

# **Economic, Commercial and Regulatory Aspects of the Integration of Distributed Generation: A UK perspective**

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# Overview

- 1. Why is Distributed Generation important now ?**
- 2. The need for a new regulatory approach**
- 3. From passive to active distribution networks**
- 4. Outline of some new incentives**

# UK Government's objectives for energy policy



## Energy White Paper (2003):

- **To put the UK on a path to cut CO<sub>2</sub> emissions by 60% by about 2050 with real progress by 2020**
- **to maintain the reliability of energy supplies**
- **to promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity**
- **to ensure that every home is adequately and affordably heated**

# One expected impact: Large increase in DG

- **Some 10GW of various forms of DG expected by 2010; More in subsequent years**
- **Result of government support for renewables and cogeneration**
- **DG to assume responsibilities for system support**
- **DG to be considered in network replacement and development**

***Key Challenge:*** Cost effective integration of DG in operation and development of the system

# Connecting DG in the UK: Present situation

- **Limiting factors for connecting DG**
  - In urban areas: Fault levels
  - In rural areas: Voltage rise effect
- **Connection cost is related to voltage level at which DG is connected**
- **Conflicting objectives**
  - Distribution network operator- minimise the impact of DG on networks (connect to as high voltage level as possible)
  - Distributed Generation - minimise connection cost (connect to as low voltage level as possible)
- **Effect is prohibitive connection costs for many DG projects**

# Long term goal: From Passive to active networks?

- **Passive**
  - Designed to accept bulk power from transmission system and distribute to customers
  - Generally with unidirectional flows - some interconnected
- **Ad hoc approach with existing practise (“fit and forget”)**
  - No control over DG
  - Worst case scenarios condition for connection (maximum generation minimum load)
  - Limits capacity of DG that can be absorbed by networks
- **Active distribution network**
  - Local, coordinated control of voltage, flows and fault levels
- **Dilemma: Invest in distribution network primary plant or make it more intelligent through active management**

# Potential benefits of active management

**Incremental investment cost of upgrading the network**  
(including cost of active management systems in £m):

	<b>Low Density</b>		<b>High Density</b>	
	<b>P</b>	<b>A</b>	<b>P</b>	<b>A</b>
<b>Capacity of DG:</b>				
2.5GW	0	0	0	0
5GW	0	0	238	124-136
7.5GW	100	80	359	293-310
10GW	243	80	562	416-434

# Levelling the Playing Field

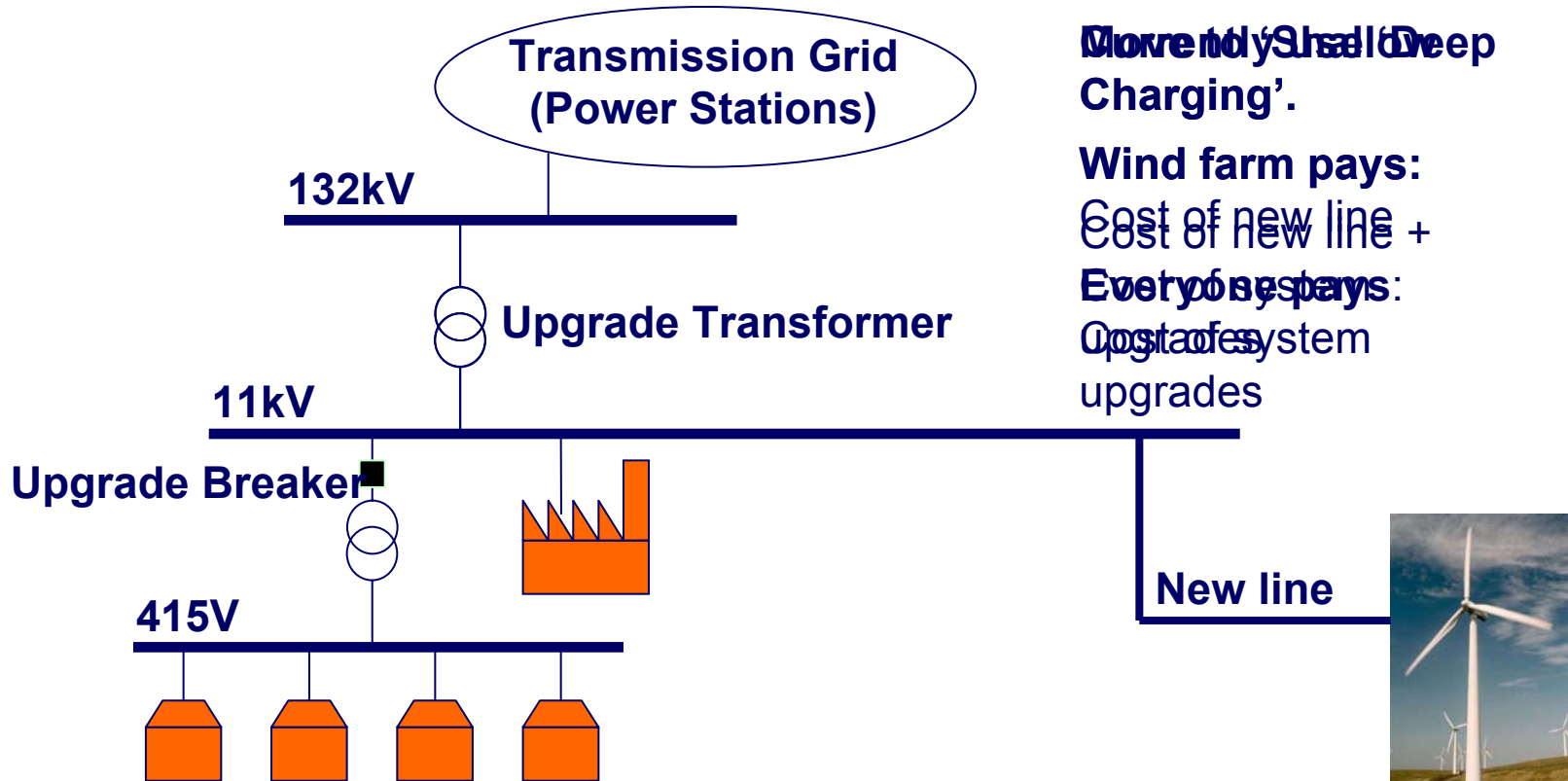
- **Legislation**
  - Role of distribution networks to facilitate competition
  - Financial separation of distribution businesses (DNOs)
- **Regulatory reforms by Ofgem**
  - Performance based regulation
  - Design of incentive schemes for DNOs to connect DG
- **Commercial integration**
  - New approaches to network pricing
  - Security standards reviewed to recognise the ability of DG to displace network capacity
- **Technical integration**
  - Coordinated operation of network with DG as part of move to active management



# Key regulatory changes

- **A series of reforms are being implemented in 2005 as part of the next regulatory price control:**
  - The objectives of the incentive scheme are to encourage DNOs to undertake the investment required to facilitate distributed generation connections and invest efficiently and economically in the their system.
  - The proposals provide protection to companies, with 70-80 percent pass-through of costs, with an incentive rate of £2-3.5/kW/year.
- **Other developments**
  - A move away from ‘deep’ connection charges for DG
  - New incentives for R&D and demonstration projects

# From deep to shallow charging



~~Currently 'Shallow Deep Charging'~~

Wind farm pays:  
Cost of new line +

Everyone pays:  
Cost of system  
upgrades



- **Innovation Funding Incentive (IFI)**
  - designed to encourage DNOs to invest in appropriate R&D activities that focus on the technical aspects of network design, operation and maintenance. Cost pass through of 90%, falling year by year. Max spend 0.5% of turnover.
- **Registered Power Zones (RPZ)**
  - designed to encourage DNOs to develop and demonstrate new, more cost effective ways of connecting and operating generation. Two applications per DNO per year allowed. Incentive of £4.5/kW of DG (up to 3x normal DG rate).

# Will this be enough?

- **Ofgem's new approach is radically different from the regulatory practice of the 1990s**
- **R&D incentives a unique experiment - but will they be enough to revive network R&D in the UK ?**
- **Much depends on detailed implementation and interpretation of rules**
- **Additional steps will be required - e.g. to enable new markets for active management services**
- **To meet White Paper objectives, may need further integration of environmental goals in economic regulation**