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Transmission Charging Methodologies Forum



Tuesday 12th March 2013

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Introduction & Welcome

Patrick Hynes

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Safety Moment

Tushar Singh

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Safety moment – Gardening Hazards

Garden incidents result in 300,000 hospital visits every year

Can you spot the hazards?

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Safety moment – Gardening Safety Tips

- Wear gloves when using shears, pruners, and other bladed instruments;

- When cleaning or checking your lawnmower or other electrical equipment, make sure the power is off at the plug;
    - Use a trip plug to minimise risk of electrocution

- Try to avoid wearing shorts and sandals when mowing the lawn;

- Tools and chemicals (herbicide, pesticide, preservatives, petrol) should be cleared away and out of reach from children when not being used;

- Reduce the risk of contact with chemicals by wearing long-sleeved shirts, eye protectors and face-masks when spraying;

- Cover up or use sunblock of factor 15 or higher when out in the sun.

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Agenda

- Actions from Previous TCMF
- Ongoing modification proposals
- Update on CMP 213
- 2013/14 final TNUoS tariffs and 2014/15 initial TNUoS tariffs
- Lunch
- Embedded generation charging
- Future modification topics – Prioritization results
- Any other business

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Actions from previous TCMF



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Actions from previous TCMF

Action (Outstanding; Completed; New)	Responsibility	Due Date	Comments
Send out invitations to CMP213 seminar	National Grid	Nov 2012	Completed post November 2012 meeting
Update application fees two pager with further clarification on BELLA / BEGA issues	National Grid	Jan 2013	Further work is required on this, including discussion with DNOs. This will be brought back to TCMF in May for discussion.
Consider responding to National Grid's open letter of 31/10/12 on views on progression of enduring arrangements for user commitment for non-generation users	All	Jan 2013	
Send an updated pdf generation zone map for 2013-14 to users.	National Grid	Jan 2013	
Circulate direction from Ofgem to review clause C13 of the Transmission Licence	National Grid	March 2013	
Add 2 hour development slot for embedded charging topic to the March 2013 TCMF	National Grid	March 2013	
Invite Ofgem to present on rationale for reviewing clause C13 of the Licence at March 2013 TCMF	National Grid	March 2013	
To prioritise topics on the potential future modification topics list and email to adelle.mcgill@nationalgrid.com	All	28th February 2013	

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Ongoing Modification Proposals

Adam Sims

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Ongoing Modification Proposals

- CMP201: Generation BSUoS
  - Code Administrator Consultation published

- CMP207: Limit changes to TNUoS tariffs using an annual cap and floor
  - Ofgem determination in January to reject the proposal
  - Decision mainly on insufficient justification of the impact

- CMP208: BSUoS forecasting
  - Ofgem determination in February to implement WACM1 from 1 June 2013
  - This was the preferred option of the CUSC Panel

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Ongoing Modification Proposals

- CMP209/10: Embedded TNUoS payment process
  - Currently awaiting determination from Ofgem
  - Ofgem planning to issue a consultation shortly

- CMP215: Removal of interconnector TNUoS references and requirement for BSUoS security cover
  - Self-governance
  - To be discussed at 28 March CUSC Panel

- CMP216: Removal of interconnector BSUoS references
  - Self-governance
  - To be discussed at 28 March CUSC Panel

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CMP213 – TransmiT TNUoS Modification - Update



Patrick Hynes

CMP213 – TransmiT TNUoS Modification



Overview of proposal

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Existing TNUoS & NETS SQSS

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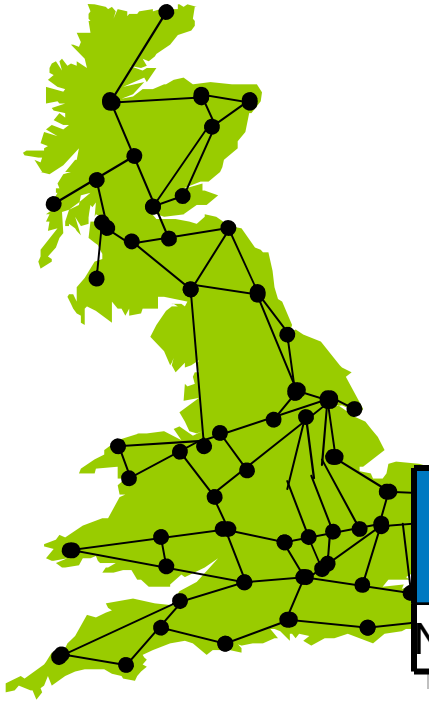
Transmission Network Use of System Charges

- Collect revenue on behalf of transmission companies
- Promote effective competition
- Reflect costs of transmission network assets
- Take account of developments in transmission business
-

TransmiT issues focus on cost reflectivity and developments

Reflecting transmission network costs

- Tariffs reflect network cost of increasing/decreasing generation/demand at a point on the system



Parameter	Value
Network, generation & demand data	Ten year statement
Expansion constant	£11.72318/MWkm
Annuity factor	6.6%
Overhead factor	1.8%
Security factor	1.8

TO Area	Cable factor			OHL factor		
	400kV	275kV	132kV	400kV	275kV	132kV
NGET	22.39	22.39	30.22	1.00	1.14	2.80

- Charging model calculates power flows across the network as a result of background assumptions

No sub-sea or HVDC circuit expansion factors

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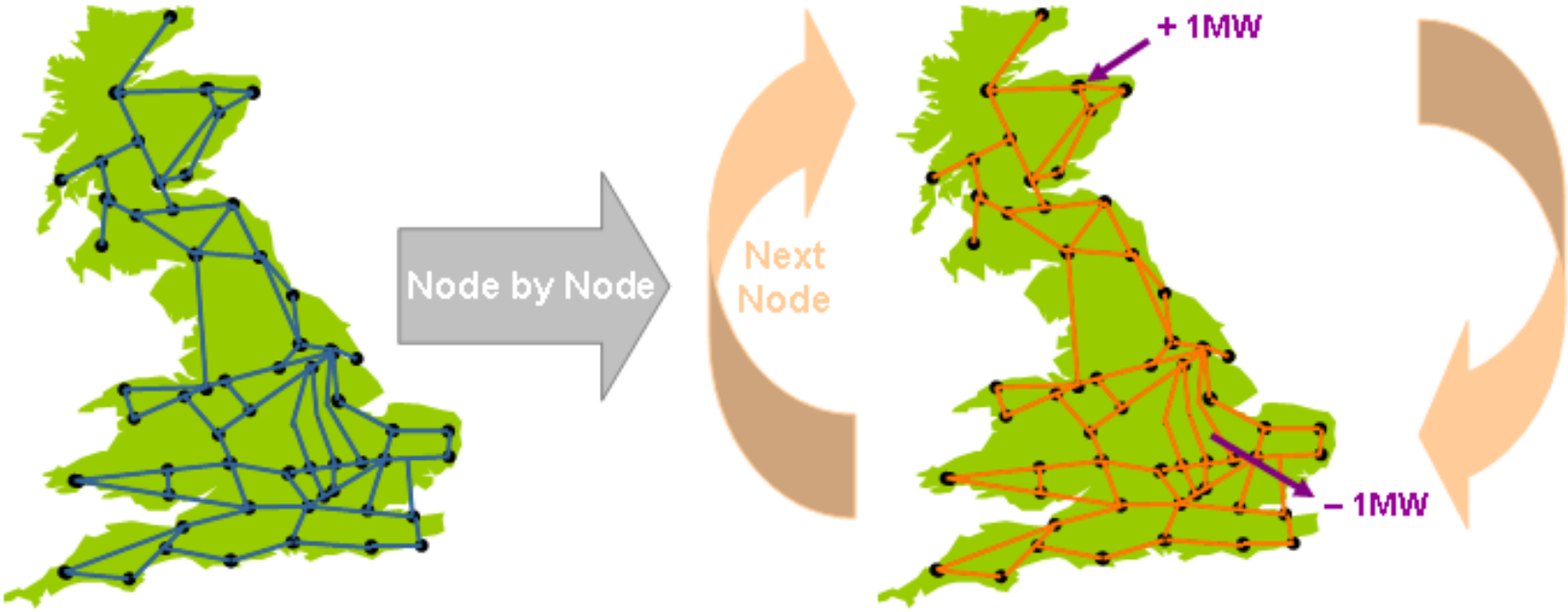
Reflecting transmission network costs

Base Case MWkm

1) Scale G to meet D
2) Calculate flows on circuits
3) Sum total network MWkm

Incremental MWkm

4) +1MW (-1MW at reference)
5) Calculate flows on circuits
6) Sum total network MWkm



7) Nodal Incremental MWkm =
Incremental MWkm – Base Case MWkm

Assume all incremental MWs have the same impact ~ NETS SQSS

Reflecting transmission network costs

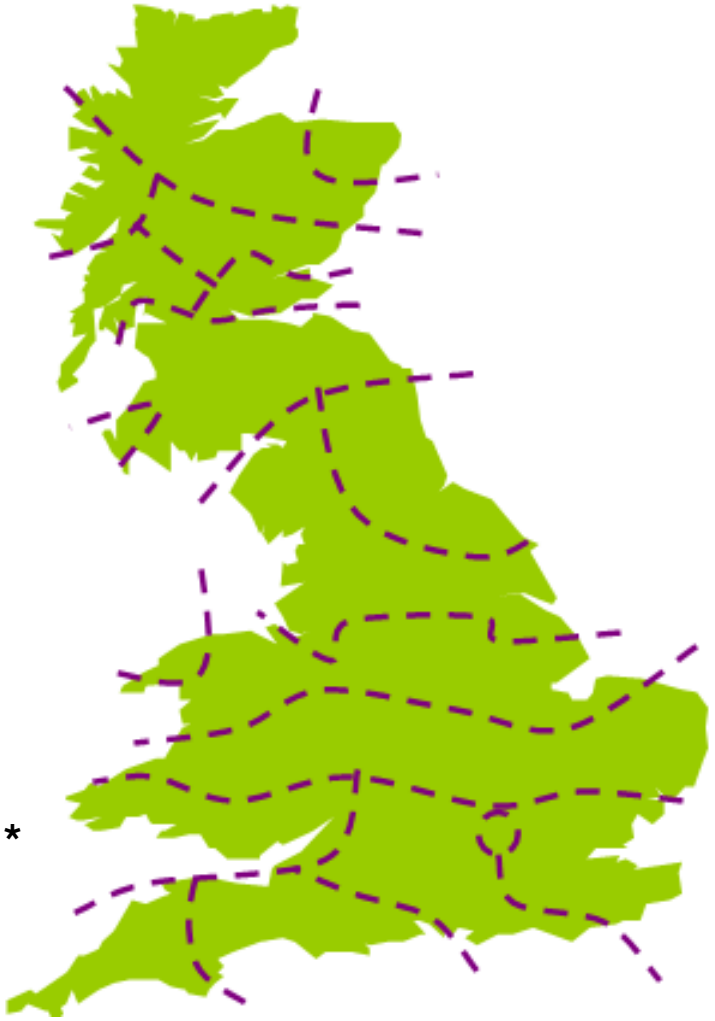
8) Zonal Incremental MWkm:

i. nodal incremental MWkm
ii. zoning criteria
iii. demand weighted average

Zonal Incremental MWkm

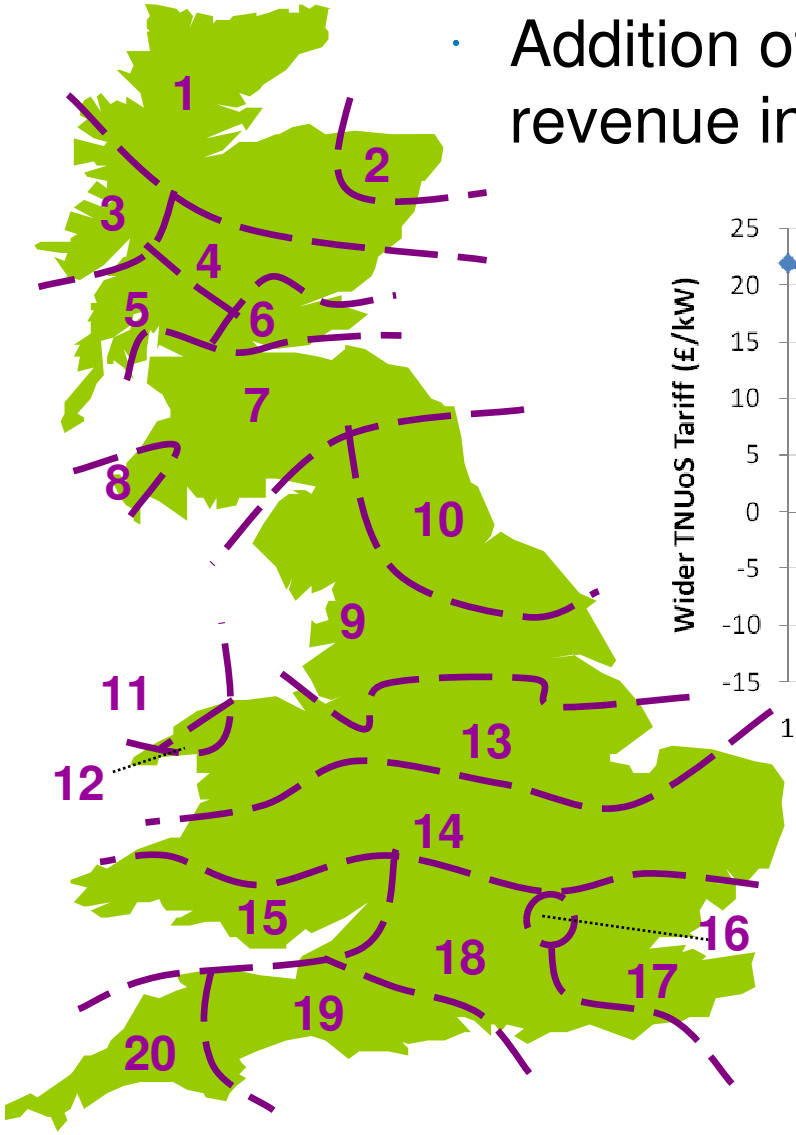
x EC x 1.8

= Wider Locational Tariff*

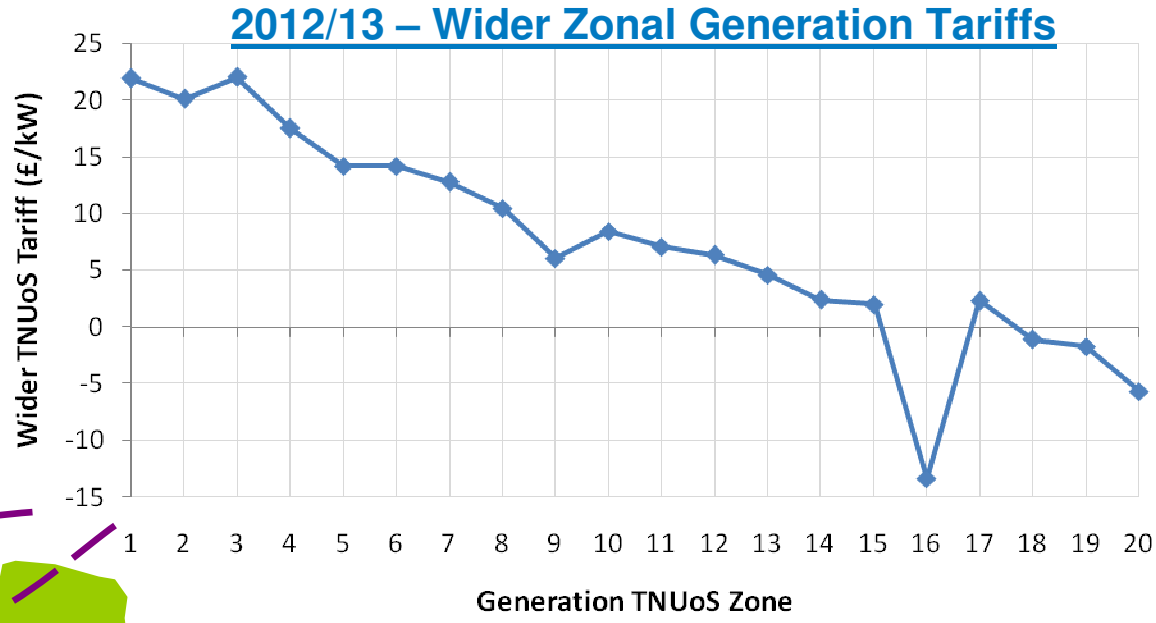


*Generation tariff is equal and opposite to demand tariff until zoning takes place

Example: Generation TNUoS Tariffs



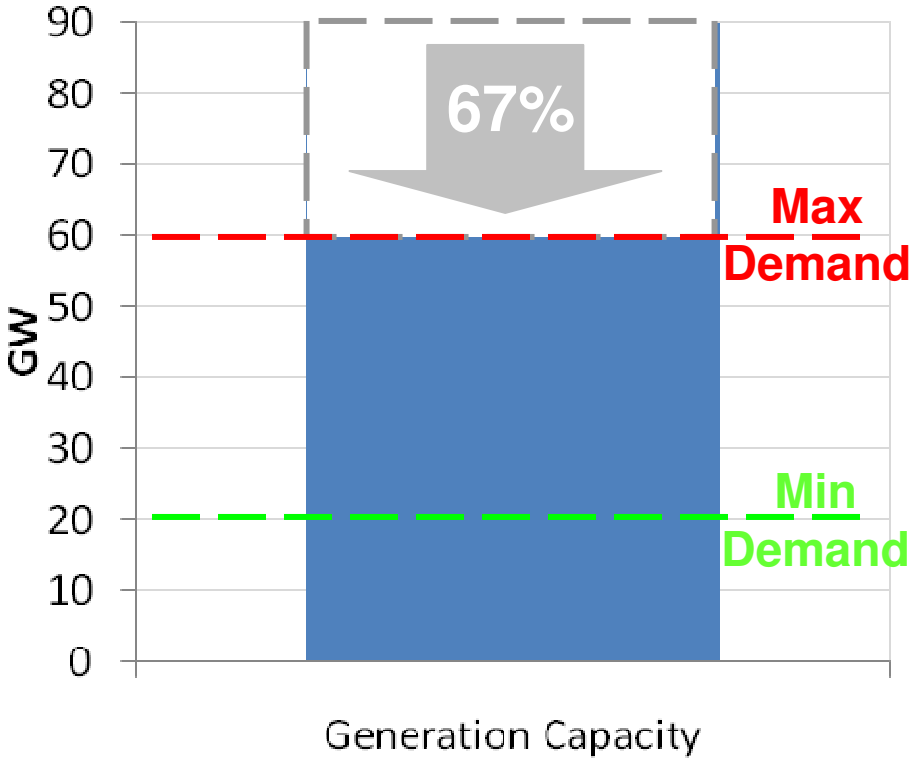
- Addition of residual element to collect correct revenue in proportion (27% G : 73% D)



- Vary by location (distance related)
- Local circuit and local substation tariff added to wider tariff

NETS Security & Quality of Supply Standards

- Planning standard for investment in network capacity
- Network model and "load flow" calculation used for planning

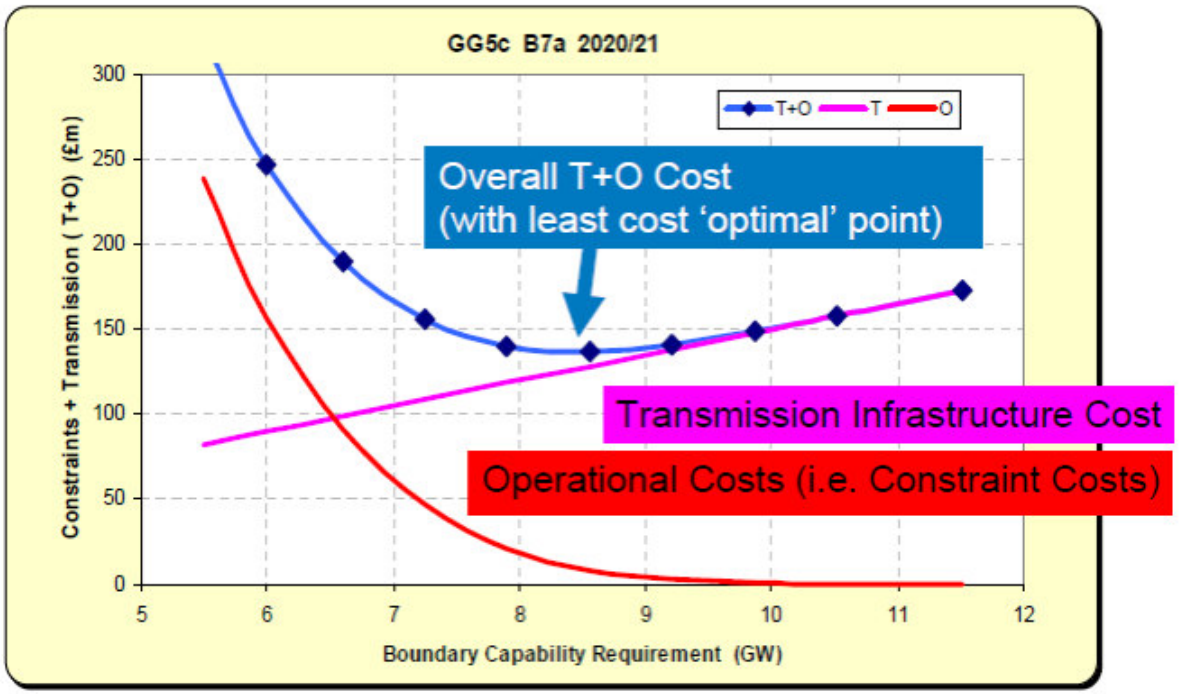


- Historically investment driven predominately by requirements at peak demand
- 1MW of additional generation capacity ≠ 1MW of additional network capacity

Largely uniform treatment of generation capacity

GSR-009: Review of NETS SQSS for Intermittent

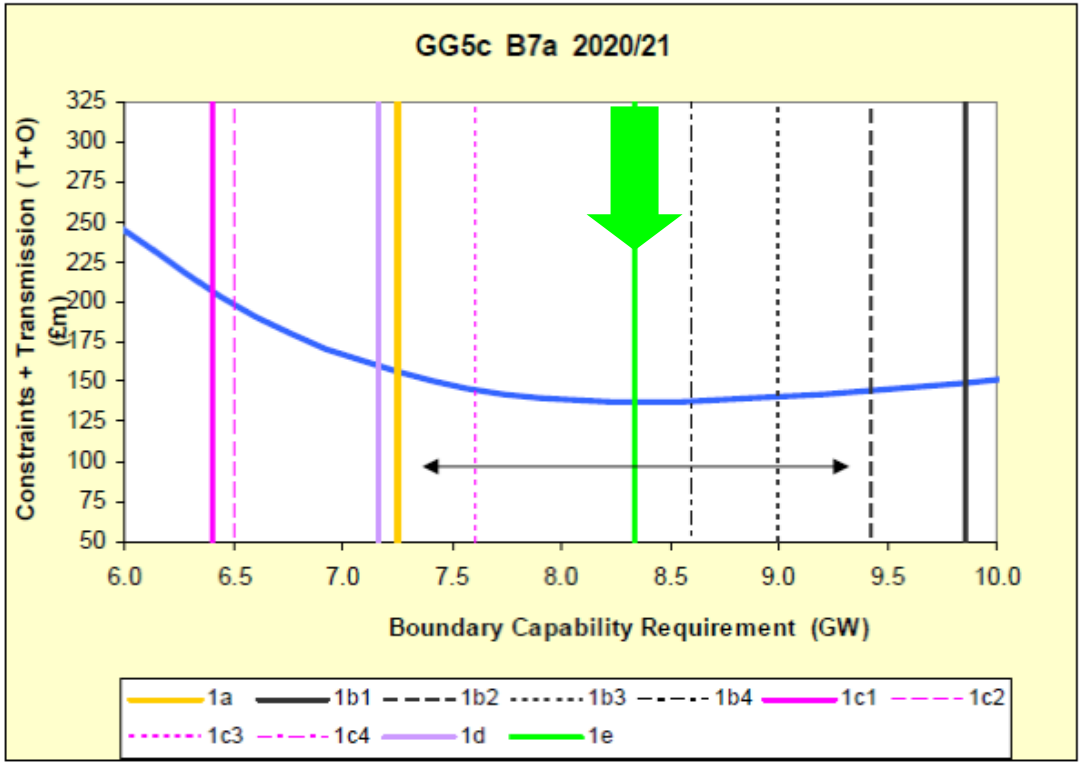
- Total transmission cost = operational + infrastructure



- GSR-009 set out to create deterministic standards from detailed cost-benefit analysis (CBA)

http://www.nationalgrid.com/uk/Electricity/Codes/gbsqsscode/LiveAmendments/

GSR-009: Review of NETS SQSS for Intermittent



- Various approaches to the grouping and scaling of generation to meet peak demand investigated
- Address both demand security and CBA requirements

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GSR-009: Results

- Split planning background into peak and pseudo-CBA
- Fixed scaling factors for some generation

Generator Type	TEC	Current Methodology	Peak Background	Pseudo-CBA Background
Intermittent	5,460	65.5%	0%	70%
Nuclear & CCS	10,753	65.5%	72.5%	85%
Interconnectors	3,268	65.5%	0%	100%
Hydro	635	65.5%	72.5%	66%
Pumped Storage	2,744	65.5%	72.5%	50%
Peaking	5,025	65.5%	72.5%	0%
Other (Conventional)	61,185	65.5%	72.5%	66%

Values in grey vary depending on the total demand level, whilst values in black are fixed scaling factors

Supported by full blown CBA for large investments

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Summary – "Defect"

- Increasing amounts of variable generation
- Changes in network planning to reflect differential impact of various generation plant types
  - GSR-009 changes to NETS SQSS and increasing use of a CBA approach
- Charges need to evolve to properly reflect costs
- Use of technologies such as HVDC circuits that parallel the AC network and sub-sea island connections
- Additions required to take account of developments

Original proposal

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Elements of the Modification Proposal

- Modification to reflect network investment cost impact of different generation technologies (capacity sharing)

1 Capacity Sharing

- Addition of parallel HVDC circuits

2 Parallel HVDC

- Addition of sub-sea island connections

3 Islands

Drafted to provide flexibility in addressing defect

Sharing

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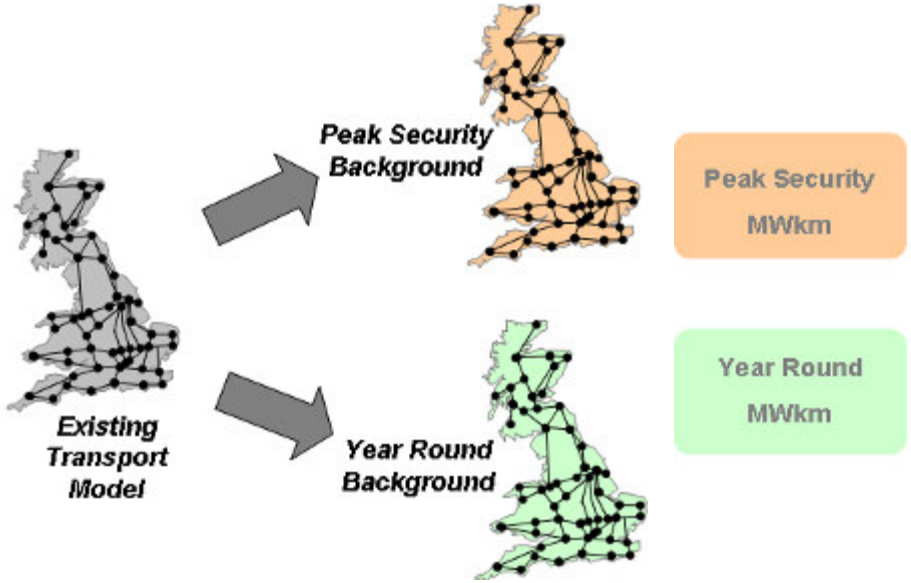
Sharing – Proposal



- Sharing takes place on the wider network
- Dual backgrounds in the Transport Model – SQSS
- Separate tariffs consistent with network planning
- Generator specific load factor multiplier for year round

Conventional Tariff =

Peak Security £/kW + (Year Round £/kW x Specific Load Factor) + Residual £/kW

Intermittent Tariff =

(Year Round £/kW x Specific Load Factor) + Residual £/kW

HVDC

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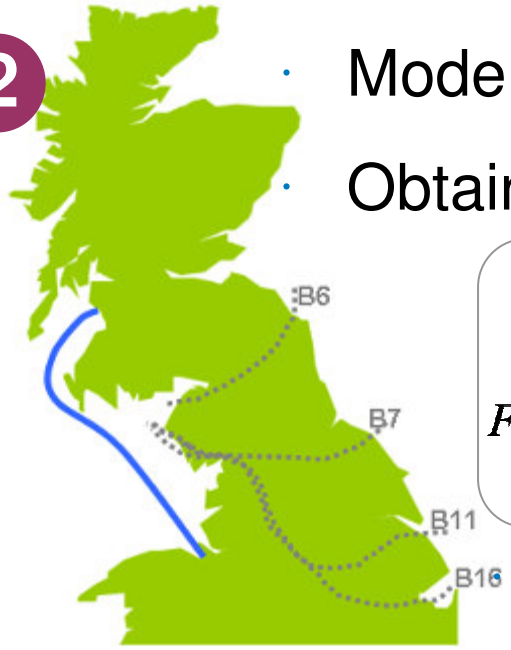
Parallel HVDC – Proposal

1

- Annuitised, unit capital cost – £/MWkm/year
- Include cable and converter costs into calculation
- Consistent with existing treatment of radial HVDC circuits; appropriate for parallel links?

2



- Model HVDC as pseudo-AC □ need impedance
- Obtained by calculating power flow in base case

$$Flow = \frac{\sum_{0}^{N_B} BF_{MW} \times \left(\frac{HVDC_{cap}}{BR} \right)}{N_B}$$

Where:

BF_{MW}	= MW boundary flow from Transport model with no HVDC
$HVDC_{cap}$	= MW capacity of HVDC circuit
BR	= Total secured rating of boundary
N_B	= No. of boundaries crossed

Impedance dictates incremental MW flow

Islands

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Scottish Island Connections – Proposal

1
- Different network technology proposed for each island
- Calculate technology specific expansion factors
- Based on annuitised, capital unit costs

2
- Maintain existing MITS definition (i.e. local/wider)
  - *diversity or change in definition

3
- Specific for island connections classed as ‘local’
- Circuit spans of lower redundancy would have adjusted Expansion Factor calculation (i.e. multiply by 1.0/1.8)
- Tariff commensurate with access rights

Workgroup development



Sharing

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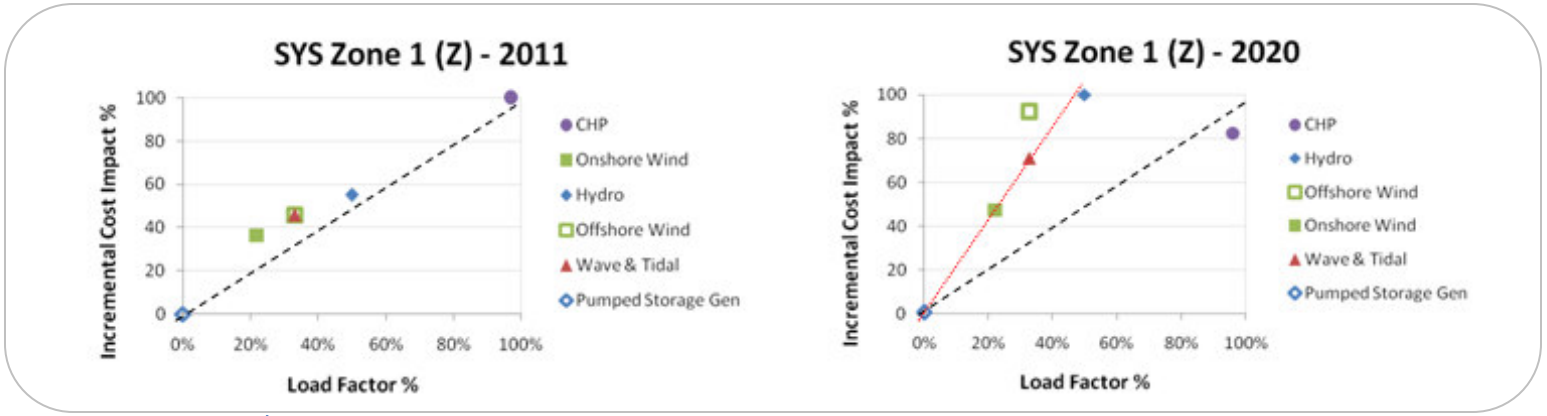
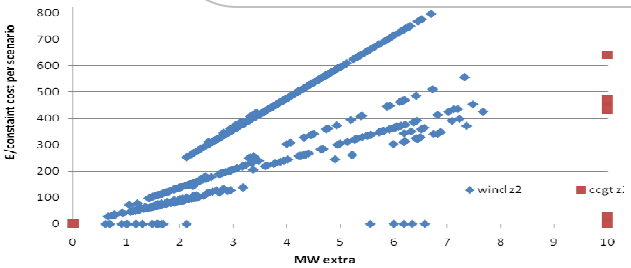
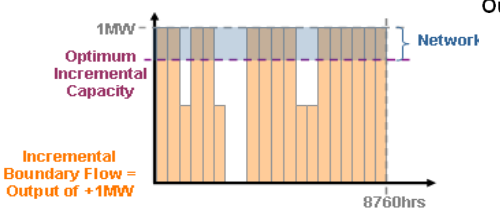
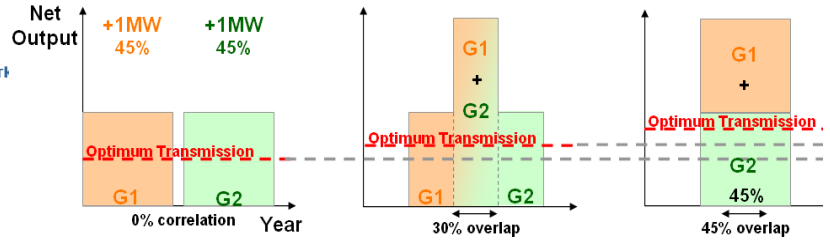
Sharing

- Despite its outward simplicity, the original proposal for sharing is based on somewhat complex underlying theory
- Considerable amount of time spent on understanding, debating and developing the sharing aspect









- Market modelling and theory used to explore network cost impacts

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Key elements affecting incremental cost

- Five elements identified as driving incremental constraint costs

Volume of Incremental Constraints (MWh)

i. Generator output over the year

ii. Correlation between generation running within an area

iii. Correlation with constraint times

X

Price of Incremental Constraints (£/MWh)

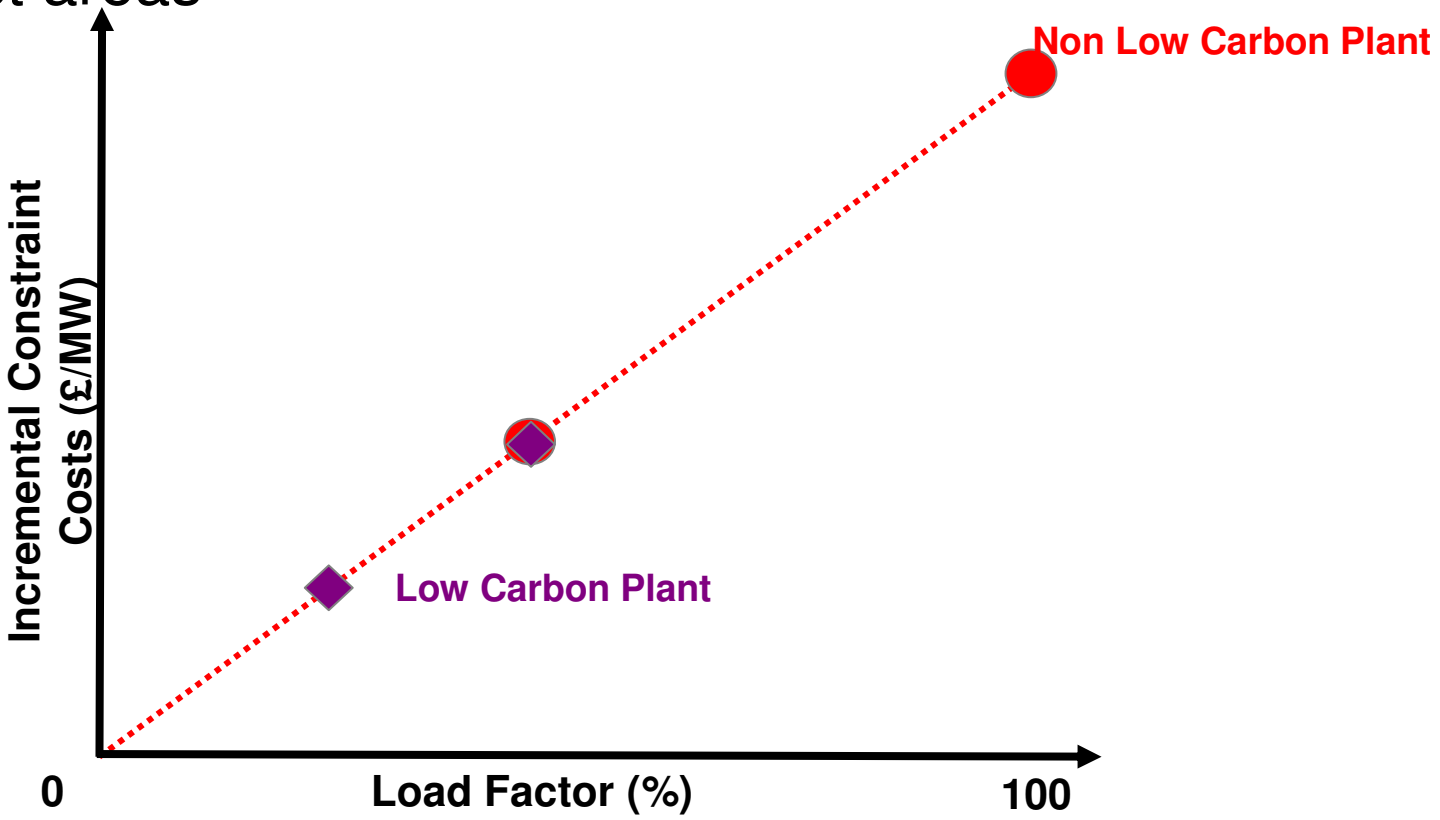
iv. Bid price of the marginal generator on the exporting side

v. Offer price of the marginal generator on the importing side

- Generator output ~ annual load factor
- Bid and Offer prices investigated in detail
- Correlation elements inherent in market model (granularity of modelling questioned by some)

Simple LF vs. Constraint Costs

- Where sufficient diversity exists; good linear relationship in most areas



- Primary factor of cost is unconstrained despatch over the year (load factor x 1MW)

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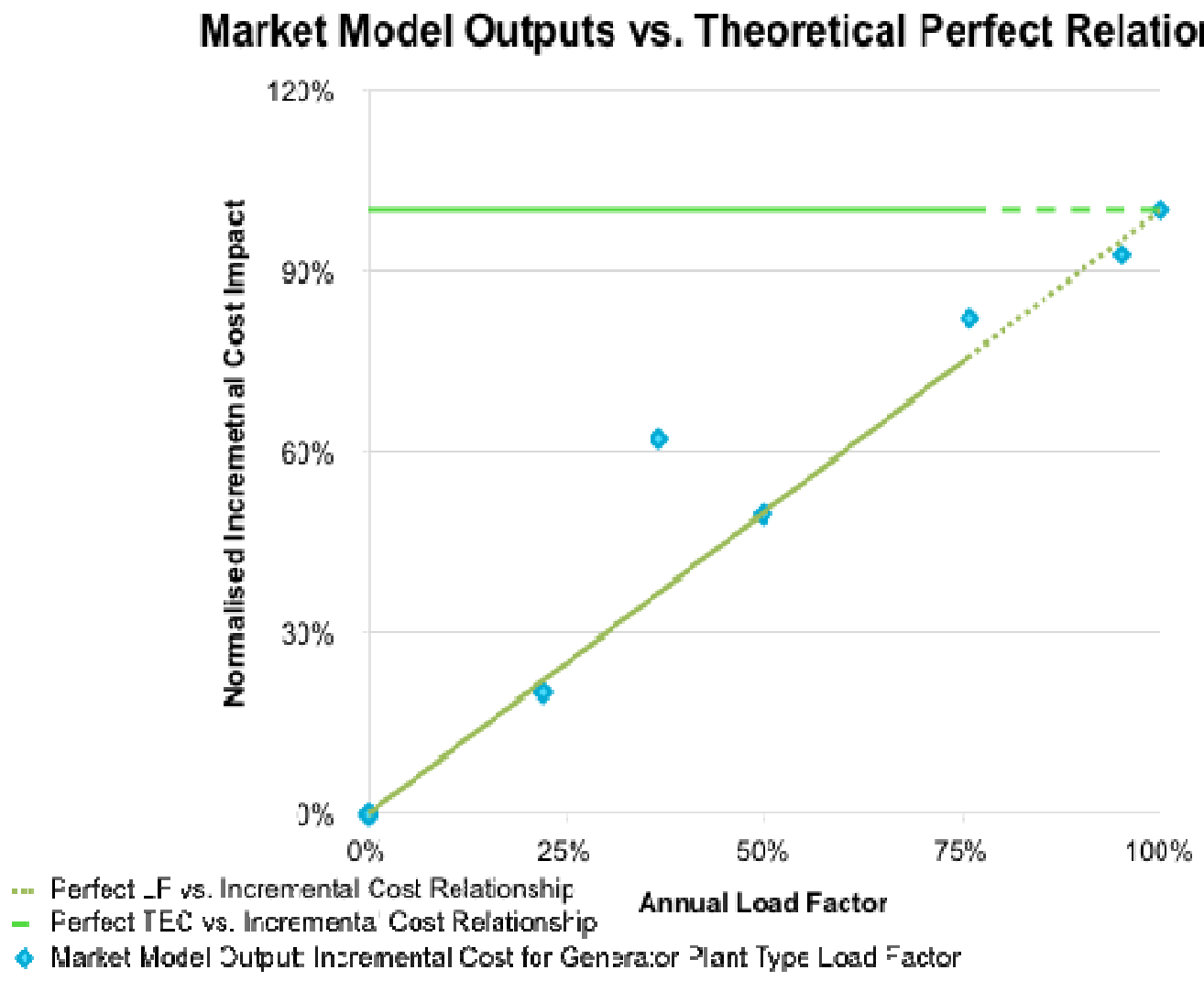
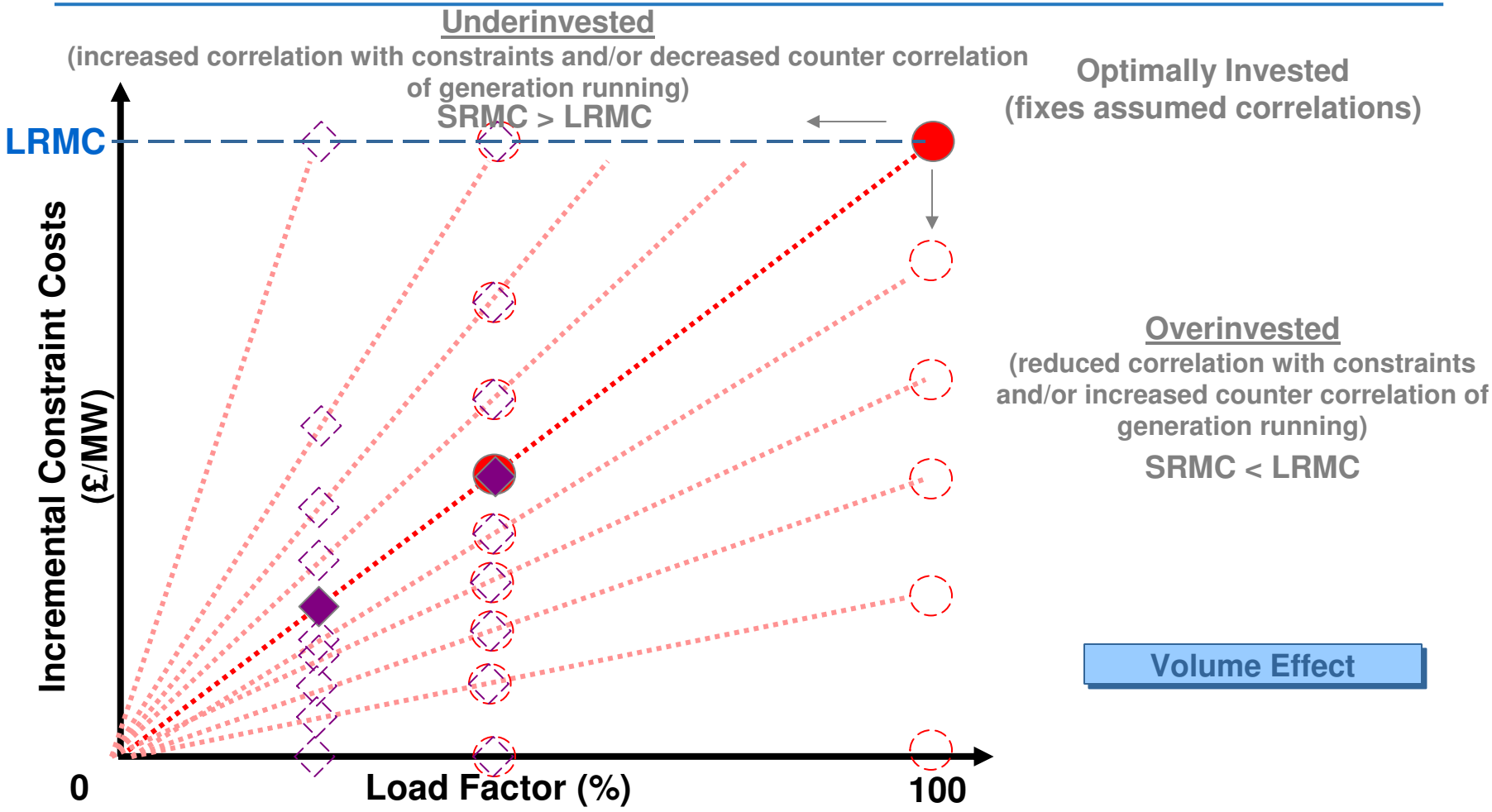
Complex modelling – complex effects

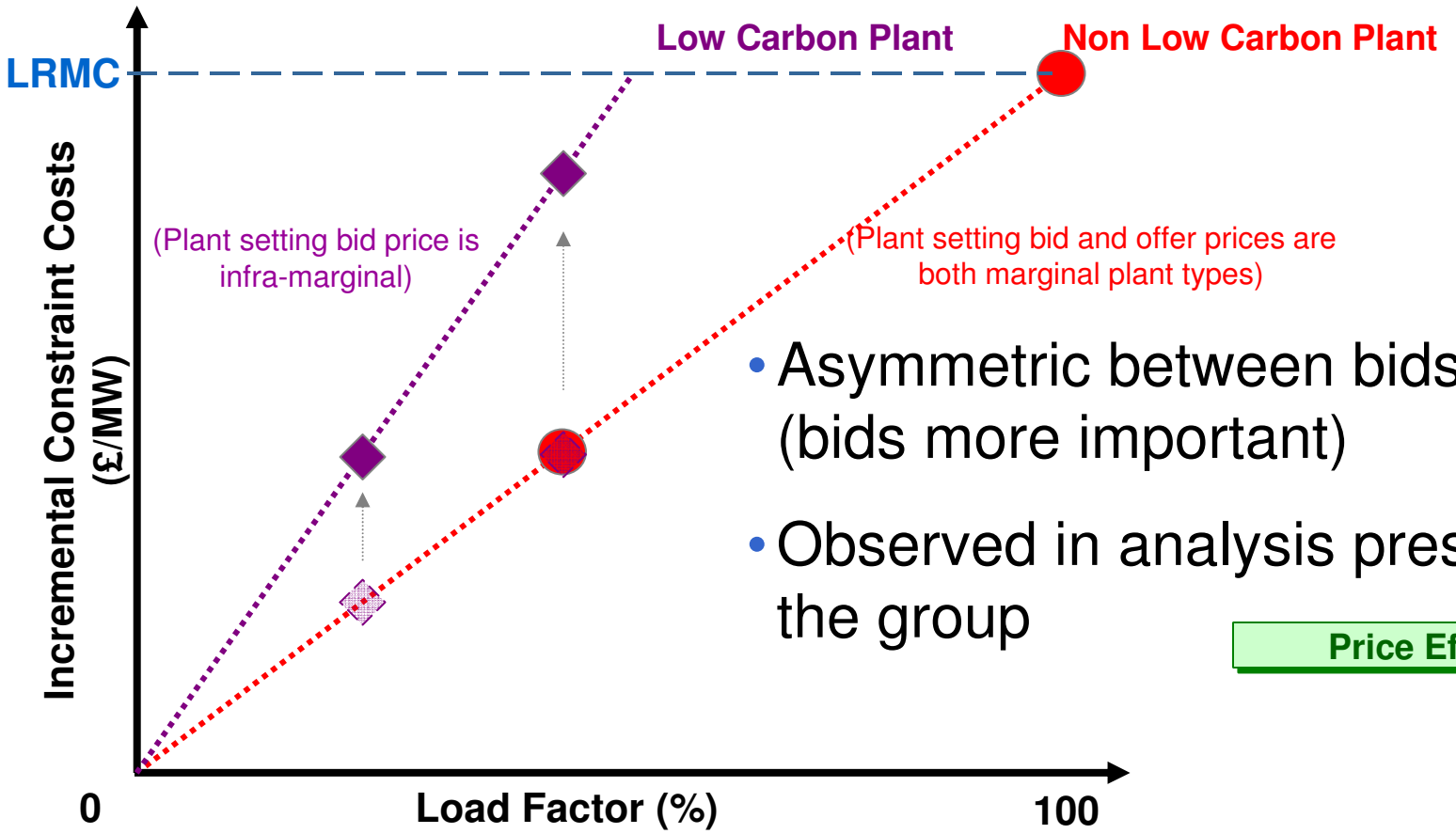


Effect of Boundary Capacity and Correlation



- Correlation with *constraints* and assumed counter correlation of *plant running* fixed at optimum

Effect of Infra-Marginal Bid/Offer Price

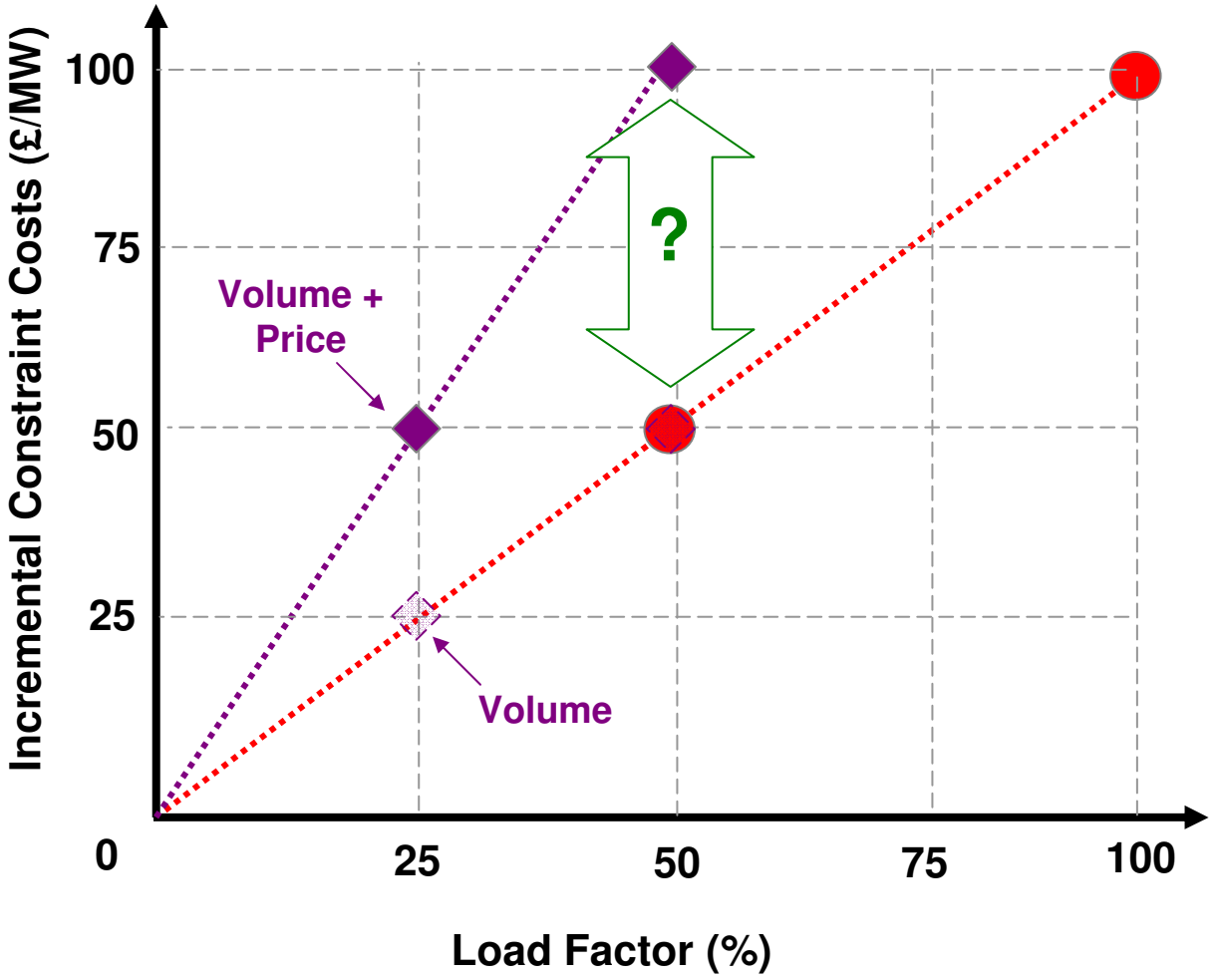


- Asymmetric between bids and offers (bids more important)
- Observed in analysis presented to the group

Price Effect

- In areas with insufficient diversity of plant the SO may be forced to accept bids from infra-marginal plant

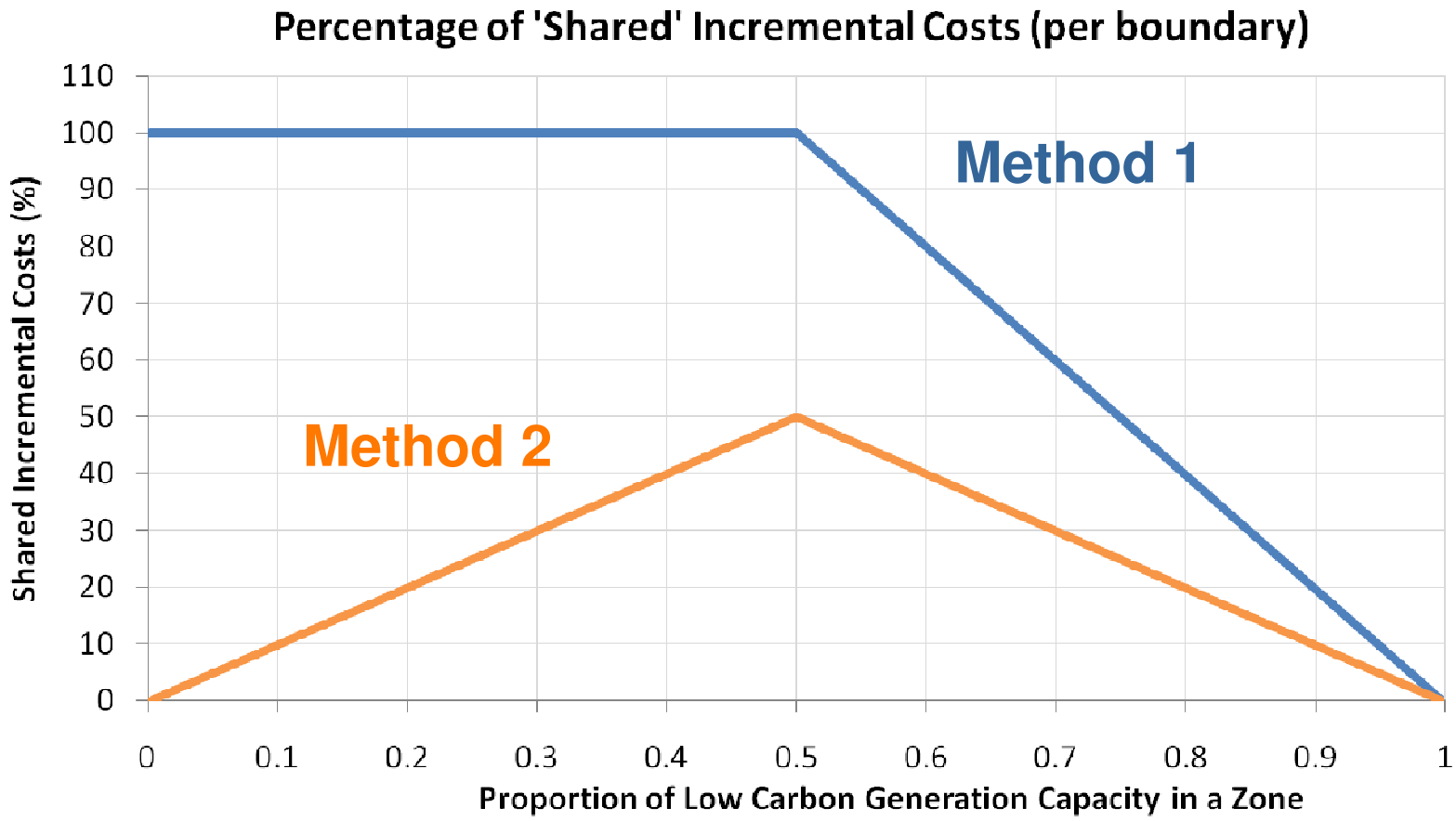
Export constrained zones – Theory



How much diversity is sufficient?

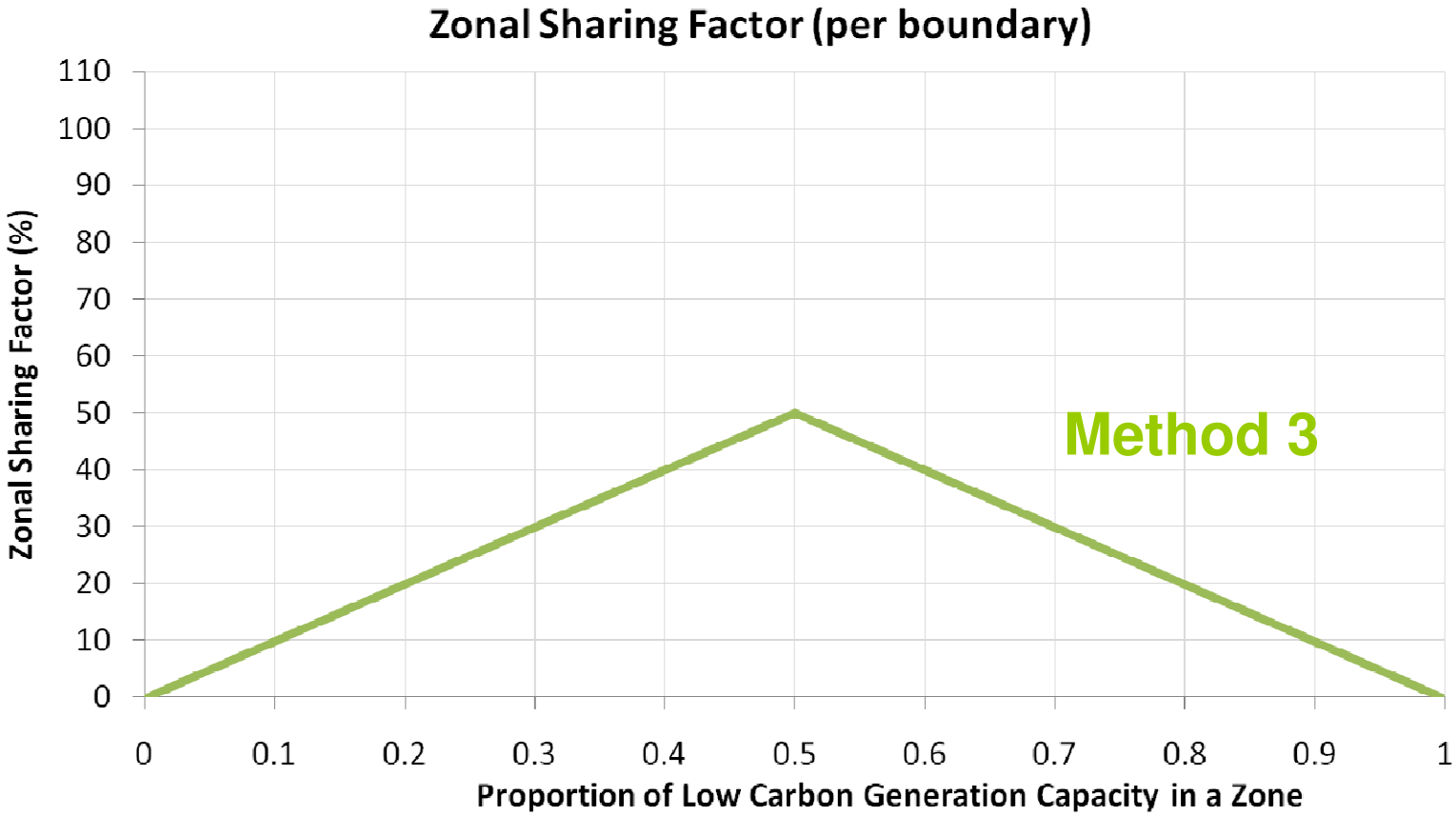
Is the additional complexity proportionate for the additional cost-reflectivity?

Export constrained zones – Implementation



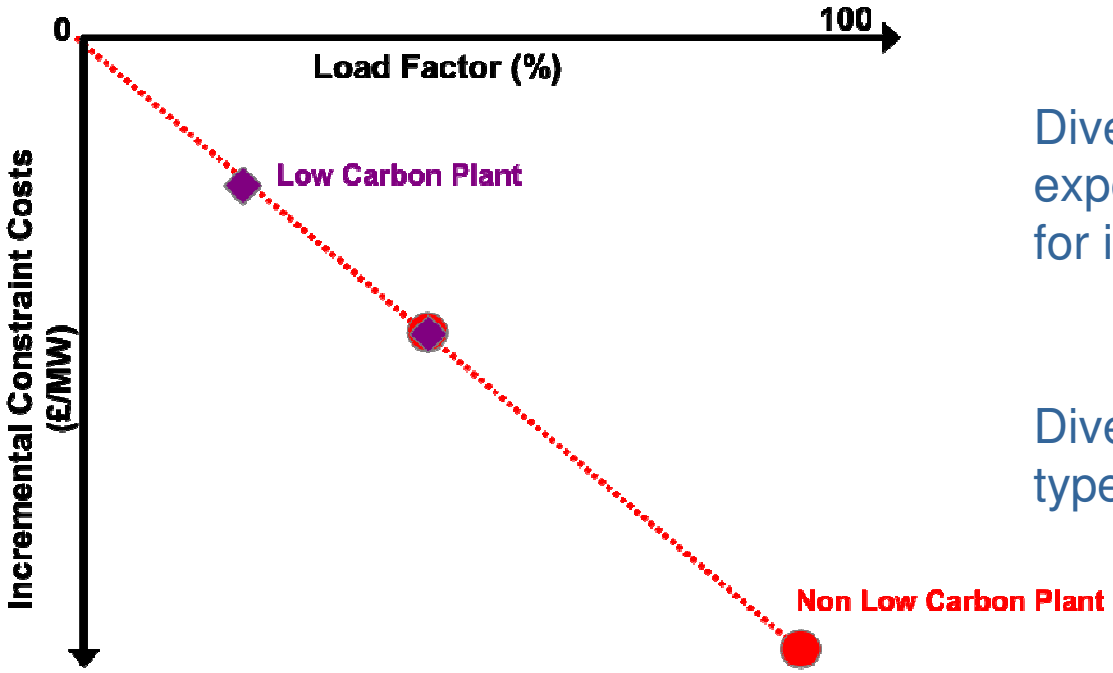
- (YR Shared Incremental £/kW) x **ALF** x TEC
- (YR Non-shared Incremental £/kW) x TEC

Export constrained zones – Implementation



- (Incremental £/kW) x **ZSF** x TEC

Import constrained zones



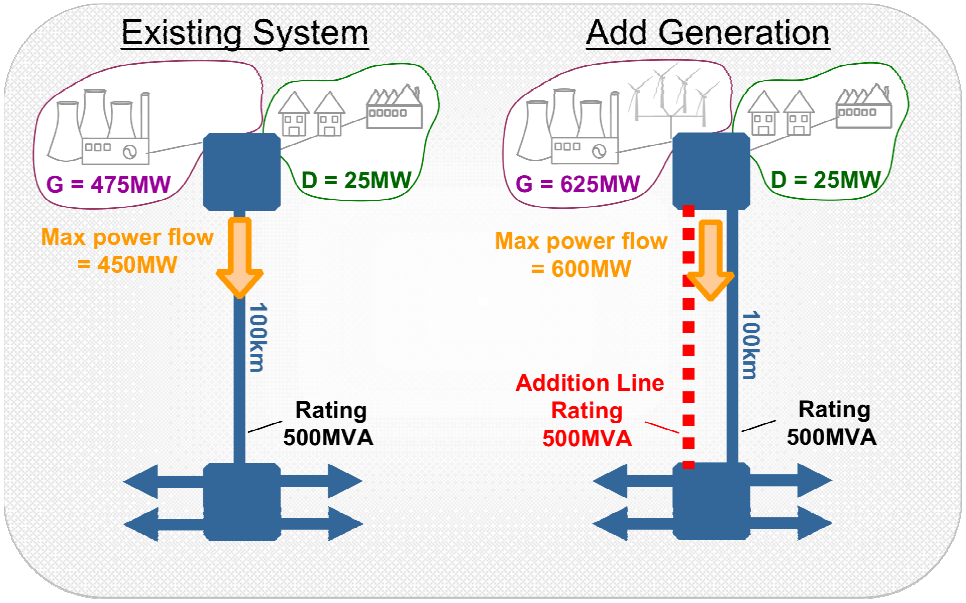
Divergence observed for exporting zones not identified for import constrained zones

Diversity of generation plant types less significant

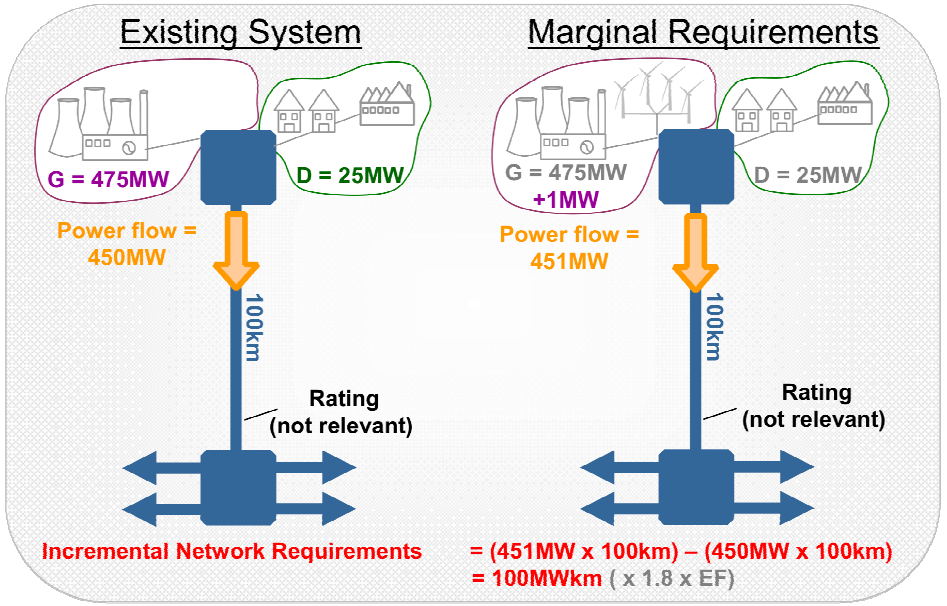
- Linear relationship robust over time due to Offer-Offer spreads relative to size of 'efficient' constraint costs on importing boundaries (i.e. LRMC << SRMC)
- Effect arises largely due to impact of VoLL
- Original proposal applies in these zones

Is there sharing on local circuits?

Planning



Charging



- Planning undertaken on total capacity, with an uncertain background and network technology that is 'lumpy' in nature
- Charging done on the impact of an + 1 MW and assumes incremental network requirement is exact

Local circuit capacity not planned < total generation capacity

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Options for applying sharing (ALF)?

Method	ALF	Description	Updated when?
i	TEC (MW)	ALF=100%; same result as approach used in existing charging methodology.	TEC register
ii	NETS SQSS generic	Generation plant based load factors from GSR-009	NETS SQSS updates
iii	Other generic	Generic historical average per generation plant type	Price Control
iv	User forecast	Ex-ante annual forecast, provided by the User, with ex-post reconciliation	Annually
v	Hybrid	Original proposal with option for User to provide own forecast (as per (iv))	Annually

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Workgroup development



Parallel HVDC Circuits

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Reflecting HVDC in Transport Model

- Impact on tariffs is combination of:

Cost Components

£/MWkm

Marginal MW flow

MWkm

- Which **cost components** are included in the model?
  - Need to calculate cost relative to 400kV OHL – Expansion Factor
- How much of the **marginal MW** flows down the link?
  - Need to calculate an impedance for the model
- Use onshore technology costs?

Converter Stations

- ii) Remove some converter station costs from the calculation
- Options
  - 1) Remove % of costs based on elements of the converter station that are similar to elements of the AC transmission network currently not included in the locational signal (such as substation equipment); and
  - 2) Remove a portion of the costs based on similarity between power flow redirecting capability of HVDC converters stations and of Quadrature Boosters (QBs) - currently not included in the locational signal – 10%
  - For Islands STACOMs rather than QBs – 20%
  - Generic or Specific

Workgroup development



Island connections

Islands

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Including Island Links in the Methodology

- Harnessing renewable energy sources on the northern islands of Scotland will require new transmission circuits
- The existing charging methodology does not accommodate this
- Requires consideration of:
  - Expansion Factors
  - Local/Wider
  - Security Factor

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Islands – Local or Wider?

- Is definition robust
  - Concern that definition did not take account of islands
  - Consequences of extending it
- Islands can become wider, but little apparent sharing
  - Limited diversity - renewable / non renewable
- Some evidence of counter correlation
  - Specific island sharing factor?
  - When / should sharing apply on islands?
- Does ‘Diversity’ bridge the gap?
  - Addresses concerns in apply the definition

Islands – Expansion factor

- Expansions factor
  - Project specific (original)
  - Generic across all the whole system
    - e.g. inlc. onshore cable
  - Generic – across relevant technologies
    - e.g. island AC and island DC
  - Island group specific
    - Averaged across a group of islands (not project)
- Pros and Cons
  - Mainly: Predictability vs. Cost Reflectivity
- Consistency with HVDC

Islands - Security and anticipatory

- Security Factor
  - Should reflect the redundancy
  - Commensurate with access rights
- Anticipatory
  - ‘lumpiness’ catered for (unit charges)
  - Alternative based on potential future sharing ?
- Local sharing / diversity / CCF

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Where does that take us

Aspect	Main Components of CMP213	Original	Votes	
Extent of Sharing				
	local/wider(existing definition) + EF divided by SF to reflect lack of redundancy		8	
	local/wider (refined MITS definition) - separate definition		15	All being taken forward with a view to settle on one
	local/wider (refined MITS definition) - interconnected	x		
	No Diversity	x		x
	Diversity Method 1		11	x
	Diversity Method 2		8	x
	Diversity Method 3		9	x
	CCF Local	x		x x x x
	CCF Local T-4		3	
Form of Sharing				
	PS - Conv. X TEC ; Int. x SQSS linkage	x		x x x x
	PS - Conv. X TEC ; Int. x TEC		2	
	YR - ALF historic specific (5 years)	x		x x x
	YR - ALF SQSS based		1	
	YR - ALF generic on plant type (as in consultation)		6	
	YR - ALF generic on broader plant grouping		1	
	YR - Hybrid		10	x x x x
Parallel HVDC				
	Single boundary impedance		5	
	Specific EF 100% Conv+100%Cable (original)	x		
	Specific EF 90% Conv+100%Cable (QB)		9	
	Specific EF 50% Conv+100%Cable (AC sub)		8	
	Specific EF; generic 40% Conv+100%Cable (AC sub + QB)		9	x x
	Specific EF; generic 0% Conv+100%Cable (fixed asset)		6	
	Specific EF; generic onshore Equiv.		2	
	Specific EF; generic 50% Conv+100%Cable (AC sub)		added	x x
	Specific EF; specific *x*% Conv. cost reduction (AC sub)		8	x
	T - 4 EF calculation		3	
Islands				
	Specific EF 100% Conv+100%Cable (original)	x		
	Specific EF; generic 30% Conv+100%Cable (AC sub + STATCOM)		7	x x
	Specific EF; generic 50% Conv+100%Cable (AC sub)		9	x x
	Specific EF; generic 0% Conv+100%Cable (fixed asset)		6	
	Specific EF; specific *x*% specific Conv. cost reduction (AC sub)		14	x
	T - 4 EF calculation (AC + DC)		4	

End

Questions...

TNUoS Charges for 2013/14
Initial View on TNUoS Charges for 2014/15

Damian Clough

Content

- 13/14 Final Tariffs

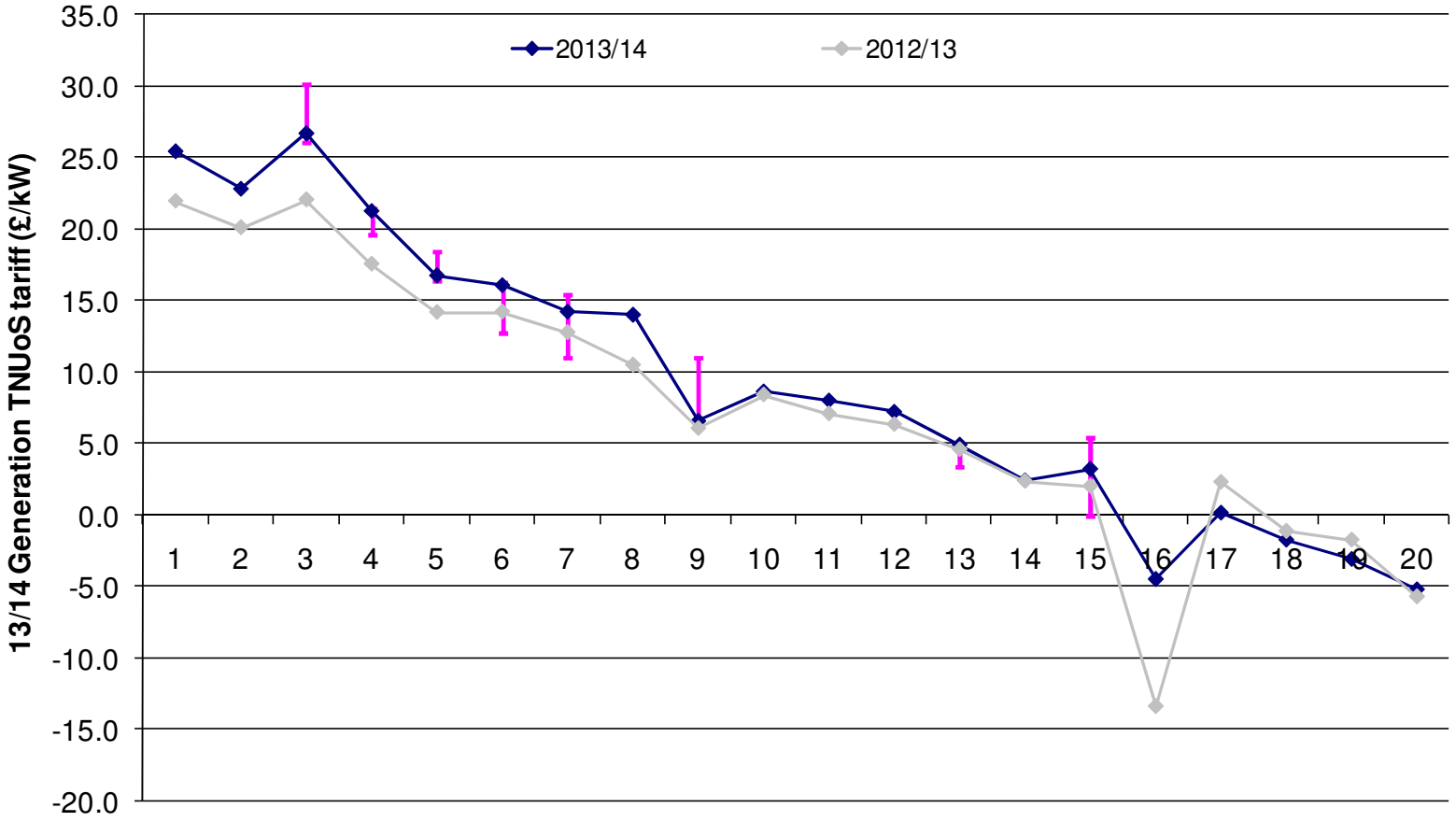
- 14/15 Initial View on Tariffs
  - Feedback opportunity
  - Updates. What would you like/expect to see

- Publication of Remaining Condition 5 years

13/14 Final TNUoS Tariffs

- Limited change since comprehensive discussion regarding Draft Tariffs
  - Next four slides quick reminder of drivers of change
- Feedback on 13/14 Tariff setting process
  - What could be done better
  - What went well

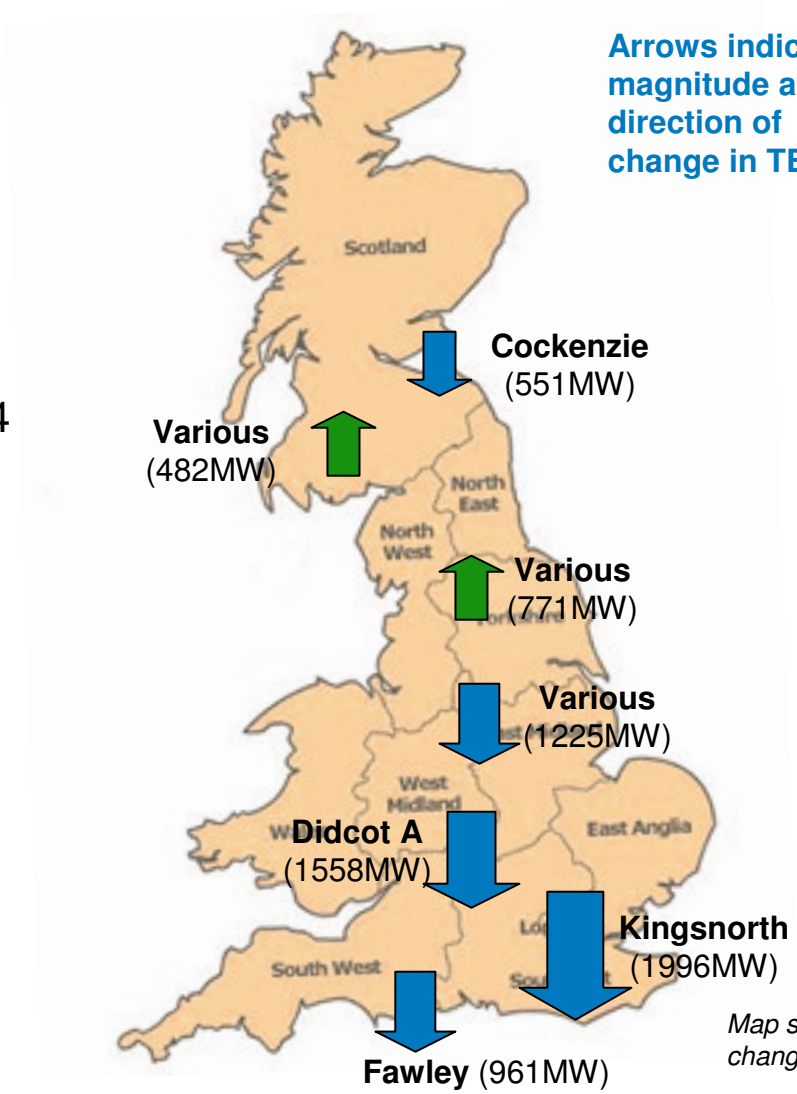
13/14 Final TNUoS Tariffs



Key changes

Generation Background

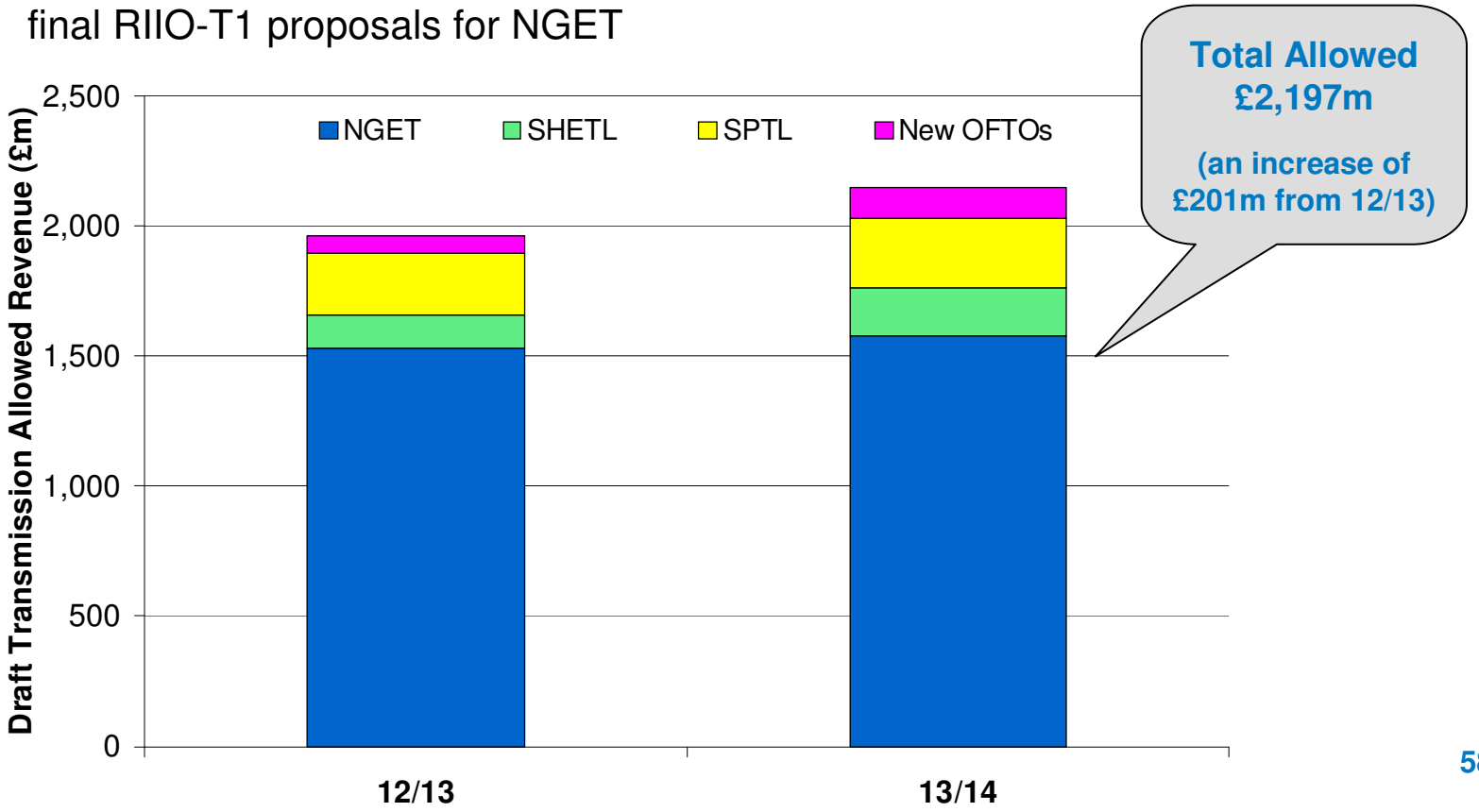
- The most significant update to the charging model is the change in the generation landscape from 2012/13
  - 82GW in total is contracted
- There is a total reduction of 7GW in the contracted generation for 2013/14 compared to 2012/13
  - virtually no net change in Scotland however there is a notable change in east – west split of generation
  - in England, there are large TEC reductions particularly in southern areas



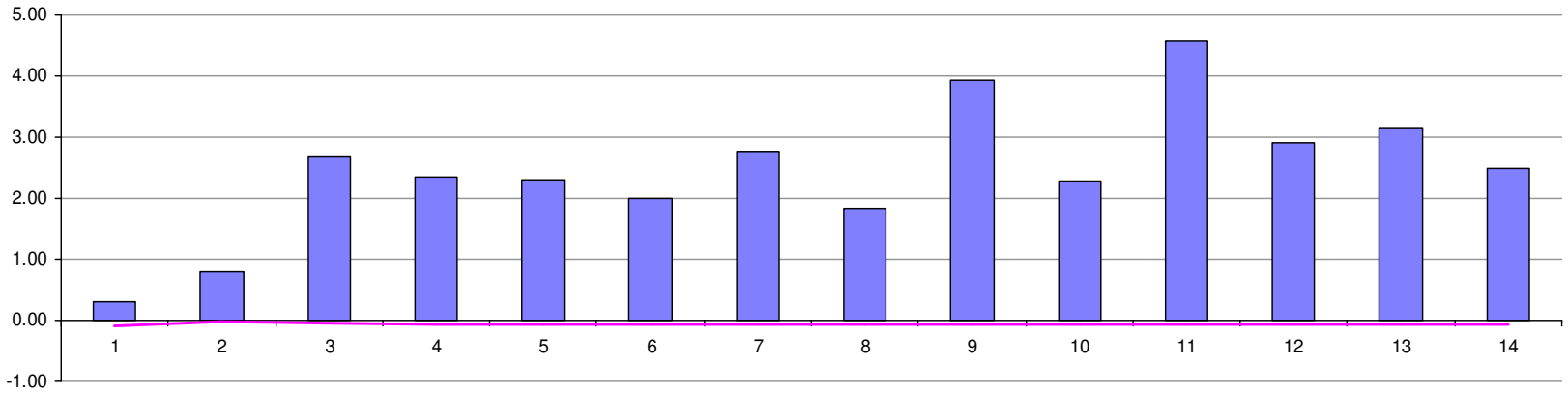
Key changes

Total Allowed Revenue

- Total Transmission Allowed Revenue based on
  - information provided by SHETL, SPTL, and existing OFTOs
  - a forecast of new OFTO revenues (informed by Ofgem & Developers)
  - final RIIO-T1 proposals for NGET



13/14 Final Demand TNUoS Tariffs



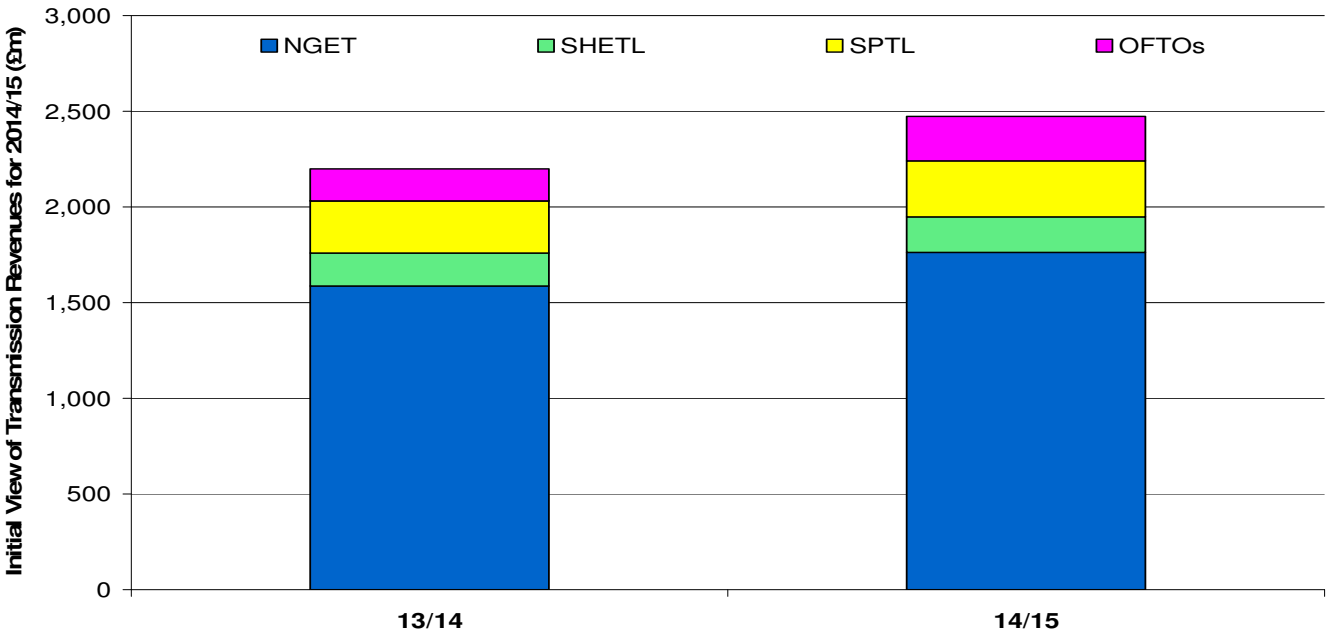
The chart above shows the absolute change in HH Demand Tariffs from 12/13 to 13/14

14/15 Initial View TNUoS Tariffs

- Based on current methodology
- Contracted position as of 31st October 2012
- 14/15 Tariffs fairly similar to 13/14 Tariffs

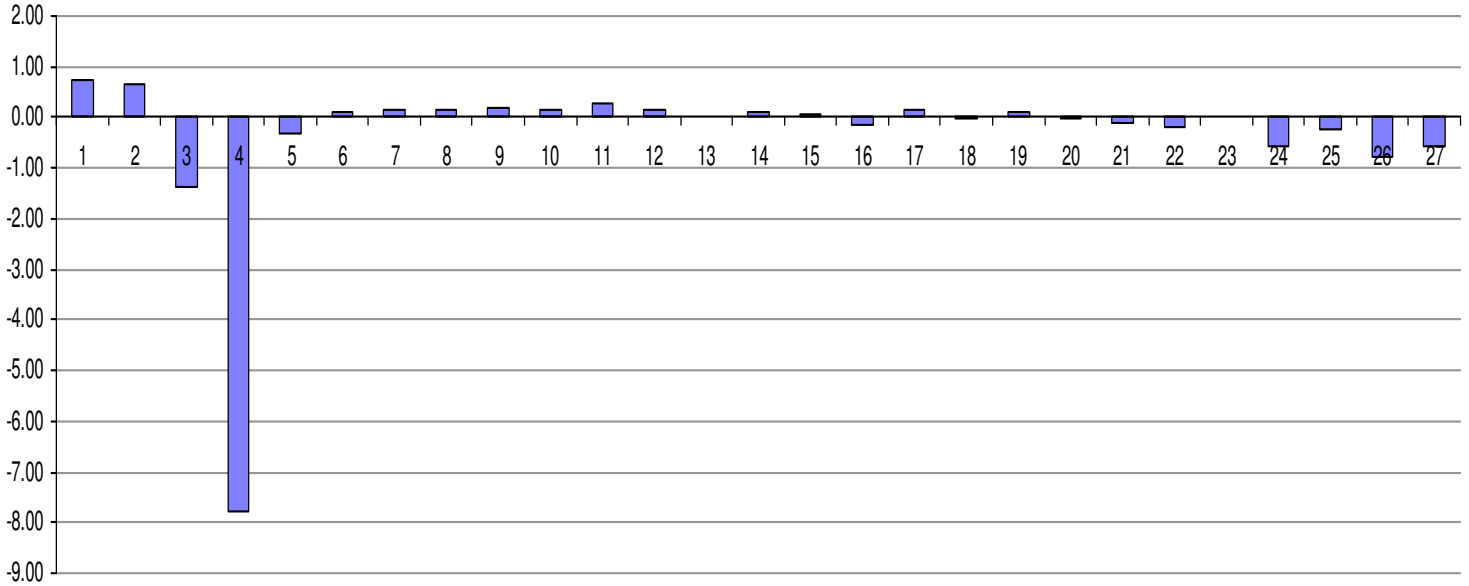
14/15 Draft TNUoS Tariffs: Revenue

- Increase in revenues of £278m
  - 12/13 adjustments still to be calculated but minimal
  - 12/13 K to be finalised but c~£14m
  - 13/14 adjustments flow through into 15/16



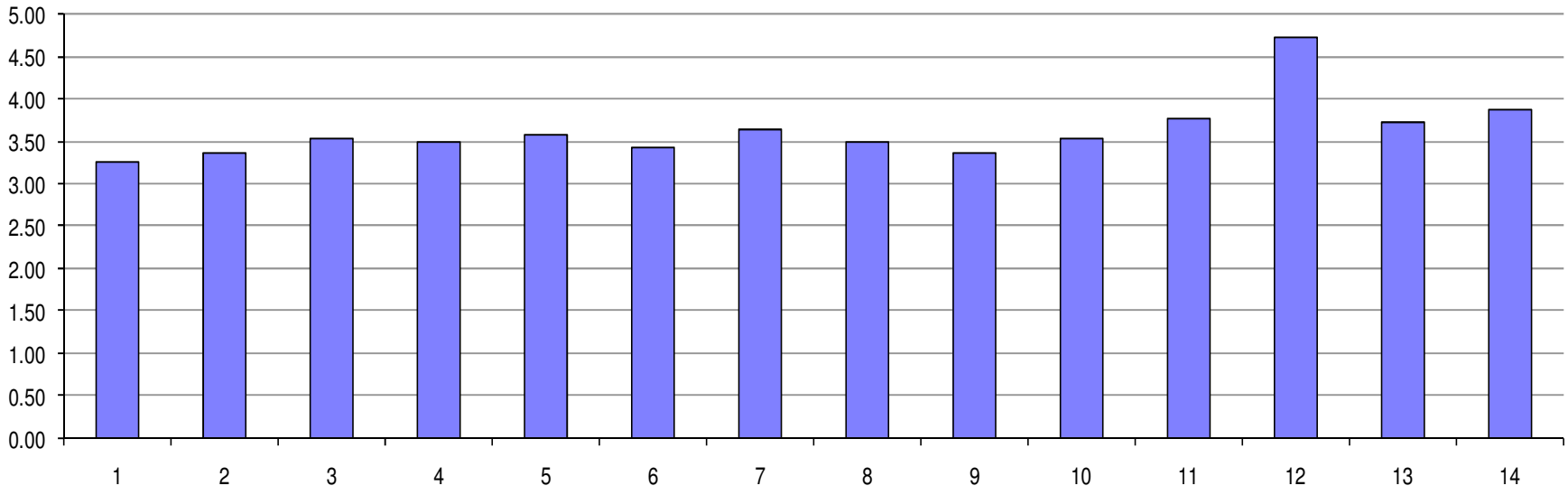
14/15 Draft TNUoS Tariffs: Generation

- Changes minimal
- Inflationary measures increases the Tariffs in the North and decreases Tariffs in the South. Other large changes is due to changes in flows along radial circuits.



14/15 Initial View TNUoS Tariffs: Demand

- Locational Changes minimal
- Residual increase of £3.66/kW due to increase in allowed revenues
- Table below shows absolute change in HH demand charges



Update of 14/15 Tariffs

14/15

- We will update our view of Draft 14/15 Tariffs throughout the next charging year at the following times:
  - **26 April 2013** 1st update of forecast tariffs for 2014/15
  - **31 July 2013** 2nd update of forecast tariffs for 2014/15
  - **1 November 2013** 3rd update of forecast tariffs for 2014/15
  - **24 December 2013** Draft tariffs for 2014/15
  - **31 January 2014** Final tariffs for 2014/15
- Other TO's in their STC (System Operator Transmission Owner Code) have committed to update their revenue projections on a quarterly basis. These updates are timed such that they can feed into the above updates

- Feedback on the Initial View Tariffs?

Condition 5 Tariffs

- Remaining years will be published by the end of March
  - I.e 15/16, 16/17 and 17/18
  - Will be based on current methodology

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Questions

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Lunch

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Distributed (Embedded) Generation Benefit



Iain Pielage – 12th March 2013

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Overview

- Re-cap of background & reason for change
- Where the previous (GBECM-23) proposal got to
- Proposal in more detail:
  - Interfaces & Review of Previous Analysis
- Summary Comparision
- Discussion: Way Forward.

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Embedded Charging - Background

- Issue first hightlighted as a consequence of BETTA
- Charging pre-consultation GB-ECM23 raised to review embedded generator benefit (linked to Standard Licence Condition SLC C13)
  - Work progressed over January – June 2010
- Project TransmiT launched : September 2010
  - Consequential impact on GB-ECM23
    - At that time, the outcome of SCR was unknown
    - CMP213 subsequently raised
- Standard Licence Condition C13 now extended to 2016
  - Allows for enduring charging solution replacement for SLC C13 based on new transmission charging baseline progressed under CMP213.
  - Expectation “that industry will begin work during this time to produce an enduring solution”

Link to Ofgem decision letter:
http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/Charging/Documents1/SLC%20C13%20decision.pdf

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Why Change?

- Exemptible distributed (embedded) generators avoid generation and receive demand TNUoS from the relevant supplier (subject to their own commercial contracts)
  - Due to the effect of the residual element of charges, this treatment leads to an 'embedded benefit' of ~ £25/kW (and increasing)
- Also receive BSUoS & Transmission Losses benefits

- Different definition of Transmission across GB.
  - At BETTA, a directly connected gen. at 132kV in Scotland located in close proximity to one which is embedded would arbitrarily pay ~£18/kW more
  - Ofgem introduced the time limited small gen. discount in Scotland for 132kV directly connected gen. to address this (SLC C13)

- Time Limit: 2016 not that far off.

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How Does TNUoS Benefit arise?

- TNUoS consists of two elements
  - Locational signal + Residual (revenue recovery)

- Transmission Connected – pays generation TNUoS: G_{Loc}+ G_{Res}
- Distribution Connected treated as negative demand
  - Avoids generation TNUoS & receives demand TNUoS: D_{Loc}+ D_{Res}

- If both Tx & Dist connected in same zone then
  - Locational signal equal & opposite: $D_{Loc} = - G_{Loc}$

- Benefit = Avoided TNUoS + Received TNUoS

  $= (G_{Loc} + G_{Res}) + (- G_{Loc} + D_{Res})$

  $= G_{Res} + D_{Res}$

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BSUoS & Losses

- Similar to TNUoS, distributed generation
  - does not pay BSUoS
  - no adjustment for transmission losses

- Receives both BSUoS and losses benefit.
  - Reduces the net demand for associated Supplier
  - Reduces Suppliers share of BSUoS and Losses
    - Costs recovered from other parties.

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Proposal Objectives

- Cost Reflective:
  - Should reflect both cost imposed on transmission network and appropriate credit for benefits provided
- Help to ensure competition takes place on a level playing field.
  - Transmission and Distribution connected generation face comparable cost signals
- Proportionate
  - Administrative & regulatory burden on smaller players commensurate with their size
- Enduring industry solution

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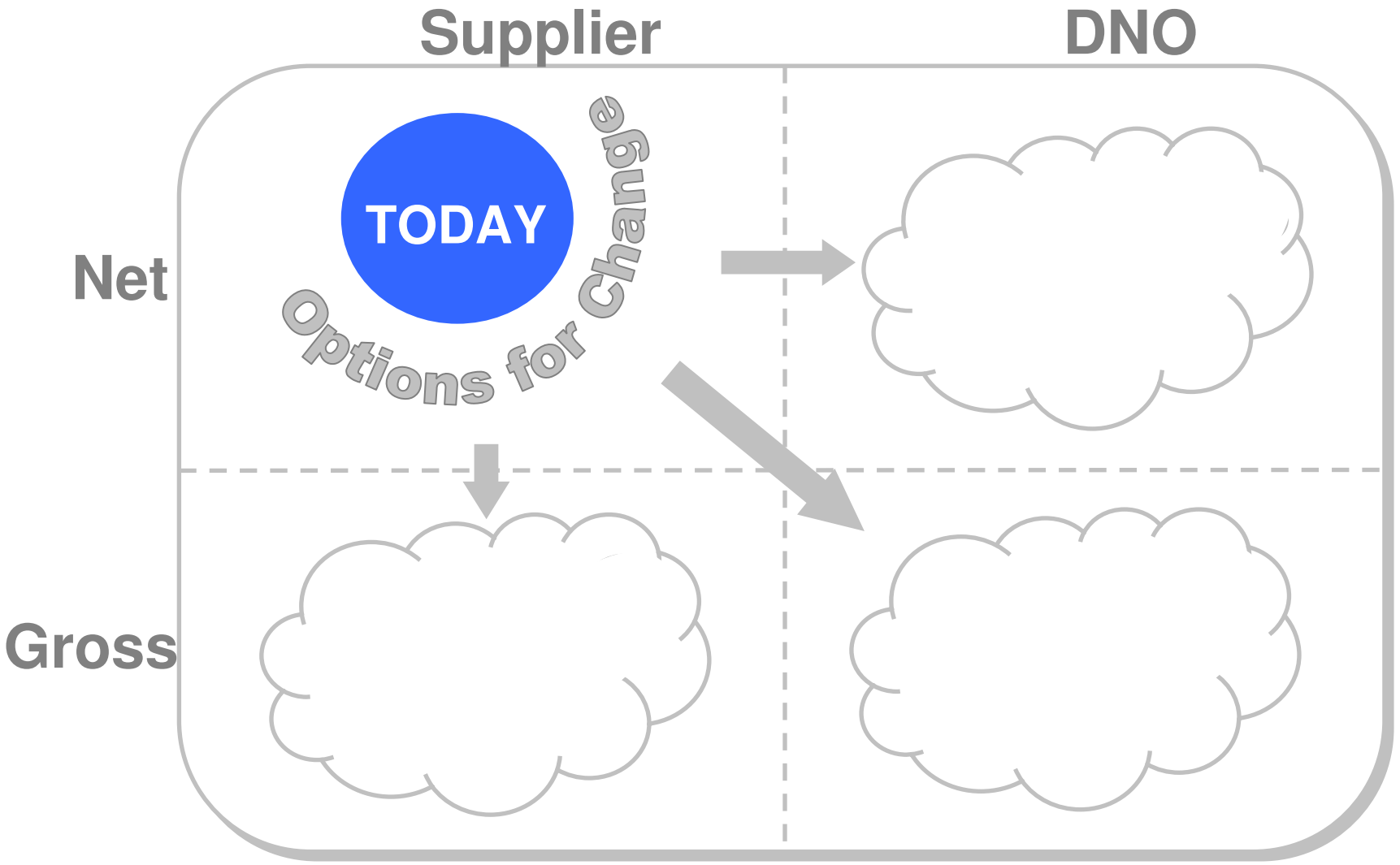
Previously Considered Options for Change



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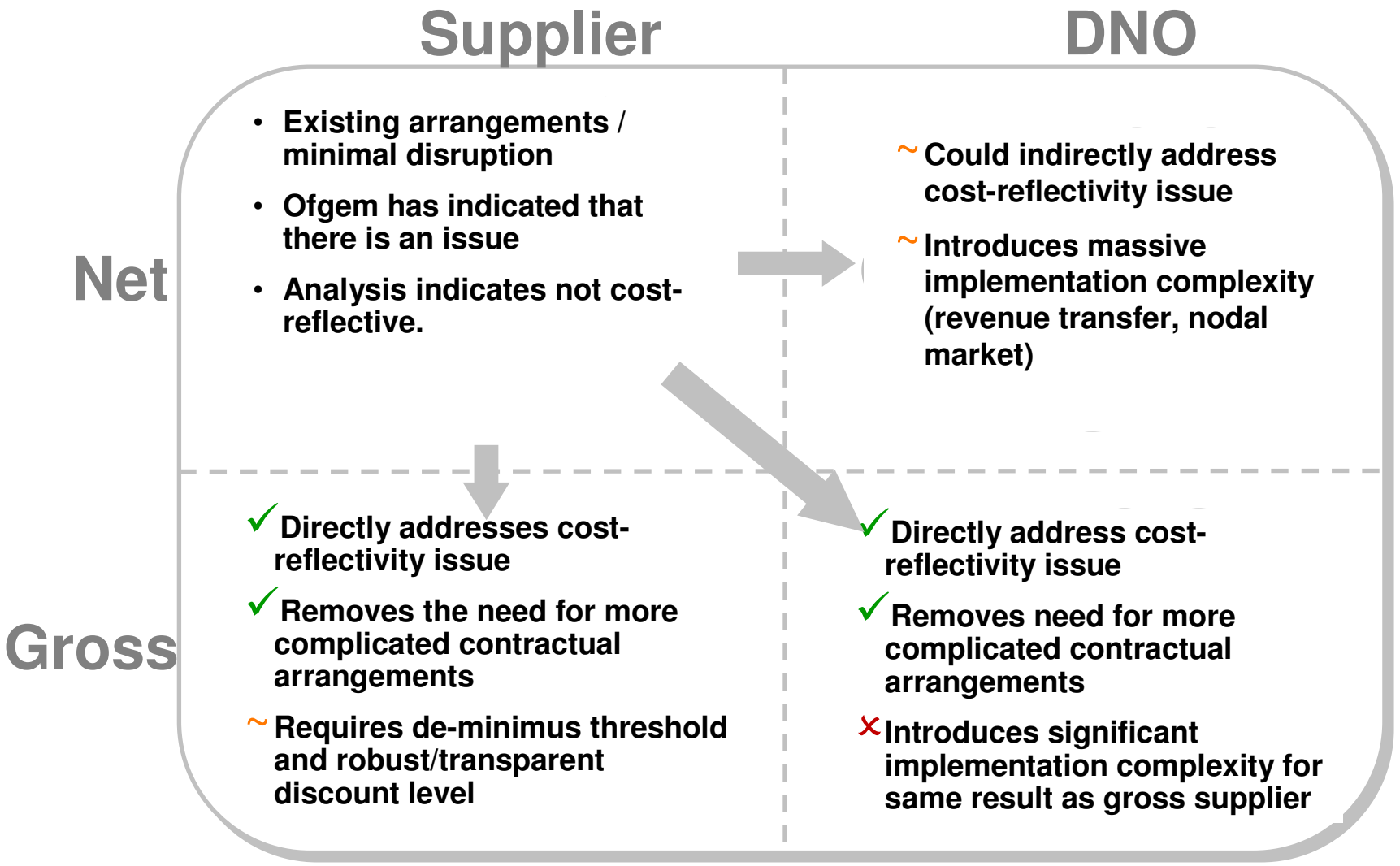
Previously Considered Options for Change



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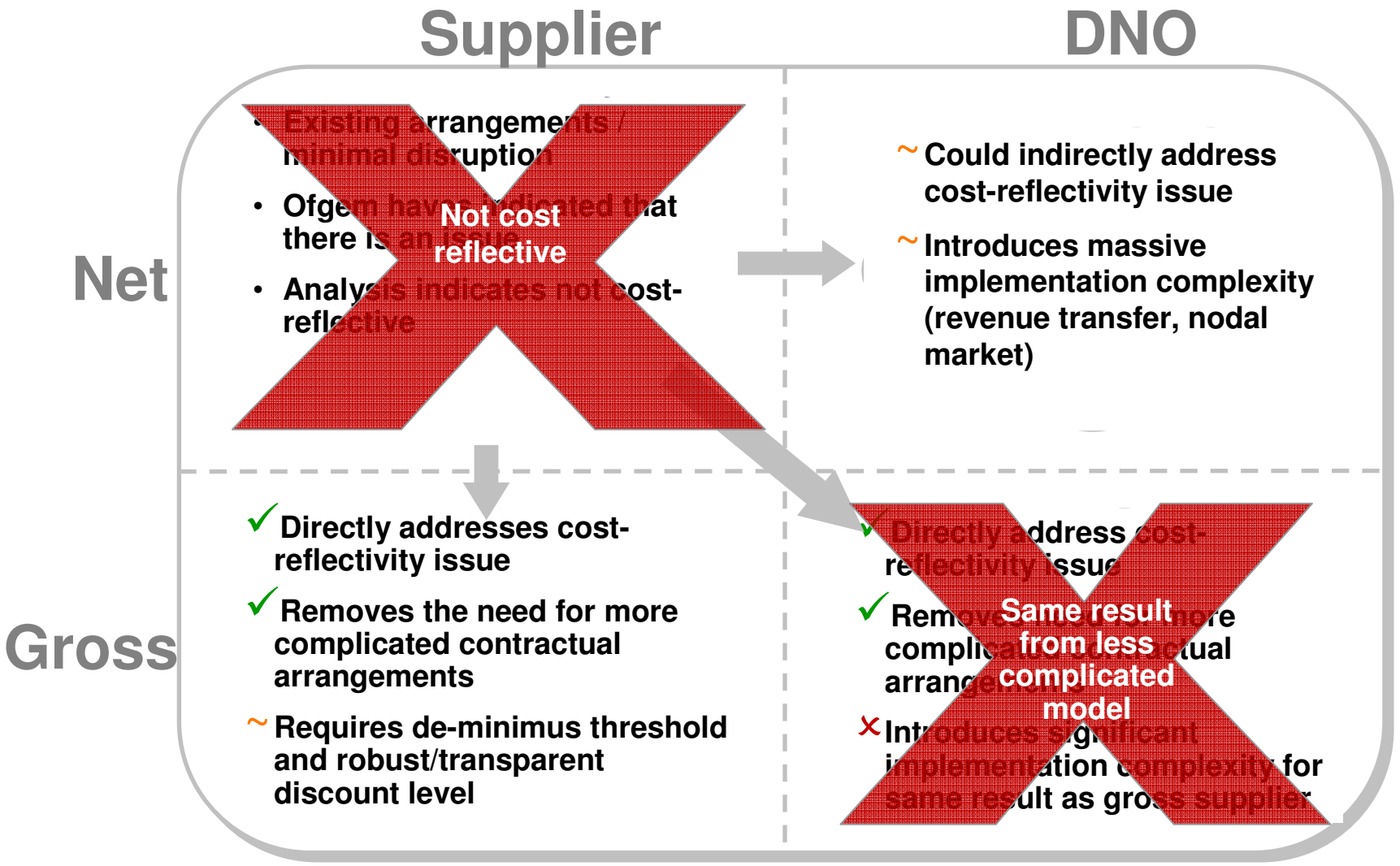
Previously Considered Options for Change



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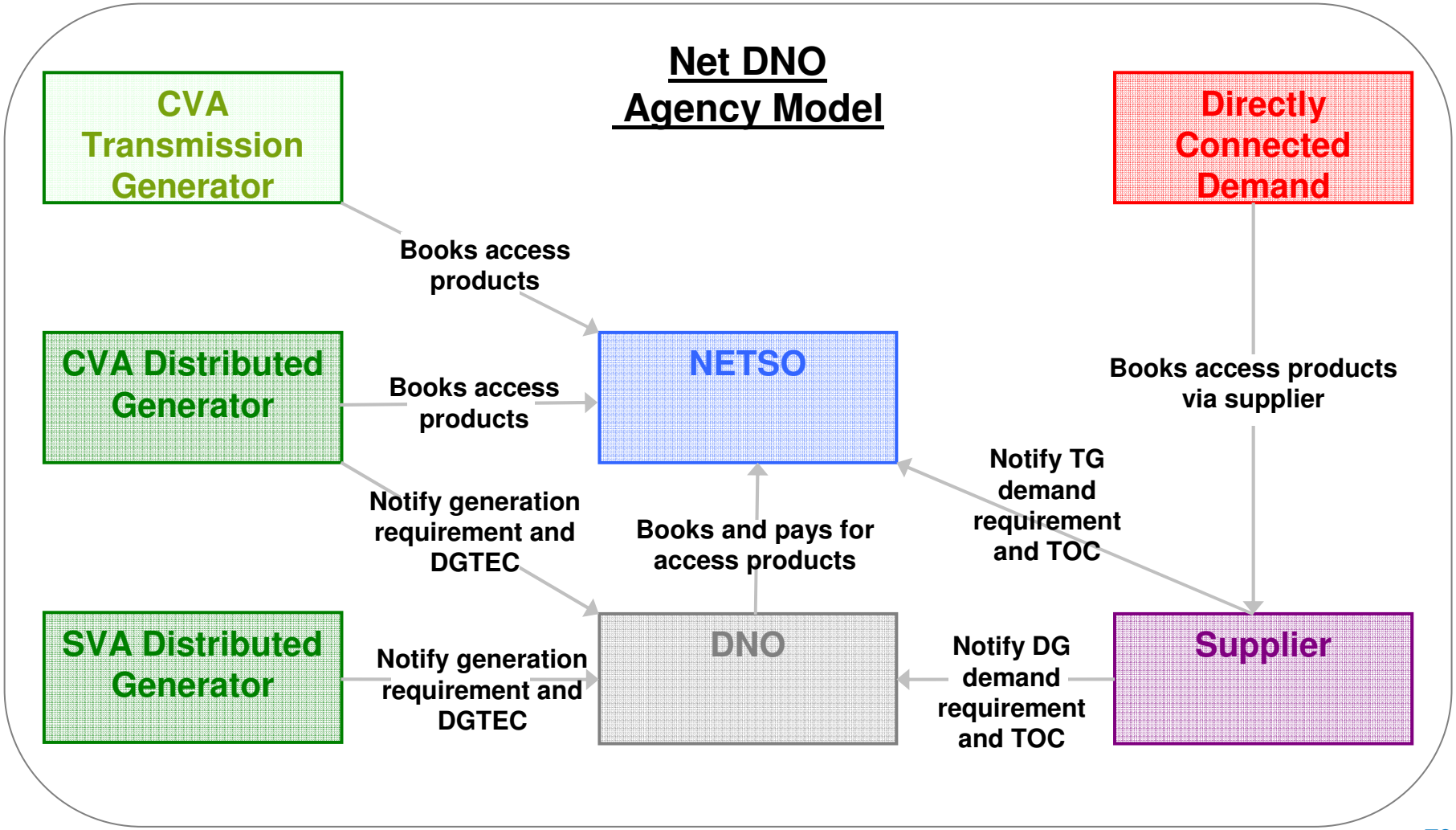
Previous Proposal Options

- Distributed Generation Tariff + Gross Demand Tariff
  - Charge Suppliers on Gross HH imports & Gross HH metered output (versus) current net.
  - Sub-options for calculating DG Tariff
    - Average Maximum export
    - DG Capacity (e.g. over triad)
- Net Locational Tariff + Gross Residual to demand
  - TNUoS split into locational + residual elements
  - Charge locational to both Suppliers & embedded
  - Gross residual charged only to suppliers (demand)
  - Sub-options for Gross demand charges – similar to DG Tariff

Net DNO - Contractual Interfaces



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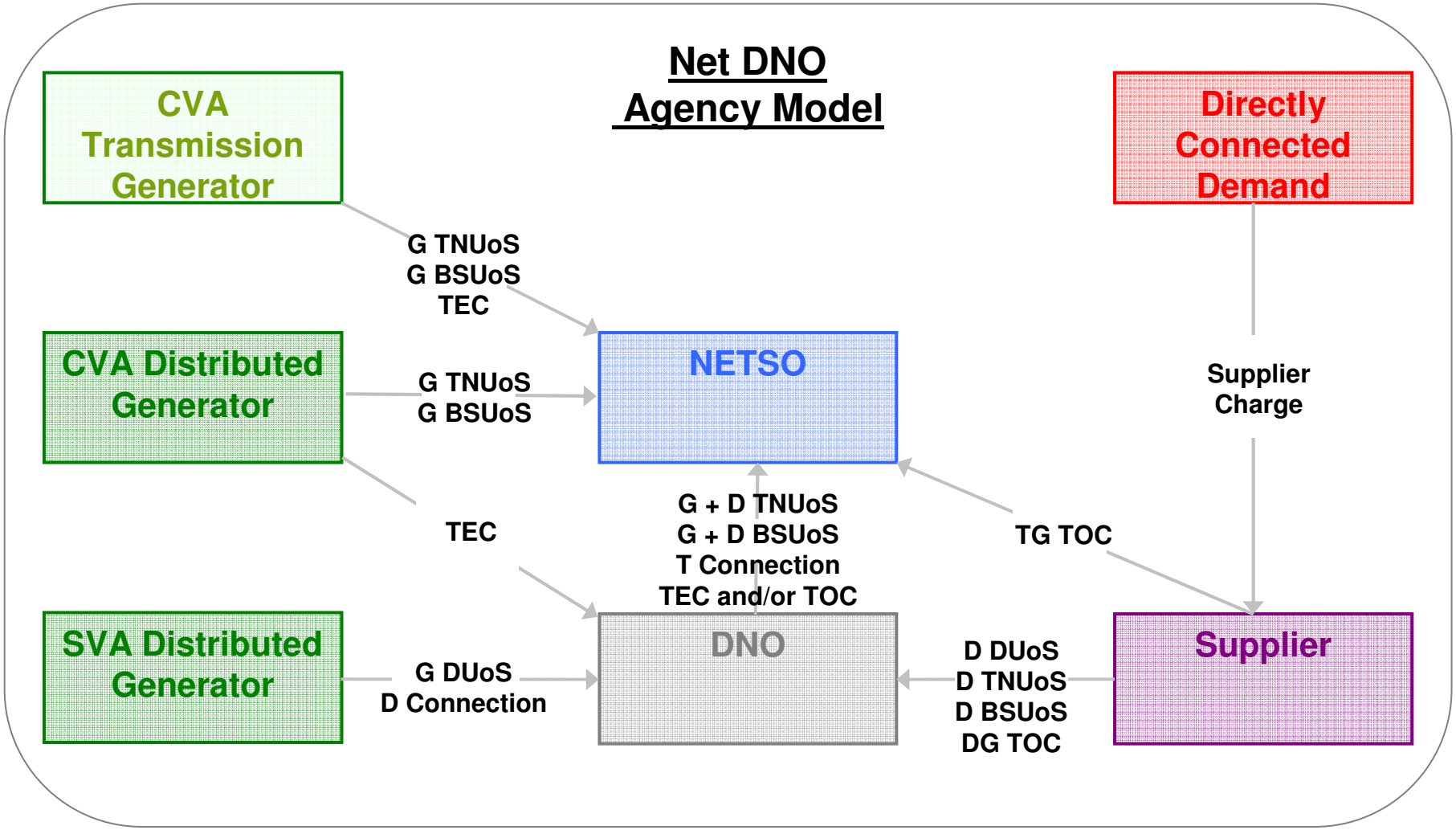
Net DNO - Illustrative Revenue Flows



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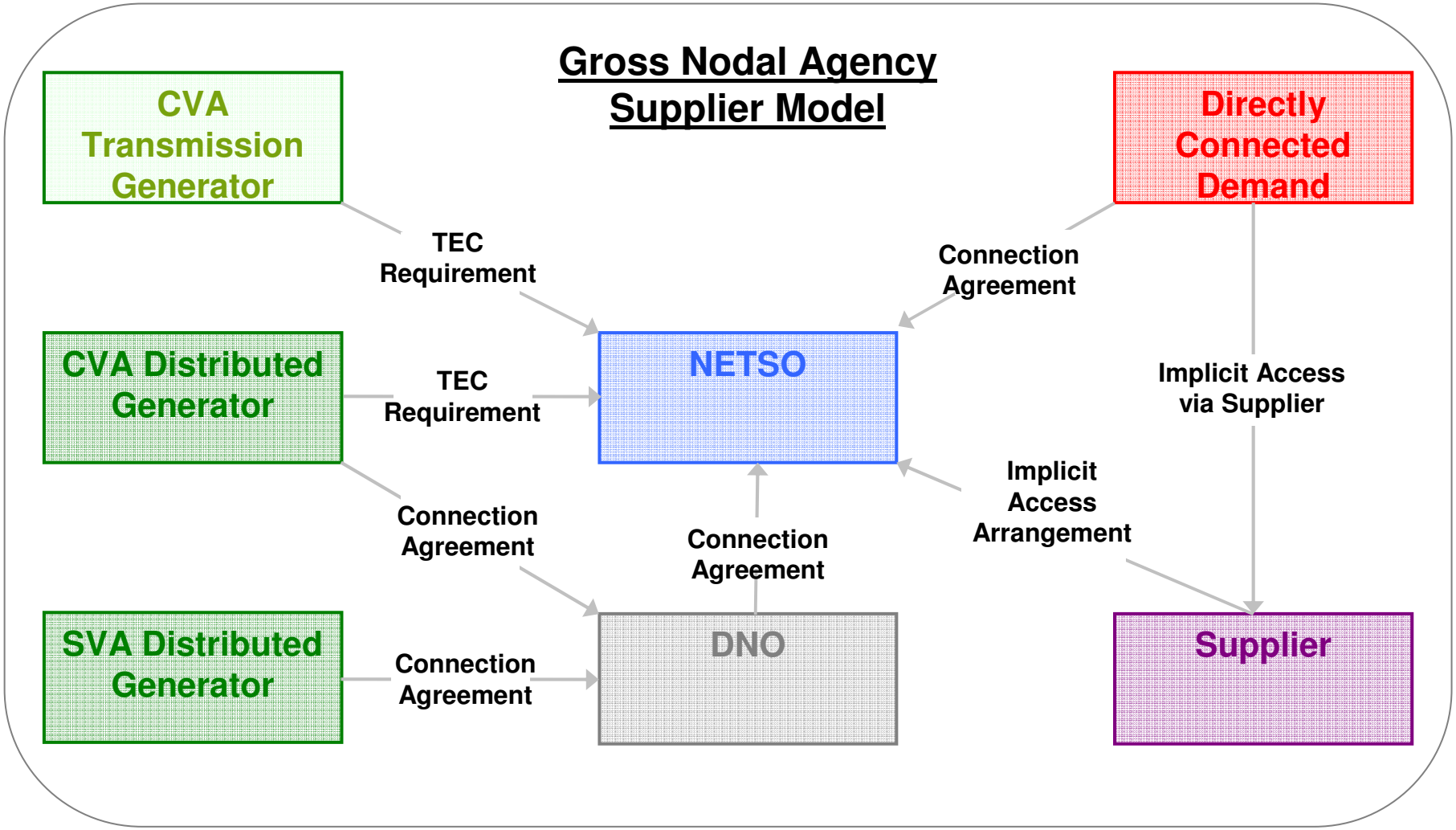
Gross Supplier - Contractual Interfaces



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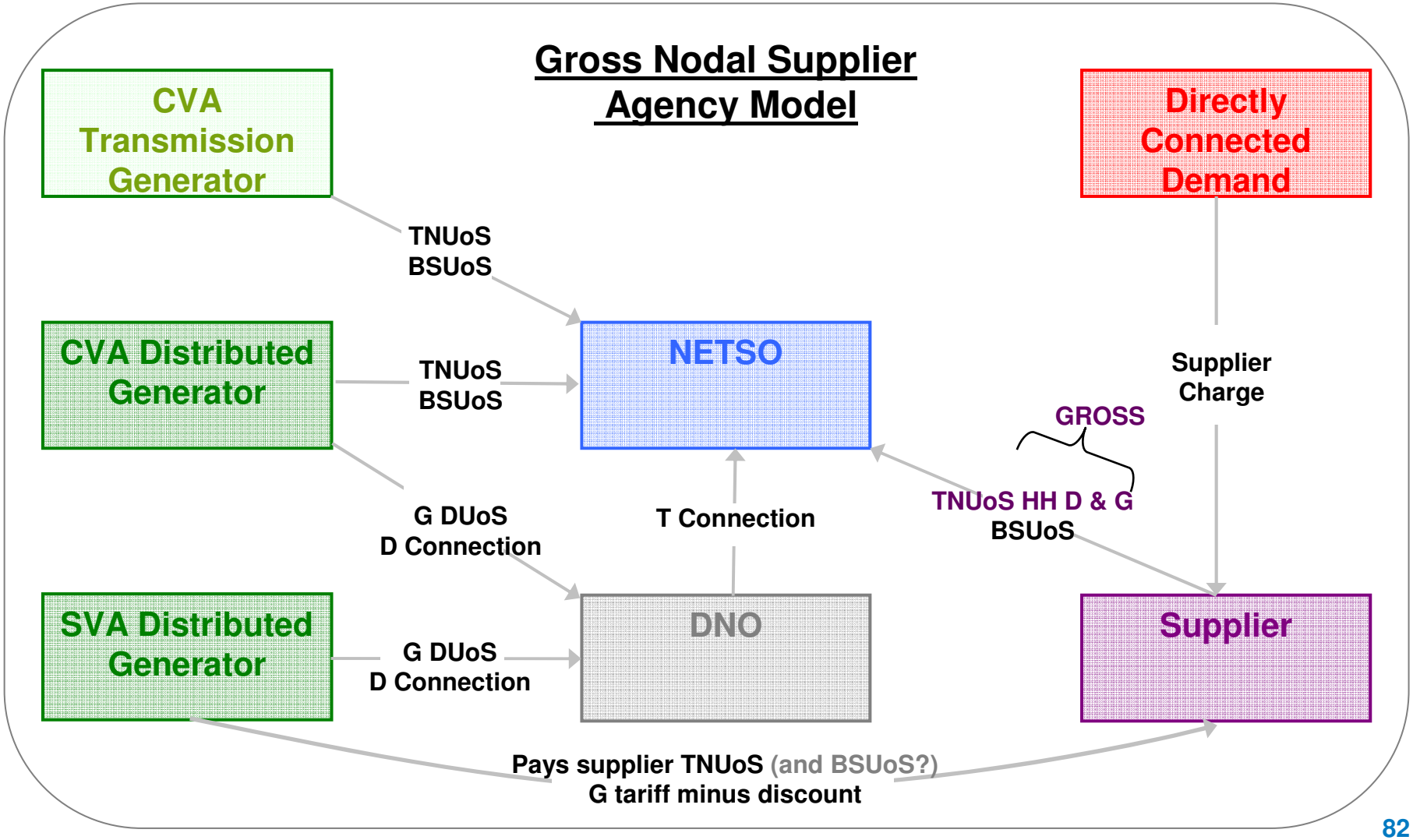
Gross Supplier - Illustrative Revenue Flows



Gross Supplier
Establishing a Distributed Generation Tariff

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- Option: Gross Demand Tariff + *Distributed Generation Tariff*
- Require a Tariff that:
  - Reflect cost of avoided GSP investment
    - appropriate credit for benefits provided
    - Considers both elements of:
      - Avoided Demand Investment
      - Avoided Generation Investment
  - Accounts for the difference between demand zones
    - D TNUoS *less* avoided cost benefit

- Reminder: NGET's overall revenue recovery remains unchanged.

Gross Supplier
Avoided Demand Investment - Initial Views

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- Previous analysis had utilised a top down approach for avoided exit related investment:

$$\frac{\text{Annual Average Investment}}{\text{Annual Average Demand Increase}}$$

- This led to annuitised avoided investment of approx. £5/kW
- Alternatively, using a bottom up approach could look like:

$$\frac{\text{Average SGT Infrastrucutre Cost}}{\text{Average SGT Size}}$$

- This leads to a unit cost for a marginal increase in demand of approx. £1/kW (i.e. £3m/240MVA x 8%)
- This figures is significantly different from previous method
- Can this be corroborated?

Gross Supplier
Avoided Demand Investment – Cost Basis

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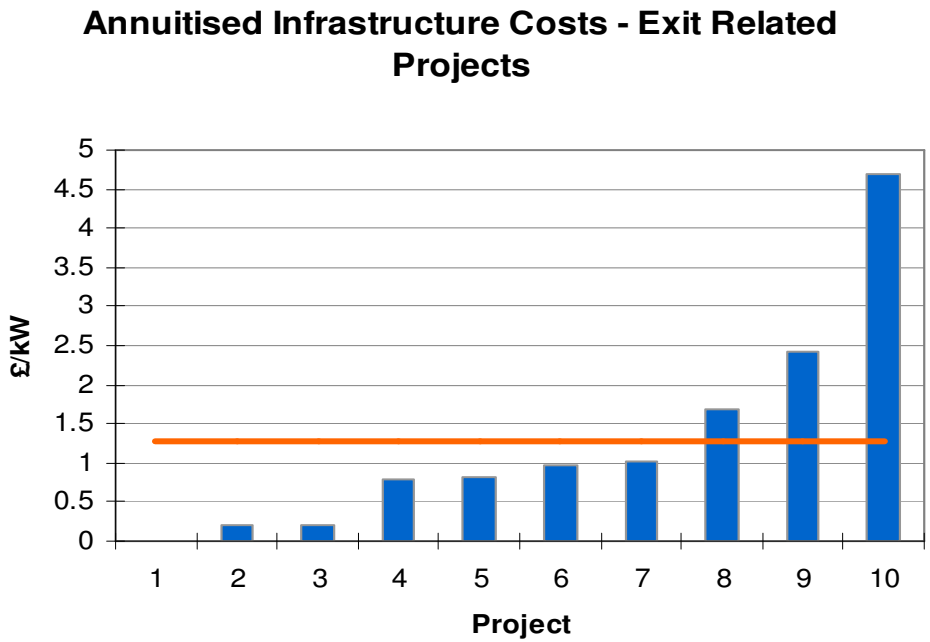

- Comparing infrastructure costs vs. capacity delivered amounts to an average annuitised cost of ~£1.3/kW
- Based on a sample of 10 E&W projects (from 2010 analysis)
- Assume this to be better estimate of benefit

Gross Supplier Avoided Generation Investment

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- Pre-consultation approach:
  - Utilised average of E&W revenue drivers from TPCR4 i.e. Unit Cost Allowances across all zones
- Subsequent work questioned appropriateness of UCAs
  - includes assumed baseline of load related investment
  - includes significant proportion of cost already within wider tariff

Gross Supplier Avoided Generation Investment

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- A similar bottom-up approach could be used for calculating a generic unit cost of connecting generation
- How much generation capacity is to be assumed as delivered by a given connection?
- This has already been done in the local substation charge

Substation Rating	Connection Type	Substation Voltage		
		132kV	275kV	400kV
<1320 MW	No redundancy	0.135	0.082	0.066
<1320 MW	Redundancy	0.305	0.195	0.157
>=1320 MW	No redundancy	0.000	0.261	0.210
>=1320 MW	Redundancy	0.000	0.423	0.340

- However no equivalent local substation portion within DNO distribution tariff
  - Avoided generation connection investment already reflected within tariff

Gross Supplier Proposal Distributed Generation Tariff

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- From previous analysis
  - Suggested DG benefit was ~£1.30 /kW
  - For each Demand Zone, there would be two gross tariffs
    - Gross demand – D TNUoS
    - Distributed Generation Tariff
      - Base on Initial Tariff *less* "Benefit"

Comparison Summary

Gross Demand + Distributed Generation Tariff

Embedded User	Today	Proposal
SVA HH Production (through Supplier BMU)	Negative Demand TNUoS	Distributed Generation TNUoS
SVA HH Consumption (through Supplier BMU)	Demand TNUoS	Demand TNUoS
SVA NHH Consumption (through Supplier BMU)	Demand TNUoS	Demand TNUoS
CVA Exemptible Generator with BEGA	Negative Demand TNUoS	Distributed Generation TNUoS
CVA Exemptible with a BCA	Generation TNUoS	Transmission Generation TNUoS
CVA > 100MW	Generation TNUoS	Transmission Generation TNUoS
Derogated Distribution Interconnectors	Negative Demand TNUoS (when exporting onto mainland)	Distributed Generation TNUoS

Comparison Summary

Net Locational + Gross Residual to Demand

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Embedded User	Today	Proposal
SVA HH Production (through Supplier BMU)	Negative Demand TNUoS (Locational + Residual Element)	Negative Demand TNUoS (Locational Element)
SVA HH Consumption (through Supplier BMU)	Demand TNUoS (Locational + Residual Element)	Demand TNUoS + Residual (Net Locational) (Gross Residual)
SVA NHH Consumption (through Supplier BMU)	Demand TNUoS (Locational + Residual Element)	Demand TNUoS + Residual (Net Locational) (Gross Residual)
CVA Exemptible Generator with BEGA	Negative Demand TNUoS (Locational + Residual Element)	Negative Demand TNUoS (Locational Element)
CVA Exemptible with a BCA	Generation TNUoS (Locational + Residual Element)	Generation TNUoS (Locational Element)
CVA > 100MW	Generation TNUoS (Locational + Residual Element)	Generation TNUoS (Locational Element)
Derogated Distribution Interconnectors	Negative Demand TNUoS (when exporting onto mainland)	Negative Demand TNUoS (when exporting onto mainland)

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Embedded Charging – Way Forward

- Main Interaction: CMP213 – Project Transmit.
  - Workgroup Consultation closed 15th January 2013
  - Expect Final Mod Report to be with Ofgem April 2013

- Proposed way forward: Seeking Views
  - Do we re-establish expert group or proceed to proposal?
    - Is situation sufficiently different to warrant re-visit prior to a Workgroup?
  - Preference? Raise CUSC Modification; Workgroup to:
    - Review previous (GB-ECM23) work;
    - Consider consequences of CMP213

- Possible Timeline:
  - Raise CUSC modification proposal, April 2013
  - Ofgem decision, April 2014
  - Transition period April 2014 to April 2016
    - Consequential code changes

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Future Modification Topics – Prioritization exercise

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Potential future modification topics

Topic	Rankings							Total score
G/D split	1	3	1	1	6	1	5	18
Embedded	8	7	8	7	4	3	3	40
Triad	4	5	6	5	7	7	6	40
Integrated offshore	3	6	2	3	5	6	1	26
TNUoS fixed tariffs	6	4	3	8	1	5	7	34
BSUoS fixed tariffs	5	1	3	2	1	2	7	21
Methodology Housekeeping	7	8	7	6	8	8	4	48
8 year Price Control	2	2	5	4	3	4	2	22

Topic	Ranking
G/D split	1
BSUoS fixed tariffs	2
8 year Price control	3
Integrated offshore	4
TNUoS fixed tariffs	5
Triad	6
Embedded	6
Methodology Housekeeping	8

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Any Other Business

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Future meeting dates

May

21

Tuesday

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Close

ANNEX

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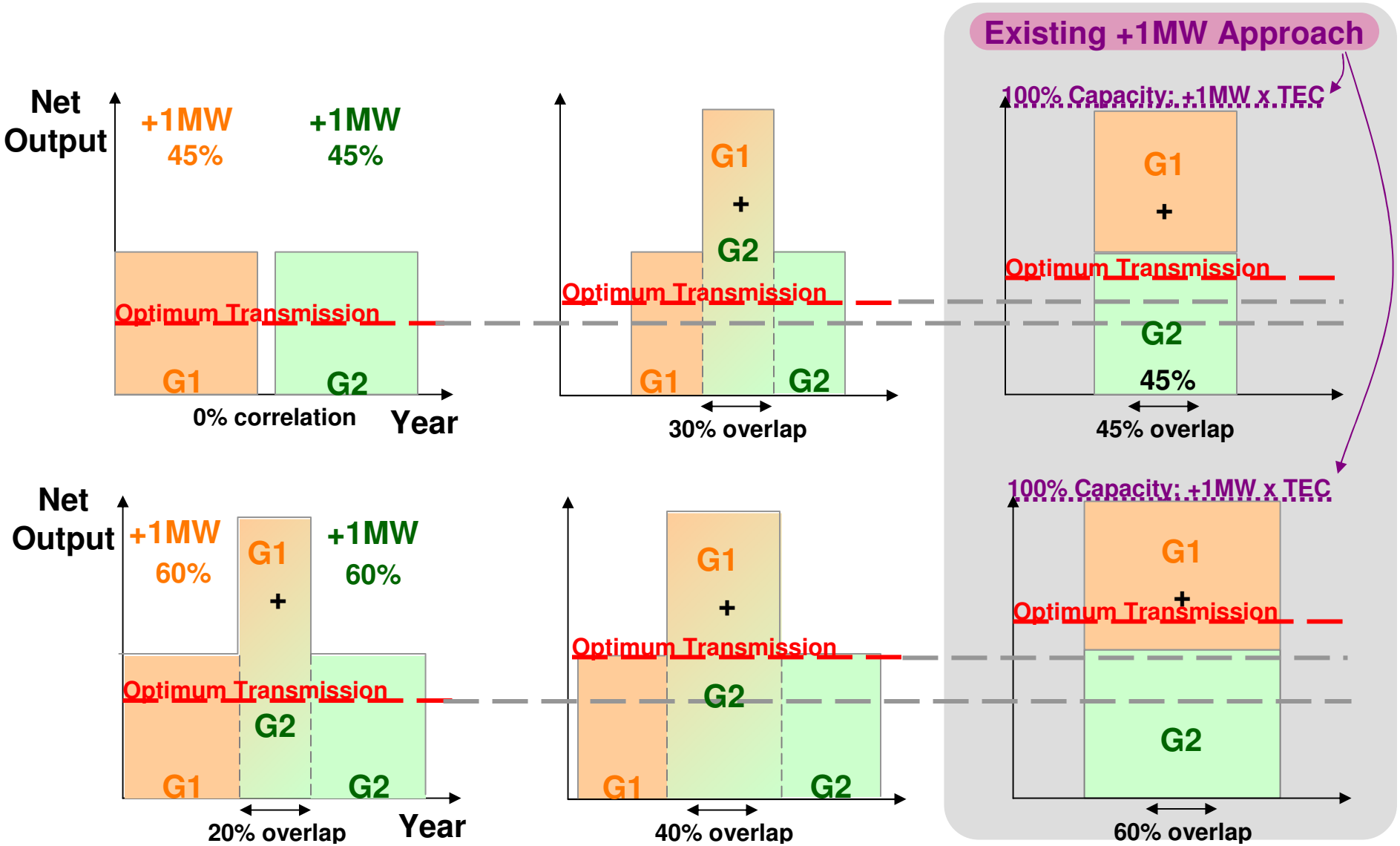
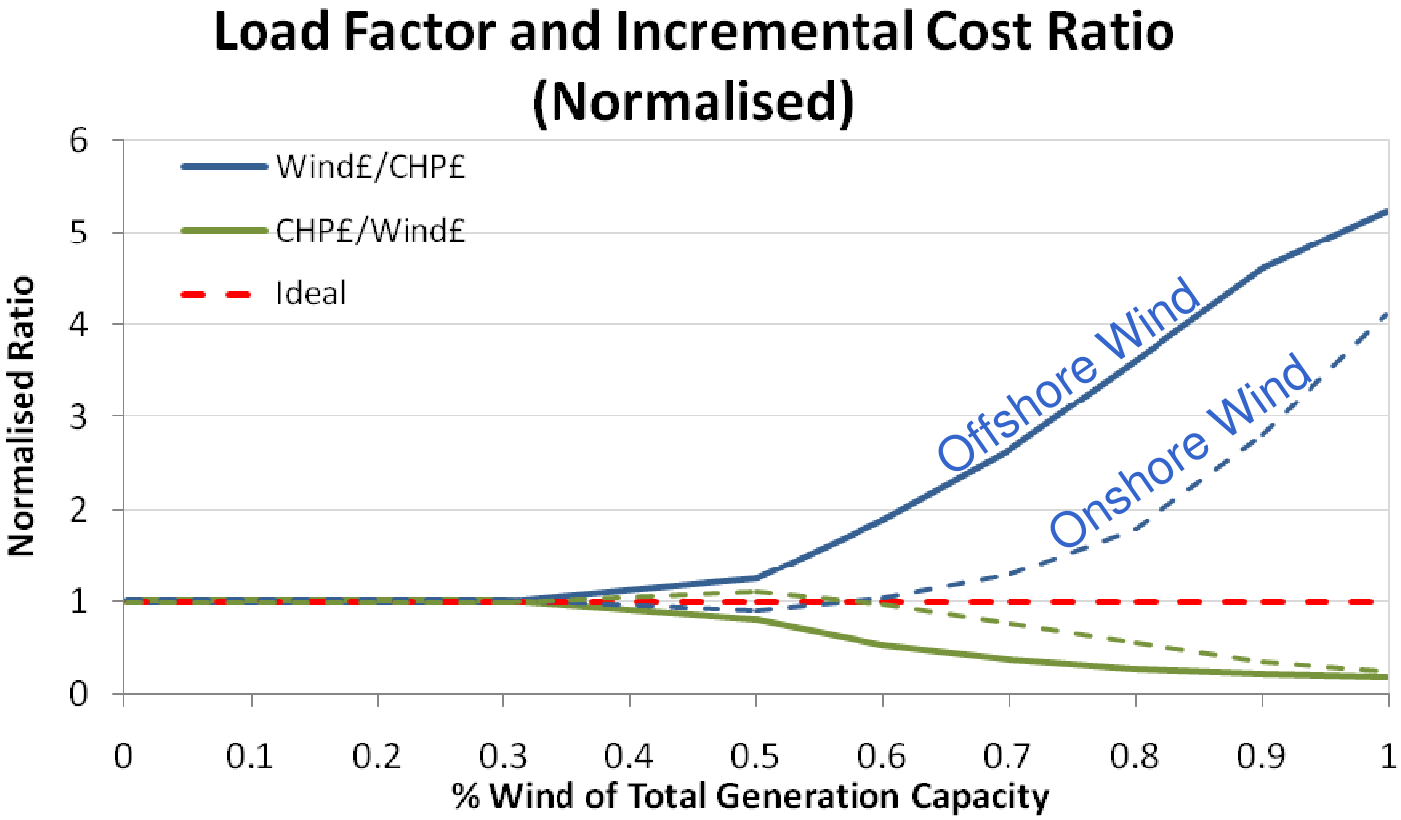
Correlation between Generators

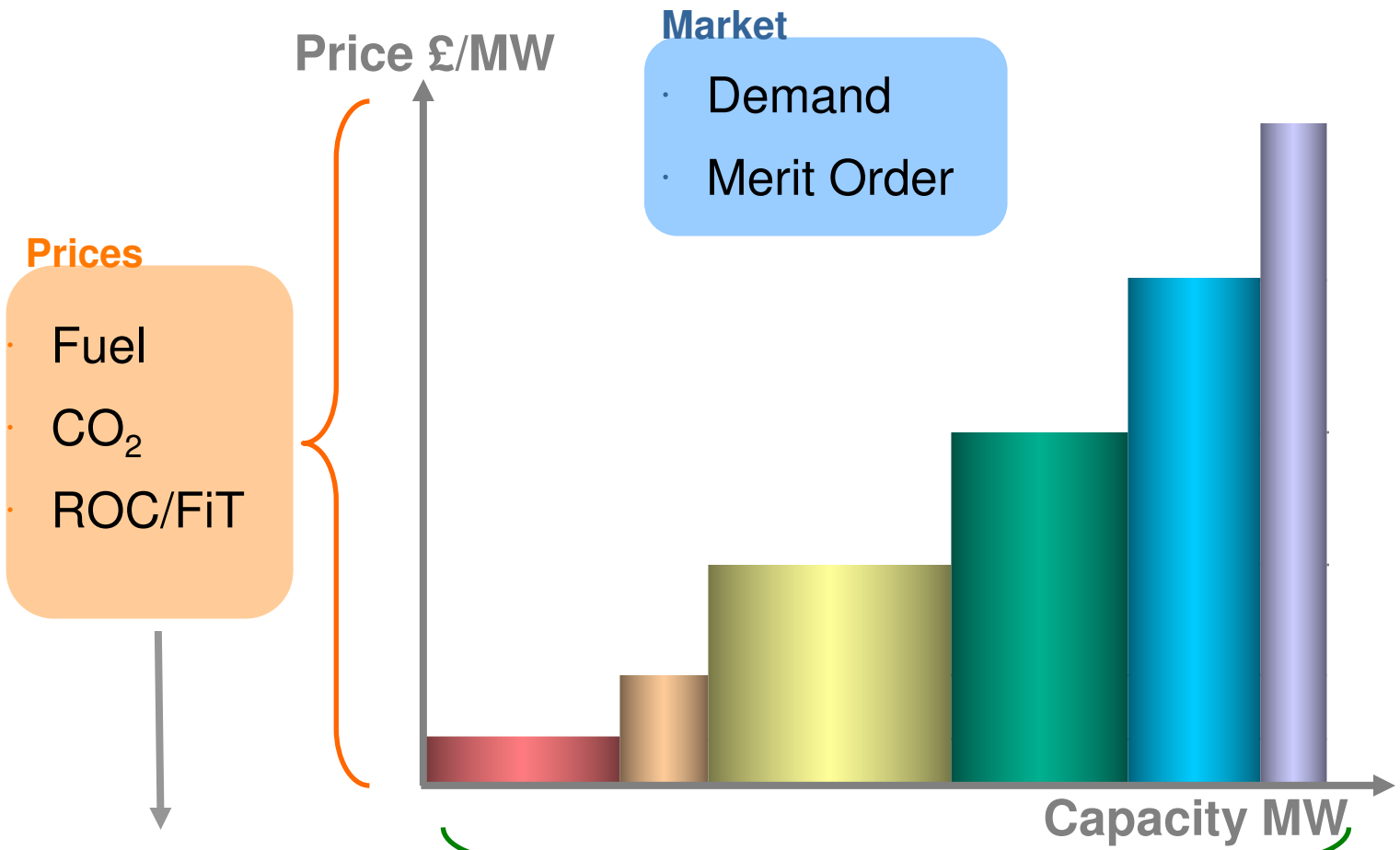


Export constrained zones – Simplified Analysis



- Simplified 'test zone' analysis served to corroborate hypothesis and help quantify effect

Market Model - Generation Inputs



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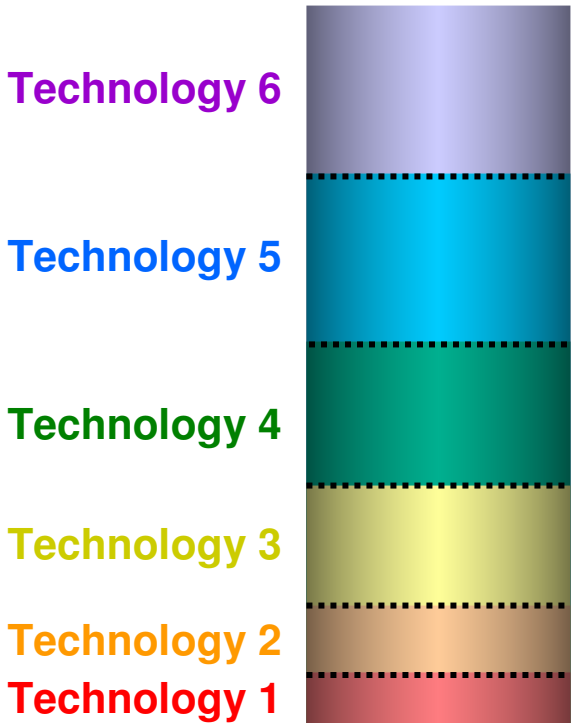
Market Model - Generation Merit Order



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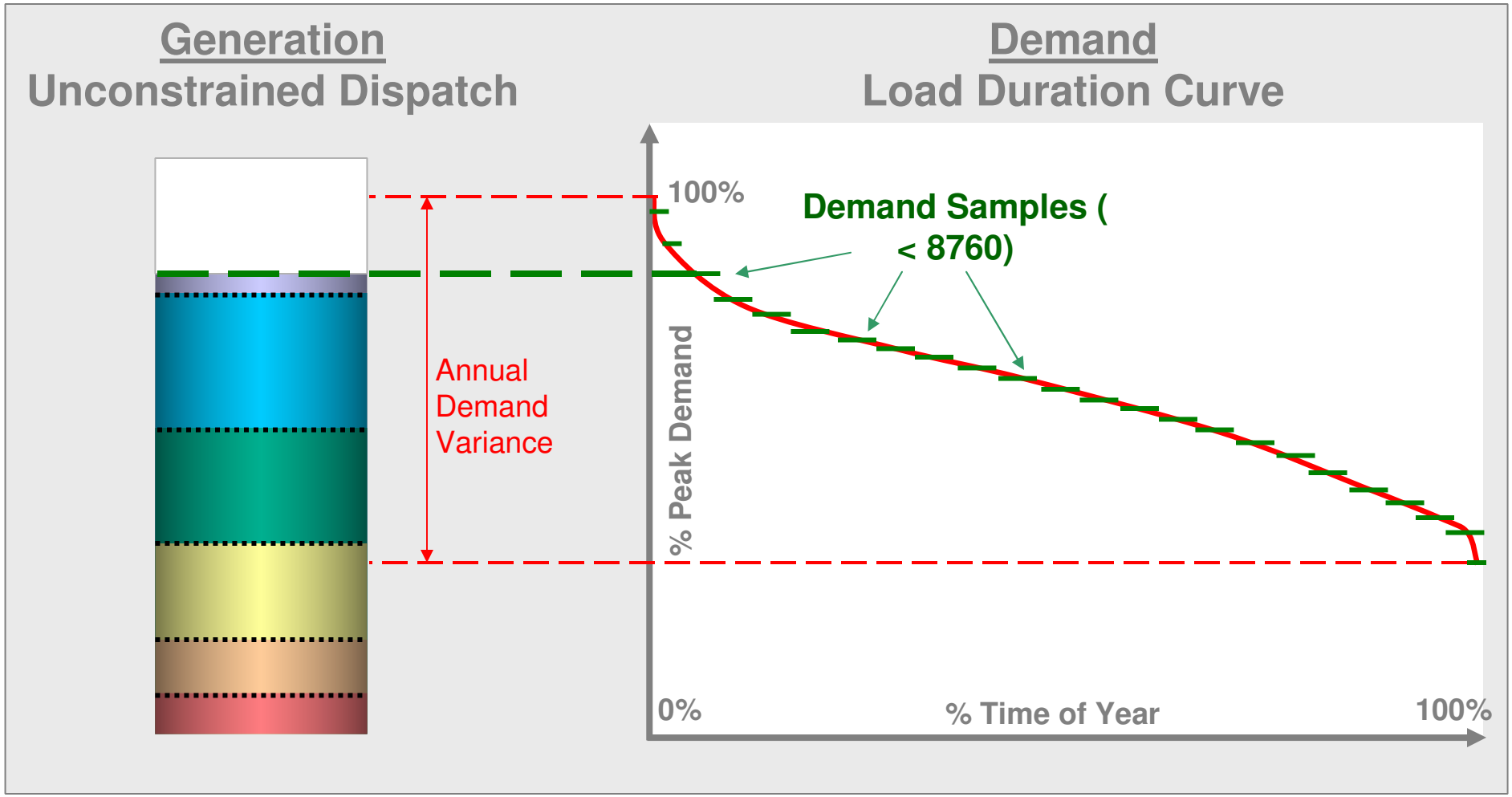
Market Model - Unconstrained Dispatch



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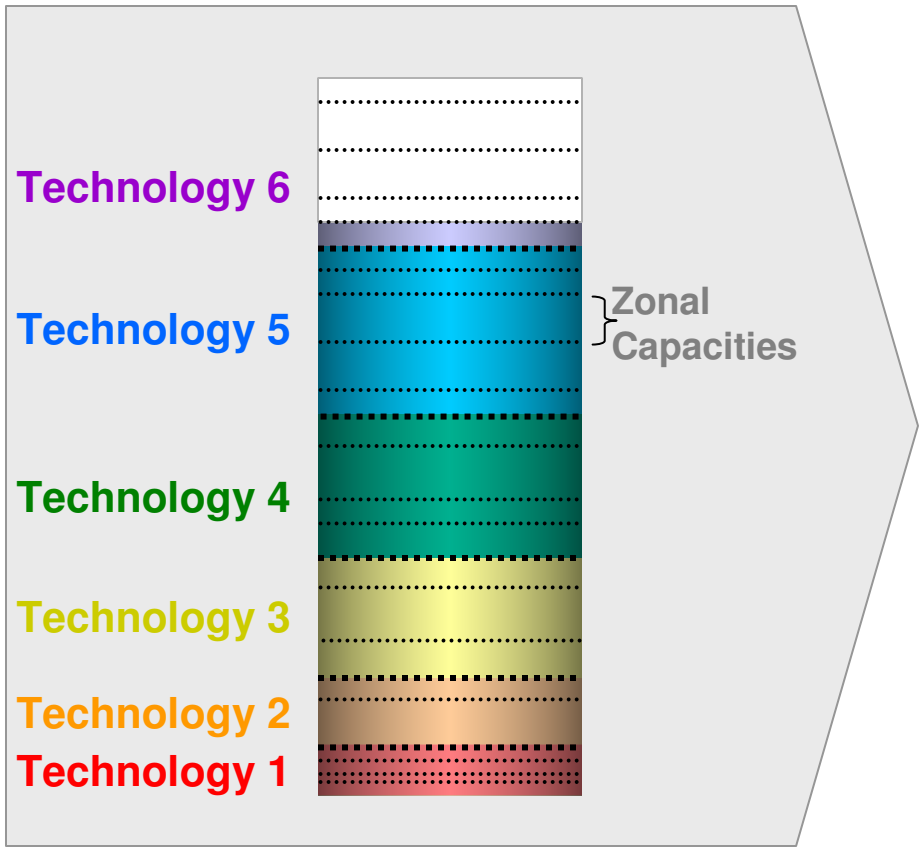
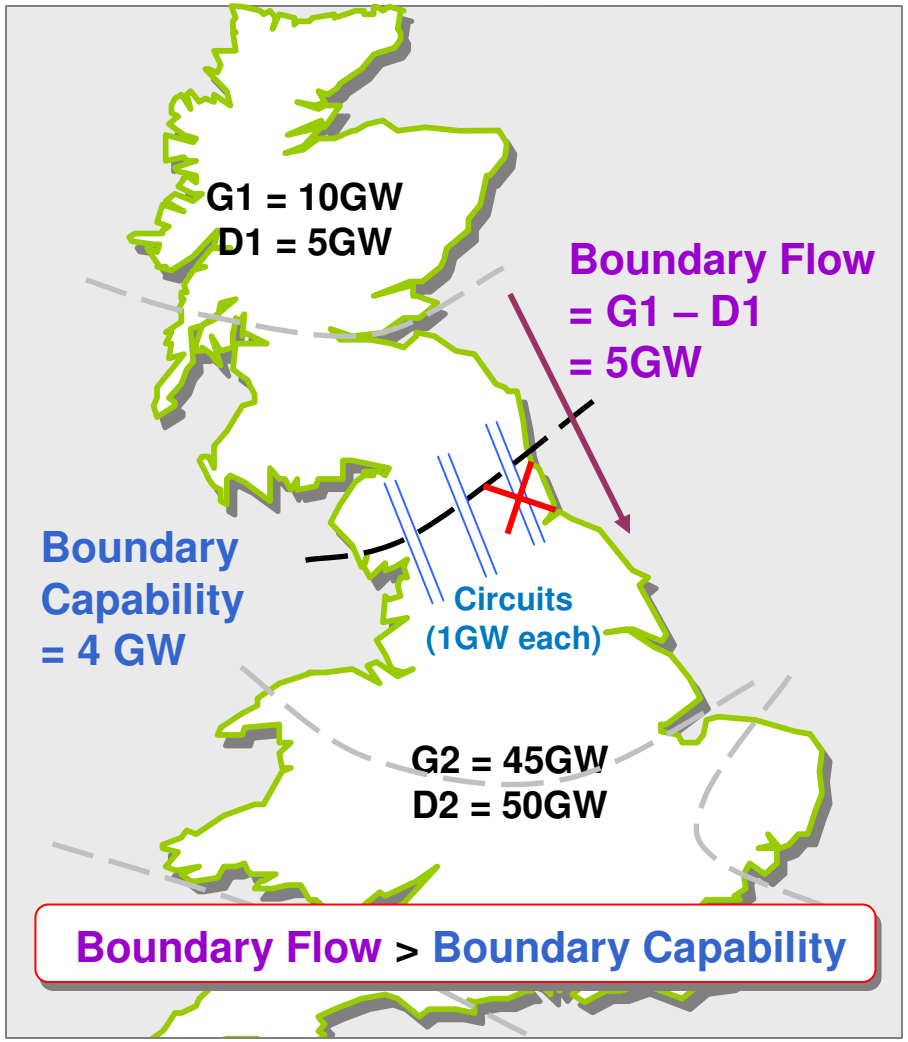
Market Model - Network Capability

Unconstrained Dispatch
(One Demand Sample)

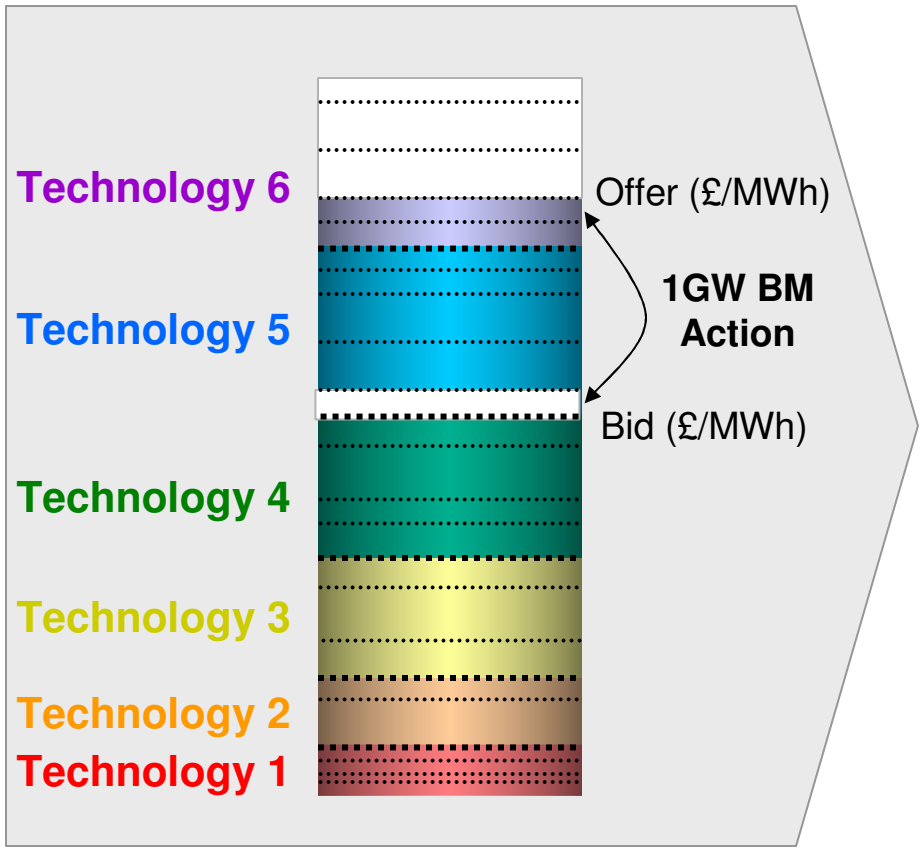


Zonal Network Representation



Market Model - Constrained Dispatch

Constrained Dispatch



Zonal Network Representation