Agenda

- 4) Overview of Transportation / Transcost Models
- 5) Capacity Initial Proposals
  - Input assumptions
  - Entry Capacity Baseline Reserve Price Analysis
- 6) Way Forward

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4) Overview of Transportation / Transcost Models

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Transcost

- Physical Model
- Incremental flows based on flow and pressure model (pan-handle)

- $P_1^2 - P_2^2 = klQ^2/D^5$
  - *where*
- P_1 ~ *inlet pressure*
- P_2 ~ *outlet pressure*
- Q ~ *flow*
- D ~ diameter
- K ~ constant

- Incremental costs based on minimum cost of pipe and/or compression required to maintain pressures
  - Additional compressor units added at existing sites
  - Additional pipe added in parallel to existing pipes
  - Incremental costs only

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Transportation model + Expansion Factor

- Transportation Model flows are calculated by minimising the total distance over which gas flows (flow-distance).
- Marginal flow increase results in a flow-distance change
  - Can be positive or negative
- An estimated cost (Expansion Factor) is applied to the marginal flow-distance (MWhkm).

$$\sum_{AllPipes} (Q * L)$$

- *Where*
- *Q = Pipe flow (peak-day MWh)*
- *L = pipe length (km)*

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S&D Data

- Transcost
  - Nodal Demands (GWh)
  - Nodal Supplies (GWh)
  - Supply node CVs
- Transportation Model
  - Nodal Demands (GWh)
  - Nodal Supplies (GWh)

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Network Data

- Transcost
  - Pipe length & diameter
  - Regulators including pressure & flow settings
  - Compressors including pressure settings
  - Configuration i.e. which side of a compressor or regulator a pipe section is fed from
- All these network parameters are set by a network analyst within each Gas Years base model and they can effect prices

- Transportation Models
  - Pipe Length

None of the network parameters that can be varied each Gas Year are modelled in the Transportation models.

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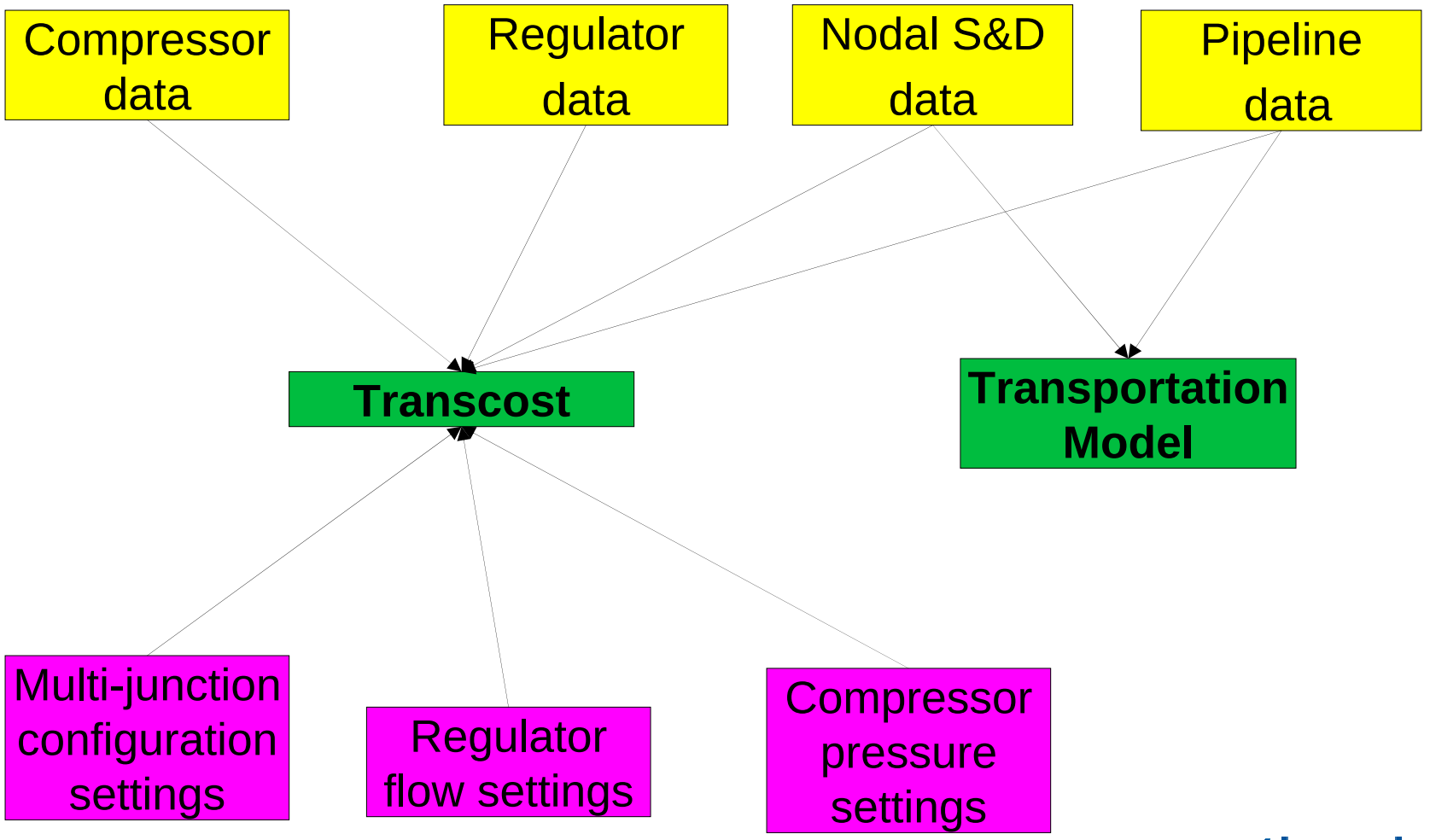
Summary of Input Data



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Incremental Cost Data

- Transcost
  - Incremental flow modelled
    - 2.834 Mscm/d
  - Every combination of entry and exit points modelled
  - Pressures maintained by identifying minimum additional pipe and compressor projects
  - Incremental cost = pipe + compression

- Transportation Model
  - Marginal flow modelled
    - 1kWh
  - Cost to reference node calculated
  - Marginal change to minimum flow-distance calculated
  - Incremental cost = marginal flow-distance multiplied by Expansion Factor

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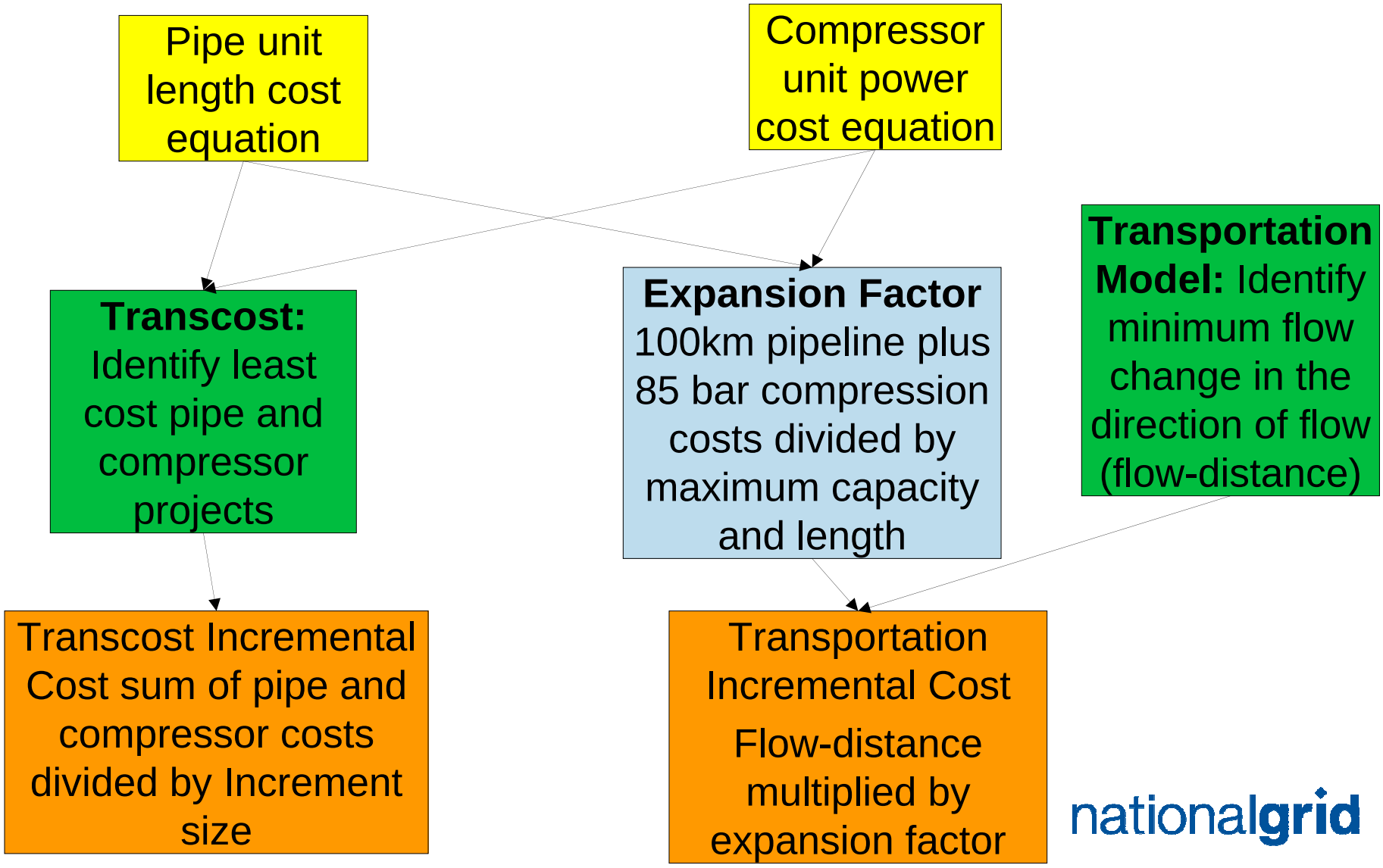
Incremental Costs



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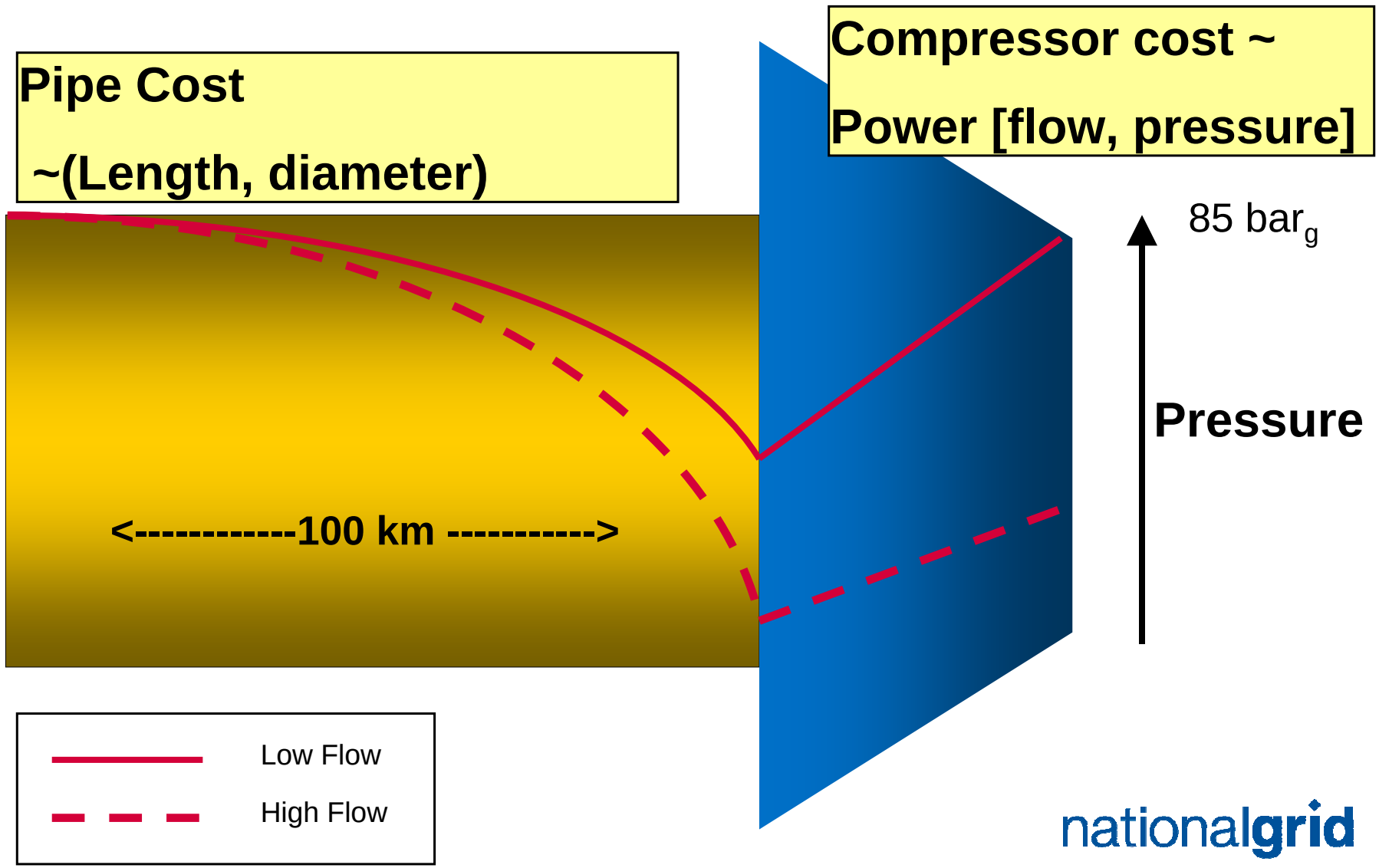
Incremental Costs



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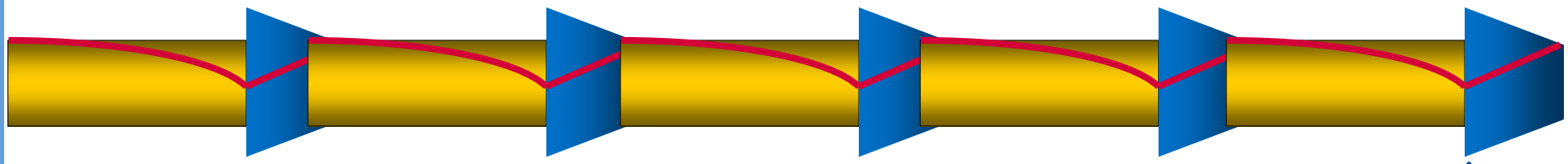
Expansion Factor

- A – Pipe Cost [£]
  - Calculated from pipe cost equation (£/km)
- B – Compressor Cost [£]
  - Calculated from compressor cost equation (£/MW)
- C – Project (15%) & Operational Costs (1.5%)[£]
- D – Capacity (Maximum at 85barg) [peak-d-GWh]
- E – Pipe Length 100 km
- Expansion Factor= ((A+B+C)/D)/E [£/pk-d-GWhkm]



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Model Summary

- **Transcost**
  - Physical model of system flows and pressures hence costs are driven by
    - Network assets
    - Changes in S&D
    - Compressor and regulator settings
    - Network configuration
  - Cost are based on additional assets but incremental flows may not require reinforcement hence
    - Spare capacity is included
    - Cost are always greater or equal to zero

- **Transportation Model**
  - Flow model based on minimum flow distance hence costs are driven by
    - Pipe lengths
    - Changes in S&D
  - Incremental flows will always result in the flow distance increasing or decreasing hence
    - No spare capacity is modelled
    - Backhaul cost benefits are modelled

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6) Entry & Exit Capacity Initial Proposals

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Transport Methodology (Transitional Exit)

Issue	Prevailing Exit Arrangements	Working Group Consensus	Initial Proposals
1. S&D Scenarios: 1 Year or multiple Year?	10 Gas Years	Less than ten Gas Years to remove forecasting uncertainty & increase simplicity	**Single Gas Year** **Network model and S&D data for gas year**
2. How should incremental costs be modelled?	Transcost	No opinion, although inclusion of spare capacity would indicate Transcost	**Transportation Model with single expansion factor**
3. How would spare capacity be treated?	Included (although "held pressures" remove some capacity)	Include "genuine spare capacity" within the Model	**Excluded from model**
4. How would decrement (back flow) costs be treated?	No backhaul cost benefit included	Include within Model	**Include within model**

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Tariff Methodology (Transitional Exit)

Issue	Prevailing Exit Arrangements	Working Group Consensus	Initial Proposals
5. How should entry and exit costs be disaggregated?	Solver with non-negative constraint	Solver with 50: 50 constraint	**Reference node**
6. How should negative costs be treated?	Removed by solver	Removed as final step	**Removed as part of final step (revenue recovery)**
7. Should capacity charges (LRMCs) be adjusted to 50:50 entry:exit and if so how?	LRMCs are not adjusted	Yes - Solver constraint	**Adjust to 50 50.**
8. Are zones required?	Exit Capacit charges are zonal	Only if capacity is a zone based product	**Transitional exit is Zonal**
9. Are capacity charges adjusted to recover allowed revenue and if so how?	Prices scaled to recover 50% of allowed revenue.	Where possible by adjustment, otherwise recovery via commodity based charges	**Prices adjusted to recover 50% of allowed revenue.**
10. Should year on year price changes be capped?	LRMCs are capped relative to the previous Gas Year (+/-30%)	Retain: Potential to remove year-on-year capping but have capping based on forecast prices	**No capping**

NTS Exit Capacity Charging Implementation

- Initial Proposals
  - Implementation for 1st April 2007
    - Methodology change need to be implemented December 2006 to allow updated charges for use from 1st April 2007.
  - Prices would normally be updated annually for 1st October
  - The combined Transport and Tariff model would be made available to Users once S&D data could be made available (This may require a UNC Modification)

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Transport Methodology (Entry)

Issue	Prevailing Entry Arrangements	Initial Proposals
1. S&D Scenarios: 1 Year or multiple Year?	10 Gas Years	**Single Gas Year** **Capacity priced on Network model and S&D data for relevant Gas Year** **Relevant Entry point at;** **baseline/obligated level** **and** **baseline/obligated + incremental levels**
2. How should incremental costs be modelled?	Transcost + Falcon	**Transportation Model with single expansion factor**
3. How would spare capacity be treated?	Included (although "held pressures" remove some capacity)	**Excluded from model**
4. How would decrement (back flow) costs be treated?	No backhaul cost benefit included	**Include within model**

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Tariff Methodology (Entry)

Issue	Prevailing Entry Arrangements	Initial Proposals
5. How should entry and exit costs be disaggregated?	Solver with non-negative constraint (Reference node for falcon analysis)	**Reference node**
6. How should negative costs be treated?	Removed by solver	**Removed as part of final step (50 50 adjustment)**
7. Should capacity charges (LRMCs) be adjusted to 50:50 entry:exit and if so how?	LRMCs are not adjusted	**Adjust to 50 50.**
8. Are zones required?	No	**No**
9. Are capacity charges adjusted to recover allowed revenue and if so how?	No	**No**
10. Should year on year price changes be capped?	Reserve prices are based on UCAs	**No capping** **De-link UCAs** **Remove auction discounts**

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NTS Entry Capacity Charging Implementation

- Initial Proposals
  - Implementation for 1st April 2007 – revised reserve prices would apply for all auctions held on or after 1st April 2007
  - Prices would normally be updated annually for October
  - The combined Transport and Tariff model would be made available to Users once S&D data could be made available (This may require a UNC Modification)

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Assumptions

	Network	Supply & Demand
Entry	❑ Network for relevant Gas Year including all future planned / committed projects up to that Gas Year o Gas Year 0 o Gas Year 1 o Gas Year 2	❑ Base Case for Gas Year ❑ Separate analysis for each terminal and Gas Year: o relevant terminal increased to baseline flow o Supply substitution used to balance S&D
Exit	❑ Network for relevant Gas Year including all future planned / committed projects up to that Gas Year	❑ Base Case forecast for Gas Year

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LONG TERM (LTSEC) AUCTION	ANNUAL (AMSEC) AUCTION	ROLLING MONTHLY (RMSEC) AUCTION	DAILY (DSEC/DISEC) AUCTION
QUARTELY CAPACITY	***MONTHLY CAPACITY***	***MONTHLY CAPACITY***	***DAILY/DAILY INT. CAPACITY***
•Gas Year N+2 •Baseline •Incremental	•Gas Year N •(April to Sept) •Gas Year N+1 •(Oct to Sept) •Gas Year N+2 •(Oct to Mar)	•Gas Year N	•**Daily Firm** •Gas Year N •**Daily Interruptible** •Pay as bid (zero reserve)
Capacity Years 2 to 17 Ahead	Capacity Years 1 & 2 Ahead	Month Ahead	Gas Day and Day Ahead

GAS DAY (D)

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Price Setting Timeline & Input Data

- Input data from 1st April '07
  - Gas Year 2006/7
    - NTS Exit
    - DSEC
- Input data @1st Sept '07
  - Gas Year 2006/7
    - NTS Exit
    - DSEC
  - Gas Year 2007/8
    - RMSEC
  - Gas Year 2009/10
    - LTSEC (First six months)
  - Gas Year 20010/11
    - LTSEC
- Input data @1st Oct '07
  - Gas Year 2007/8
    - NTS Exit
    - DSEC, RMSEC
- Input data @1st Feb '08
  - Gas Year 2007/8
    - NTS Exit
    - DSEC, RMSEC
    - AMSEC (First 6 months)
  - Gas Year 2008/9
    - AMSEC (Middle 12 Months)
  - Gas Year 2009/10
    - AMSEC (Last 6 months)

NB Slide corrected post meeting

NB Gas Year is Oct to Sept whereas Capacity Year is April to March hence multiple prices within a Capacity year.

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Entry Capacity Baseline Reserve Price Analysis

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Aims

- To summarise the analysis undertaken with the Transportation Model to provide indicative baseline reserve prices

- To compare these prices with prices based on the current methodology (UCA based prices)

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Key assumptions

- Three gas years considered: 2006/7, 2007/8, 2008/9
- 1 in 20 Peak Supply/Demand Scenario
  - Price at max physical baseline*/permanent obligated capacity level
  - Use supply merit order to balance supply with demand, using central case flows as a starting point
  - Consider each entry point separately
- Network Model
  - Include only approved investment projects completed before gas year under consideration
- Where no baseline or obligated level, set zero reserve price (consistent with current methodology)

**as determined by current Licence*

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Initial Thoughts: Entry Capacity Baseline Reserve Price

TPCR	Decouple Entry Capacity Baseline Reserve Prices and Licence UCAs	
Charging Principles	**LRMC-based price**	◆ Single year costs ◆ Peak central case supply/demand scenario adjusted for **practical max physical baseline capacity level for each entry point** (i.e. 20 entry points = 20 LRMC analyses) ◆ Networks as planned for relevant years (sanctioned projects) ◆ Adjusted for 50:50 Entry:Exit split ◆ Non-negative nodal price for each entry point ◆ TO Commodity Charge for under/over-recovery
LTSEC (Firm)	**Single price for all years**	◆ Network and adjusted peak supply/demand scenarios for Y+2
AMSEC (Firm)	**Price for each year**	◆ Network and adjusted peak supply/demand scenarios for Y+1 and Y+2
RMSEC (Firm) **DSEC (Firm)**	**Price within year**	◆ Network and adjusted peak supply/demand scenarios for Y

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Results Summary

Compare prices from current methodology…

- Ofgem proposed 2008/9 UCAs converted to prices
- LTSEC/MSEC Reserve Price for 2006/7 auctions

…with

- Indicative prices using central case flows with adjustments for baseline/obligated levels as for proposed methodology
- Illustrative prices using central case flows

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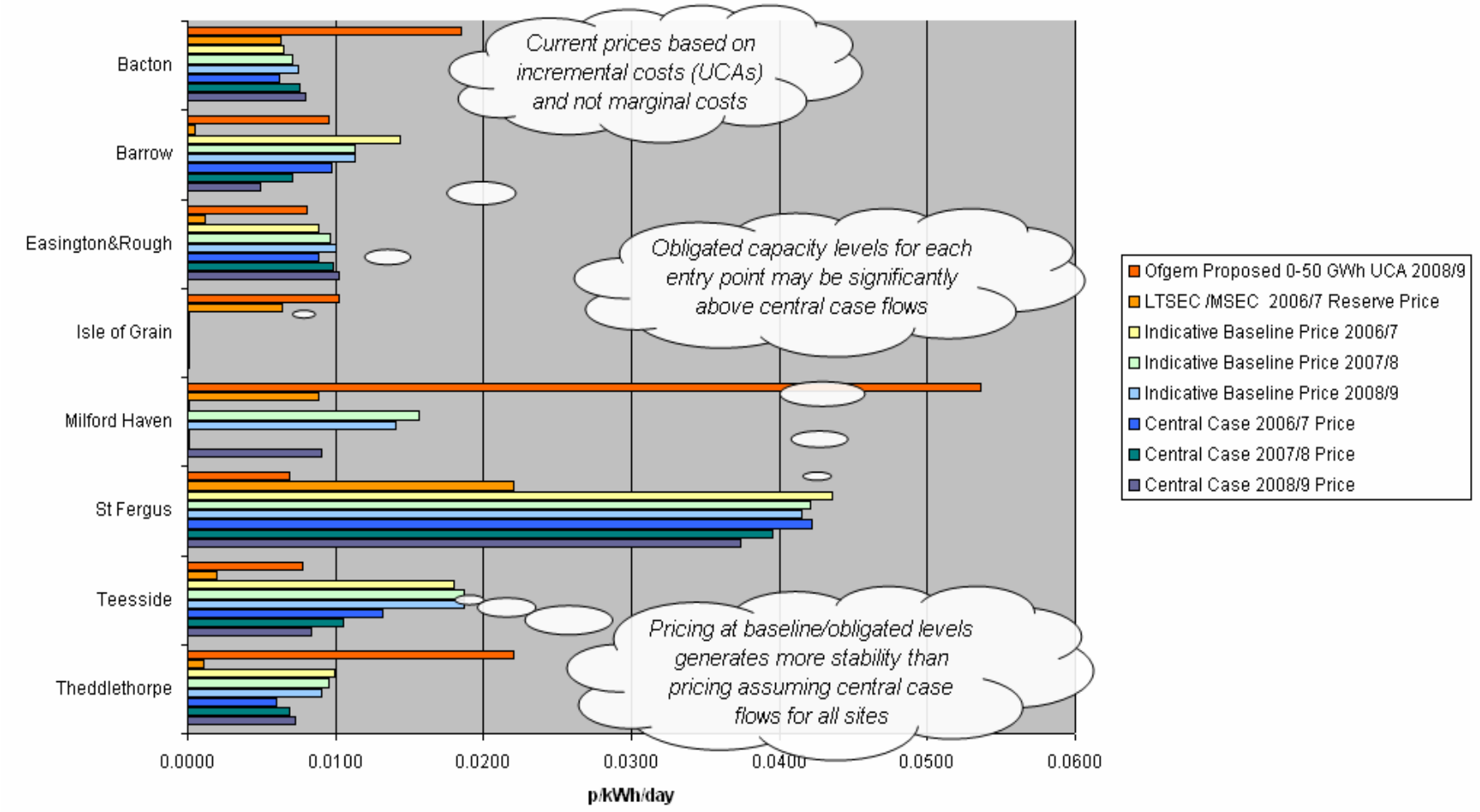
Larger Entry Points: Indicative Prices



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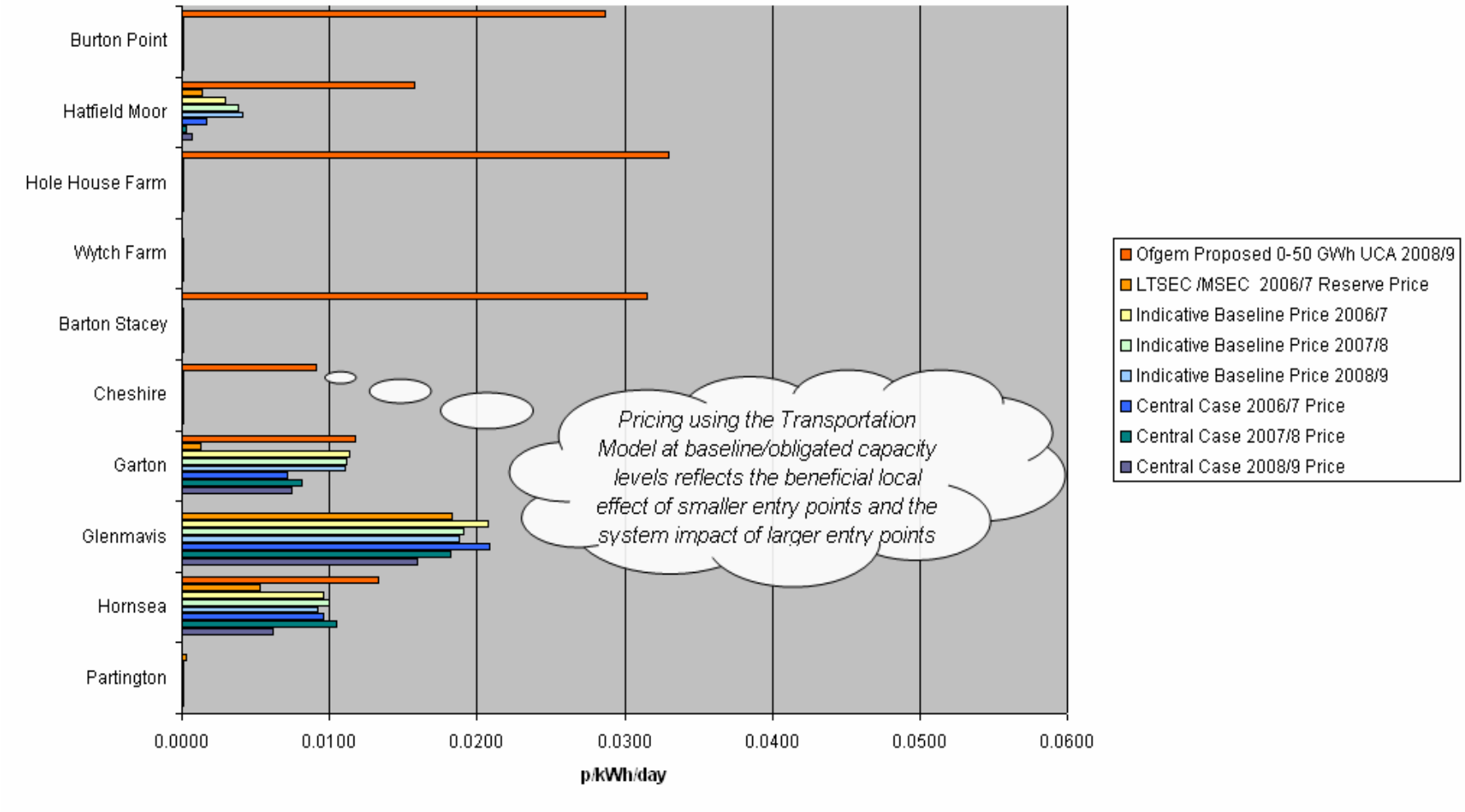
Smaller Entry Points: Indicative Prices



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Summary

- Current UCAs
  - Are intended as incremental revenue drivers
  - No longer reflect latest underlying marginal costs of capacity provision
- Prices based on Ofgem's proposed UCAs may be significantly different from current prices especially at smaller entry points
- Prices reflecting entry baseline capacity levels can be higher than those based on central case flows, but in general
  - Are more stable
  - Reflect beneficial local flows from smaller entry points and system wide impact of larger entry points
  - Are more consistent with Transporter's obligations for baseline and incremental entry capacity release

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7) Way Forward - Capacity

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Way Forward – Capacity Charges

- Produce a Gas TCMF progress report on model options and analysis undertaken to date (JULY).
- Produce a consolidated charging consultation paper on entry and exit capacity charges for use from 1st April 2007 (AUGUST).
- Support consultation paper by a new version of the charging methodology statement to ensure clarity of our proposals (AUGUST).
- Progress issues associated with publishing S&D data (AUGUST/SEPTEMBER)

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