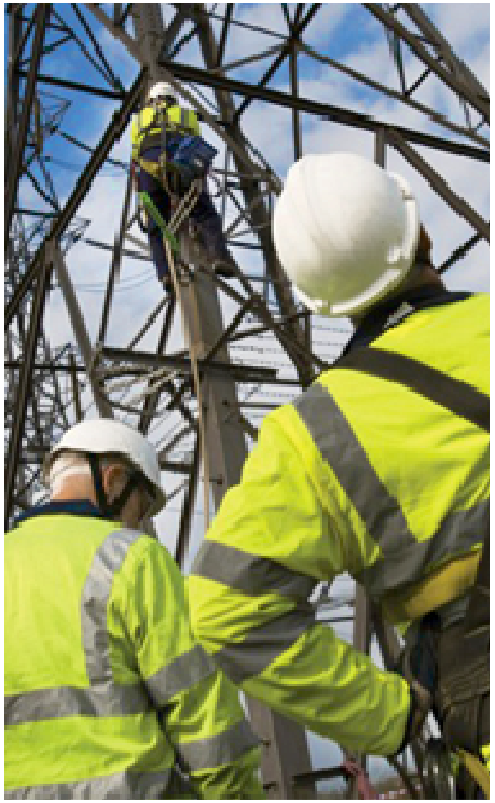
# Exit Capacity Substitution and Revision

Workshop 4:  25th May 2010

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# Agenda

- Address actions from workshop 3.

- Substitution examples
  - DN baseline re-jig
  - Large DC incremental loads

- Review timeline
  - Informal consultation
  - Next workshop

# Action: European Legislation.

## Action 11: Monitor European Legislation for potential impact on exit substitution proposals.

- Key obligations are set in Article 16 of Regulation (EC) 715/2009 on conditions for access to transmission networks.
- Applicable to interconnector points
- Should be effective March 2011
- Guidelines and codes being developed to implement these regs.

# Action: European Legislation.

Maximum capacity….shall be made available….taking into account system integrity and efficient network operation.

TSO to implement transparent non-discriminatory capacity allocation mechanisms, which shall provide economic signals for efficient and maximum use of technical capability.

Constraint Management Principles:

- Aim to maximise capacity availability
- Aim for consistent constraint actions available.

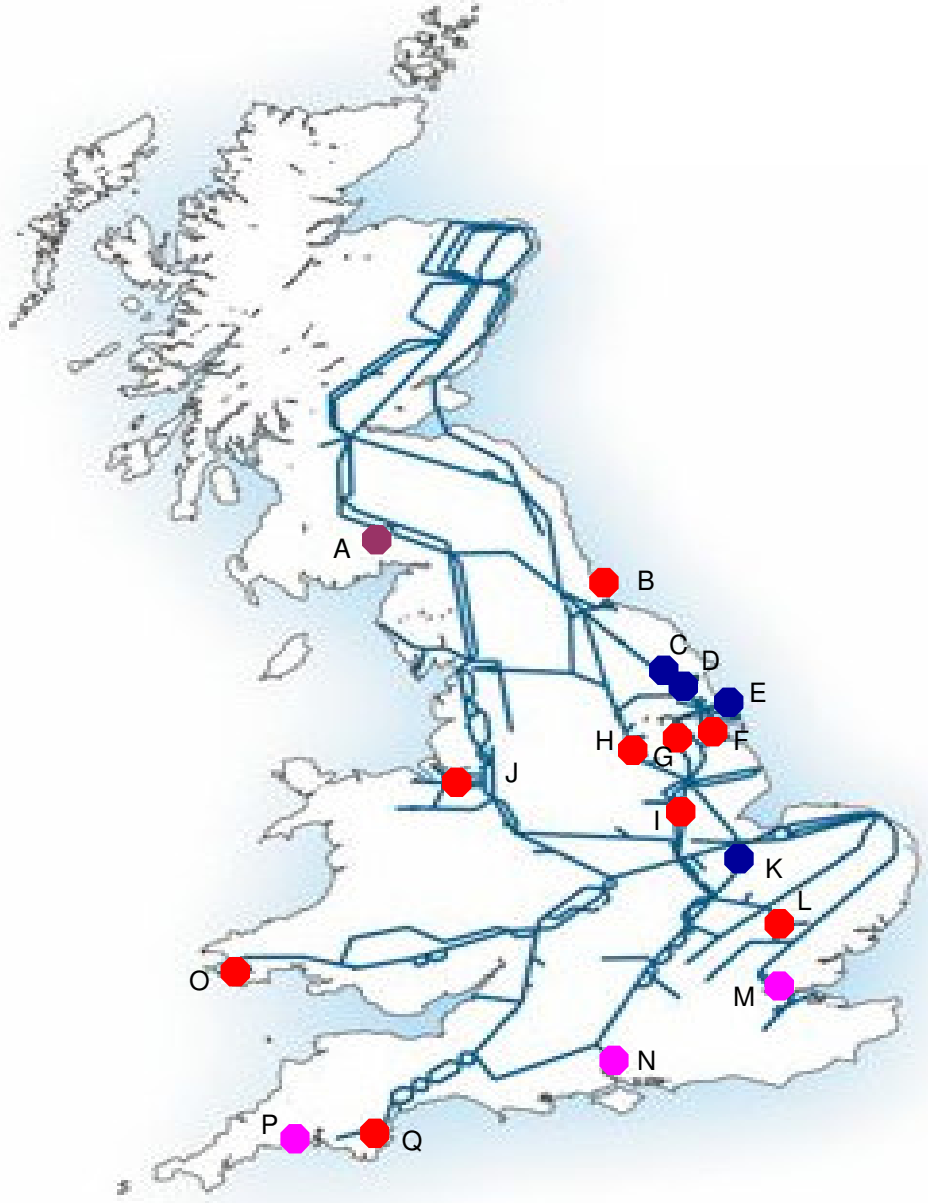
National Grid in not aware of any developments that would result in exit capacity substitution being in conflict with these regulations.

- Maximum capacity is made available: baseline plus incremental
- Incremental capacity is subject to User commitment
- Substitution maximises use of system capability in most efficient (zero cost) manner and within system limits.

# Action: “Spare” Capacity.

- Action 16: National Grid to record the actual incremental quantities against the location. This information to be published.
- This information can be found on the National Grid website.
- See next slides.

# Incremental Capacity released in July 2009




- Inter-connector - no revenue driver
- Storage – no revenue driver
- Power station / industrial – no revenue driver
- Power station with revenue driver

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# Incremental Capacity released in July 2009

| Map location | Exit Point | Incremental capacity kWh/day | Revenue Driver |
|---|---|---|---|
| A | Moffat | 95,078,028 | No |
| B | Teesside Hydrogen | 28,400 | No |
| C | Hornsea | 22,359,585 | No |
| D | Garton (Aldbrough) | 114,500,000 | No |
| E | Rough | 210,479,121 | No |
| F | Stallingborough | 1,512,169 | No |
| G | Thornton Curtis (Killingholme + Humber Refinery) | 29,890,000 | No |
| H | Blyborough (Cottam) | 1,760,000 | No |
| I | Staythorpe | 5,760,000 | No |
| J | Weston Point (Rocksavage) | 2,650,000 | No |
| K | Caythorpe | 75,000,000 | No |
| L | Epping Green (Enfield Energy) | 1,190,000 | No |
| M | Stanford-le-Hope (Coryton) | 1,990,000 | Yes |
| N | Marchwood | 39,840,000 | Yes |
| O | Upper Neeston (Milford Haven) | 7,180,000 | No |
| P | Langage | 40,004,000 | Yes |
| Q | Centraxx Industrial | 85,000 | No |

# Action: Investment

- Action 17: National Grid NTS to investigate whether additional investment information for specific projects could be obtained from revenue driver submissions
- National Grid does not publish external financial data on projects and would not want to show any project specific breakdowns.
  - e.g. such information has been excluded from Ofgem consultations for exit revenue drivers at Abernedd, Barking, Coryton and Gilwern.

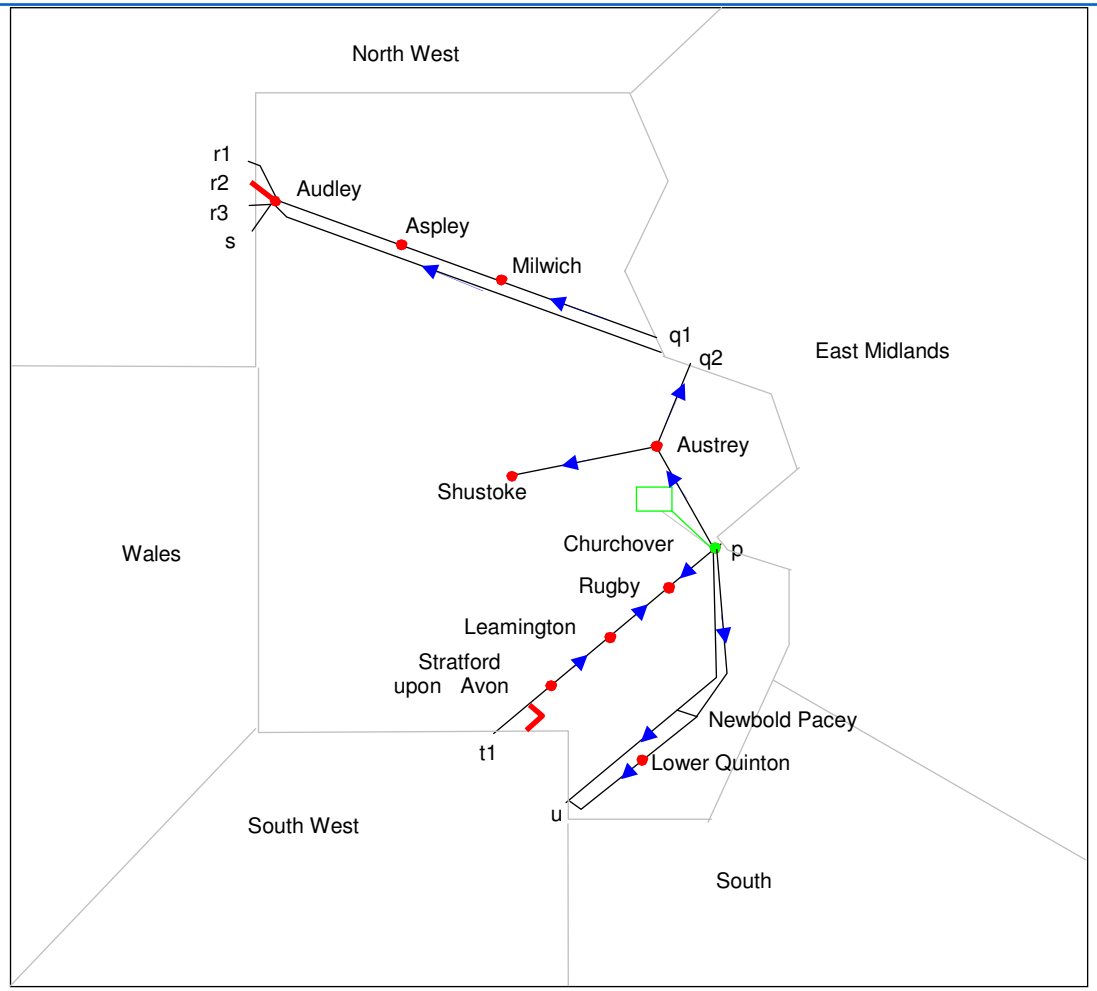
# Action: Revenue Driver

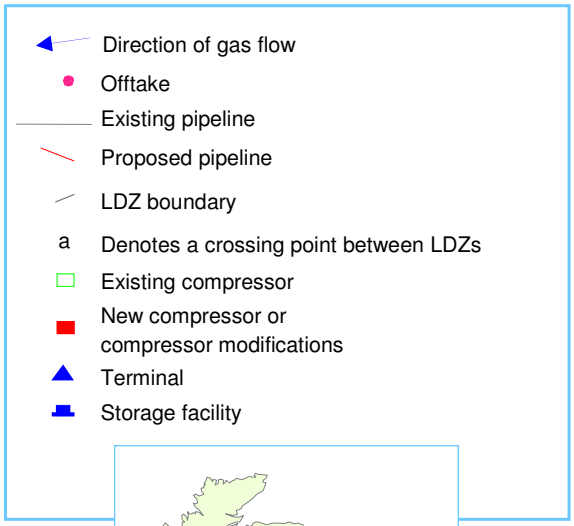
- Action 18: Transmission workstream minutes to be checked to clarify previous statements on the requirement for revenue drivers for the 2009 baseline re-jig.
- May 2009 Transmission Workstream minutes checked.
  - **"National Grid NTS intention was to use the existing capability of the system wherever possible rather than seeking revenue drivers"**
  - "Ofgem said that any **incremental capacity was not funded through the price control**. MW argued that it was never envisaged that National Grid NTS might be asking for 80 or more revenue drivers as part of the first annual invitation. **By not asking for revenue drivers, National Grid NTS's potential revenue would be reduced"**
- This is consistent with NG statements at workshop 3, that revenue drivers would not be sought if existing capability (or substitution) is used.

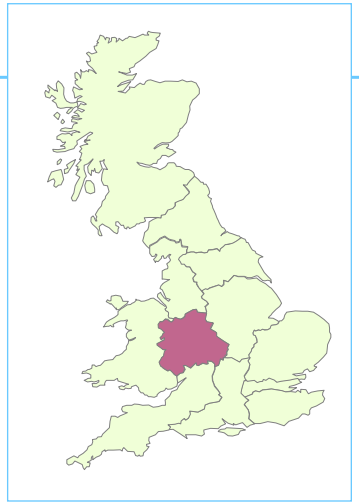
# Action: Donor Exit Point

- Action 20: National Grid to consider whether donor exit point selection order could be represented diagrammatically in the methodology statement.
- Schematic diagrams of LDZs from 10 Year Statement can be used with flow direction added. Flow direction is taken from charging model and is correct for that network and supply / demand scenario only.

# West Midlands (WM) – NTS



Note: Direction of gas flow in the NTS is determined from the gas charging model based on 2013/14 network. Substitution analysis may be undertaken for a range of supply/demand scenarios which could result in different flow patterns. The above diagram is not definitive and should be used for indicative guidance only.



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# Action: Baseline Reductions

- Action 21: National Grid NTS to review and clarify the possibility of exit capacity revision resulting in baseline reductions.

From workshop 2

- Exit capacity revision means to "revise the level of NTS baseline exit flat capacity …… in the event that the release of incremental obligated entry capacity changes the availability of NTS exit capacity"
- Incremental obligated entry capacity can be
  - "funded" – i.e. generally met through investment.
  - "non-incremental obligated" – i.e. substituted.
    - If entry capacity is substituted to an ASEP additional exit capacity could be made available in the location of the recipient ASEP at the expense of exit capacity in the location of the donor ASEP. Hence baselines may be increased or **decreased**.
- National Grid is currently considering proposing to apply exit capacity revision only in respect of "funded" entry capacity: so decreases will not be possible.

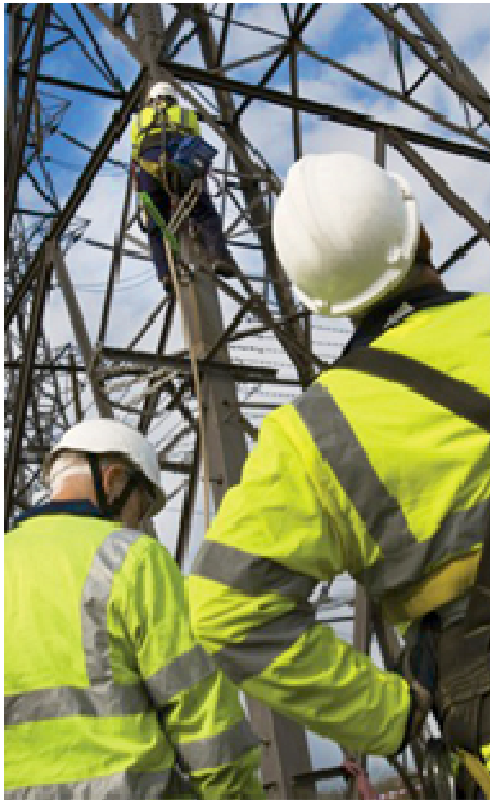
# Actions

- Action 19: Ofgem to monitor whether a licence change is required to clarify the scope for veto of exit substitution proposals.

- Action 22: National Grid to check if investment cost savings can be provided with examples at workshop 4.
  - Included in main presentation.

# Exit Capacity Substitution

## Examples

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# Detailed Examples of Exit Capacity Substitution

- DN load increase triggering substitution
  - Specific example / analysis not provided, but
  - Analysis of 2009 DN baseline re-jig.
- New large power station loads in Grain area and in the vicinity of Easington.
  - Grain: Two scenarios, uncertain / certain entry flows.
  - Easington: Sufficient quantity of certain entry flows.

# DN Baseline Re-jig 2009

- Key points from the re-jig.
  - Anticipated need for incremental signal of 576 GWh/Day at DN Offtakes with 80 revenue drivers needed.
  - But industry knew that demand (if not baseline capacity) would reduce elsewhere to compensate.
  - The re-jig was undertaken to avoid the need for inefficient investment and revenue drivers.
- Principles
  - Re-jig should result in no overall increase in LDZ baseline.
  - Re-jigs limited to within LDZ
    - Increased & decreased exit points should be located on the same feeder or supplied from a common source where possible.
  - A 1:1 capacity exchange was assumed.
- No information was provided on cost savings through the re-jig because investment / revenue drivers were not needed.

# DN Baseline Re-jig 2009

- Process
  - Identify exit points where the initialised values were capped at the original baseline level;
    - i.e. original baseline is below the 2011 / 2012 OCS value.
  - Increase baselines to 2011 / 2012 OCS levels
    - Re-jig was based on assumption that capacity applications would be consistent with previous OCS submissions.
  - Find where original baselines exceed initialised values and decrease.
  - Process halted where no further exit points to increase or no available capacity to decrease.
    - If insufficient donor capacity, increase baseline at the location of the biggest potential increase.

| LDZ | Baseline increased. No. sites. | Baseline decreased. No. sites | Capacity moved. GWh/Day | Increments > 100k, based on actual July applications | | Comment |
|---|---|---|---|---|---|---|
| | | | | And pre-re-jig baselines | And post-re-jig baselines | |
| **Total** | 33 | 29 | 432 | 41 | 20 | Re-jigged quantity ~76% of expected incremental signal. |

# DN Baseline Re-jig 2009: Summary

| LDZ | Baseline increased. No. sites. | Baseline decreased. No. sites | Capacity moved. GWh/Day | Increments > 100k, based on actual July applications | |
|---|---|---|---|---|---|
| | | | | And pre-re-jig baselines | And post-re-jig baselines |
| **NW** | 5 | 3 | 39 | 5 (All b/ls increased) | 0 |
| **EM** | 5 | 4 | 62 | 4 (All b/ls increased) | 0 |
| **WM** | 2 | 1 | 2 | 2 (Both b/ls increased) | 0 |
| **EA** | 4 | 1 | 20 | 3 (All b/ls increased) | 0 |
| **NT** | 1 | 1 | 200 | 1 | 0 |
| **NO** | 5 | 3 | 9 | 4 (All b/ls increased) | 1 (B/l increased) |
| **NE** | 2 | 1 | 0.4 | 1 (B/l not re-jigged). | 1 |
| **WN** | N/A | N/A | 0 | 0 | 0 |

# DN Baseline Re-jig 2009: Summary

| LDZ | Baseline increased. No. sites. | Baseline decreased. No. sites | Capacity moved. GWh/Day | Increments > 100k, based on actual July applications | |
|---|---|---|---|---|---|
| | | | | And pre-re-jig baselines | And post-re-jig baselines |
| **WS** | 1 | 2 | 6 | 1 (b/l increased). | 1 (Revenue driver sought). |
| **SC** | 2 | 4 | 24 | 13 (b/l increase: one site, decrease: two sites) | 13 |
| **SE** | 0 | 0 | 0 | 1 | 1 |
| **SO** | 1 | 1 | 8 | 4 (b/l increase: one site) | 3 |
| **SW** | 5 | 8 | 62 | 2 (Both b/ls increased) | 0 |

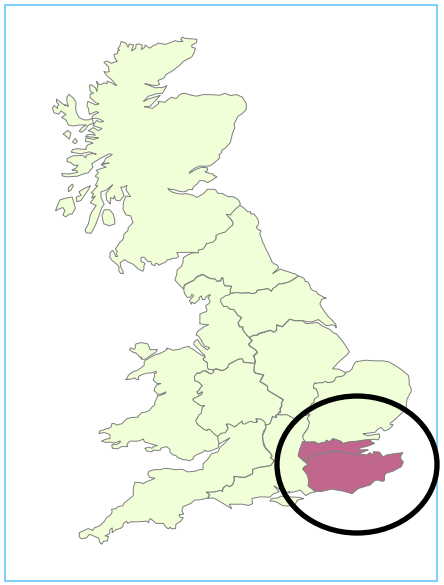
# Incremental Capacity in the South East (System Extremity)

**This example** considers a new Power Station connecting to the NTS at a new exit point near to the south east extremity of the system.

Exit point established in the Licence with baseline of 0 GWh/d

An NTS Exit (Flat) Capacity request is signalled during the July Application Window for 50GWh/d (4.6168mscm/d) from October 2013.

The capacity is released in accordance with UNC and National Grid's Exit Capacity Release methodology statement.



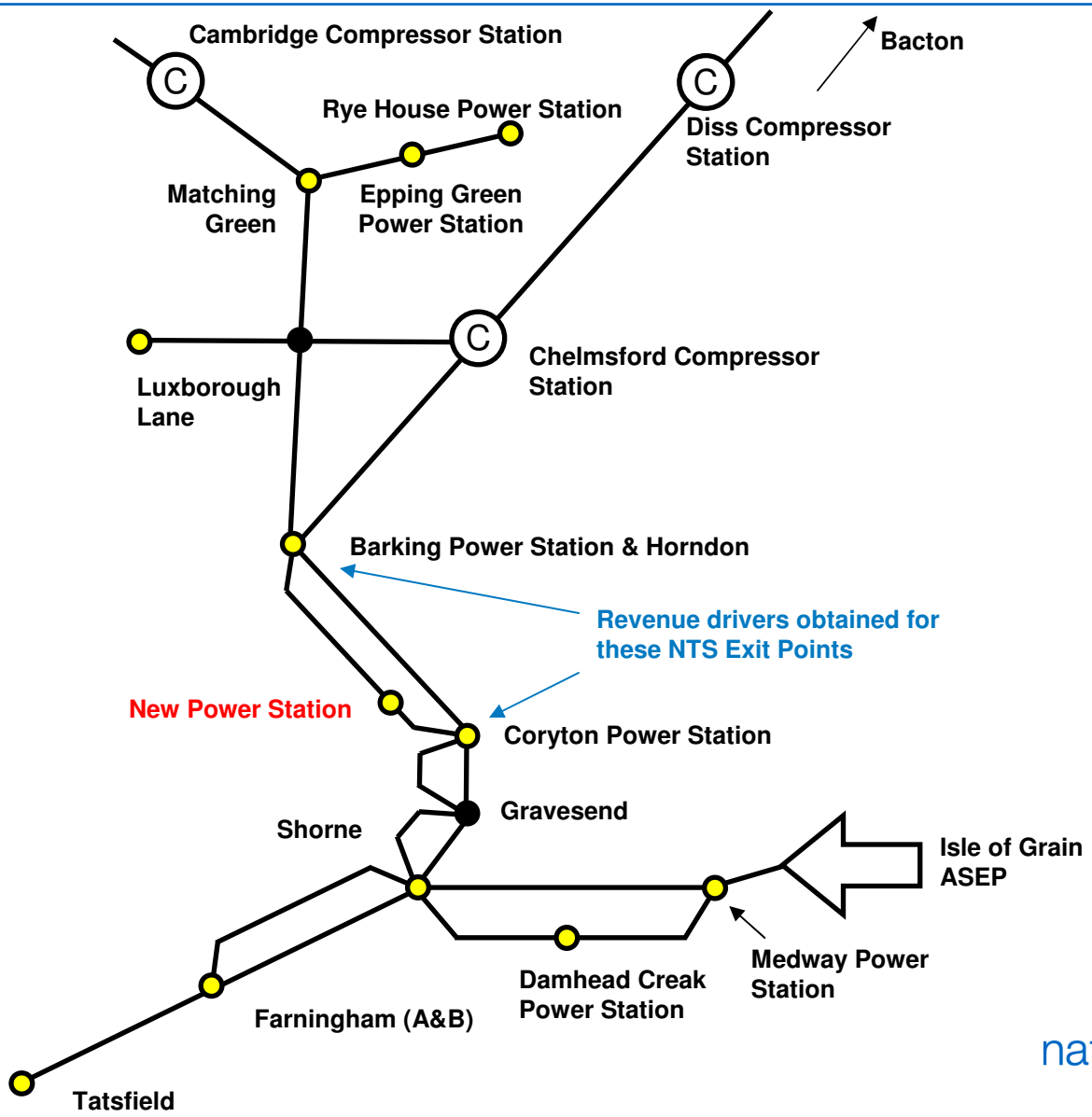
**Basis of substitution analysis.**

- Gas Year – 2013/14.
- Consistent with Transmission Planning Code and assumptions therein.
- Consistent with analysis undertaken for Coryton and Barking revenue driver consultations.
- Offtake rates set at obligated levels for exit points in South East area.
  - Baselines plus any incremental capacity released.
  - Allocated levels of NTS Exit (Flexibility) Capacity assumed at all DN exit points.
- Supplies set at TBE forecasts with balancing at least interactive ASEPs.
  - Profiled Entry Flows not assumed i.e. 1/24th rate.

# Incremental Capacity in the South East (System Extremity)

- National Grid uses supply scenarios to assess changes to exit capacity levels.
- These scenarios focus on localised supply sensitivities and conditions that are known to exist on the NTS. For example, supply scenarios may be developed to explore the conditions on a part of the network when:
  - a) Gas flows are assumed, or
  - b) Gas flows are uncertain and cannot be assumed to be present.
- In the case of the South East, National Grid considers scenarios centered around levels of Isle of Grain flow.
  - Bacton flows have an impact on the SE, albeit to a lesser extent, so any supply balancing is undertaken at remote Northern ASEPs.
- This South East example considers two Isle of Grain flow scenarios.

# Incremental Capacity in the South East (System Extremity)



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# Example a) – Incremental Capacity in the South East (System Extremity)

**High levels of entry flow at Isle of Grain assumed*.**

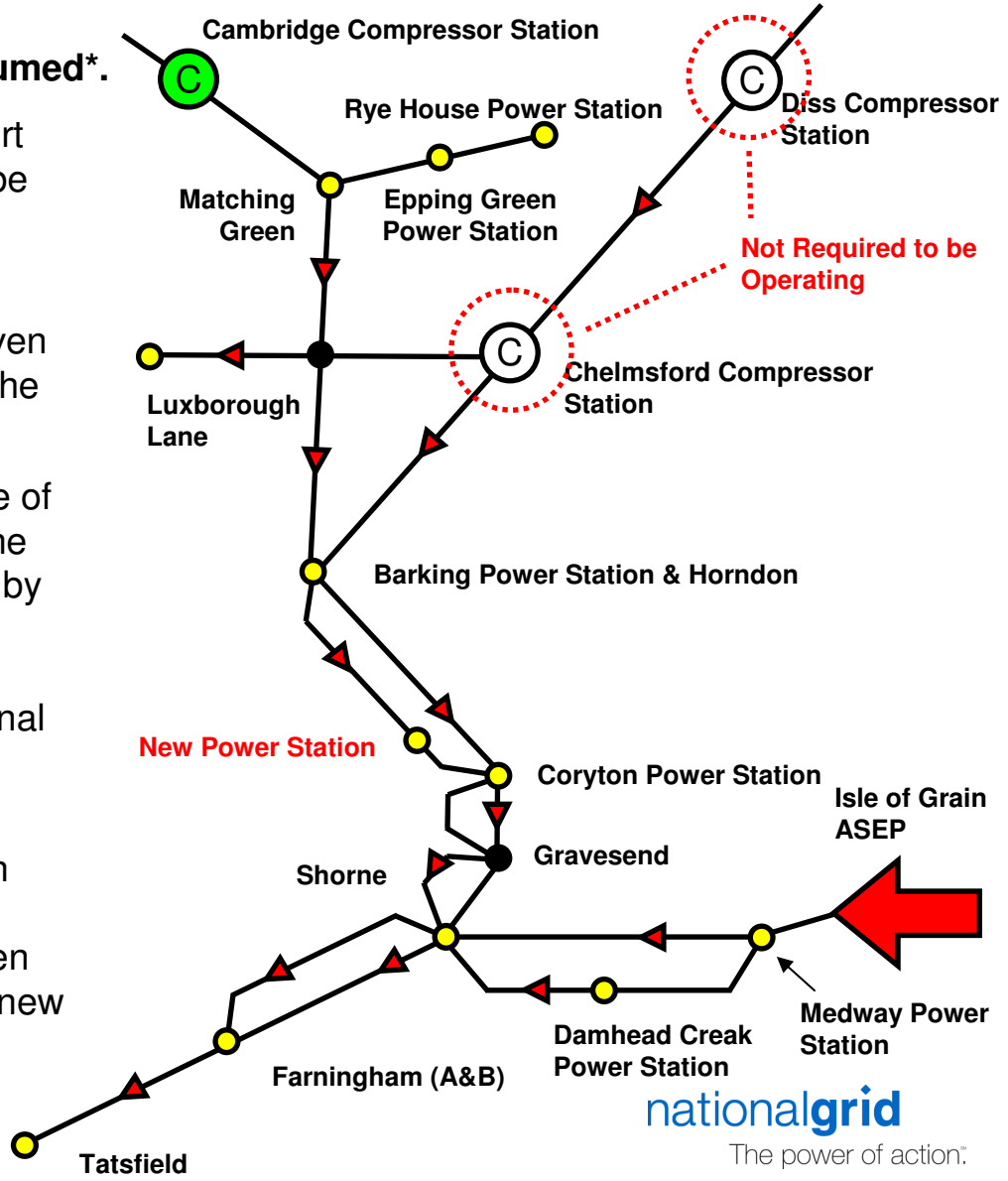
Compressors that are usually required to support Assured Offtake Pressures are not required to be operating.

With the high levels of entry flow at Isle of Grain Assured Offtake Pressures can be supported even with the addition of the incremental capacity at the new exit point.

This supply scenario demonstrates that high Isle of Grain gas flows reduce network constraints in the South East. Increased exit capability generated by certain gas entry flows would remove the requirement for investment and/or exit capacity substitution to support the release of the additional NTS Exit (Flat) Capacity.

With the high levels of entry flow at Isle of Grain Assured Offtake Pressures can be supported, without the need for investment/substitution even with the addition of incremental capacity at the new exit point up to a level of approx 300 GWh/d.

* National Grid does not have sufficient experience of high level flows at Isle of Grain and believes that this scenario is currently unrealistic.



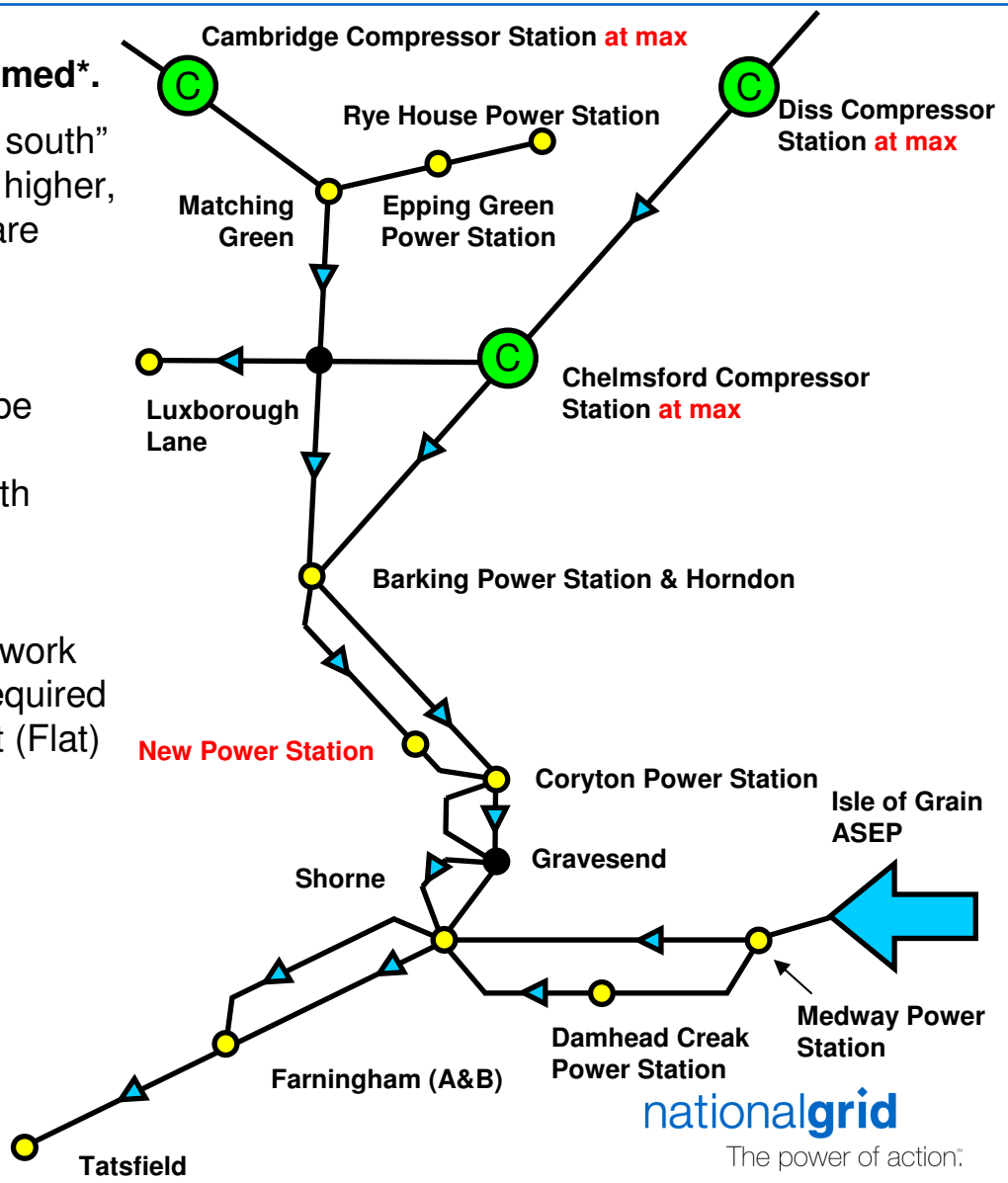
# Example b) – Incremental Capacity in the South East (System Extremity)

**Low levels of entry flow at Isle of Grain assumed*.**

Under this supply scenario the level of “north to south” flow in the NTS feeders need to be significantly higher, and hence pressure drops through the system are increased.

As a result, Assured Offtake Pressures cannot be supported given the addition of the incremental capacity procured at the new exit point, even with compressors operating at maximum capability.

With a low level of entry flow at Isle of Grain network investment and/or exit capacity substitution is required to support the release of the additional NTS Exit (Flat) Capacity.




* National Grid believes that this scenario is the most realistic.

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## Example b – Incremental Capacity in the South East (System Extremity)

- Exit capacity substitution will be considered before network investment.
- Firstly the level of unsold baseline capacity both downstream and upstream of the proposed new exit point will be identified.
- Substitution from downstream exit points will be considered first, starting with the furthest downstream as this is most efficient.
    - Substitution from upstream exit points will only be considered up to an operating compressor boundary.
- Therefore, this means that substitution will only be considered between exit points which share common infrastructure.

The levels of unsold capacity at downstream exit points are as follows:

| | GWh/d | mscm/d |
|---|---|---|
| Tatsfield | 56.0750 | 5.1777 |
| Farningham | 38.3060 | 3.5370 |
| Shorne | 17.9420 | 1.6567 |

All other downstream exit points have zero levels of unsold capacity.

The levels of unsold capacity at upstream exit points are as follows:

| | GWh/d | mscm/d |
|---|---|---|
| Barking Power Station | 7.3178 | 0.6757 |
| Hordon (DN) | 8.2292 | 07593 |
| Luxborough Lane | 56.025 | 5.1731 |

All other upstream exit points (up to any compressor boundary) have zero levels of unsold capacity.

# Example b – Incremental Capacity in the South East (System Extremity)

The 50GWh/d (4.6168mscm/d) of incremental exit capacity at the new power station can be accommodated by substituting 32.46GWh/d (2.9972mscm/d) of unsold capacity from Tatsfield.

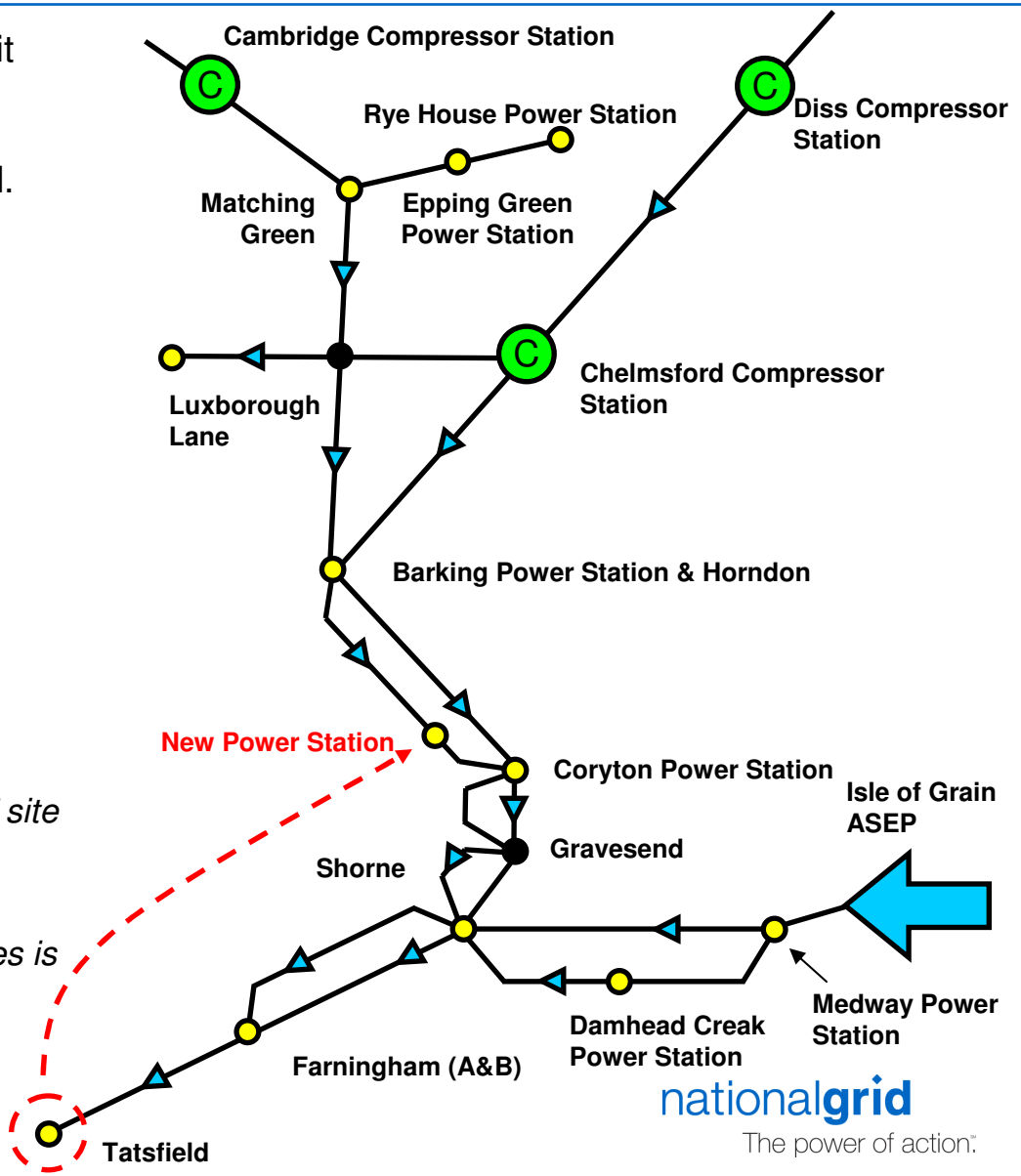
Following this substitution all Assured Offtake Pressures can be met under the given supply scenario. Therefore, no further downstream or upstream substitution is required.

This is a 1 : 0.649 exchange rate.

*As a result of analysis National Grid is reviewing whether an exchange rate <1 : 1 is appropriate.*

*Moving capacity from a "dormant" to an "active" site increases the likelihood of capacity curtailment actions being needed.*

*Analysis time for multiple substitution possibilities is inconsistent with UNC / Licence timelines. NG needs to simplify analysis process.*



# Example b – Incremental Capacity in the South East (System Extremity)

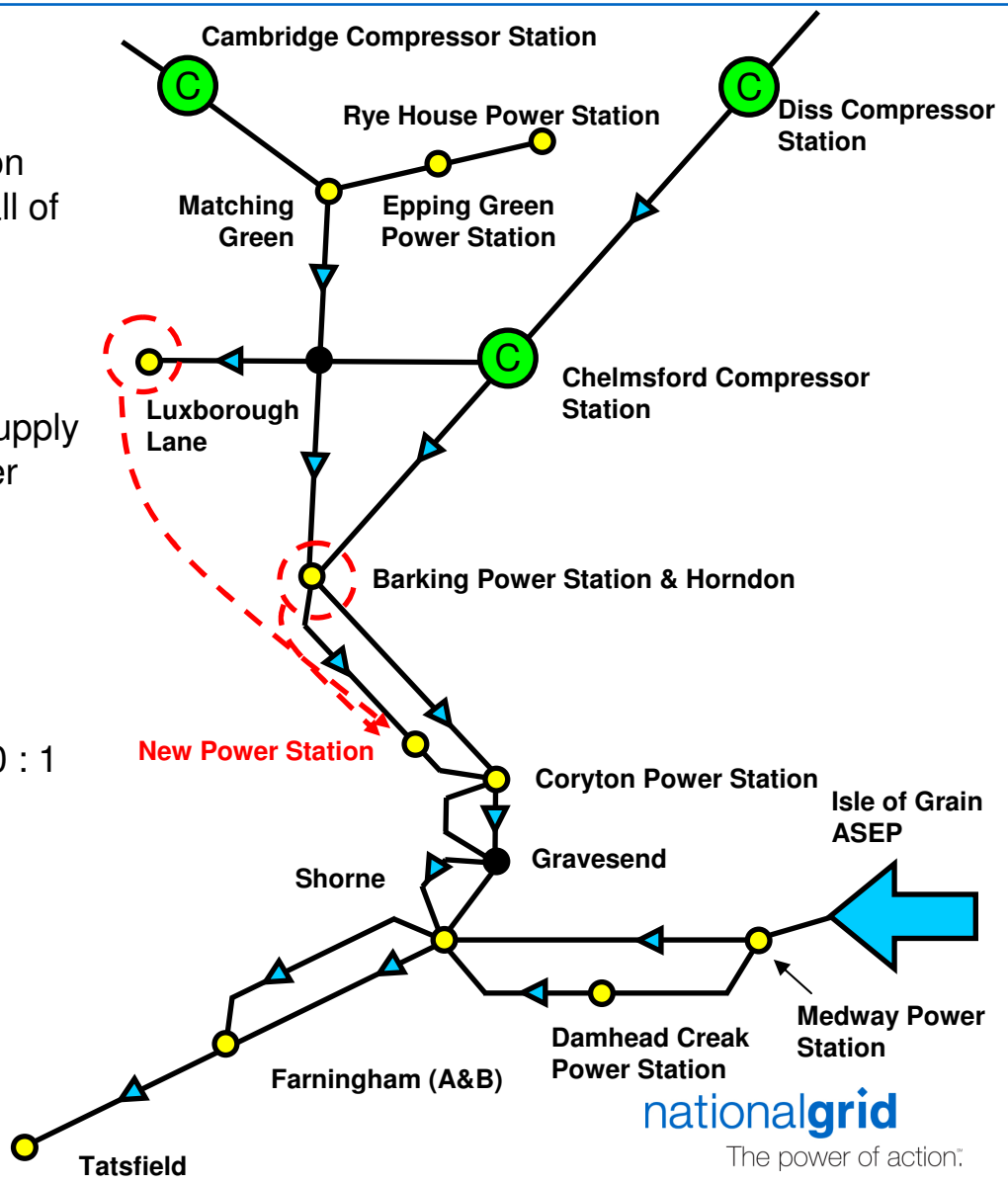
If we assume that there is no downstream substitutable capacity then the 50GWh/d of incremental exit capacity at the new power station cannot be accommodated even by substituting all of the available upstream capacity.

To ensure that following substitution all Assured Offtake Pressures can be met under the given supply scenario the increased capacity at the new power station must be limited to 46.298GWh/d

This gives a substitution exchange rate of (7.3+8.2+ 56.0) : 46.298 or 1.546 : 1.

For Luxborough Lane the exchange rate is 1.790 : 1
And Horndon / Barking is 1.025 : 1

The remaining 3.702GWh/d will be met through investment (or contractual alternative) at an approximate cost of £3m.



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# Incremental Capacity in the South East (System Extremity)

- In the absence of exit capacity substitution network reinforcement would be considered.
  - Approximately 43km of pipeline and significant compressor station modifications would be required to accommodate the increased load.
  - The approximate cost of these system modifications is £100m.

- As an approximation only; the revenue driver for the new power station can be obtained from the revenue driver for Coryton.
  - Coryton revenue driver, for an increment of 46.2 GWh/d, is £129,552/GWh/yr

- Hence potential savings resulting from exit capacity substitution for this example would be in the region of:
  - £6.5m/yr (plus indexing) for five years from non-application of the revenue driver.
  - Allowed rate of return on £100m investment from year six (assuming efficiently incurred).

It should be noted that profiled entry flows were not assumed in this analysis and a flat 1/24th rate was used. Profiled entry flows could increase or decrease the ability of the network to meet demand flows and Assured Offtake Pressures dependant upon the nature of entry flow profiling experienced. This would impact the levels of substitution and/or network investment required.

# Incremental Capacity in the South East (System Extremity)

- These examples demonstrate that the capability of the system to provide exit capacity is dependent on the assumed entry flow at ASEPs local to the area being considered.
- Further to this, it is also important to note that Entry Capacity is not the same as Entry Flow.
    - A shipper may have procured a large quantity of Entry Capacity at an ASEP, however this does not mean that equivalent levels of entry flow into the system will occur on any given day.
- Therefore in order to fulfill its obligations, National Grid cannot rely on procured levels of Entry Capacity in order to determine levels of Exit Capacity that can be released to Users.

# Incremental Capacity in the North East

**This example** considers a new Power Station connecting to the NTS at a new exit point in centre of the country, near to a number of existing Aggregated System Entry Points.

Exit point established in the Licence with baseline 0 GWh/d

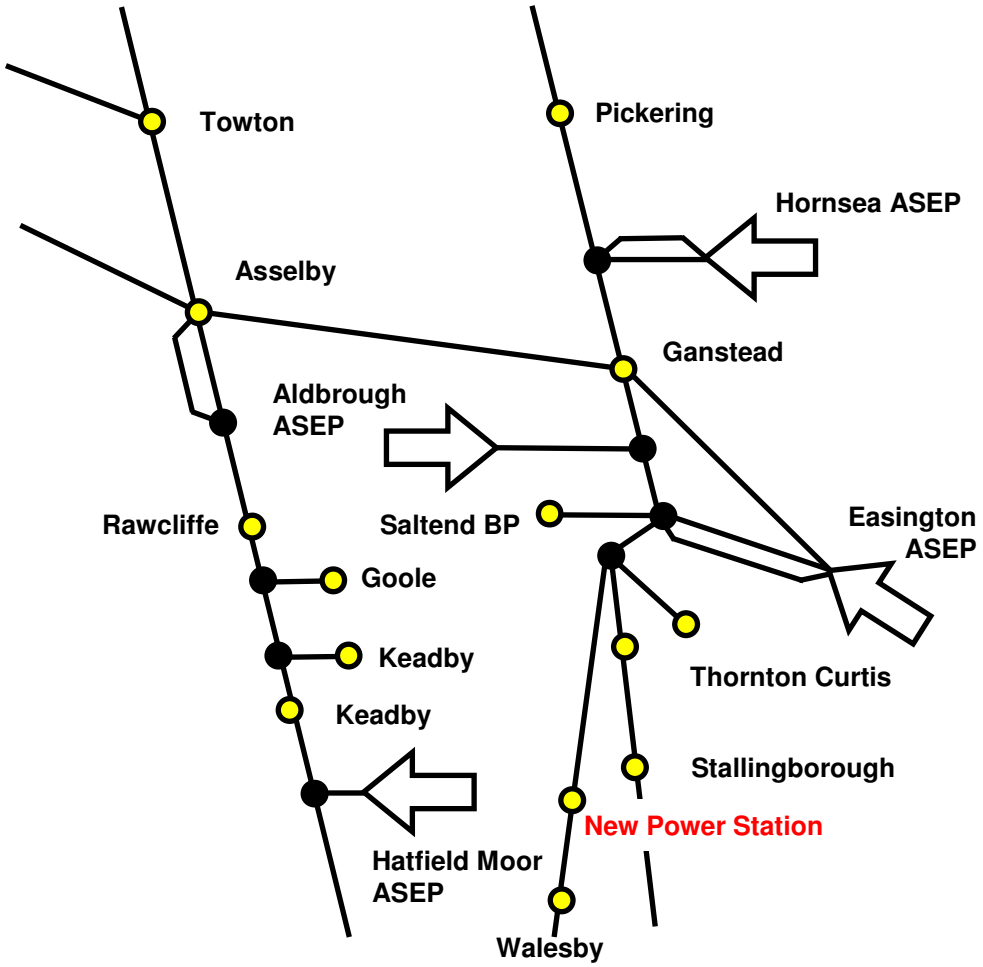
An NTS Exit (Flat) Capacity request is signalled during the July Application Window for 50GWh/d from October 2013.

The capacity is released in accordance with UNC and National Grid's Exit Capacity Release methodology statement.

**Basis of substitution analysis.**

- Gas Year – 2013/14.
- Consistent with Transmission Planning Code and assumptions therein.
- Offtake rates set at obligated levels for exit points in North East area.
  - Baselines plus any incremental capacity released.
  - Allocated levels of NTS Exit (Flexibility) Capacity assumed at all DN exit points.
- Supplies set at TBE forecasts with balancing at least interactive ASEPs.
  - Profiled Entry Flows not assumed i.e. 1/24$^{th}$ rate.

# Incremental Capacity in the North East



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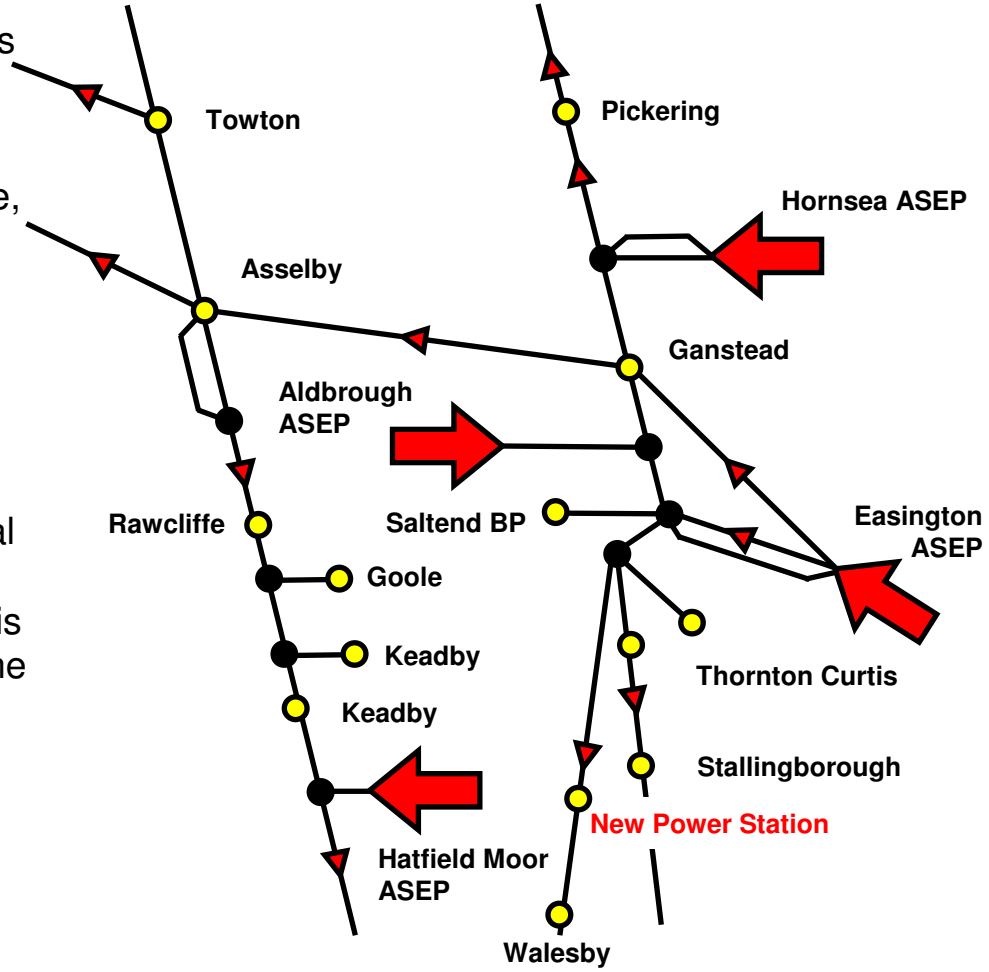
# Incremental Capacity in the North East

In this example, potential net supply in this area is much larger than the local demand due to:

a) the presence of a number of existing large ASEPs which are currently not forecast to decline,

b) high transmission capability in the area as a result of recent system reinforcement (*Easington Entry*) and significant local compression (not shown on the diagram)

Therefore, based upon the size of the incremental capacity signal, analysis to consider differing supply scenarios would not be required as there is sufficient capability within the system to accept the new load without network reinforcement or exit capacity substitution. A revenue driver would not be required.



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# Exit Capacity Revision

- Exit capacity is dependent upon certainty of entry gas flows in the same area as the exit point.
- Entry capacity does not in itself create exit capacity irrespective of the amount of infrastructure installed to provide that entry capacity.
- For example; a bi-directional connection for which incremental entry capacity is obtained may not provide any exit benefit for the same connection point because exit flows will not occur at times of entry flow.
- Similarly, where required, investment projects for entry capacity will often be different to those for exit capacity.

# Exit Capacity Revision

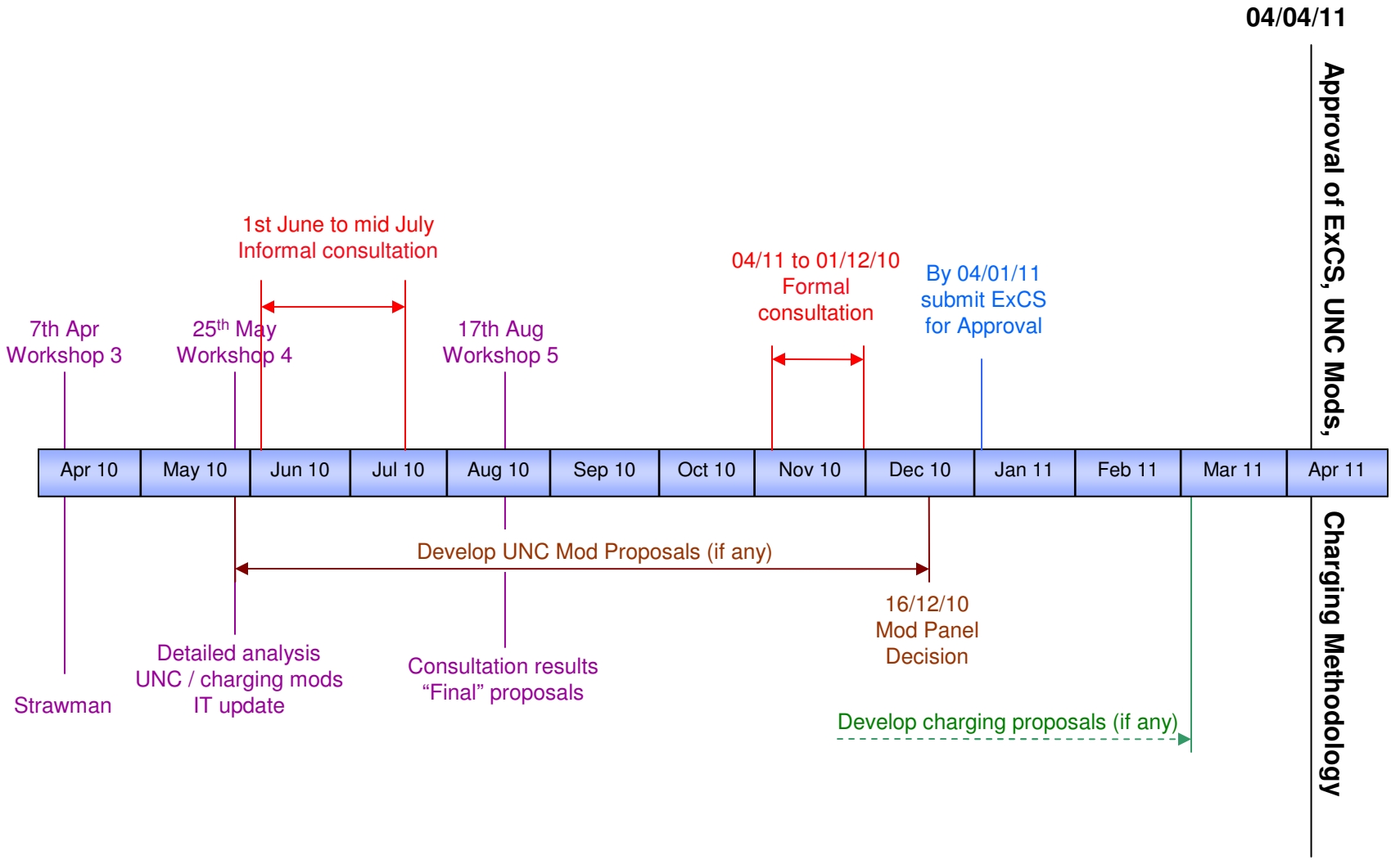
- Following:
  - the release of funded incremental obligated entry capacity; and
  - the demonstration of consistent gas flows

  National Grid will create a notional exit point adjacent to the relevant ASEP with a notional exit capacity equal to the demonstrated incremental entry flow.
- The capacity at this notional exit point shall be reviewed annually in respect of possible increases in demonstrated entry flows.
- Capacity shall be moved to any actual exit point where incremental capacity is signalled.
  - Analysis will be consistent with substitution processes, but
  - Once established, movement of capacity will not be restricted to long-term signals.

# Exit Capacity Revision

- Creating notional exit points:
  - Provide transparency that entry capacity has provided exit benefits;
  - Retains the process of allocating existing capability first;
  - Avoids the need to arbitrarily select a donor exit point which might create false expectations regarding connection capability;
  - **Should not** require a licence change.

# Indicative Timeline: Development of Exit Capacity Substitution and Revision Methodologies.



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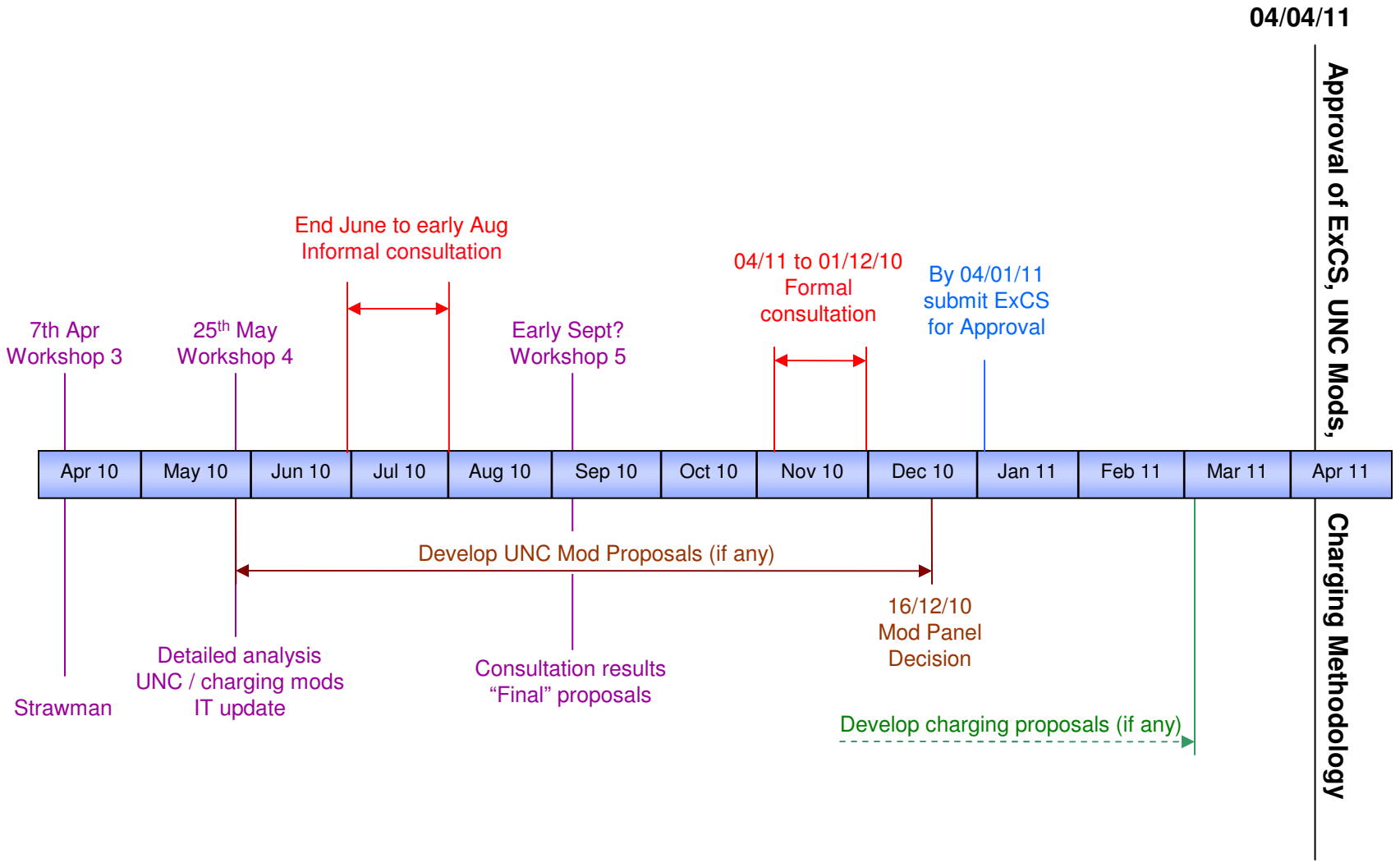
# Indicative Timeline: Development of Exit Capacity Substitution and Revision Methodologies.



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# Next Steps

Informal consultation.

| | |
|---|---|
| Start | End June….. around Friday 25th |
| End | After 5 weeks?....Friday 30th July |

Workshop 5

| | |
|---|---|
| Date: | 10 a.m. |
| | Tuesday 7th Sept? |
| Venue | TBC |
| Agenda | Present results of informal consultation, latest view on proposals |