provided)
- Almost complete.

1) Approaches to the routeing of new high voltage overhead electricity lines near existing built development

	Questions	Australia	Austria	Brazil	Canada(MA)	China
Q1	**Routeing:** Are there any legal, Government policy or other requirements that prescribe how new high voltage overhead electricity lines should be routed near exirting development?	No Government Policy for OHL routeing. Justification for a new route is through the EIA (EIS and Consultation).	electric clearances from EN 50341. EMF and audible noise regulations apply	There are guidelines for the preparation of the socioenvironmental document, required for the bidding process, recommending to avoid special types of development like airport, military zones, industrial areas and, also, keep distances as large as possible from villages and cities.	No federal regulations in Canada. Some provinces have local regulations such as Manitoba Land Use and Planning Policy which provide some high level guidelines.	Yes.There are two design codes: Code for Design of 11 750KV Overhead Transmissior Lines",and the other is "Technical Regulations on Environmental Impact Assessment"
Q2	**Routeing:** If there are no such requirements, what factors does the Transmission Owner take into account when routeing new high voltage overhead electricity lines near exirting development?	EIA legislation. Choosing of a route is two stages 1) Route Corridors and 2) Route Selection with the corridor	In an EIA: EMF limits can be defined, recently 1µT. Without EIA: 100µT apply, but values as low as possible are kept.		Avoidance of densly populated areas, future residential developments and in some cases individual residences	