



Power distribution for low carbon

Birmingham Science City

Energy Efficiency and Demand Reduction:

Realising the potential of the West Midlands knowledge base

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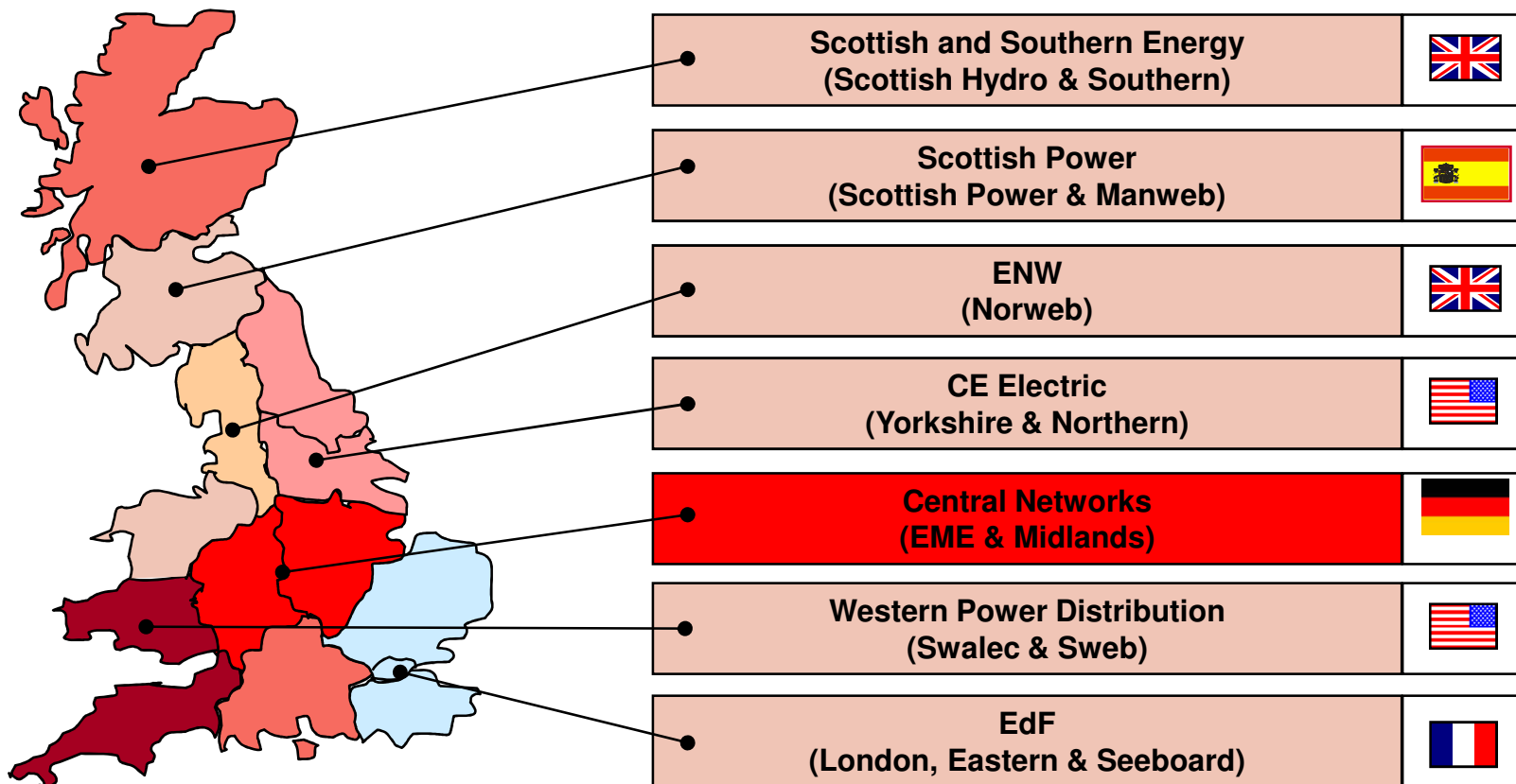
11 December 2009



1. The role of distribution networks
2. Energy issues and power distribution
3. Addressing the challenges
4. Commercial aspects and incentives
5. Research and development examples



Ownership structure of Distribution Network companies in the UK



Snapshot of Central Networks



Key Facts:

- Area covered 32,000 sq. km
- ~5 million residences and businesses
- Around 50 billion kWh per year
- Maximum demand ~10,000 MW
- Network Length 130,000 km
- Substations 97,000
- Grid Supply Points 30

Core activities:

- Overhead line construction and maintenance
- Underground cable installation
- Customer connections
- Response network faults
- Communication with customers

The Network Plan



Asset Replacement

Replacement of deteriorated 'fluid filled cables' and reduction of associated environmental risks. General removal of ageing assets to further improve safety.



Load Related

Increased capacity at areas of high demand – reduced risk of interruption during network outages. Upstream reinforcement to enable new connections. Network reinforcement to facilitate Distributed Generation connection.



Sustainability

Network reinforcement to facilitate Distributed Generation connection. Reduction in network losses. Energy projects. Skill base development.

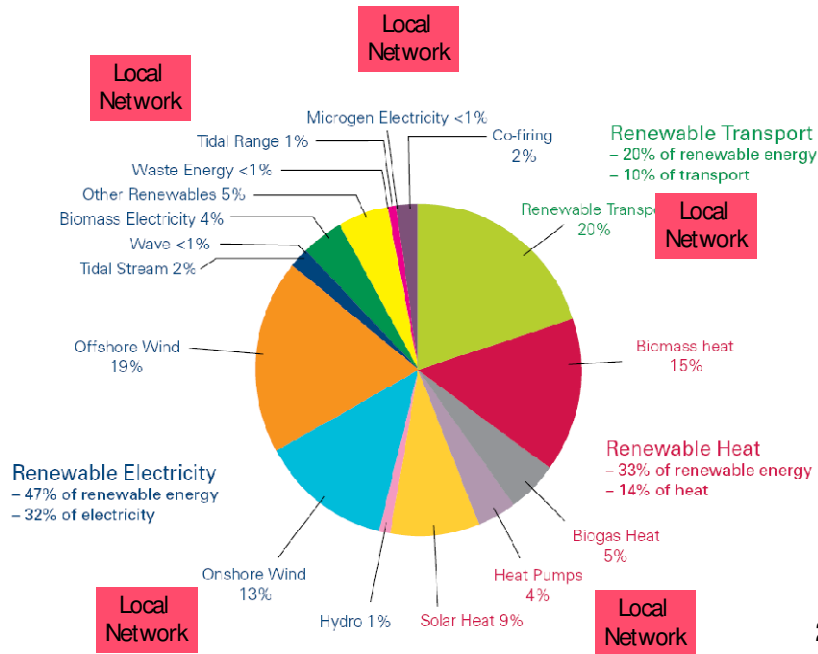
Network Performance

Extensive remote control capability to restore supplies more rapidly. Significant benefits from automated supply restoration. Some improvements for worst served customers in particularly rural locations.

Plus...

Flood protection of high risk major sites reducing possibility of supply interruptions. Enhanced intruder security at high risk sites. Increased supply security for Birmingham city centre.

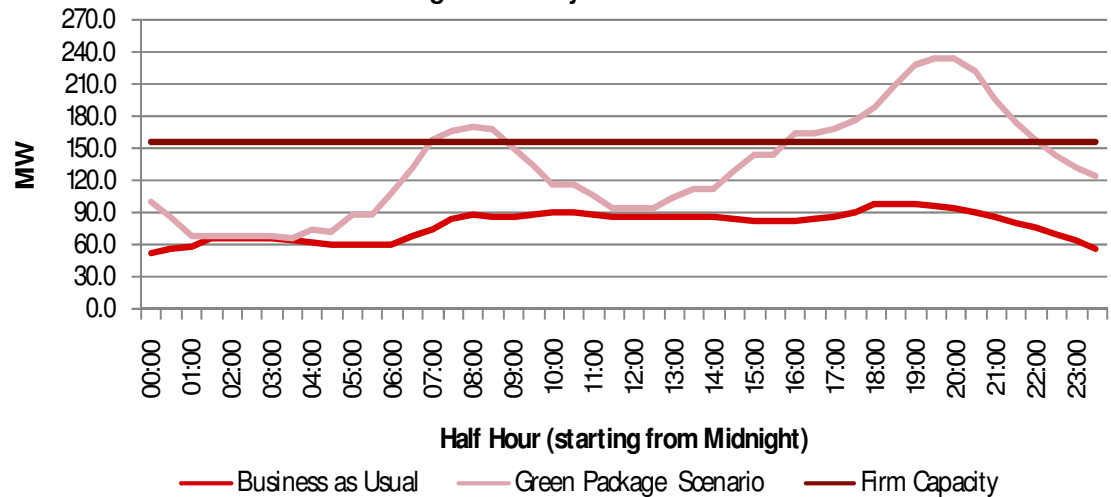
The energy challenge



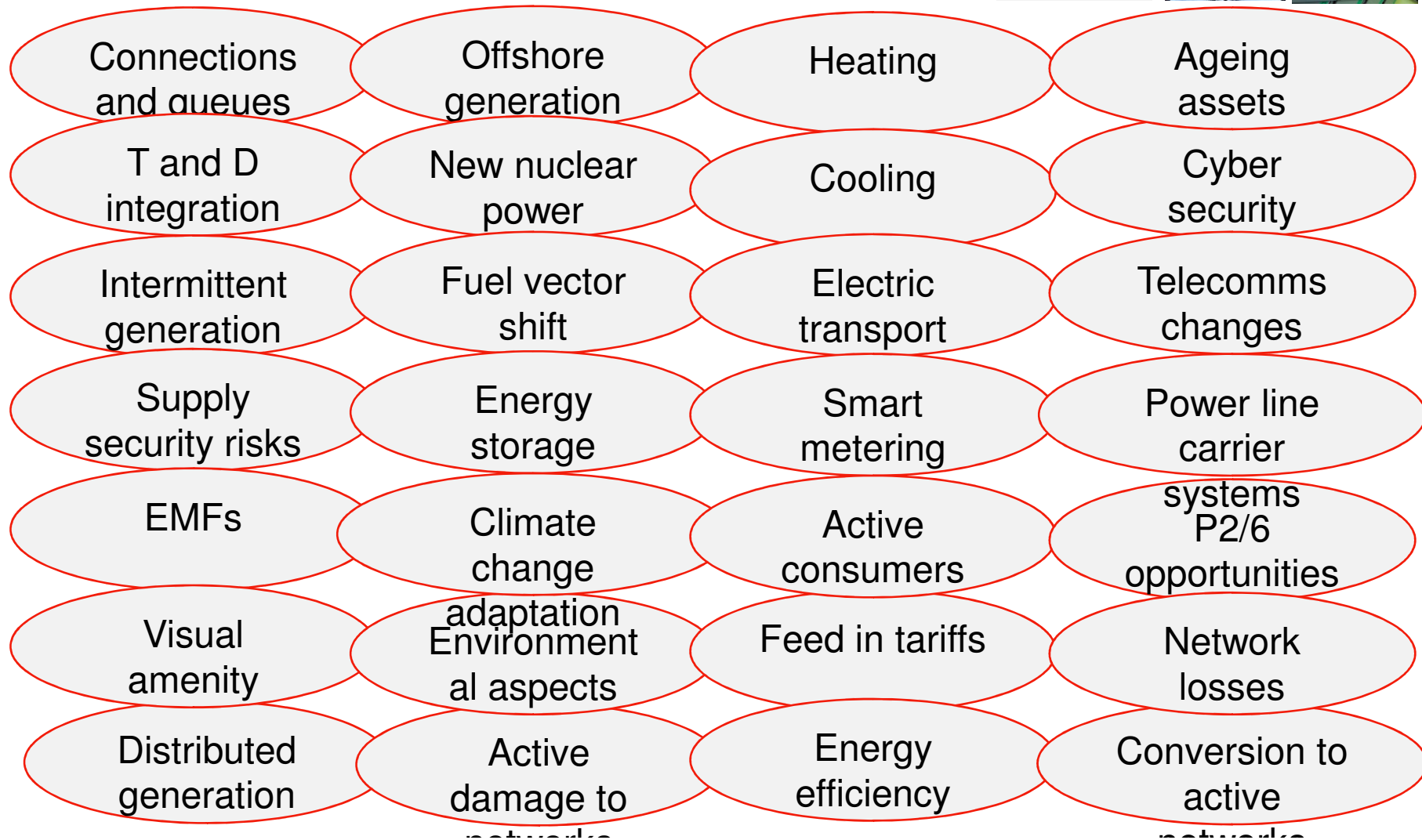
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Average Winter Day MW Profile 2030



....and some challenges for networks

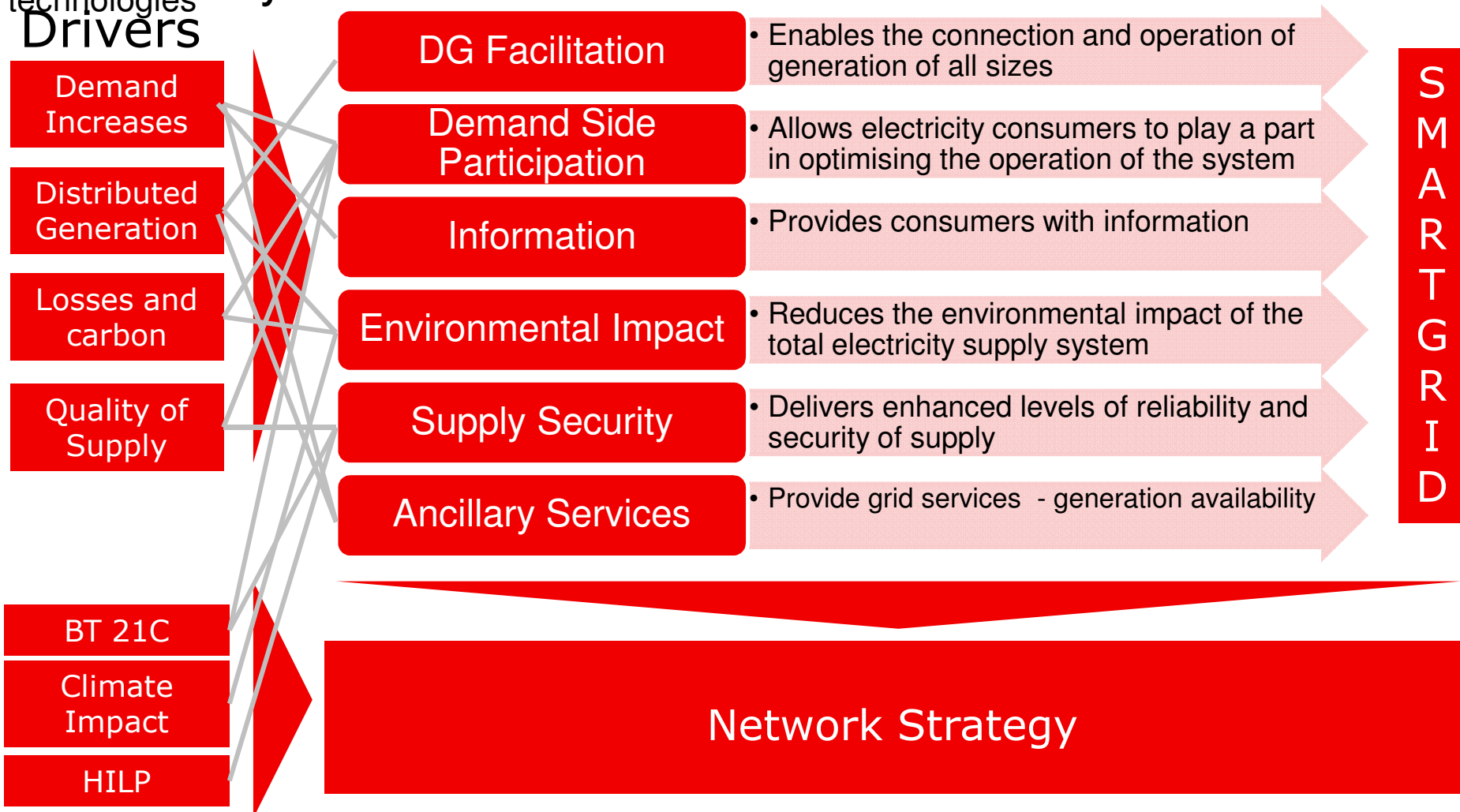




Meeting the challenge - infrastructure – and smarter grid

Innovative functions with intelligent monitoring, control, communication, and self-healing technologies

functionality
Drivers



Some Incentives

ofgem

Innovation Funding Incentive

For DNOs to trial innovative techniques on networks relating to sustainable development. £500m 2010 to 2015.

Low Carbon Network Fund

For DNOs to trial innovative techniques on networks relating to sustainable development. £500m 2010 to 2015.

Tier 1 - projects within DNO control - typical share £3M pa DNOs - 10% of the project cost.

Tier 2 - small number of flagship projects. DNOs compete to an Ofgem panel - up to two submissions pa. Average DNO contribution to the fund of £12M pa (10% of the project cost, with the remainder from the LCN fund).

Third component - £100M discretionary reward for projects that bring particular value to the low carbon economy.



Renewable Heat Incentive

Generation of renewable heat at all scales - households, communities or industrial.

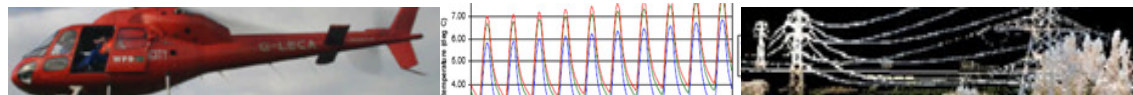
Feed In Tariffs

Support aimed at small low-carbon generators – up to 5 MW. Payments for generation and export.

Low Carbon Communities Challenge

£10m support to pay for real measures selected by the local residents themselves - local biomass plant /retrofitting homes / electric car charge points etc.

Collaboration



Universities

Imperial College
Cranfield
Manchester
Strathclyde
Queens, Belfast
Nottingham
Loughborough
Southampton
Liverpool
Edinburgh
Birmingham
Warwick
Cardiff

Industry

Areva
GE Energy
LogicaCMG
Willow
Thales
ARUP
4energy
Nortech
BT
USi
Schnieder
Ecconnect
Infoterra

Research Establishments

E.ON
Engineering
EATL
KEMA
EPRI
TNEI
Met. Office
British Geol.
Survey
Soil Association
Sterling Eng.
ADAS

DNO / TNOs

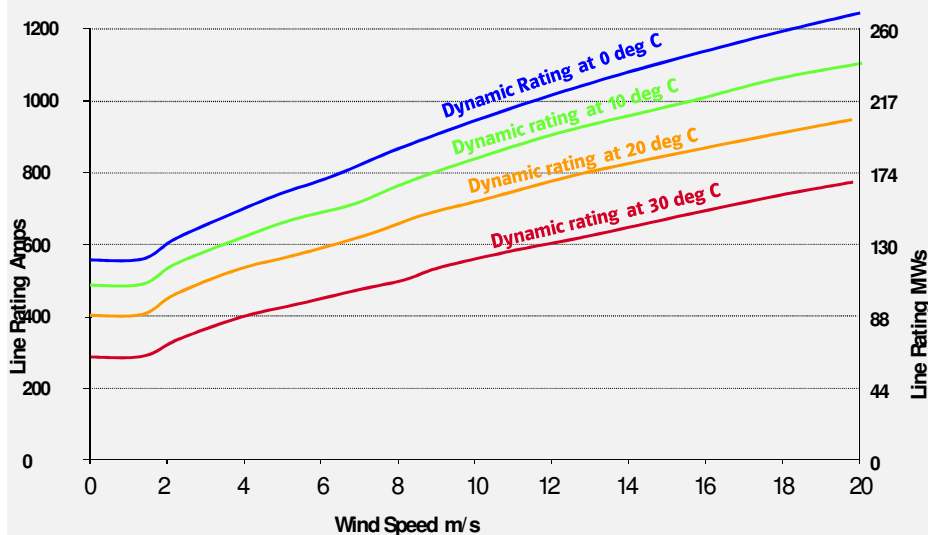
EdF
Scottish Power
SSE
ENW
National Grid

& through;
ENSG ~ DWG
ENA ~ R&D Grp
EATL ~ STP
SuperGen
Eng Ed Scheme
Climate Change

Just one example of network innovation – ‘dynamic line ratings’



Dynamic Ratings v Traditional P27 Line Ratings



The network supplying Skegness from Boston could not meet the demands of windpower export.



By linking local weather conditions with the network management system the traditional passive network capacity is significantly increased as wind speeds increase - dynamic network management

e.on | Central Networks

