Transmission Arrangements for Distributed Generation

Working Group Meeting 3 — 22nd April 2010

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Agenda

No	Agenda Item	Lead	Time
	Arrival and Coffee	-	10 minutes 10:00
1.	Housekeeping	Patrick Hynes	5 minutes 10:10
2.	Summary of Issues Presented at Meeting 2	Ivo Spreeuwenberg	30 minutes 10:15
3.	National Grid's Current Thinking	Ivo Spreeuwenberg	30 minutes 10:45
4	Break	-	10 minutes 11:15
5.	Overview of Gross Supplier Agency Model	Ivo Spreeuwenberg	65 minutes 11:25
6.	Lunch		40 minutes 12:30
7.	Progress on Actions • New: Alternative Charging of Residual • Action 1+11: Embedded Generation Data • Action 15: Feed in Tariffs • Action 6: Gross treatment of various scenarios • Action 14: Treating generators as generators	Ivo Spreeuwenberg	120 minutes 13:10
8.	Confirmation of Future Meetings	Ivo Spreeuwenberg	10 minutes 15:10
9.	AOB	-	10 minutes 15:20

1. Housekeeping

- Chair
- Fire/Evacuation Procedure
- Agenda
- Arrangements for Leaving Site

2. Summary of Issues Presented at Meeting 2

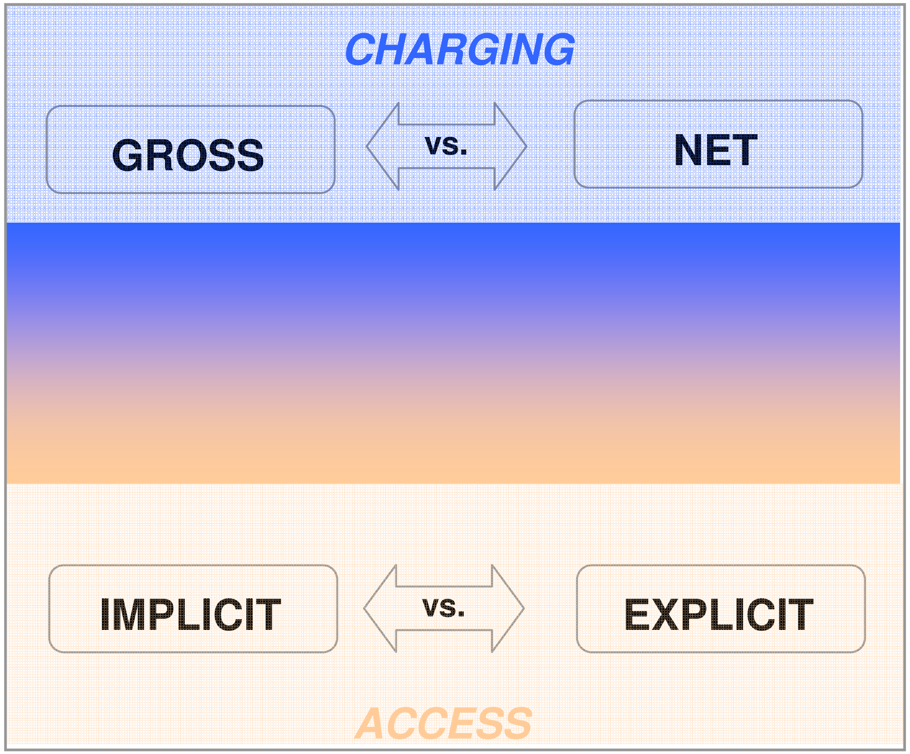
- The residual element of charges introduces a ‘benefit’ for embedded generators
- Inequities between embedded and directly connected generation introduced by this ‘benefit’ are the same (i.e. ~£18/kW) regardless of location
- There are some benefits, in terms of avoided investment in transmission, of embedding that should be taken into account (‘de-facto’ benefit)
- Several models for reform previously investigated through original TADG WG
- Broadly fall into four categories:

2. Summary of Issues Presented at Meeting 2

	Supplier	DNO
Net	• Existing arrangements / minimal disruption • Ofgem & government have indicated that there is an issue • Analysis indicates not cost-reflective (~200% >) • Contractual issues with exporting GSPs	~ Could indirectly address cost-reflectivity issue ✓ Directly addresses contractual arrangements ~ Introduces massive implementation complexity (revenue transfer, nodal market)
Gross	✓ Directly addresses cost-reflectivity issue ✓ Removes the need for more complicated contractual arrangements ~ Requires de-minimus threshold and robust/transparent discount level	✓ Directly address cost-reflectivity issue ✓ Removes need for more complicated contractual arrangements ✗ Introduces significant implementation complexity for same result as gross supplier

2. Summary of Issues Presented at Meeting 2

- Pre-consultation in January 2010 focused on the GSAM and Net DNO models as possible options for change
- Possible sub-options within 2 broad models – residual charging
- Net DNO model discussed
- Necessity for explicit, nodal rights challenged



2. Summary of Issues Presented at Meeting 2

- Discussion of issues has focussed around issue of cost-reflectivity; (with inelastic demand + competition = max. global welfare)
- The promotion of effective competition (associated with cost-reflectivity) is a key issue
- Embedded ‘benefit’ gives DG a competitive advantage

- ***Gross Supplier Agency Model*** removes non cost-reflective benefit and therefore promotes effective competition between DG and directly connected generators

- ***Net DNO Agency Model*** essentially removes the ability of DG to compete with directly connected generators through explicit, nodal access rights; DG maintain the embedded benefit

3. National Grid's Current Thinking

- A net model can only address the inequality in competition through the removal of competition altogether (explicit, nodal access rights)
- This is unlikely to result in the best outcome for the consumer (and would not maximise global welfare)
- The massive change required to deliver such a model does not compare to the benefits it currently has the potential to provide
- Charging the residual in a different manner could be a solution to the problem consistent with original TADG objectives
- Gross charging required for alternative residual solutions in order to solve the problem
- Minded to take GSAM forward for consultation

4. Break

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5. Overview of Gross Supplier Agency Model

a) High level overview

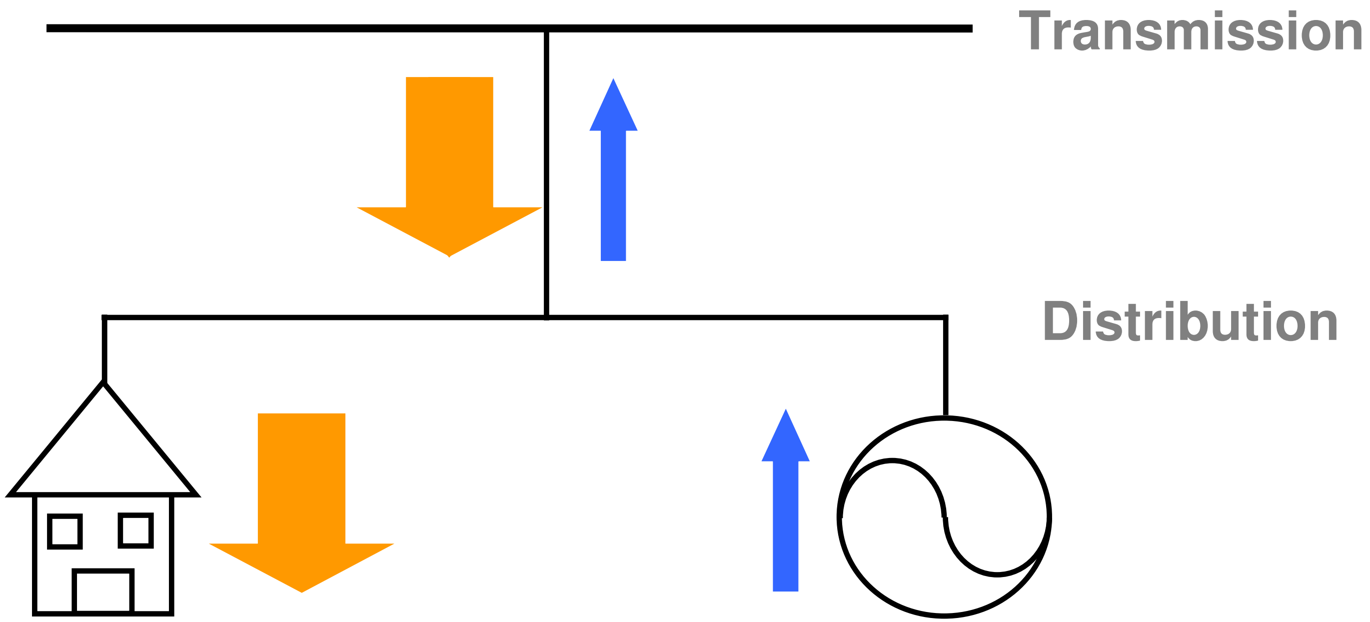
b) How GSAM addresses the issue

c) Contractual interfaces

d) Illustrative revenue flows

e) Framework/IS modifications

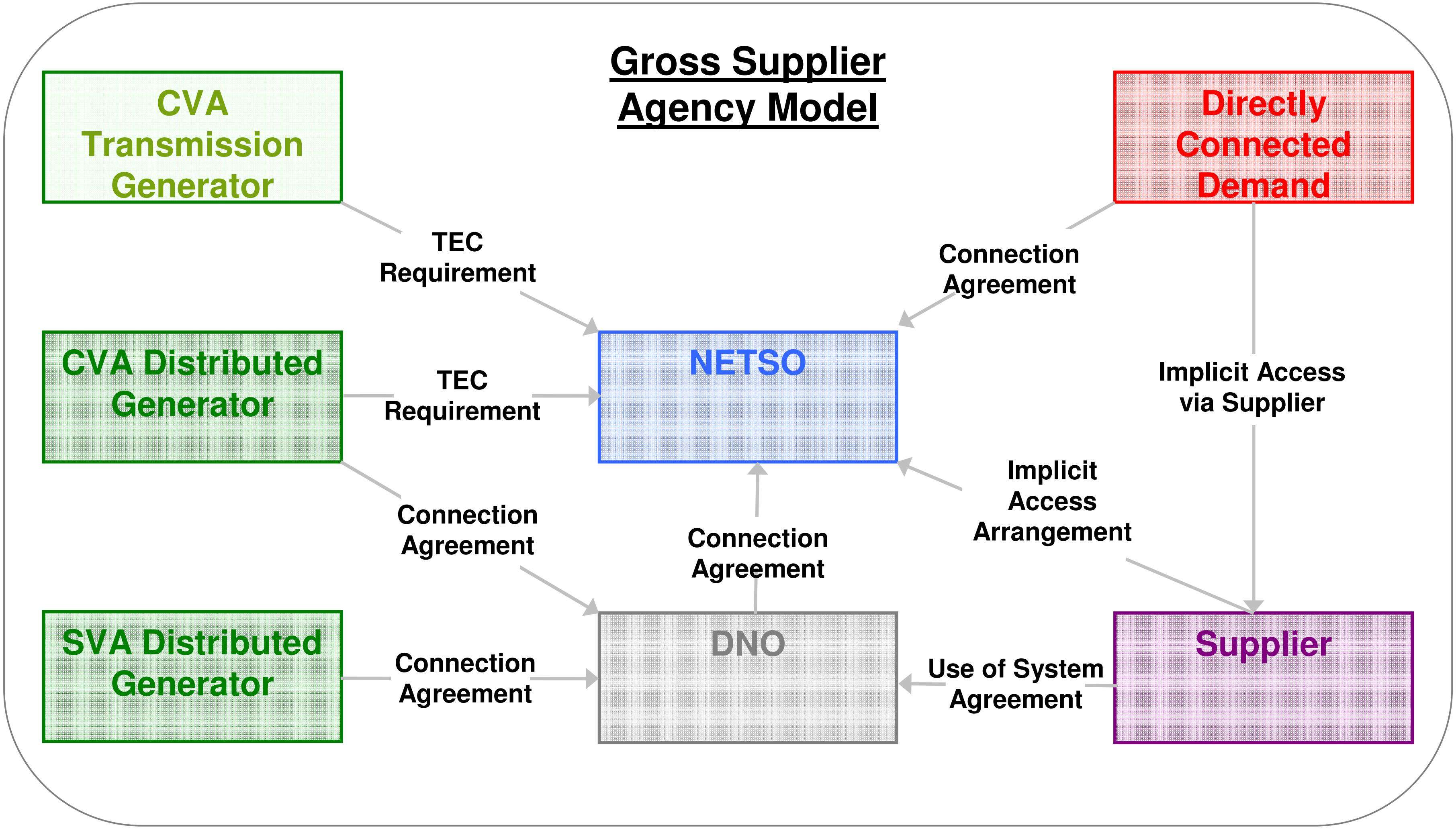
5. a) High Level Overview



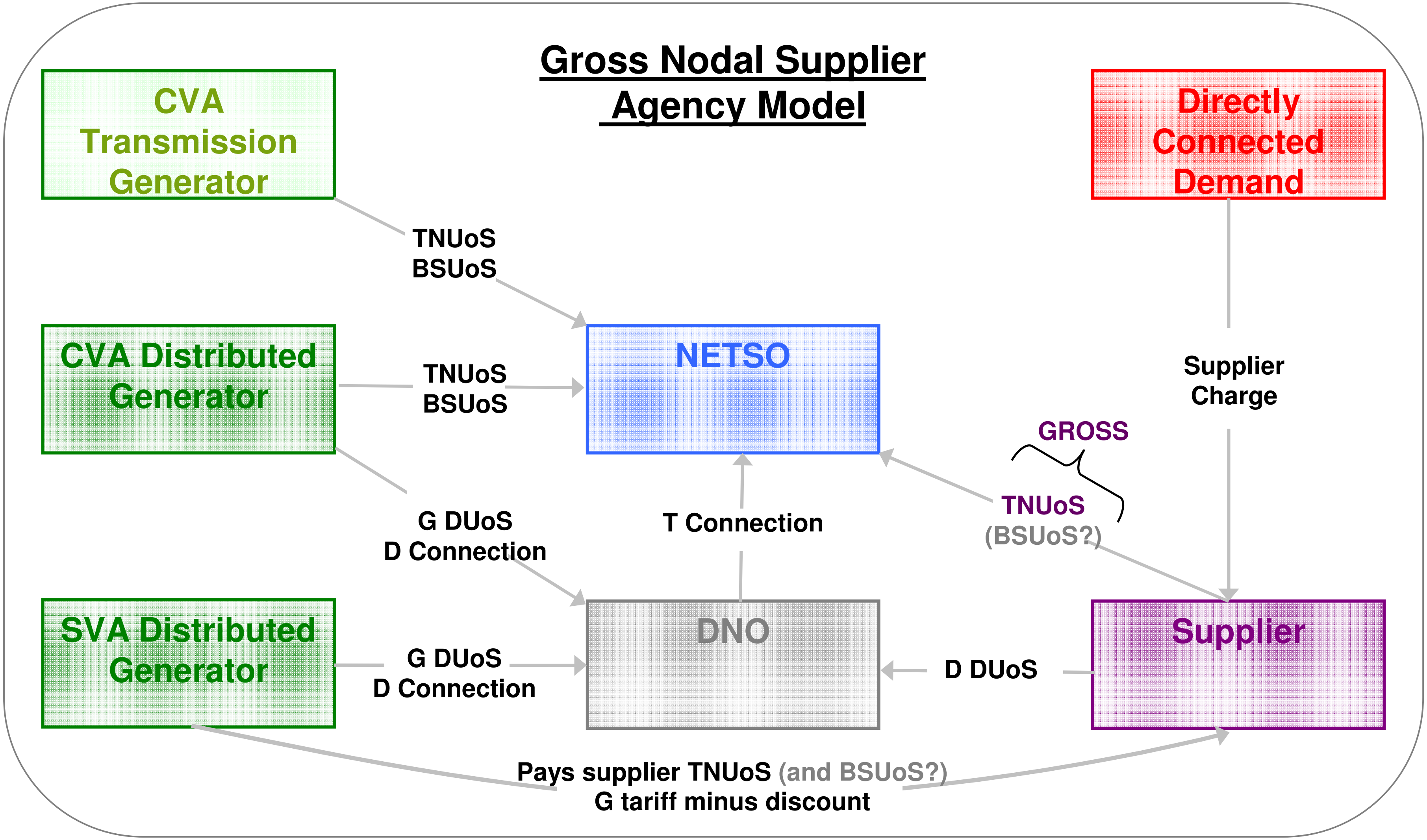
5. b) How GASM addresses the issues

- Treats DG as generation and gross charges both DG and demand (meter at distribution entry points, charge on the basis of GSP Group)
- DG therefore treated the same as directly connected for charging purposes minus the 'de-facto' benefit; improving cost-reflectivity and promoting effective competition
(De-facto benefit work still ongoing)
- Maximises use of existing contractual arrangements
- Through gross charging contractual arrangements surrounding exporting GSPs no longer an issue
- Threshold below which DG would be treated as net would be necessary; current thinking is to stop at HH meters (i.e. 100kW)

5. c) Contractual Interfaces



5. d) Illustrative Revenue Flows



5. e) Framework/IS Modifications

CUSC

- Possible minor change to CUSC 6.5 – “Obligations of Users Who Own or Operate Distribution Systems”

Grid Code

- Role of Supplier (despatch and data provision)

BSC

- Additional Metering information to support charging systems (i.e. P210 file)
- Ensure consistency with the CUSC

Charging

- Modifications to NGET EVE database for invoicing

- Requirement for modifications to distribution codes, DCUSA and bilateral agreements to be considered

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6. Lunch

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New Action

Alternative Charging of Residual

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Investigation into Alternative Residual Charging

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22nd April 2010

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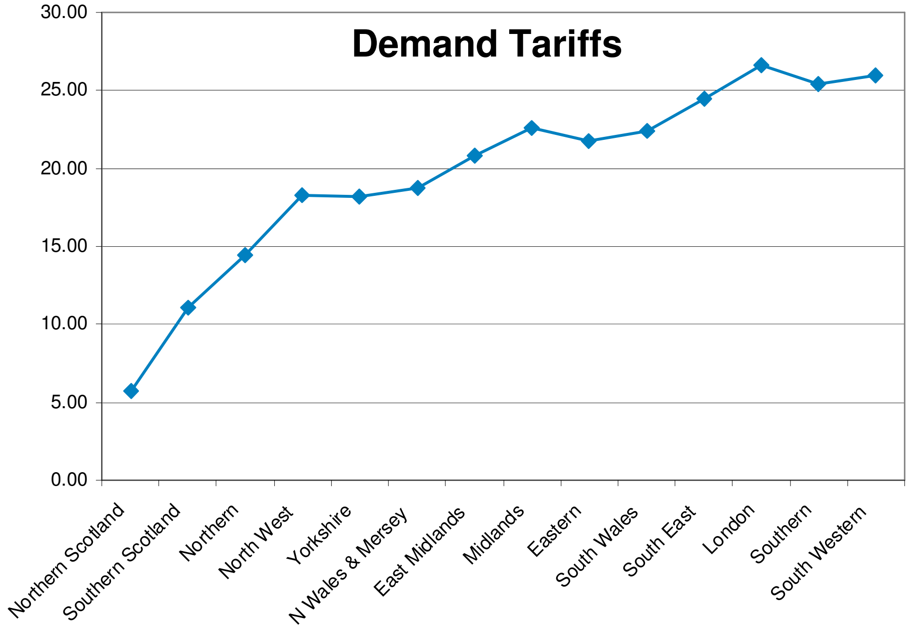
Investigation: Charging Residual to Demand

Existing Methodology

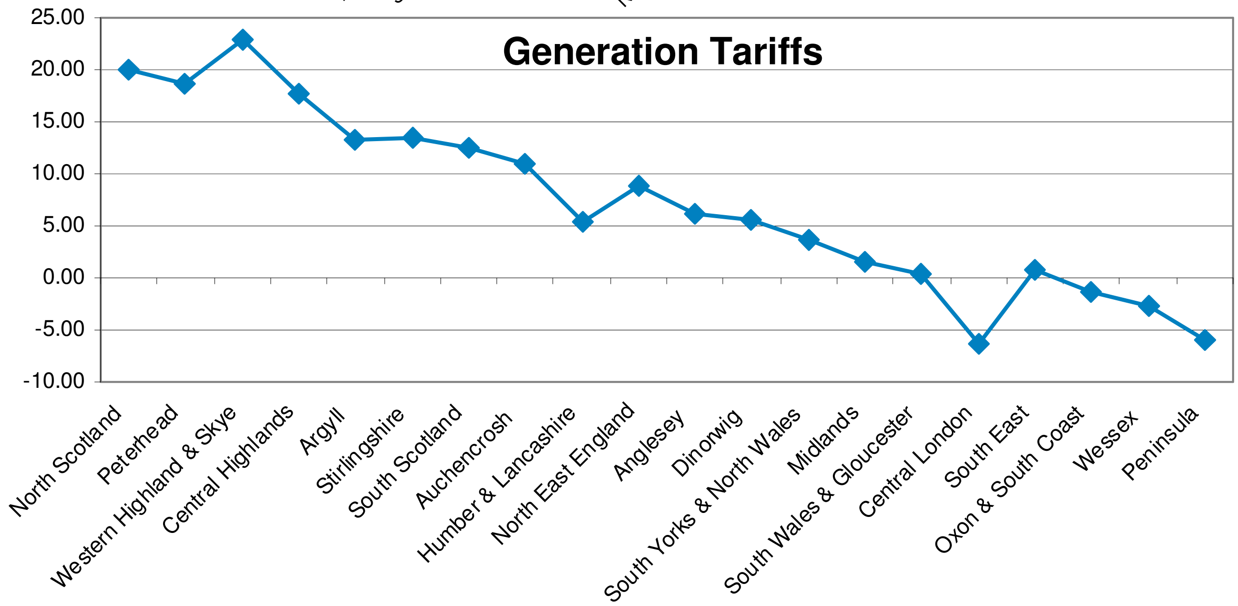
Net Demand 27/73

- Existing tariffs; '*Embedded Benefit* ' issues arising from netting residual element



G/D Split	27/73
EC	10.633
LSF	1.8
MAR (£m)	1599.8
Gen (£m)	431.94
Dem (£m)	1167.8
Local	72.36
Gen Residual	3.479
Dem Residual	18.559

Illustrative Figures Used for Modelling



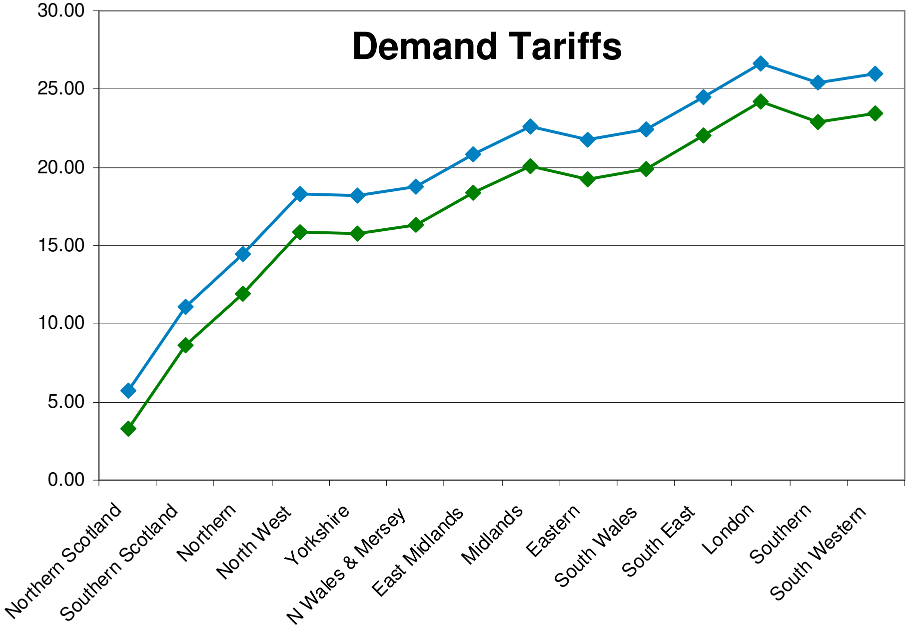
Investigation: Charging Residual to Demand

Gross Charging Demand

Net Demand 27/73

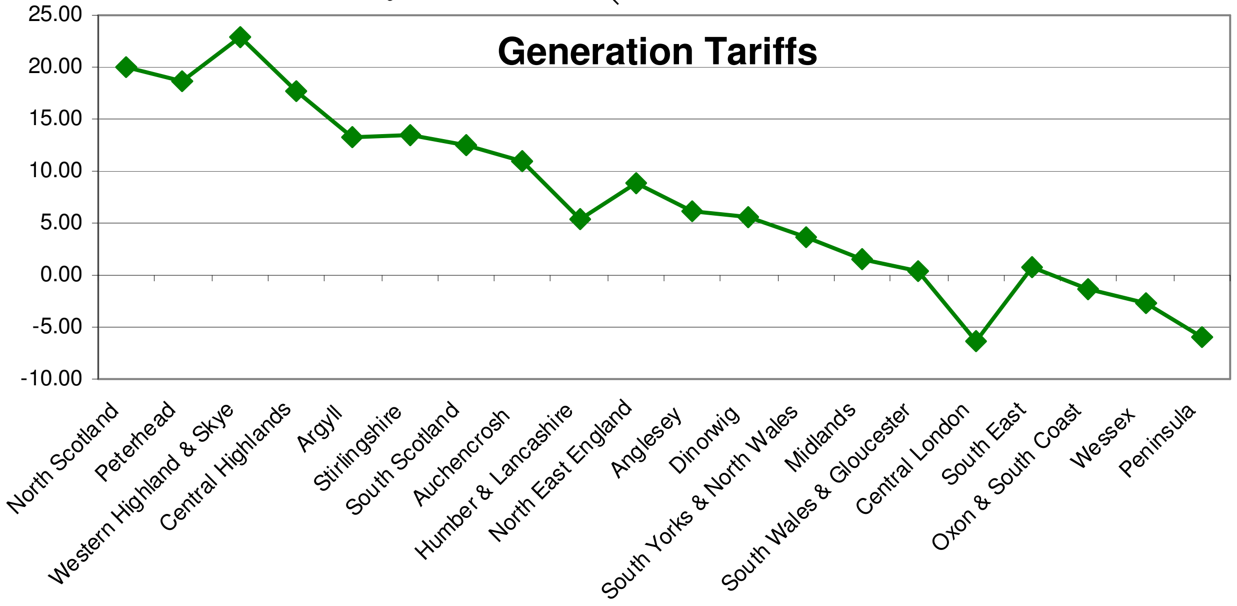
Gross Demand 27/73

- Demand Tariffs reduce due to larger charging base of ~8,300MW*



G/D Split	27/73
EC	10.633
LSF	1.8
MAR (£m)	1599.8
Gen (£m)	431.94
Dem (£m)	1167.8
Local	72.36
Gen Residual	**3.418**
Dem Residual	**16.137**

Illustrative Figures Used for Modelling



*Demand scaled up uniformly across GB; Increased Generation based not modelled

Investigation: Charging Residual to Demand

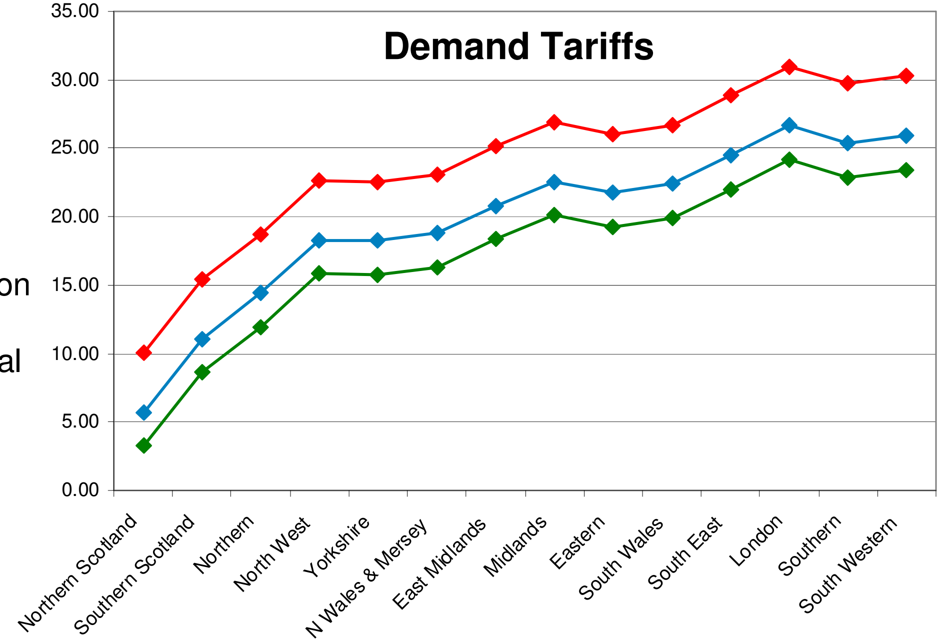
Gross Charging 100% of Revenue to Demand

Net Demand 27/73

Gross Demand 27/73

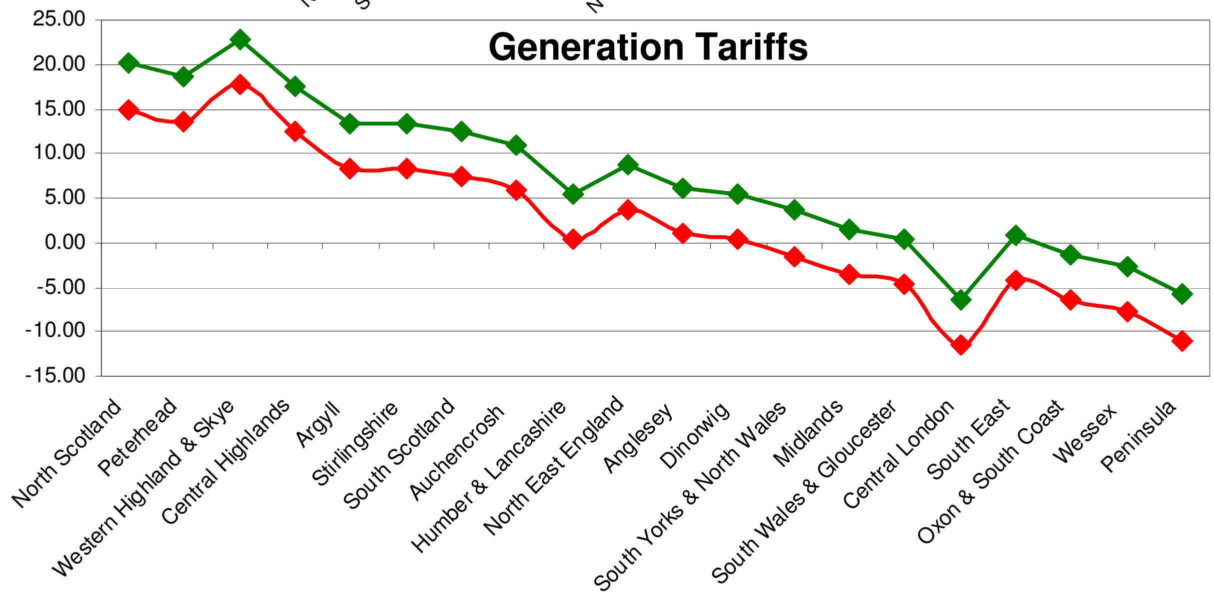
Gross Demand 0/100

- Demand pay generation due to recovery from local element and 'local circuit' charges



G/D Split	0/100
EC	10.633
LSF	1.8
MAR (£m)	1599.8
Gen (£m)	0
Dem (£m)	1599.8
Local	72.36
Gen Residual	-1.039
Dem Residual	22.322

Illustrative Figures Used for Modelling



*Demand scaled up uniformly across GB; Increased Generation based not modelled

Investigation: Charging Residual to Demand

Gross Charging 100% of Residual to Demand

Net Demand 27/73

Gross Demand 27/73

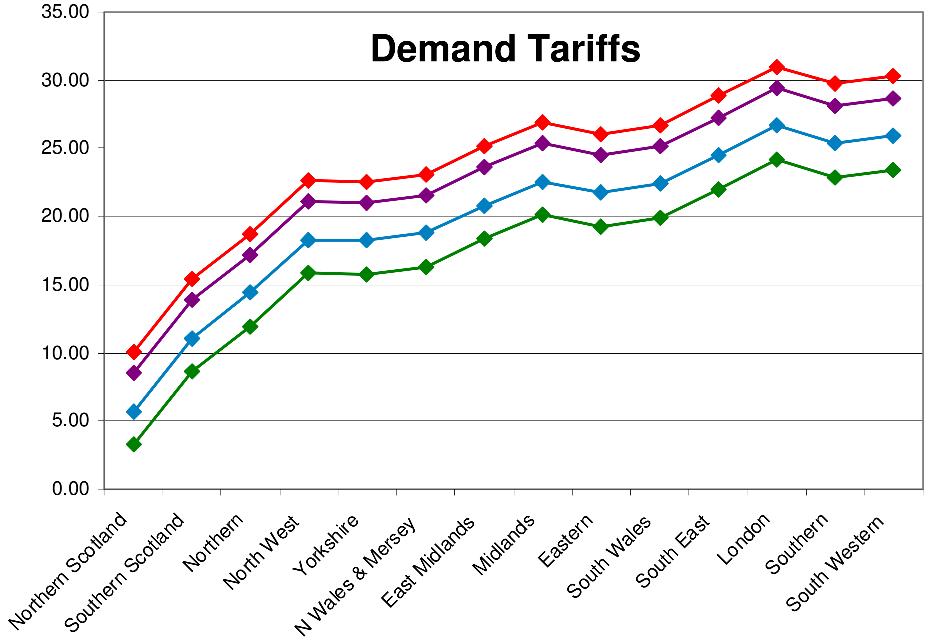
Gross Demand 0/100

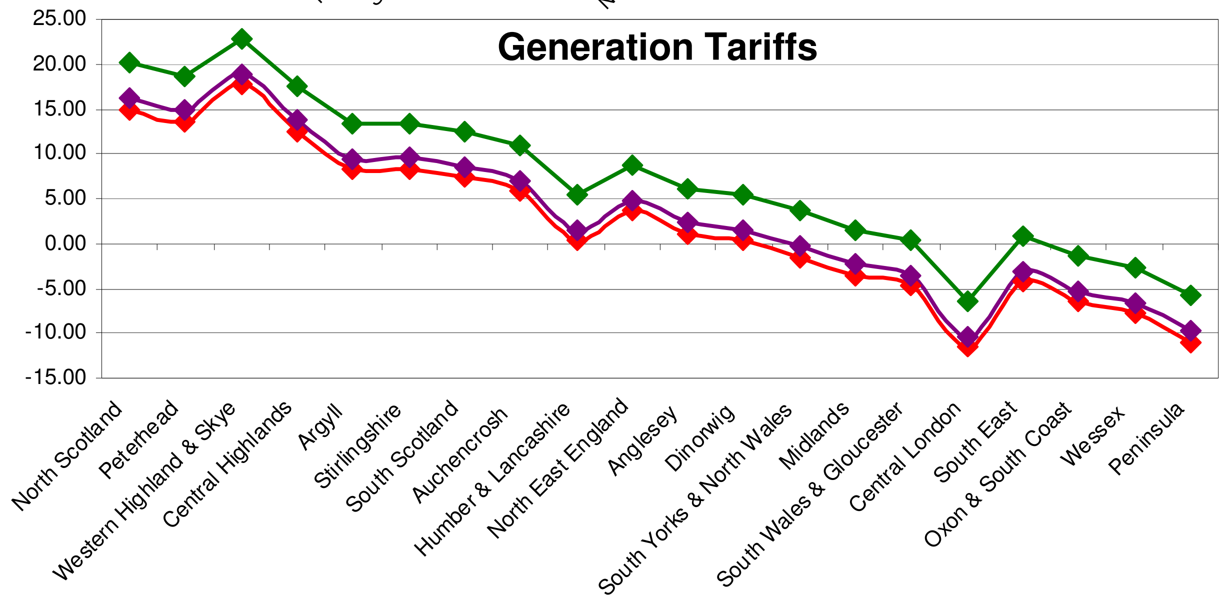
Gross Demand 6.25/93.75

G/D Split	27/73
EC	10.633
LSF	1.8
MAR (£m)	1599.8
Gen (£m)	**99.99**
Dem (£m)	**1499.8**
Local	72.36
Gen Residual	**0**
Dem Residual	**20.883**

Illustrative Figures Used for Modelling

- G/D split adjustment to bring generation residual element back up to zero





*Demand scaled up uniformly across GB; Increased Generation based not modelled

Actions 1+11

Embedded Generation Data

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Exemptible & Embedded Generation Analysis

GB ECM-23

22nd April 2010





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Data Based on DUKES and SYS – minimum 10kW threshold

Categories of Exemptible Generation in Scotland

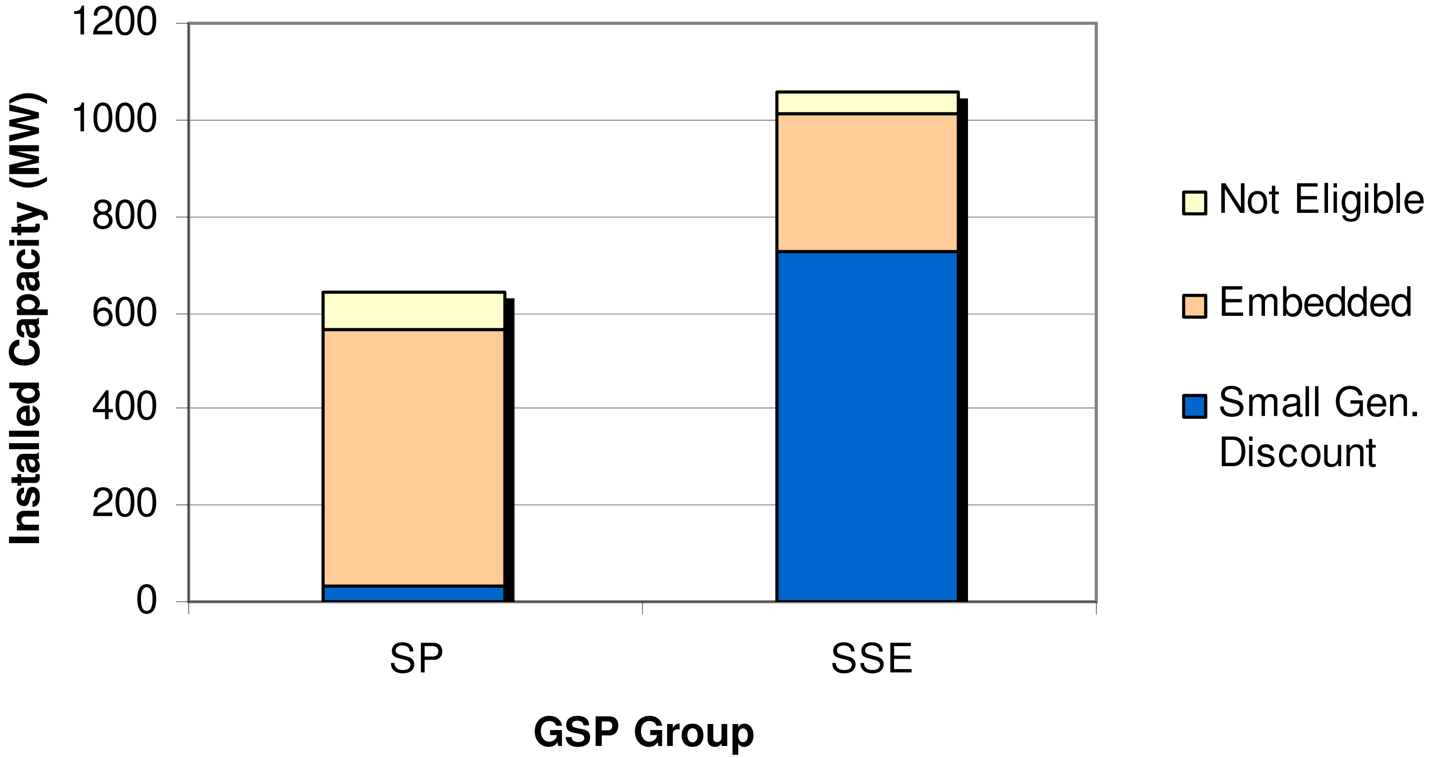
2009 Data

Total Exemptible
1703 MW

Total Embedded
820 MW

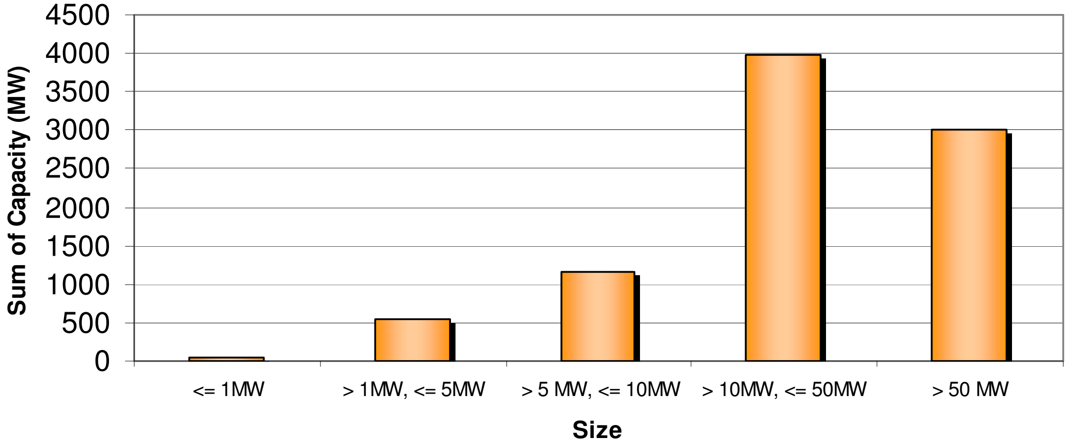
Total Directly Connected
883 MW

Total Small Gen. Discount
755 MW

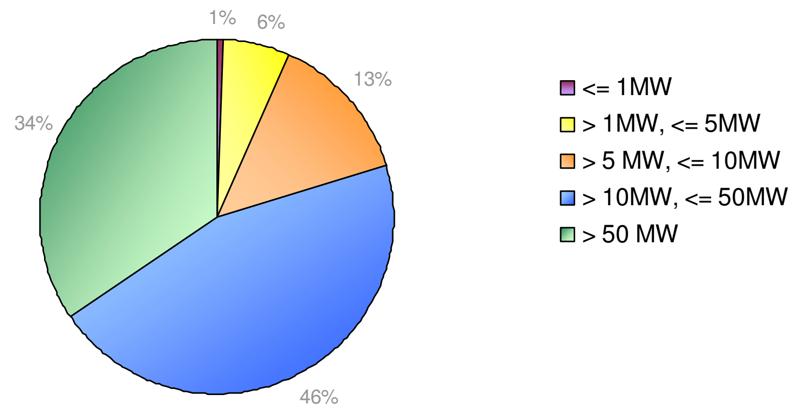


Capacity and Sites of GB Embedded Generation

Total Installed Capacity (MW) of GB Embedded Generation by Size

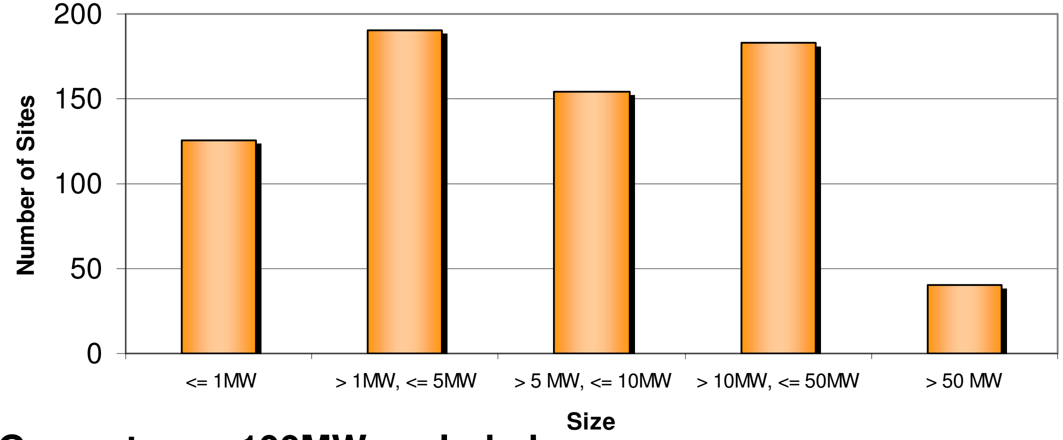


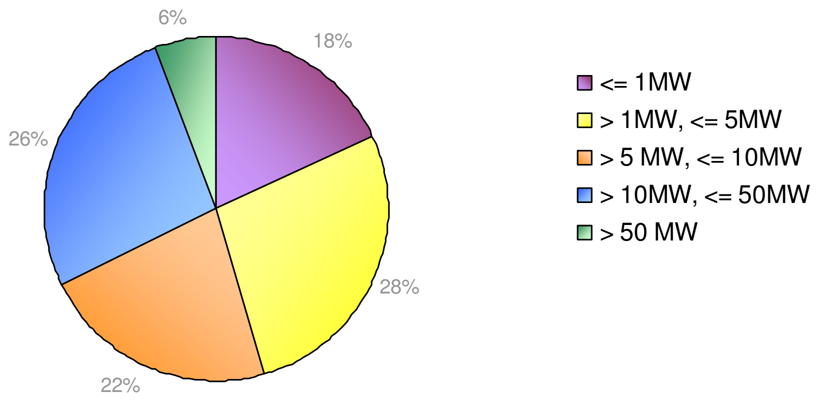
Percentages



Total Installed Capacity ~ 8750 MW

Total Number of Sites by Size of GB Embedded Generation by Size

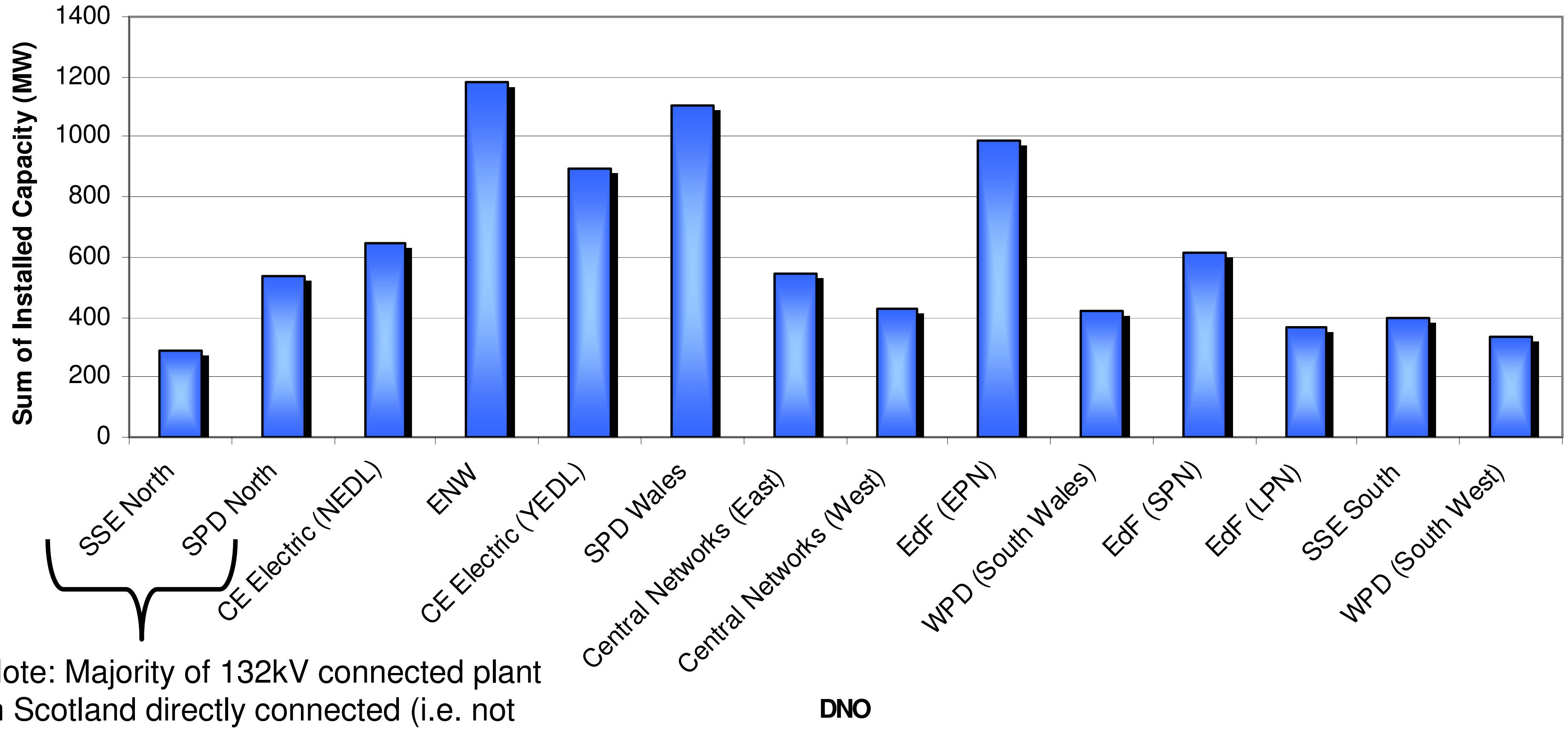




Total Number of Sites ~ 693

Generators > 100MW excluded

Capacity of GB Embedded Generation by DNO



Note: Majority of 132kV connected plant in Scotland directly connected (i.e. not classed as embedded)

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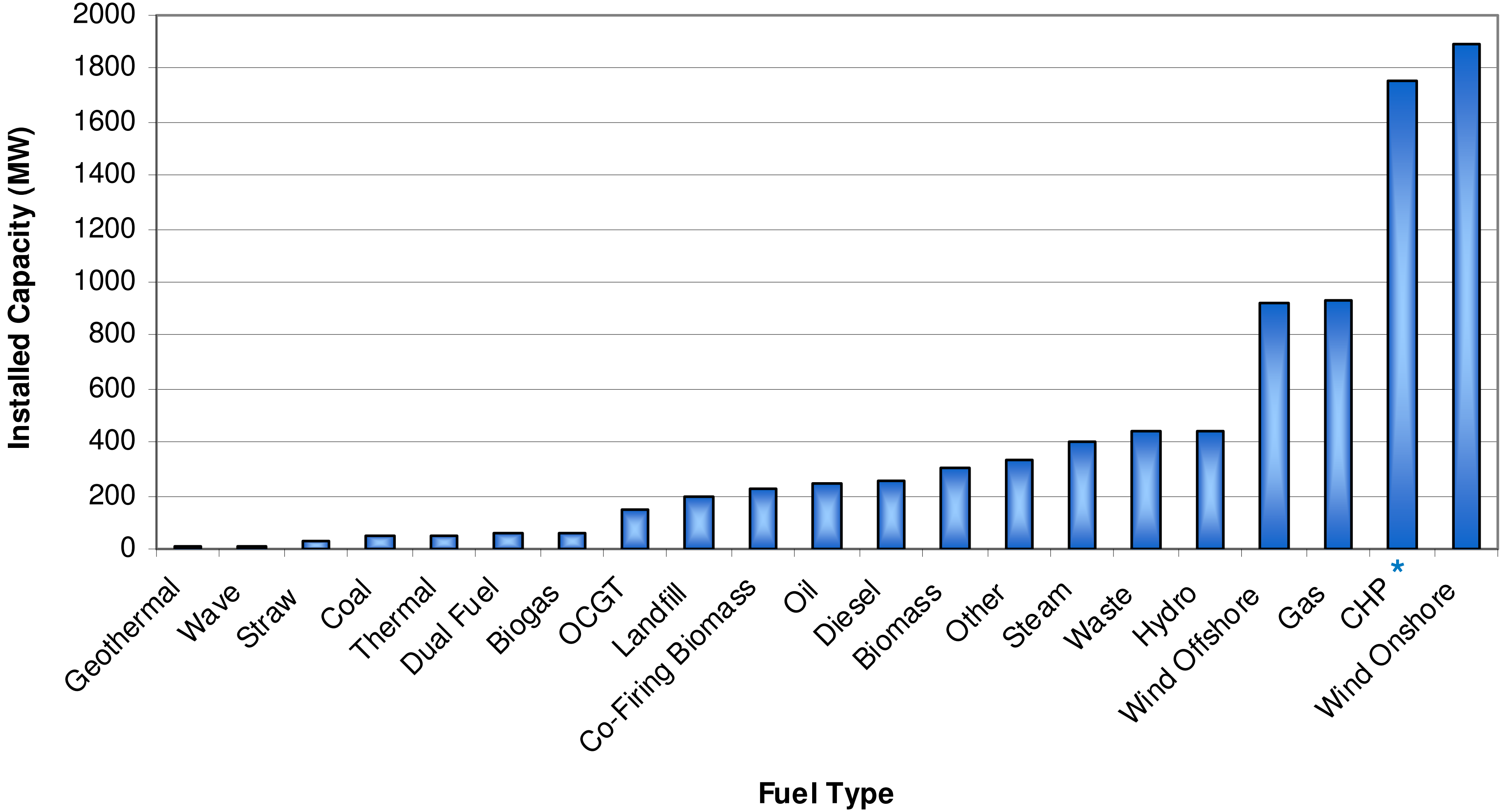
Generators > 100MW excluded

Capacity of GB Embedded Generation by Type



***CHP Association Response to pre-consultation indicated 5,469MWe installed capacity in 2008;**

DUKES indicates just over 2,100MWe of large scale CHP – Further Data Required

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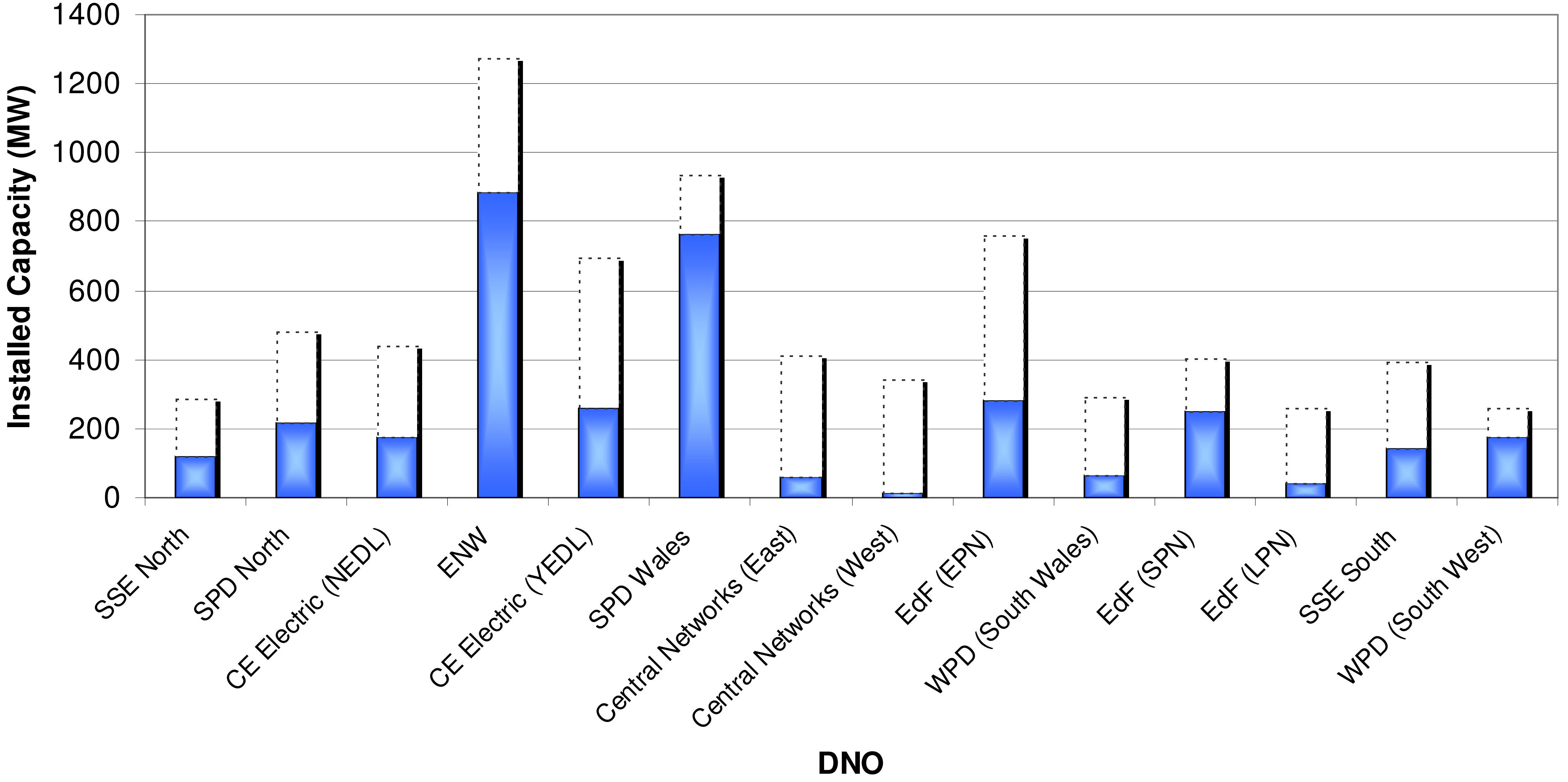
Generators > 100MW excluded

Planned Output at Winter Peak

DNO Forecast Data



Average Output as Percent of Capacity

41%

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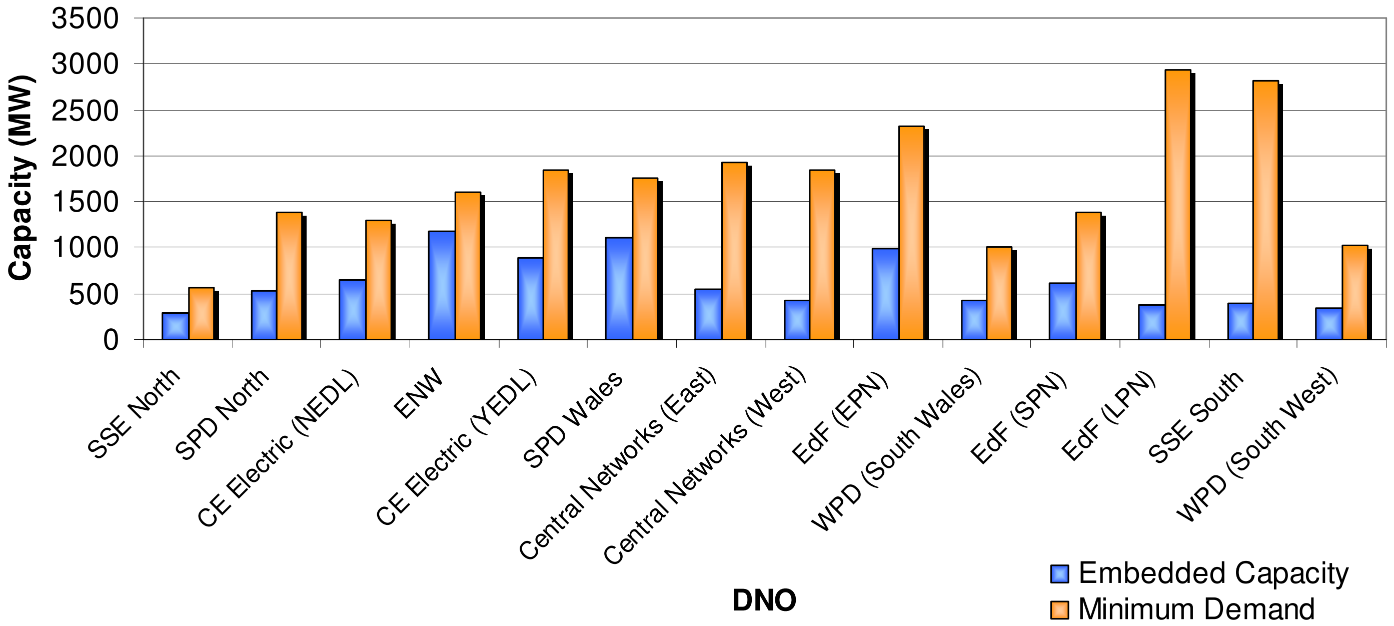
Generators > 100MW excluded

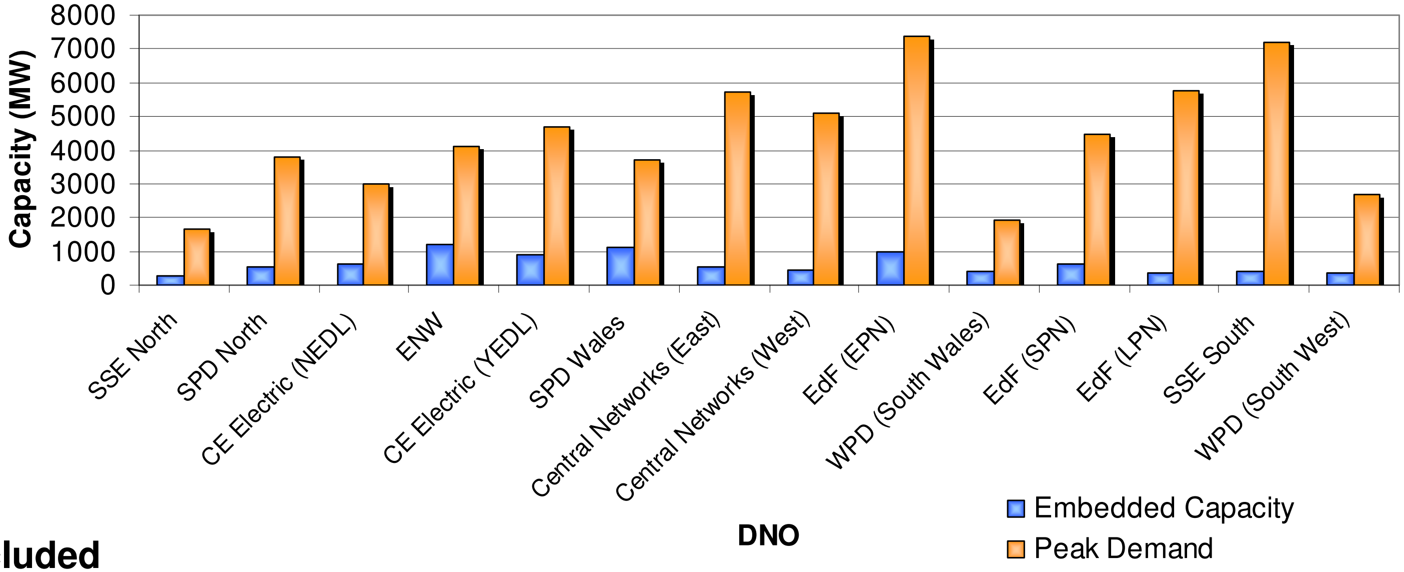
Embedded Capacity vs. Demand

2009 Data



Embedded Capacity vs. Minimum Demand

Embedded Capacity vs. Peak Demand



Generators > 100MW excluded

Action 15

Feed in Tariffs

Feed-in-Tariffs Consideration

GBECM-23

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Background

Information provided by Centrica

- Feed-in-Tariff introduced by UK government on April 1st 2009
- Paid by energy suppliers to promote self generation of energy by customers
- Any renewable generation source that generates electricity with a capacity <5MW will receive a Feed-in-Tariff (FiT)
- From April 2010, installations < 50kW must move to FiT and can no longer access Renewable Obligation

Obligations on Suppliers

Information provided by Centrica

- The costs of FiTs will be shared by all suppliers based on electricity sold
- Suppliers with more than 50,000 domestic customers are mandatory FiT suppliers
  - Must pay FiTs to their own customers
  - Must pay FiTs to off grid customers, or those served by non mandatory suppliers

Payment Flows

Information provided by Centrica

- Suppliers decide own procedures for paying generators subject to minimum standards
  - Ultimately fully integrated into industry systems & process
- No metering required at customer premesis → export metering will be deemed based on Ofgem calculation (yet to be received)
- Supplier generates invoice for customer (quarterly)
- Supplier pays FiT on deemed generation; separate from electricity bill (no netting)
- Supplier not liable for full amount of FiT and will receive a rebate from the Government (details TBC)

Potential for Interactions

National Grid's Initial Thoughts

- From the standpoint of economic theory, it is always better to target subsidies explicitly (e.g. RO, FiT) in order to promote a desired policy outcome
- Subsidies through changes to network use of system charges would promote not only renewable technologies, but all those who are a particular class of network user
- Seek to reduce impact on policy objectives with solution to 'embedded benefit' issue:
  - To what extent was 'embedded benefit' taken into account when setting FiT levels?
  - How will 'deemed' generation be calculated?
  - Any issues affecting scheme administration?
  - Interaction with 5MW threshold?

Feed-in-Tariff Levels

Energy Source	Scale	Generation Tariff (p/kWh)
Anaerobic digestion	≤500kW	11.5
Anaerobic digestion	>500kW	9.0
Hydro	≤15 kW	19.9
Hydro	>15 - 100kW	17.8
Hydro	>100kW - 2MW	11.0
Hydro	>2kW - 5MW	4.5
Micro-CHP[B]	<2 kW	10.0
Solar PV	≤4 kW new[C]	36.1
Solar PV	≤4 kW retrofit[C]	41.3
Solar PV	>4-10kW	36.1
Solar PV	>10 - 100kW	31.4
Solar PV	>100kW - 5MW	29.3
Solar PV	Standalone[C]	29.3
Wind	≤1.5kW	34.5
Wind	>1.5 - 15kW	26.7
Wind	>15 - 100kW	24.1
Wind	>100 - 500kW	18.8
Wind	**>500kW - 1.5MW**	**9.4**
Wind	>1.5MW - 5MW	4.5
Existing generators transferred from RO		9.0

Potential Impact - Example

- 1 MW onshore wind farm
- Load factor 25% → 8760MWh x 25% = 2190MWh / annum
- FiT = 9.4p/kWh

  = 2190MWh x £0.094 x 1000

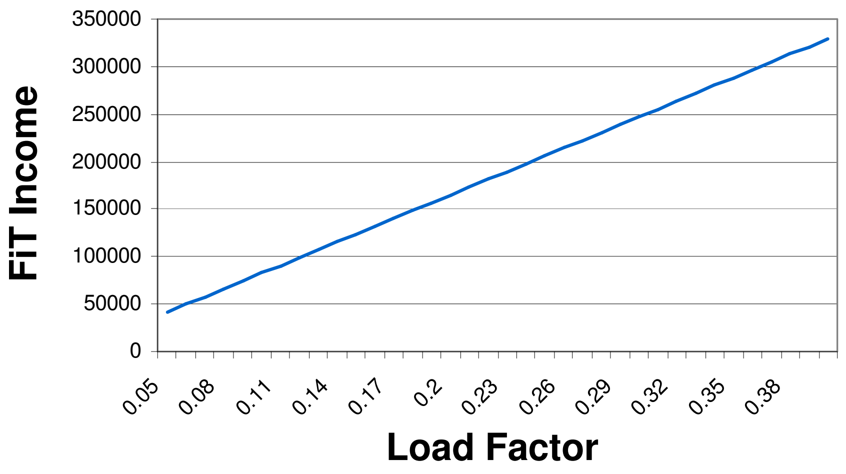
  = £205,860 / annum
- Embedded Benefit (GB wide) = £20/kW

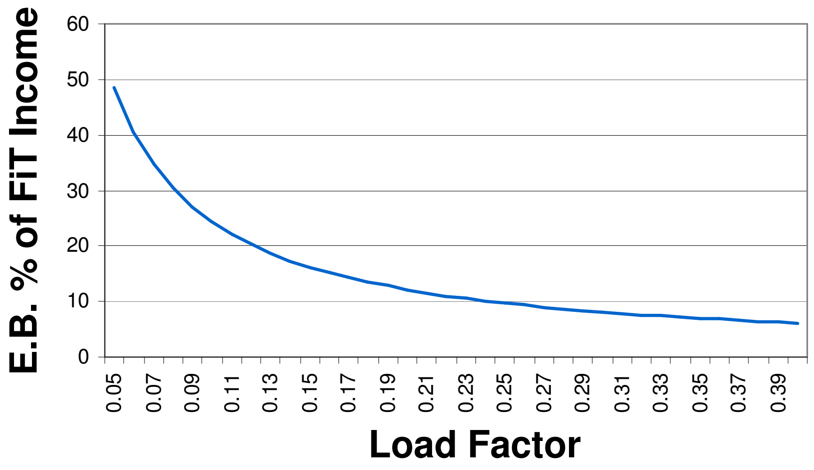
  = 1 x £20 x 1000

  = £20,000 annum
- Poyry quantitative assessment indicated a tariff calculated to increase return on investment by between 5 – 8% would be sufficient to promote investment for efficiently located units

Potential Impact - Example

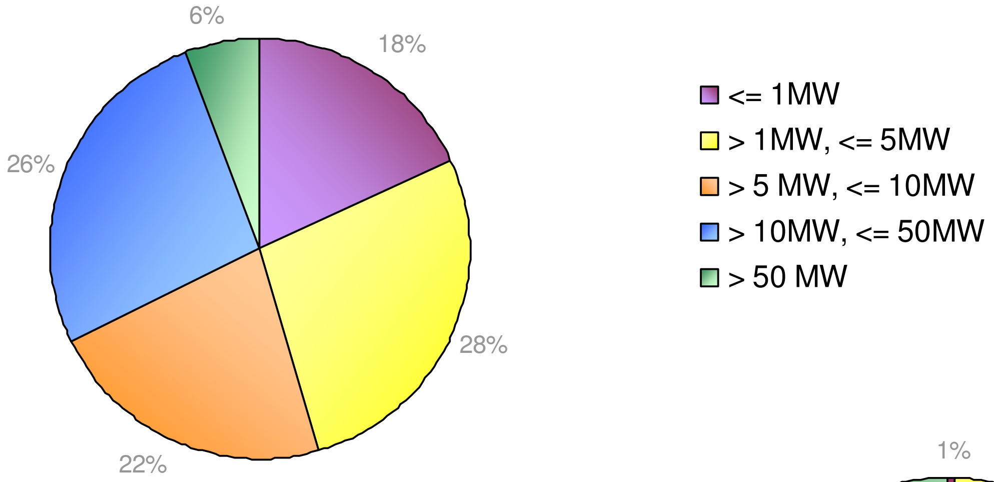
- Loss of embedded benefit is approximately 9.7% of FiT in this example
- Therefore, if £205,860 represents 5 – 8% return on investment, loss of embedded benefit could represent a reduction of between 0.485% and 0.776% in this example
- Only applicable if the existing network charging arrangements were explicitly taken into account in calculating FiT levels
- Relationships with load factor (i.e. efficient locations):





Quantity of Existing Generation Affected

- Up to 7% of installed capacity & 46% of sites;
- NHH metered sites not affected



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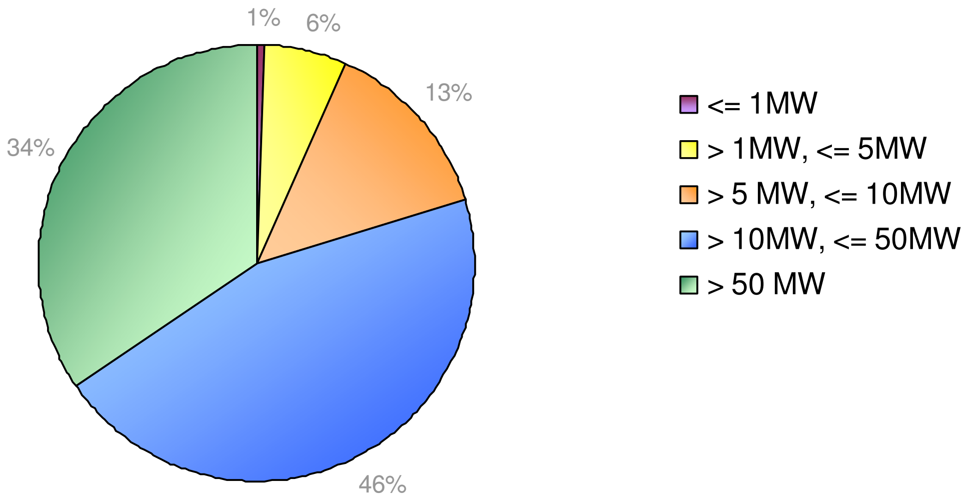

Total Installed Capacity ~ 8750 MW

Action 15

Gross Model Treatment of Scenarios

Gross Model – Treatment of Various Scenarios

- How would the gross model deal with:

1. A trading site with generation & demand?
2. A directly connected generator with onsite demand?
3. Charging arrangements for generation and demand behind an interconnector?
4. Private networks?

Future Meeting Dates

Both the 5th and 20th of May held in reserve; confirmation will be circulated a week prior to the meetings.

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