

# Embedded Generation- background

CISG

6<sup>th</sup> November 2009



**nationalgrid**

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# Why?

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- ◆ Arrangements differ for embedded generation:
  - ◆ C13 – small Generators discount
  - ◆ Put in at BETTA as a temporary measure
  - ◆ ‘reasonable endeavours’ obligation – April 2011
- ◆ Impact on competition and cost reflectivity
- ◆ Signals for investment
- ◆ TADG

# Value of Embedded Benefits

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- ◆ TNUoS
  - ◆ £150m, (£20/kW, 7500MW)
- ◆ BSUoS
  - ◆ £69m, (£1.5/MWh, 0.35LF)
- ◆ Losses
  - ◆ £46m, (£50/MWh, 0.35LF, 2%)
- ◆ Total benefit
  - ◆ £265m

# Who pays - TNUoS?

## Generation

Liabile generators  
pay £40m too much



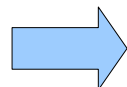
Different classes of generation  
pay different amounts

## Demand

£110m reallocated between Suppliers  
benefiting those contracted to  
embedded generation

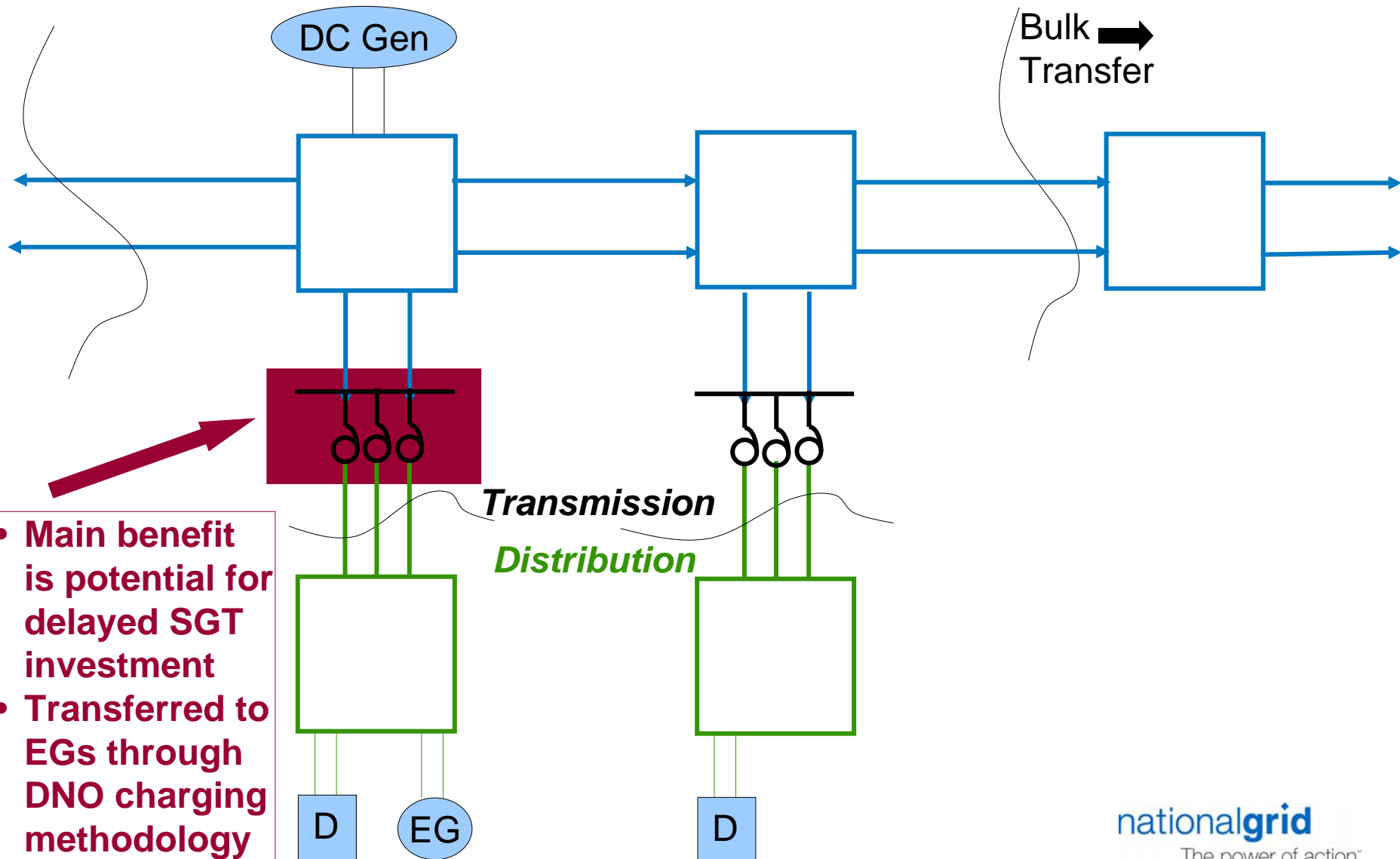


Some Suppliers to benefit  
relative to others



Does a generator embedded at a point on  
the transmission system cause £20/kW less  
investment compared to directly connected?

# Impact of generation



# Investment and signals

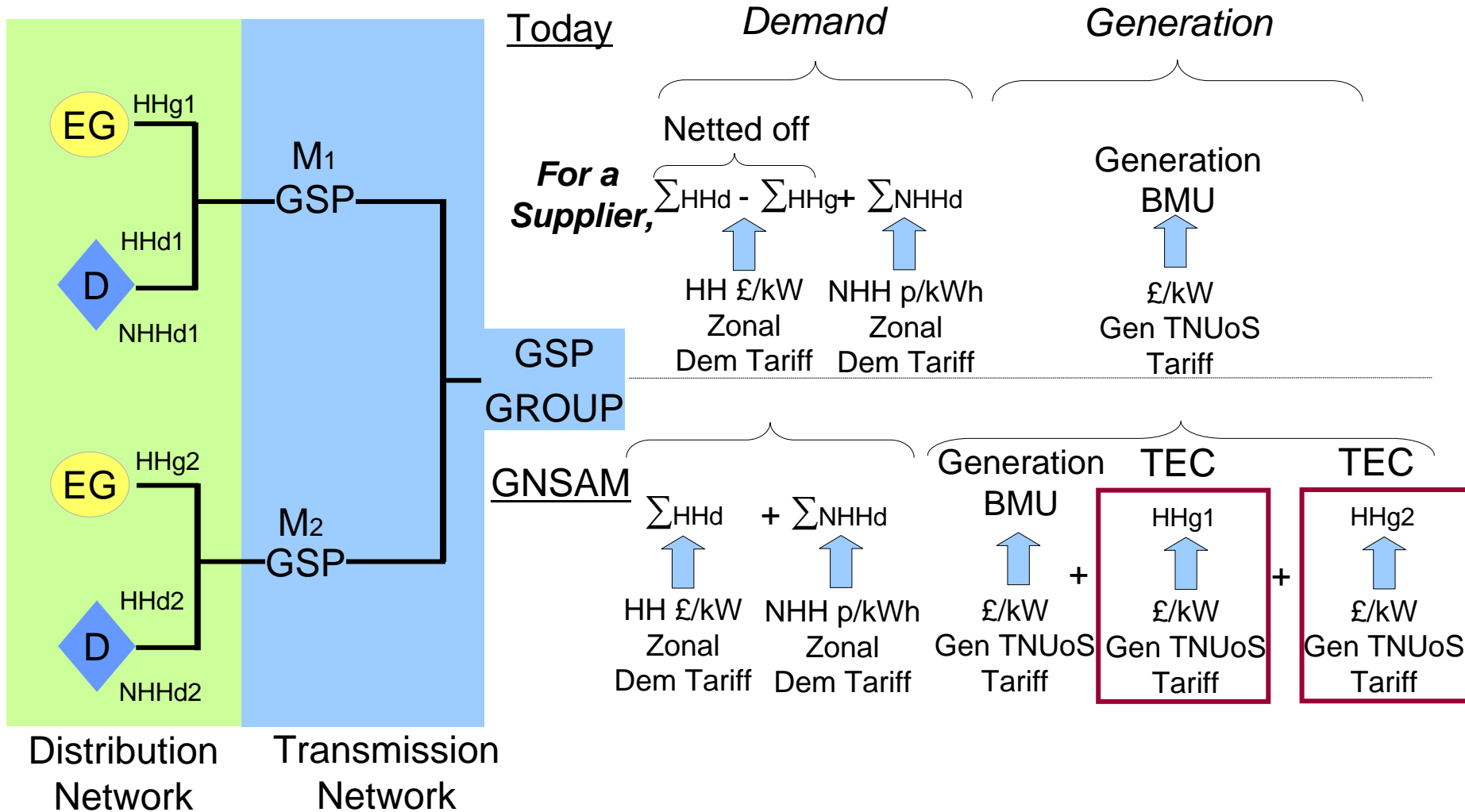
- ◆ Estimated benefit is actually nearer £7/kW (avoided gen connection costs and substation demand)
- ◆ National Grid is making transmission investments partly due to embedded generation
  - ◆ Need to justify investments - signals
- ◆ Different classes of generator are presently exposed to different transmission charges
  - ◆ No justification
  - ◆ Discriminatory and distorts competition in generation
- ◆ Embedded generators implicitly enjoy firm transmission access rights, though this is not enshrined in the CUSC
- ◆ If you were going to embed, then a generator is exposed to a differential relative to another embedded unit (the netted demand charge)
- ◆ If deciding whether to embed would see a benefit relative to directly connected – which does not reflect the cost, and so distorts effective competition
  - ◆ In an exporting area we need to invest, but arrangements ‘pay’ a unit to connect

# National Grid's Agency Model

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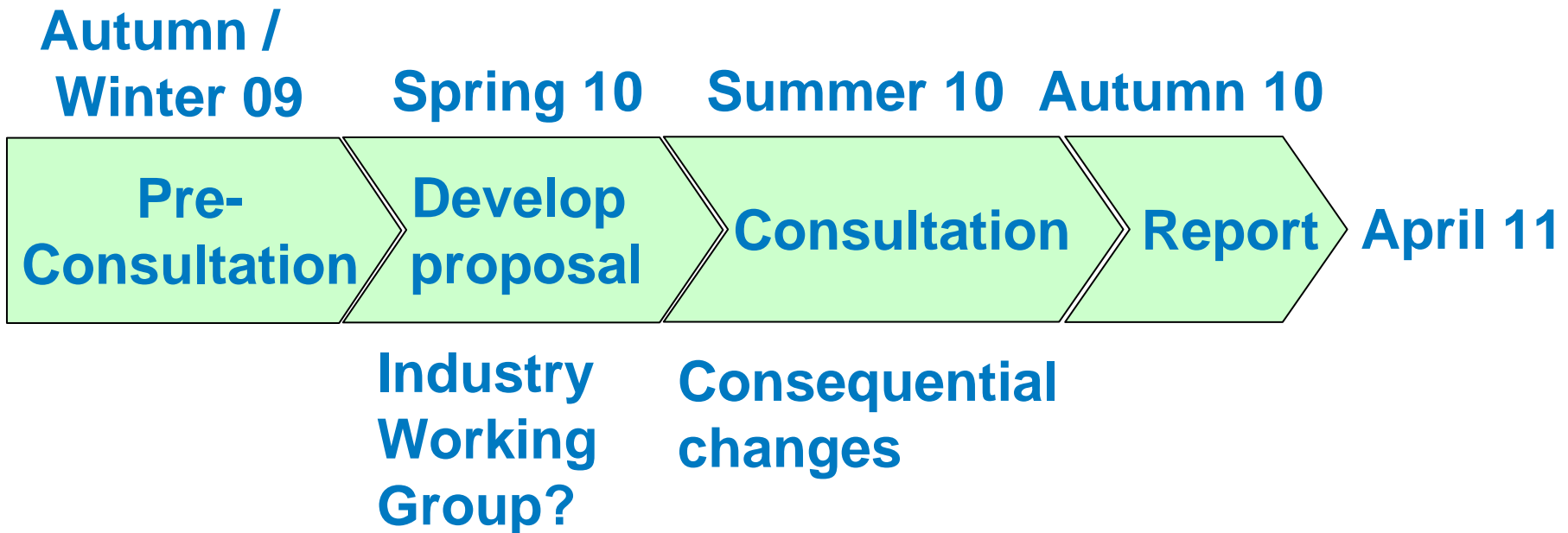
- ◆ Agent manages access rather than each individual embedded generator
- ◆ Agent manages portfolio within allocation of rights purchased
- ◆ Efficient for individual generators
  - ◆ Small gens don't need to sign CUSC

# Gross Nodal Supplier Agency Model (GNSAM)



# Next steps

- ◆ Consultation to be published exploring alternative models for embedded generation
  - ◆ Question the need for more fundamental exit reform?



# Background Information – The Charging Model

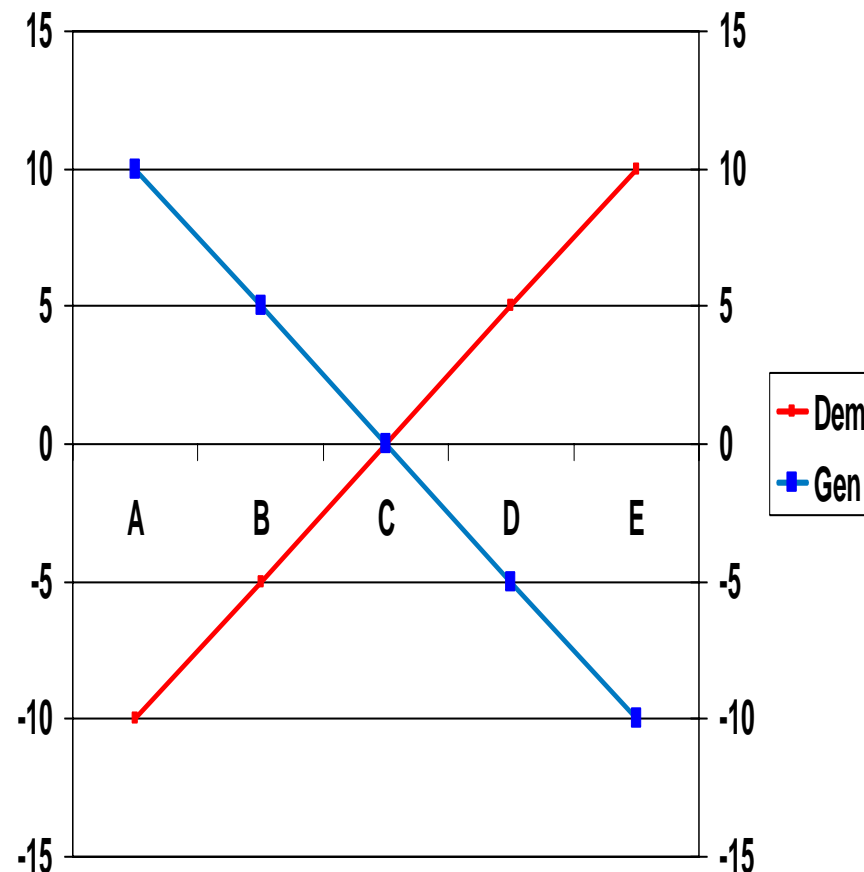
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## Explanation of Embedded benefit

# Example 1 (no residual)

## - Locational Charge only, equal and opposite

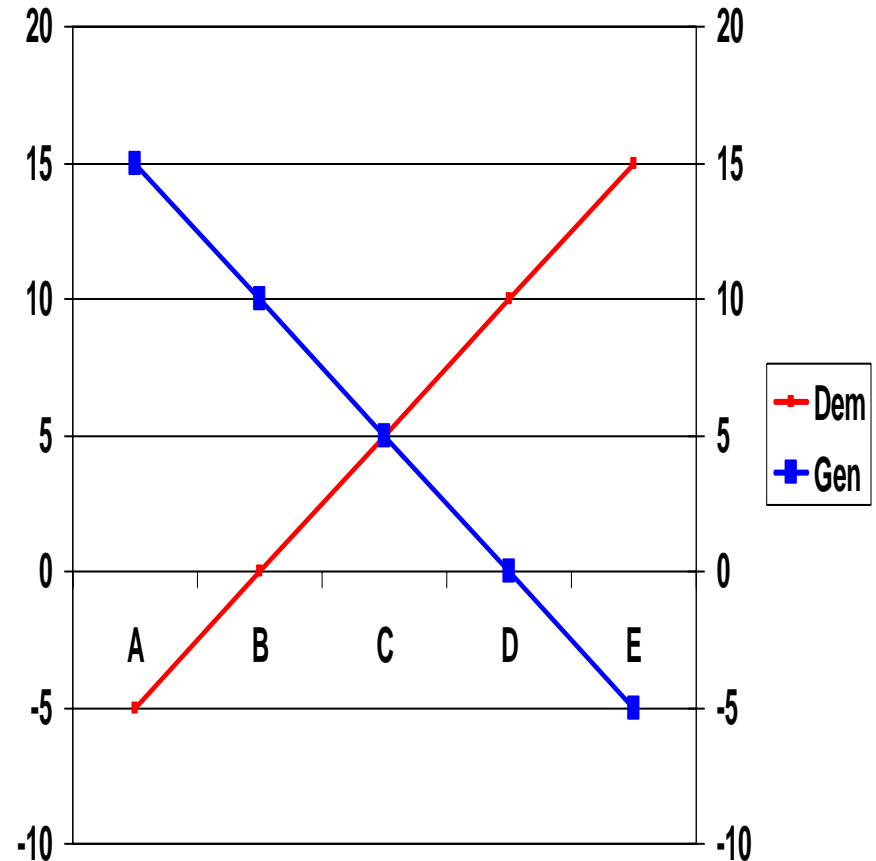
- ◆ Assumptions:
  - ◆ Ignoring residual
  - ◆ G/D split is 50/50
- ◆ Directly Connected Generator at B pays £5
- ◆ Demand at B gets paid £5
- ◆ EG at B would need to pay £5 (because treated as negative demand)
- ◆ 0 differential between generators at B
- ◆ 0 residual, Embedded benefit is 0
- ◆ **However, this recovers no money...**
  - ◆ locational signal only
  - ◆ need to consider residual charge



## Example 2 (with residual)

- Locational charge equal and opposite as in Ex.1

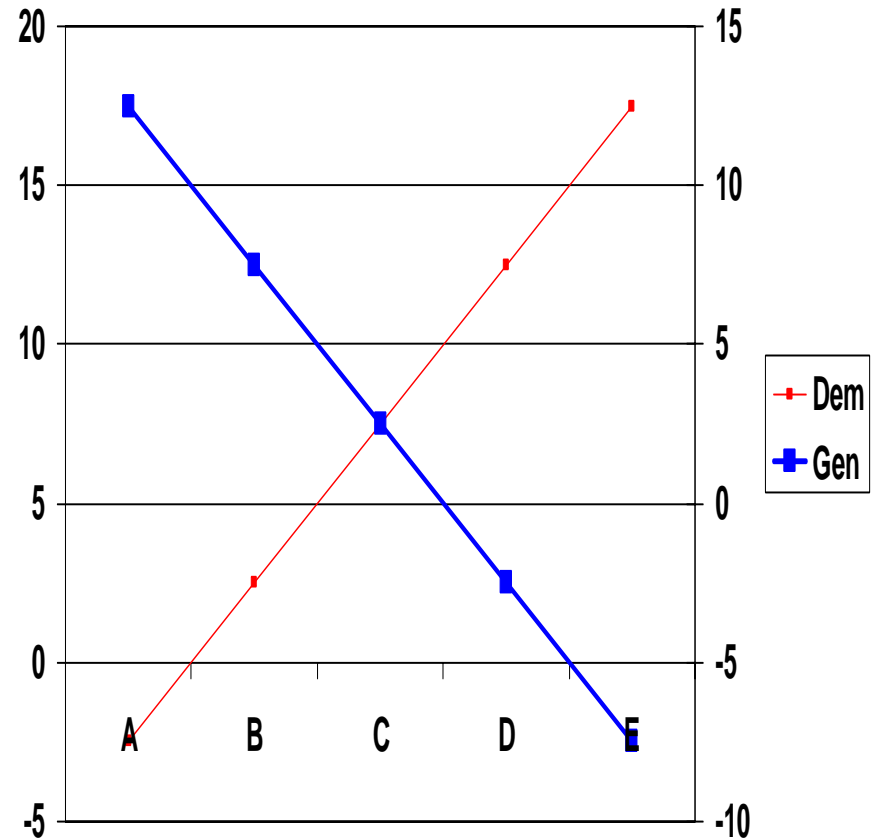
- ◆ Assumptions:
  - ◆ Residual of £5
  - ◆ G/D split is 50/50
- ◆ Directly Connected Gen at B pays £10
- ◆ Demand at B gets paid £0
- ◆ EG at B gets paid £0
- ◆ £10 differential between generators at B
- ◆ **EG benefit is £10**
  - ◆ 2 \* Residual
  - ◆ No rationale for the benefit
  - ◆ Not cost reflective
  - ◆ Does not facilitate competition



# Example 3

## - As example 2, but G/D Split 25/75

- ◆ Assumptions:
  - ◆ Residual £5
  - ◆ G/D split is 25/75
- ◆ **(Directly connected Generator tariff on 2<sup>nd</sup> Y-axis)**
- ◆ Gen at B pays £7.5
- ◆ Demand at B pays £2.5
- ◆ EG at B gets paid £2.5
- ◆ £10 differential between generators at B
- ◆ **EG benefit is £10**
  - ◆ Demand Residual + Generation Residual
  - ◆ No rationale
  - ◆ Not cost reflective
  - ◆ Does not facilitate competition



# Value of Embedded Benefit

## = Generation Residual + Demand Residual

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- ◆ L= Locational Charge
- ◆ Rg= Generation residual
- ◆ Rd = Demand residual
  
- ◆ Generation Charge =  $L + Rg$
- ◆ Demand Charge =  $-L + Rd$
- ◆ Embedded Charge =  $-D = L - Rd$
  
- ◆ Value of Embedded Benefit =  $G - EG$
- ◆ =  $(L + Rg) - (L - Rd)$
- ◆ =  $L + Rg - L + Rd$
- ◆ =  $Rg + Rd$

# Summary

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- ◆ Embedded benefit is:
  - ◆ Independent of G/D split
  - ◆ Independent of –ve demand charges (presuming that if we did have negative demand charges we would have a much wider charging base to avoid negative security affects)
  - ◆ Embedded benefit is the sum of G and D residual elements
  - ◆ Current value of embedded benefit is largely arbitrary i.e. linked to allowable revenue and not transport signal