

NTS Exit Capacity Flexibility Product - System capability assessment

EOWG

17th May 2006

(amended from previously circulated version to include a second table to inform interpretation of results)

Nks/060517_EOWG_Flex_analysis_results

*... this presentation is a repeat of that given to EOWG on the 3rd May
save for completion of the results table*

*... this has been done to ensure that the results are not considered in the
absence of an awareness of the underlying assumptions*

Contents

- ◆ High level description of Nodal Model
- ◆ Supply side assumptions
- ◆ Demand levels
- ◆ Underlying Network Investment Assumptions
- ◆ “Operational and flow” assumptions
- ◆ Methodology/approach to derive system capability
- ◆ Initial results
- ◆ Next steps

Network Modelling Challenge

- ◆ NTS
 - ◆ designed and built as a “bulk transmission” system
 - ◆ limited ability to absorb “within day” and “end of day” imbalances
- ◆ “Linepack availability” critically dependent upon
 - ◆ Previous activity and starting linepack distribution
 - ◆ Daily supply and demand distribution
 - ◆ Supply input and offtake demand within day flow rate variations
 - ◆ Pipeline and plant availability
- ◆ Network Model used to assess capability of network
 - ◆ Assumptions critical to understanding outputs
 - ◆ Network runs labour intensive
 - ◆ Base network set-up
 - ◆ Sensitivity runs

High level description of Network Model

- ◆ Limited scenario analysis credible in available time
- ◆ Analysis undertaken on:
 - ◆ Three supply scenarios
 - ◆ Three demand days
 - ◆ Five “maximisation scenarios”
 - ◆ National
 - ◆ Sub-zonal: North, Midlands, East and West
- ◆ 9 “base network runs” plus 45 “iterations”
 - ◆ estimated 63 man-days of analysis, excluding quality checking
- ◆ All modelling based on 2010/11

Supply side assumptions

- ◆ Three TBE 2005 scenarios:
 - ◆ Transit UK “aggressive build-up of imports from Norway and from LNG ... appreciable exports to Europe”
 - ◆ Global LNG “LNG to alternative markets ... high volumes from Norway, ... interconnector net imports”
 - ◆ Auctions+ “entry capacity signalled by market ... flows constrained by obligated capacity”
- ◆ Gas supply patterns determined under each scenario for each demand level

Demand levels

- ◆ Three demand levels investigated:
 - ◆ Day 1 Highest demand expected in an average year
 - ◆ Day 50 Typical winter day
 - ◆ Day 150 Typical autumn/spring day

Day Number	National Demand (mscmd)
1	541
50	424
150	376

NTS – 2010/11 Network

- ◆ Supply scenario differences:

Investment	Driver	Scenario / approx. cost (£)		
		TransitUK	Auctions+	Global LNG
East Ilsley to Barton Stacey	SW quadrant exit	42m		
IoG to Shorne	Grain entry	17.5m		
Felindre extra power	Milford Haven entry	8m		
Kings Lynn to Wisbech	Grian/Bacton entry	29m		29m
Alrewas reverse	Milford entry/deep		8m	

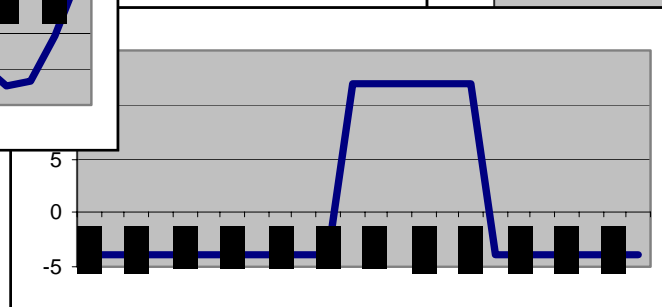
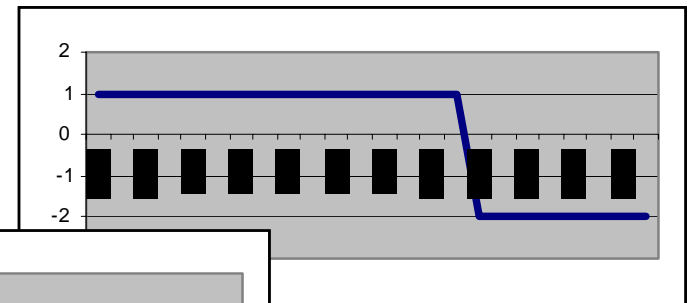
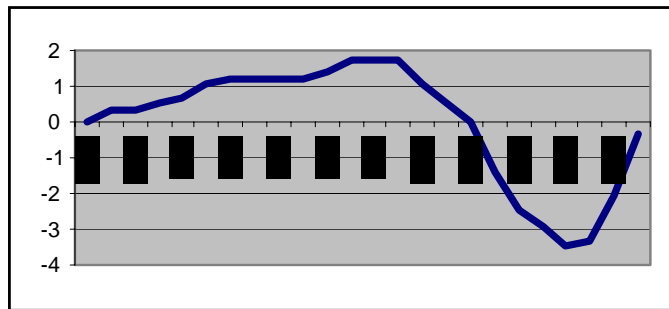
- ◆ Assumed **all** projects are built and to time
- ◆ Enables better comparison of results

Other key analysis and operational assumptions

- ◆ Flat supply entry profiles
 - ◆ National supply/demand balance
 - ◆ Full pipeline and plant availability
 - ◆ Base offtake profiles based on experienced coincident patterns
 - ◆ Scaling process to generate credible profiles
 - ◆ Current ANOPs and OCS assured pressures apply
- No offshore problem
No forecasting errors
No compressor trips

Offtake Profiles

- ◆ To simplify administration and human interaction
- ◆ 4 categories
 - ◆ Volumetrically controlled DN offtakes
 - ◆ Assuming strategy not changed within day
 - ◆ Pressure controlled DN offtakes & CCGTs
 - ◆ OCGTs (additional units)
 - ◆ Others (flat)



Flexibility utilisation profiles

- ◆ Historical usage observed on 21 and 22 November 2005 provides basis for “base offtake flow rate variation level”
- ◆ Represents credible observed co-incident pattern

Flex Capacity Profiles - Scaling

- ◆ Assumed that no demand could swing below zero flow
- ◆ Additional flex capacity apportioned automatically across demands using scaling spreadsheet



Results matrix

– National and max sub-zonal availabilities

mcm		National	North	Midlands	SouthWest	SouthEast
TransitUK	D1	31	18	19	14	11
	D50	30	24	16	15	17
	D150	26	24	18	10	11
GlobalLNG	D1	18	6	4	4	4
	D50	22	9	8	5	8
	D150	22	11	8	6	7
Auctions+	D1	17	10	5	5	4
	D50	32	16	16	15	9
	D150	34	20	18	16	19

Each zonal column availability with coincident flexibility usage in the other three zones at base levels

... the sub-zonal numbers need to be considered in conjunction with that “flexibility” utilisation that is occurring within the other three zones

... the next table therefore illustrates the National availability at associated with each sub-zonal maximisation

Results matrix

– National availabilities

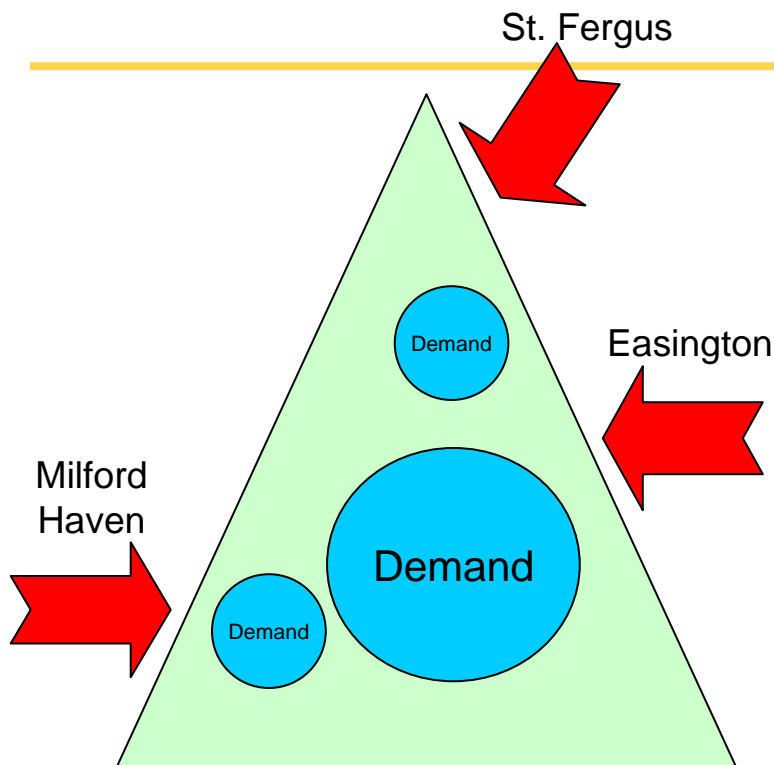
mcm		National	North	Midlands	SouthWest	SouthEast
TransitUK	D1	31	29	32	27	24
	D50	30	35	29	28	30
	D150	26	35	31	23	24
GlobalLNG	D1	18	17	17	17	17
	D50	22	20	21	18	21
	D150	22	22	21	19	20
Auctions+	D1	17	21	18	18	17
	D50	32	27	29	28	22
	D150	34	31	31	29	32

Each zonal column availability indicates national availability in the context of starting from “base” utilisation but with increased utilisation only in the designated zone

Key observations / potential implications

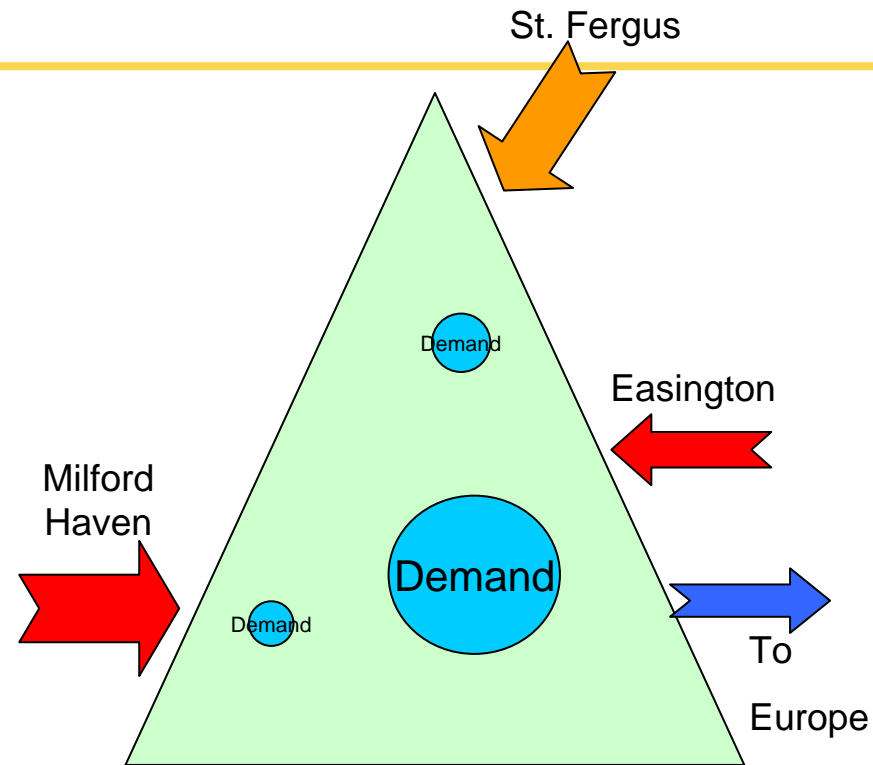
- ◆ National linepack indicative of where first “constraints” arise
 - ◆ Criticality of assumptions
 - ◆ supply side gas sourcing
 - ◆ uniform scaling of offtake profiles
- ◆ Zonal analysis
 - ◆ better indication of local linepack availability?
 - ◆ Ability to absorb greater variations in some zones?
 - ◆ ... but issue about how coincident flows can be managed

Explaining reduced “linepack” capability under reduced demand



Day 1

- Large flows from three main terminals
- High local and national demand



Day 150

- Milford and St. Fergus do not reduce noticeably
- Local demand significantly reduced
- System capacity must be used for transmission of large volumes of gas further into the system

.. lower demands can generate higher

transmission utilisation of some sectors of the system

Next steps and way ahead

- ◆ EOWG debate
- ◆ Formulation of “Product definition”