

System Flexibility Industry Workshop 2

16th November 2009



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Introduction

- ◆ Follow up to June workshop
- ◆ Main purpose of this workshop is to propose potential indicators but also to:
 - ◆ share industry feedback
 - ◆ report back on other actions
- ◆ Currently in investigatory mode, solution development will follow if necessary

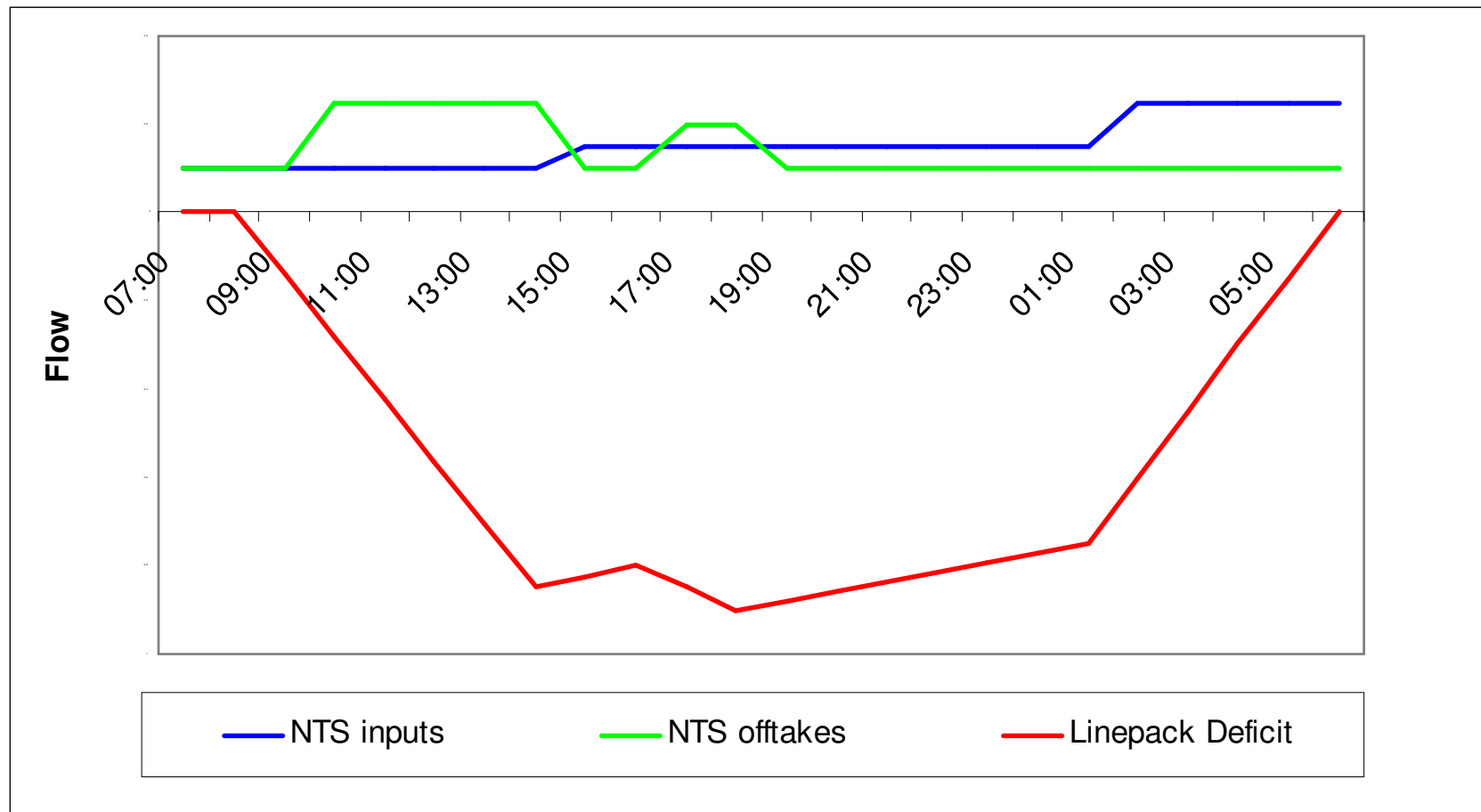
Agenda

- ◆ Introduction
- ◆ Definition
- ◆ Industry feedback
- ◆ Flexibility drivers
- ◆ Potential indicators
- ◆ Other actions from the June workshop
- ◆ Conclusions and proposed way forward

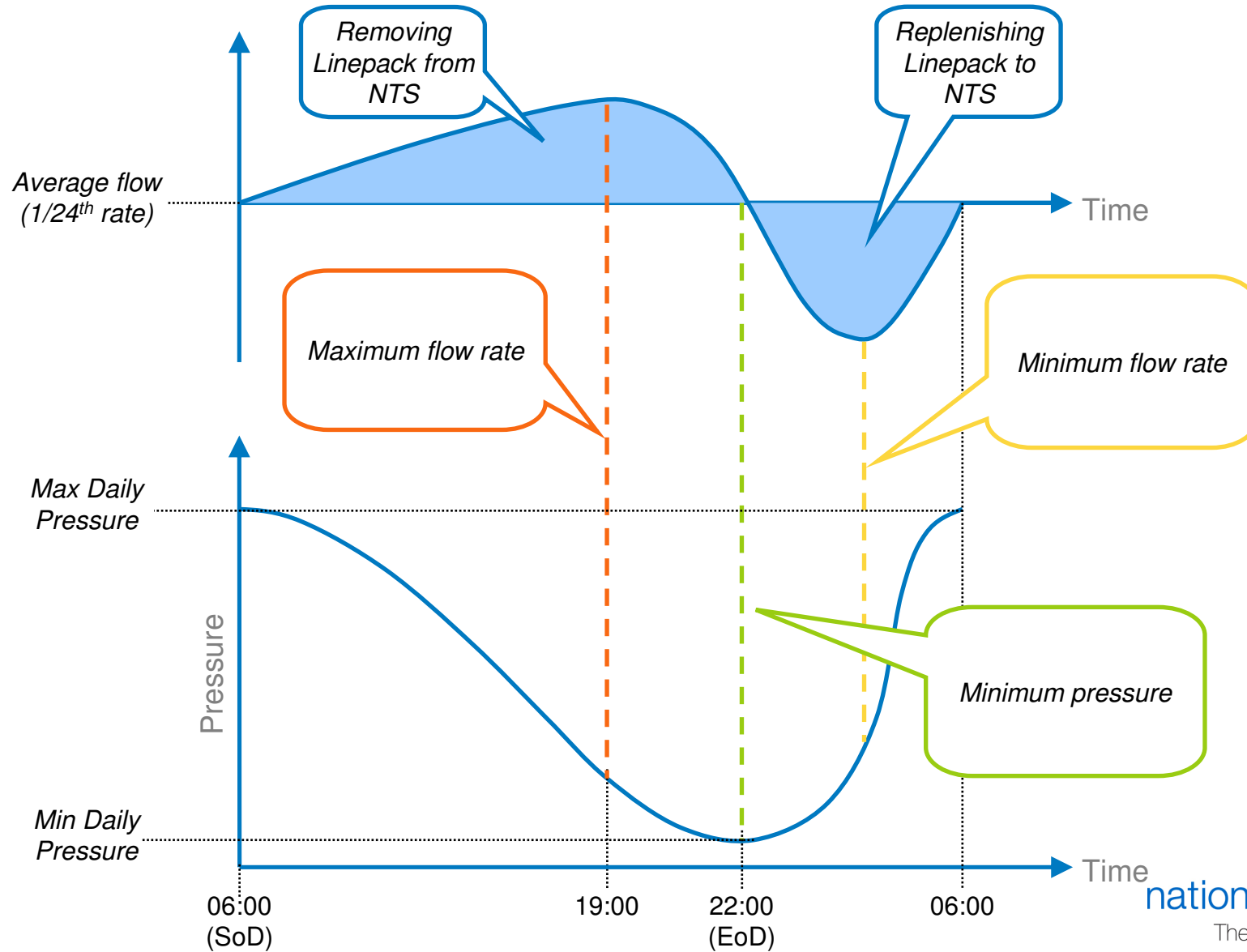
System Flexibility Definition

- ◆ The ability of the NTS to manage supply and demand mismatch without compromising safety
 - ◆ Manifests at a system level through:
 - ◆ linepack changes (national energy imbalance)
 - ◆ local pressure variations
 - ◆ Manifests at individual points on the system as flow variation from 1/24th across the day
- ◆ It may become more difficult for the NTS SO to synchronise supply and demand in the future
- ◆ Need industry help to predict customers service requirements in sufficient time to allow an appropriate response

System Level Definition: Linepack changes



Individual Point Definition: Variation from 1/24th flow rate



Industry Feedback

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Industry Feedback Summary

- ◆ 5 meetings held with industry participants
 - ◆ 2 from upstream community
 - ◆ 2 storage operators / shippers
 - ◆ 1 LNG importer
- ◆ Written feedback also received from 2 other parties
- ◆ Updates summarising the main points of the discussions published for Transmission Workstream

Feedback Summary – Consistent Themes

- ◆ UK daily NBP market works well currently
 - ◆ Increasingly limited within day UKCS response capability
 - ◆ Gas will be the primary source of new generation in the next decade
 - ◆ Increased gas demand from CCGTs
 - ◆ Renewable generation intermittency
- } Potentially greater demand for NTS flexibility
- ◆ Understanding leadtimes and forecasting accuracy are key to managing intermittency effects
 - ◆ Entry capacity substitution could potentially trend towards a more inflexible network

Feedback Summary – Areas of Contention

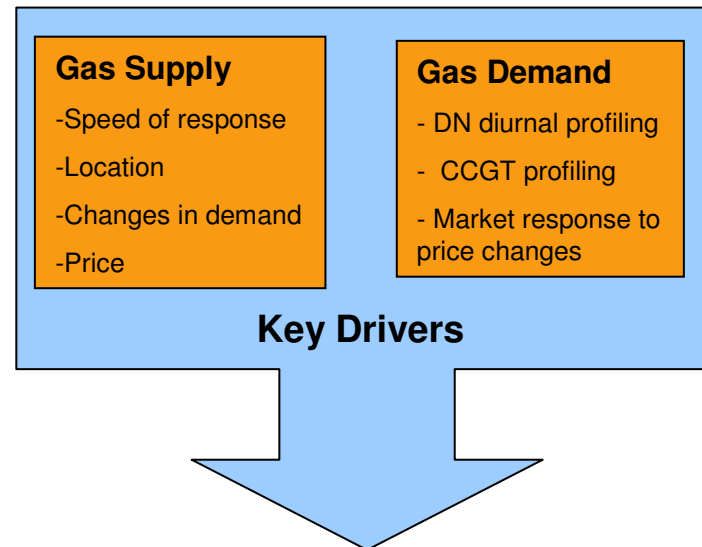
- ◆ New storage - always a provider of flexibility or a potential consumer?
 - ◆ Increasing capability to refill in winter
 - ◆ Potential for locational linepack deficits
- ◆ LNG importation - reliable baseloader or intermittent global arbitrage?
 - ◆ Global liquefaction capability is roughly half that of regas
 - ◆ ~50% utilisation on average
 - ◆ More UK terminals now
 - ◆ Our intelligence suggests that regular UK deliveries are feasible
 - ◆ Significant within day response capability provided there is gas in store

Flexibility Drivers

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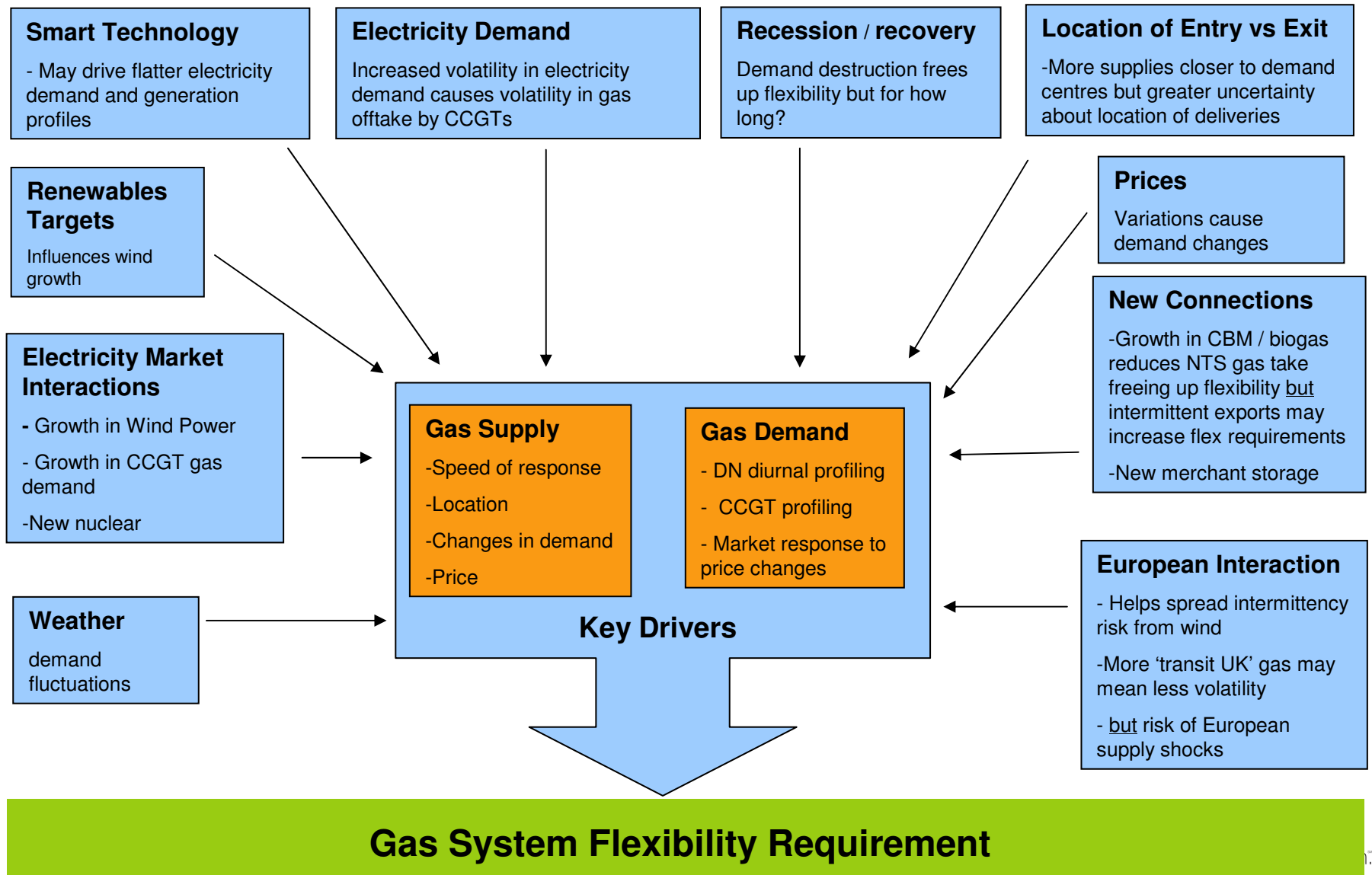
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Flexibility Drivers



Gas System Flexibility Requirement

Influences on Key Drivers



Proposed Indicators

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Brattle Report “Does Daily Balancing Threaten Security of Supply on the NTS?” (2003)

- ◆ Commissioned by Ofgem as an outcome of Review Group 0513 – Reform of the Energy Balancing Regime
- ◆ Identified key indicators to help discover the point at which the cost of within day linepack use justified a sub-daily balancing regime
 - ◆ Gas-coal forward spread
 - ◆ Expiration/regeneration of CCGT’s leg contracts
 - ◆ Change in UK Installed capacity
 - ◆ Change in patterns of gas use in Ireland
 - ◆ Spot and forward spread across the Bacton/Zeebrugge interconnector
 - ◆ Available information on offshore infrastructure
 - ◆ Within day swing sector by sector basis
 - ◆ Correlation between depletion across sectors.

Brattle's Conclusions & Recommendations

- ◆ Supply interruption due to within day linepack depletion estimated to be less than 1 day in 20 years
- ◆ However, changes in CCGT behaviour were thought likely to increase this probability
- ◆ More detailed modelling of within day flows and their Security of Supply implications should be conducted
- ◆ Incremental reforms to the balancing regime should be considered rather than fundamental change

Incremental Reforms and Performance Analysis

- ◆ Modification Proposal 0479 – Incentivised Nomination Scheme
 - ◆ Implemented in May 2002 (implemented during the development of the Brattle report)
 - ◆ INS later revised (Feb 2003) as a result of Modification Proposal 0632 – ‘Revised INS Charge to Zero’.
- ◆ During the period 2003 to 2006 National Grid conducted an annual ‘Energy (Gas) Balancing Regime Performance’ review
 - ◆ Analysis based was based on the recommendation of The Brattle Group report
 - ◆ Findings presented to the Transmission Workstream
 - ◆ Concluded that there was no evidence of any notable degradation in the performance of the regime.

Indicators linked to Key Driver 1: Gas Supply

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Proposed 'leading' indicators

Supply

- 1) Rate of change day on day from Northern and Southern ASEPs
- 2) Percentage of supply accounted for by each supply category
- 3) Percentage of supply accounted for by each ASEP
- 4) Changes in supply within day
 - ◆ vs forecast demand
 - ◆ vs actual demand
- 5) DFN correlation to supply flows

Proposed 'leading' indicators

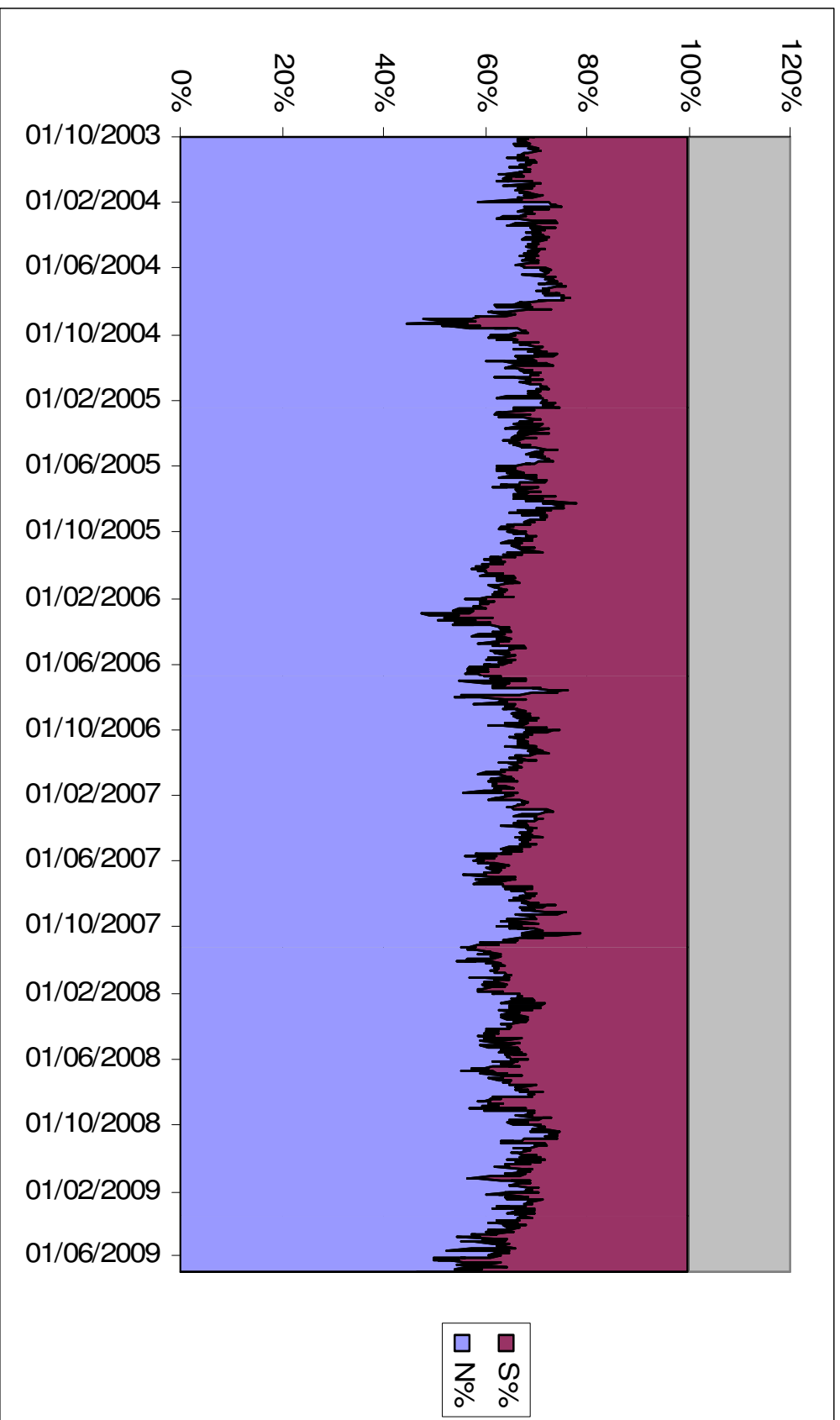
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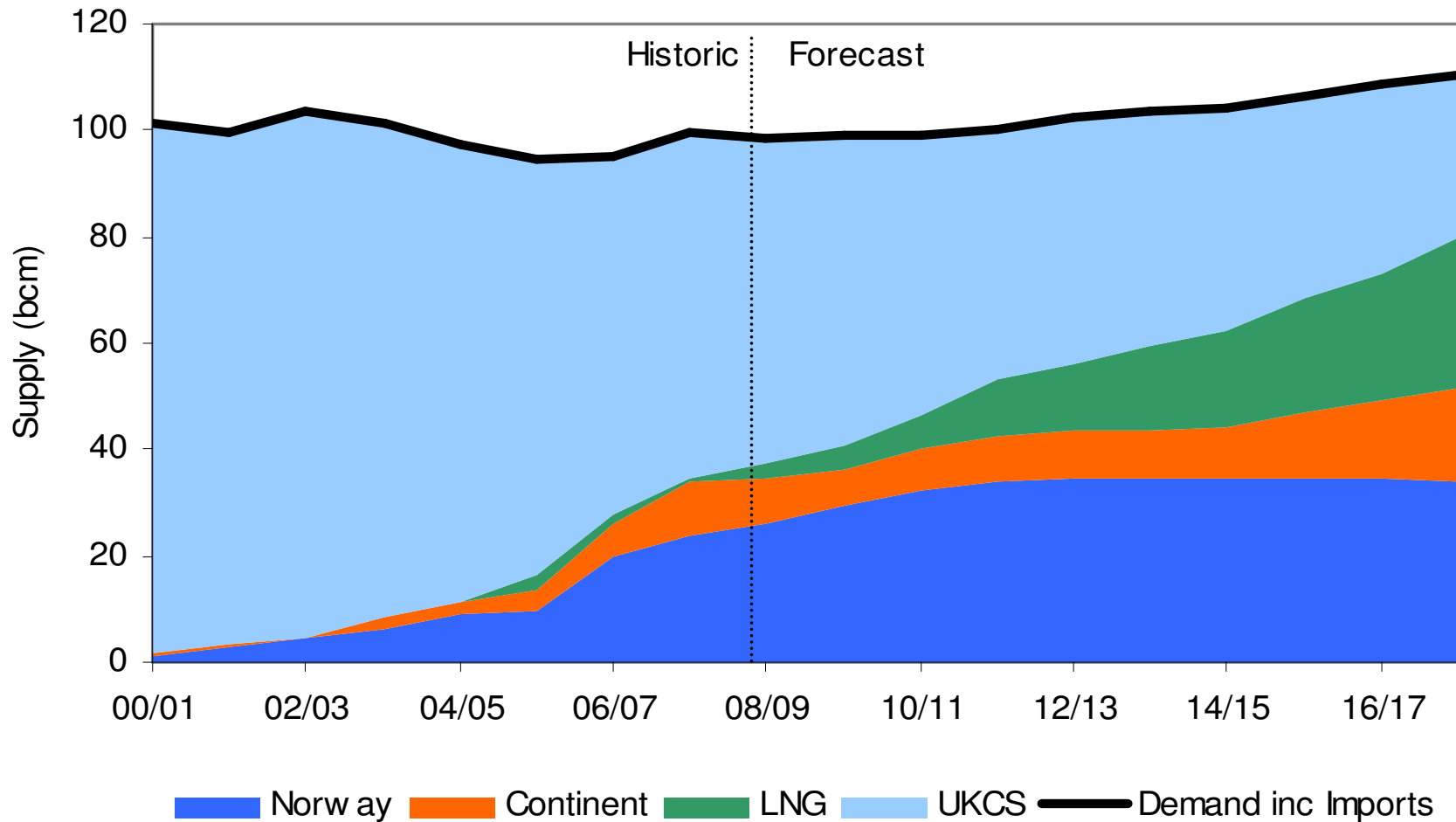
Can show now

We need to work on

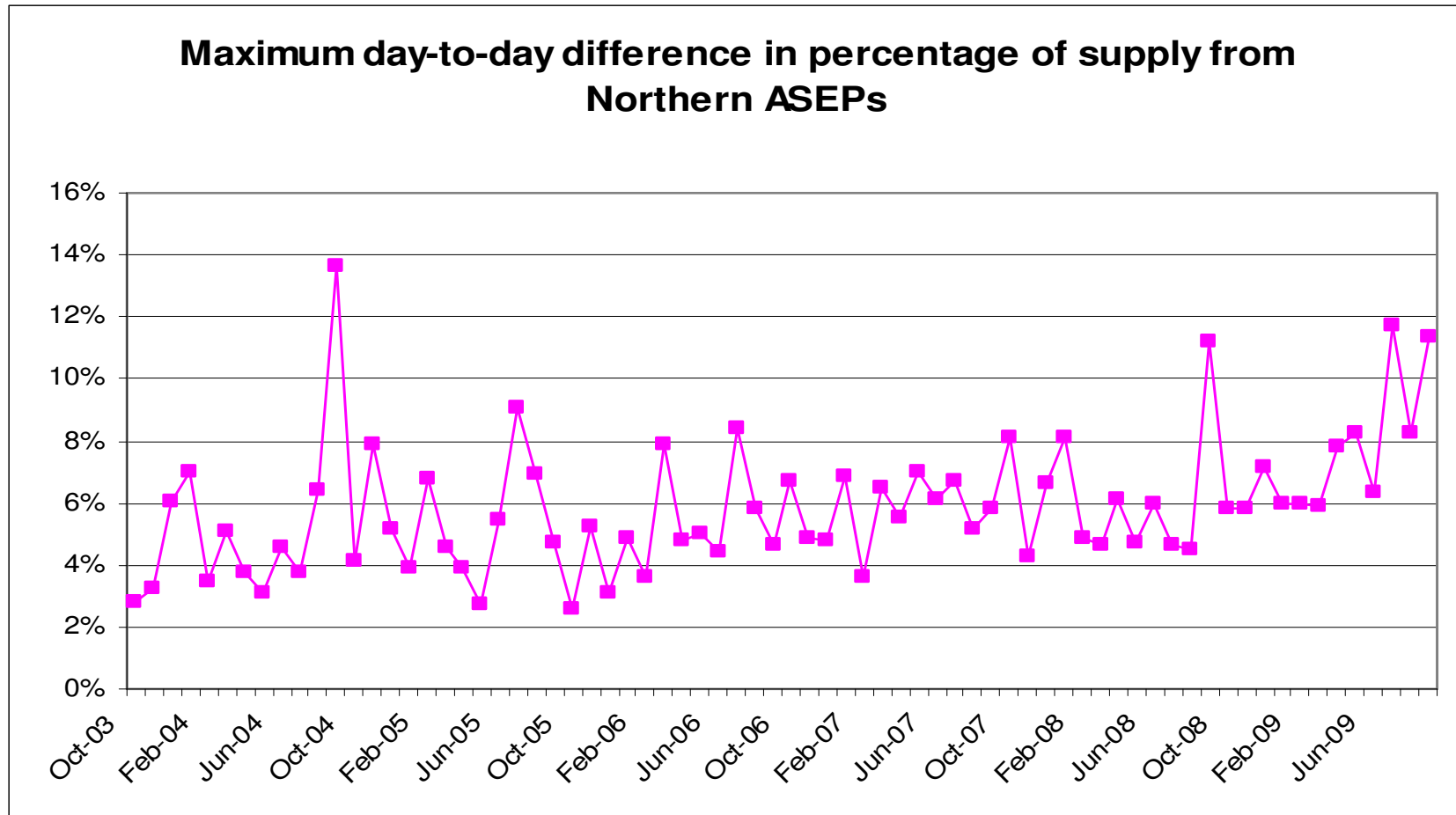
Historic North / South NTS Supplies



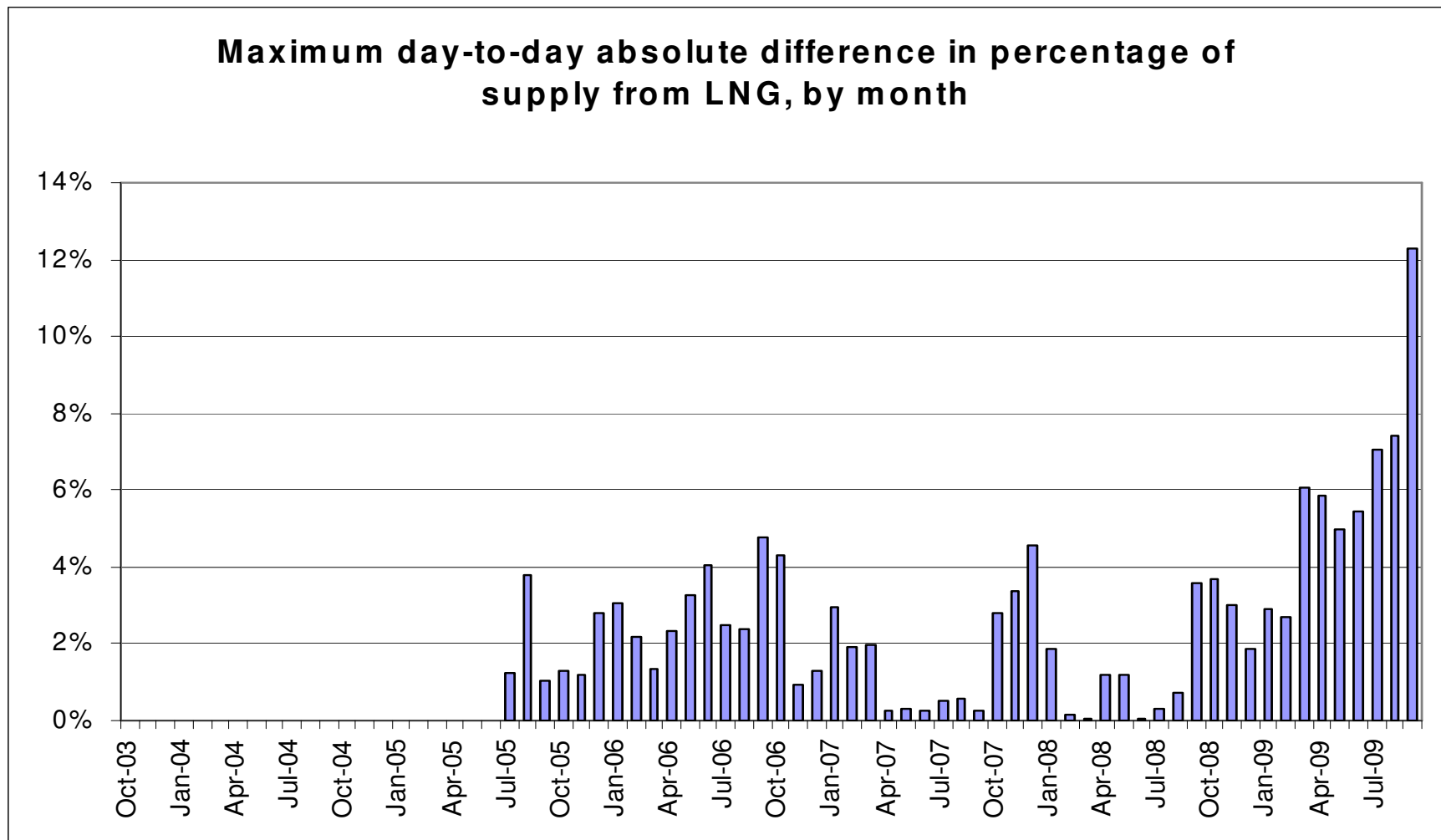
Historic and future supply view



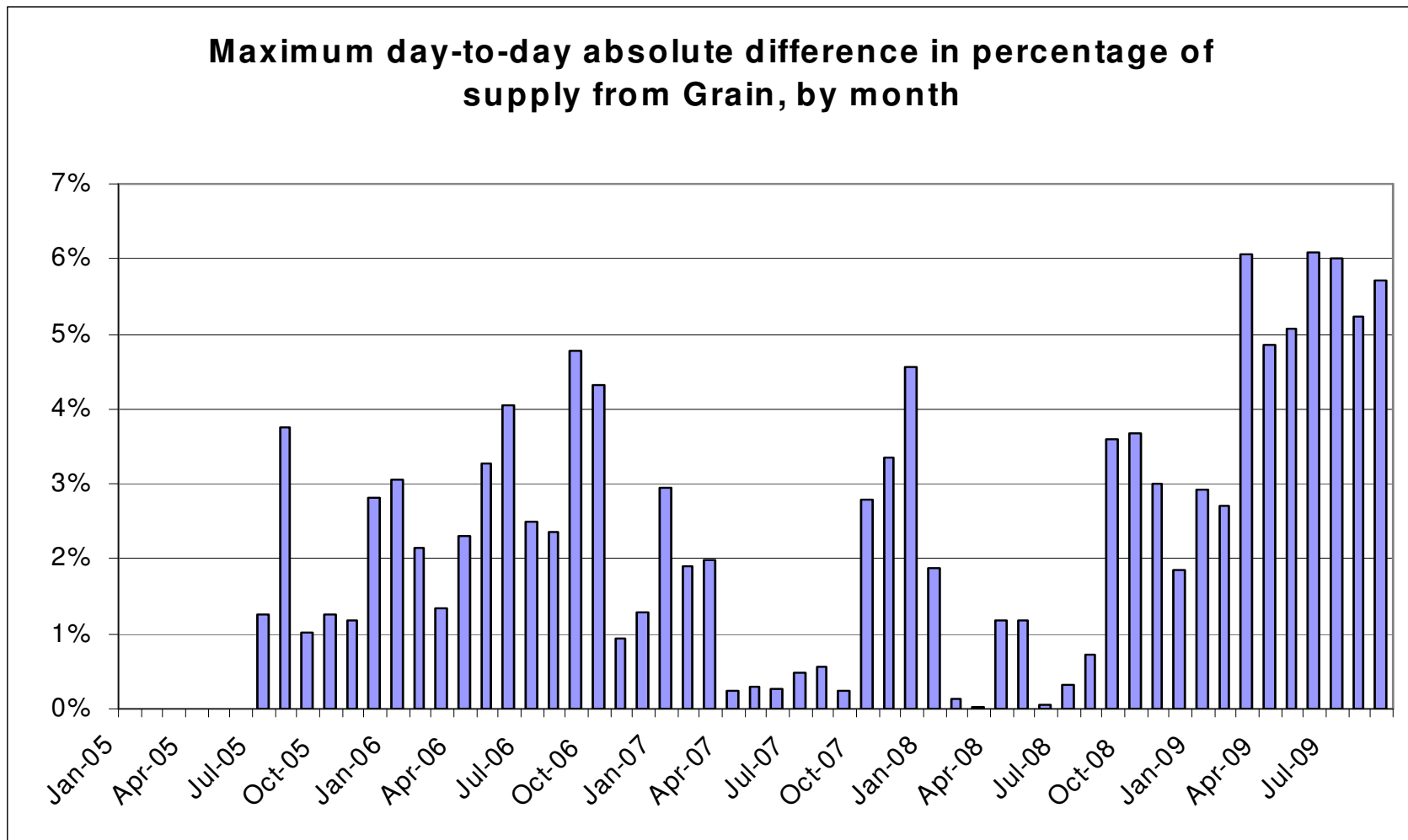
'Leading' Supply Indicator 1: North / South Supply Volatility



'Leading' Supply Indicator 2: Percentage of supply accounted for by group



'Leading' supply indicator 3: Percentage of supply accounted for by each ASEP

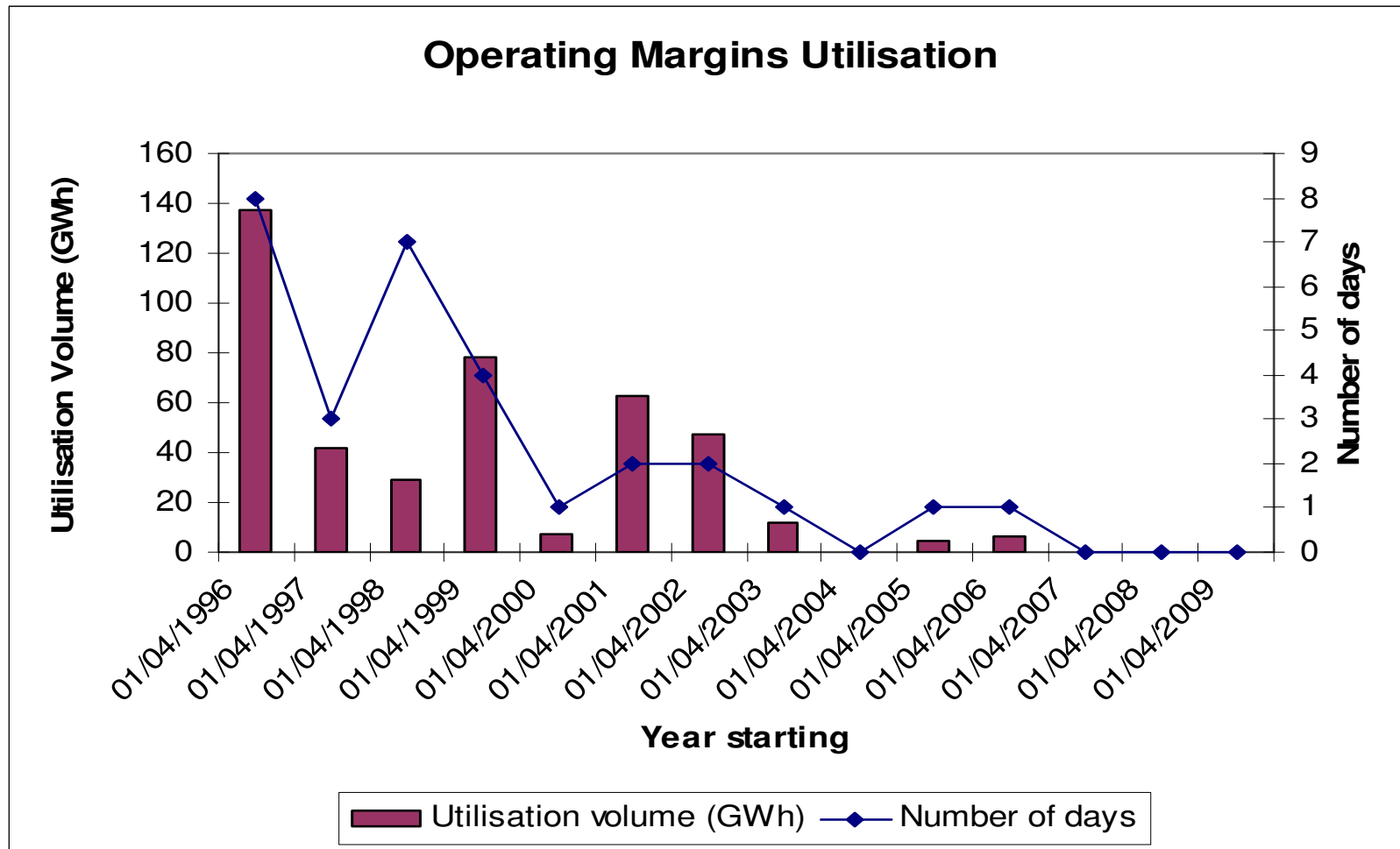


Proposed 'lagging' indicators

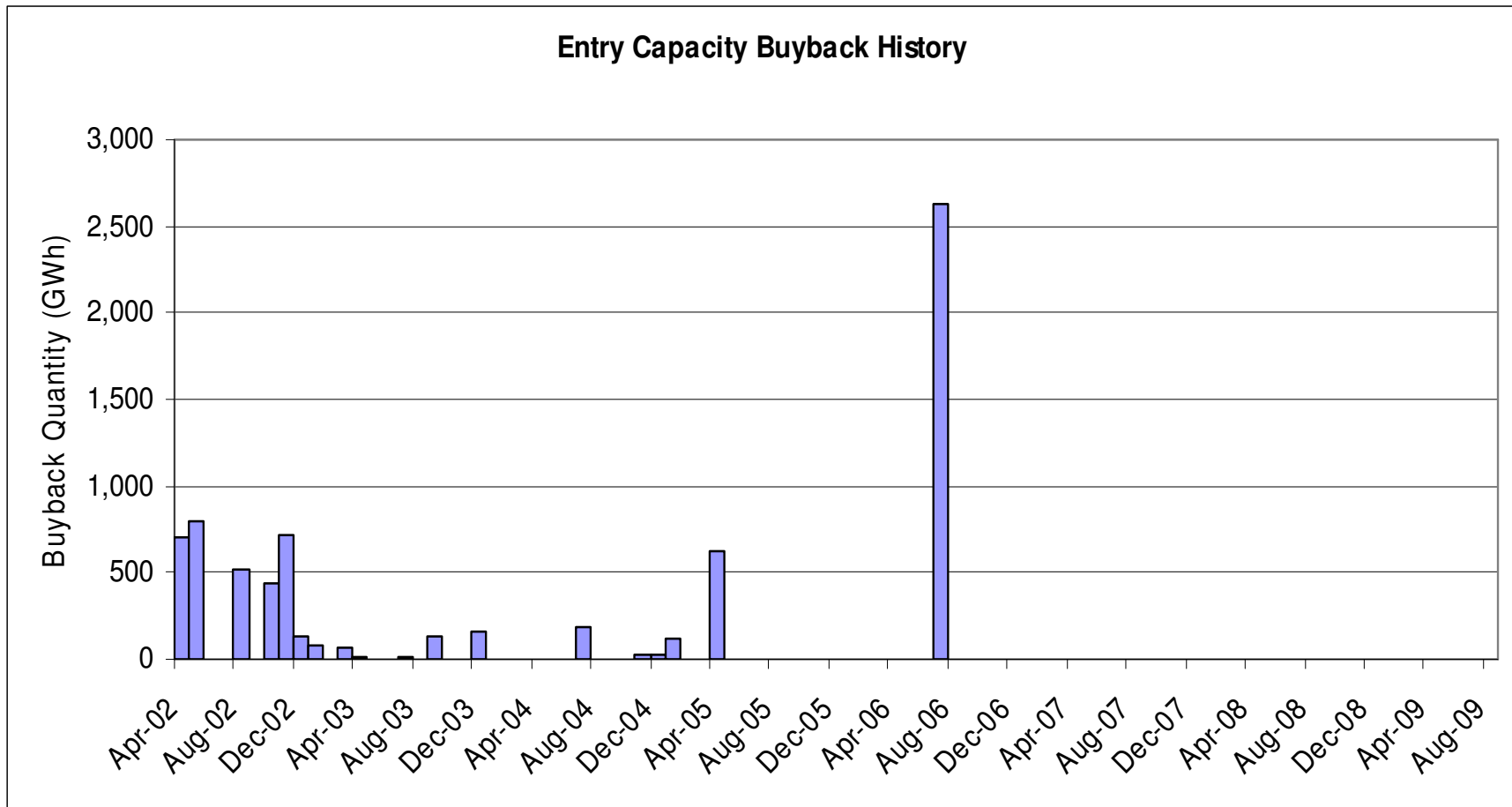
Supply

- 1) Operating margins usage
- 2) Use of entry capacity management tools – buyback
- 3) Use of entry capacity management tools – scaleback

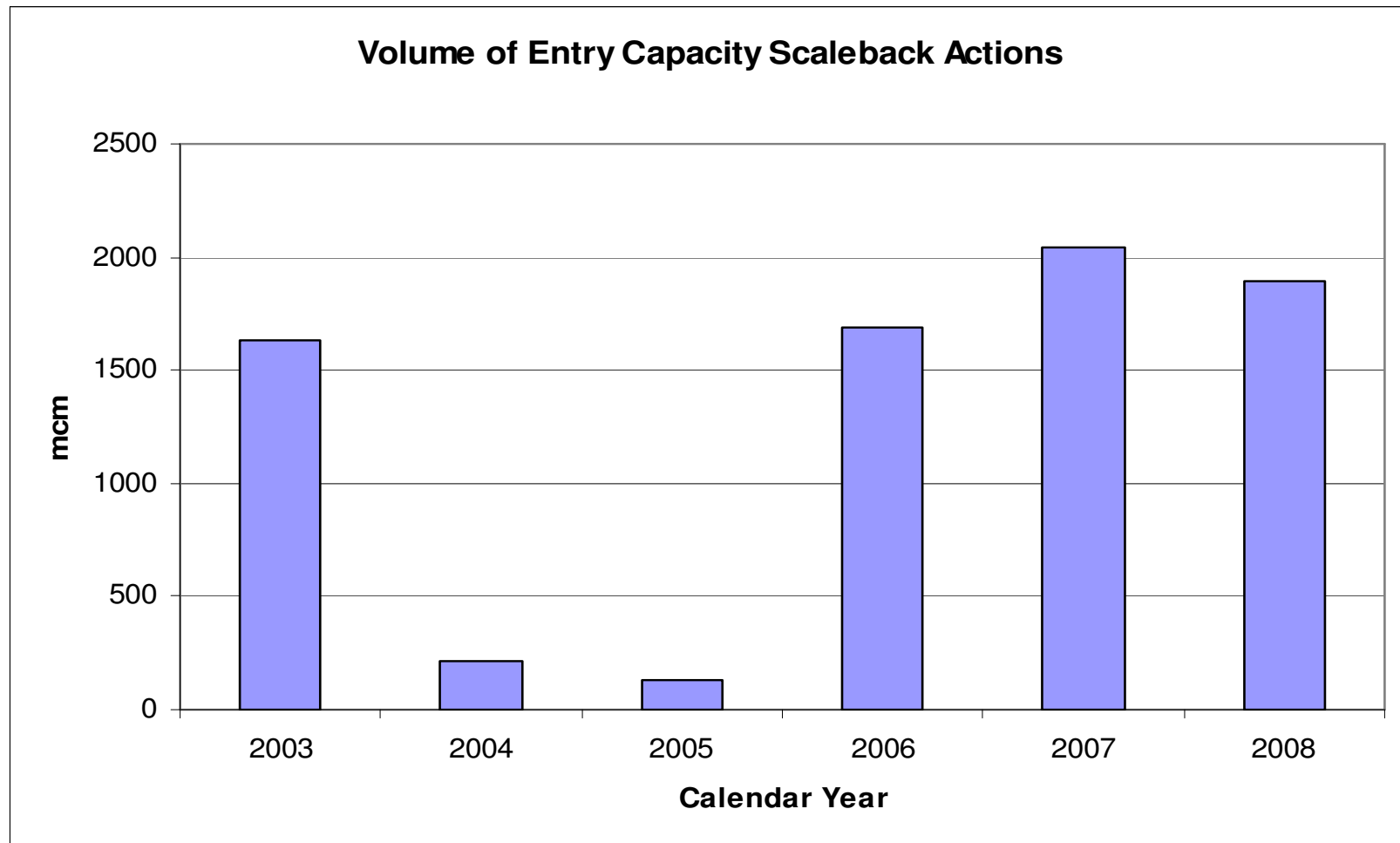
'Lagging' Supply Indicator 1: Use of Operating Margins



'Lagging' Supply Indicator 2: Entry Capacity Buybacks



'Lagging' Supply Indicator 3: Interruptible Entry Capacity Scaleback



Indicators linked to Key Driver 2: Gas Demand

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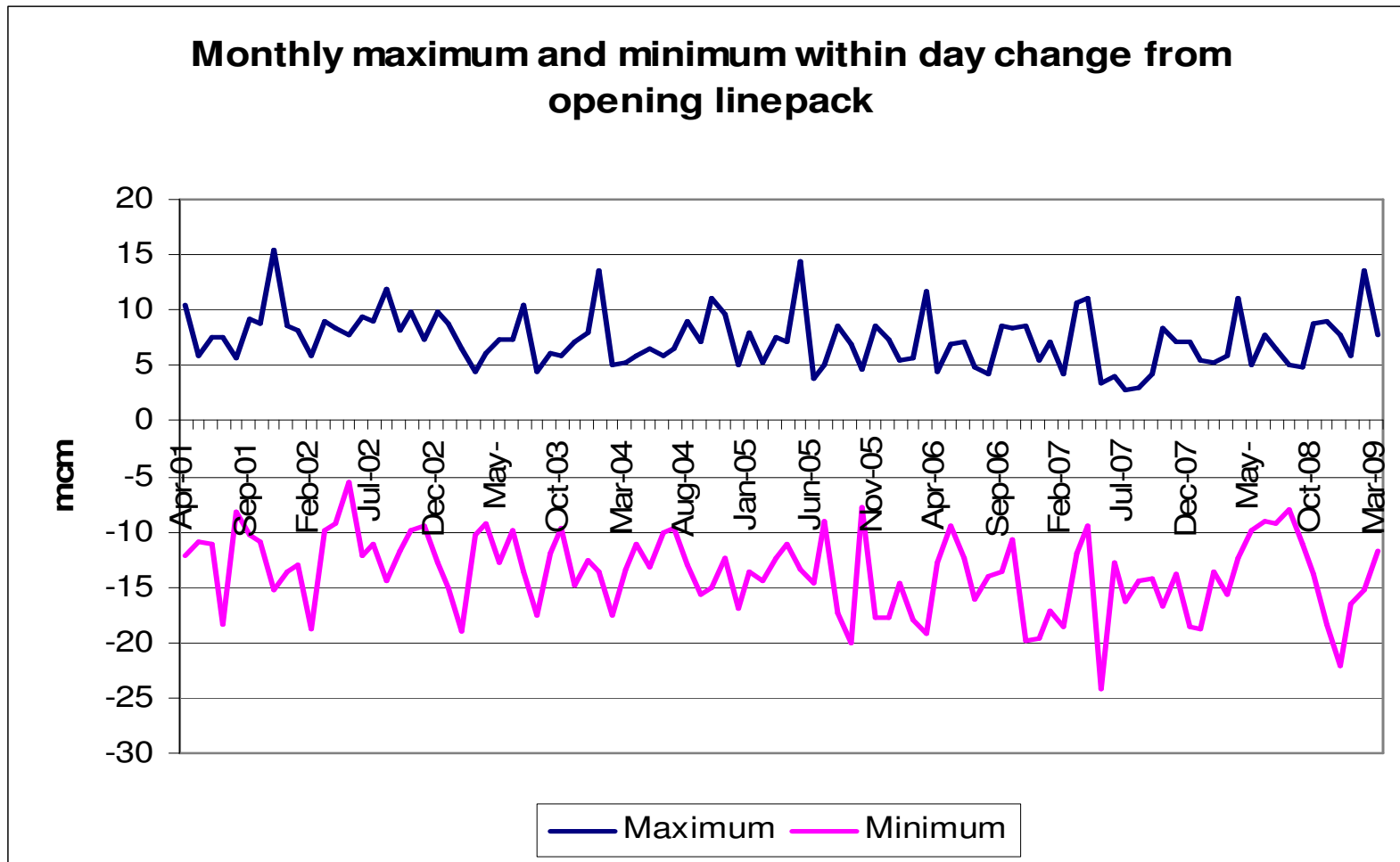
Leading

- 1) Within day linepack change
- 2) Within-day & interday demand fluctuations
- 3) Diurnal exit flexibility usage by demand sector
- 4) Within day wind output variability

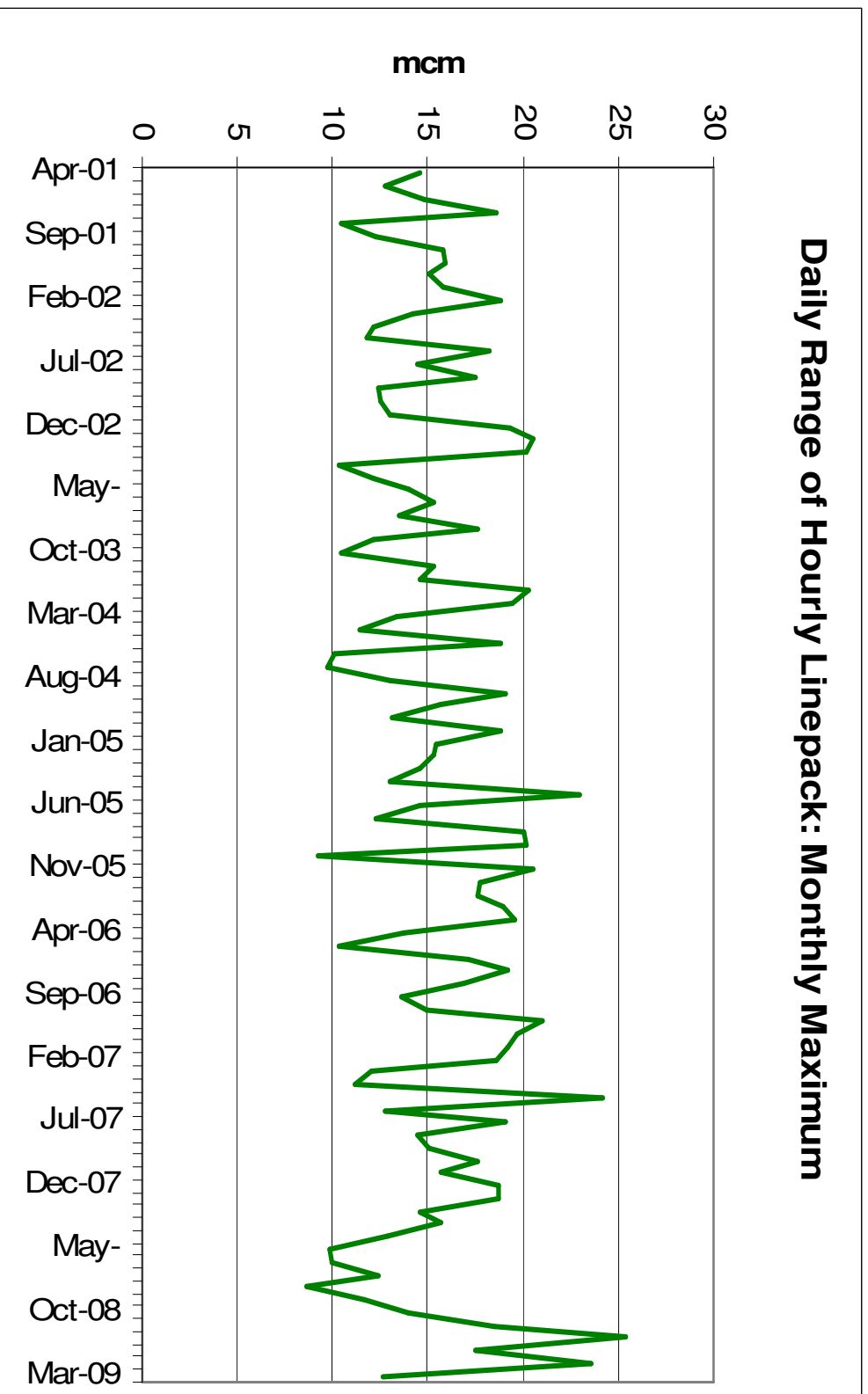
Lagging

- 1) Level of residual system balancing actions

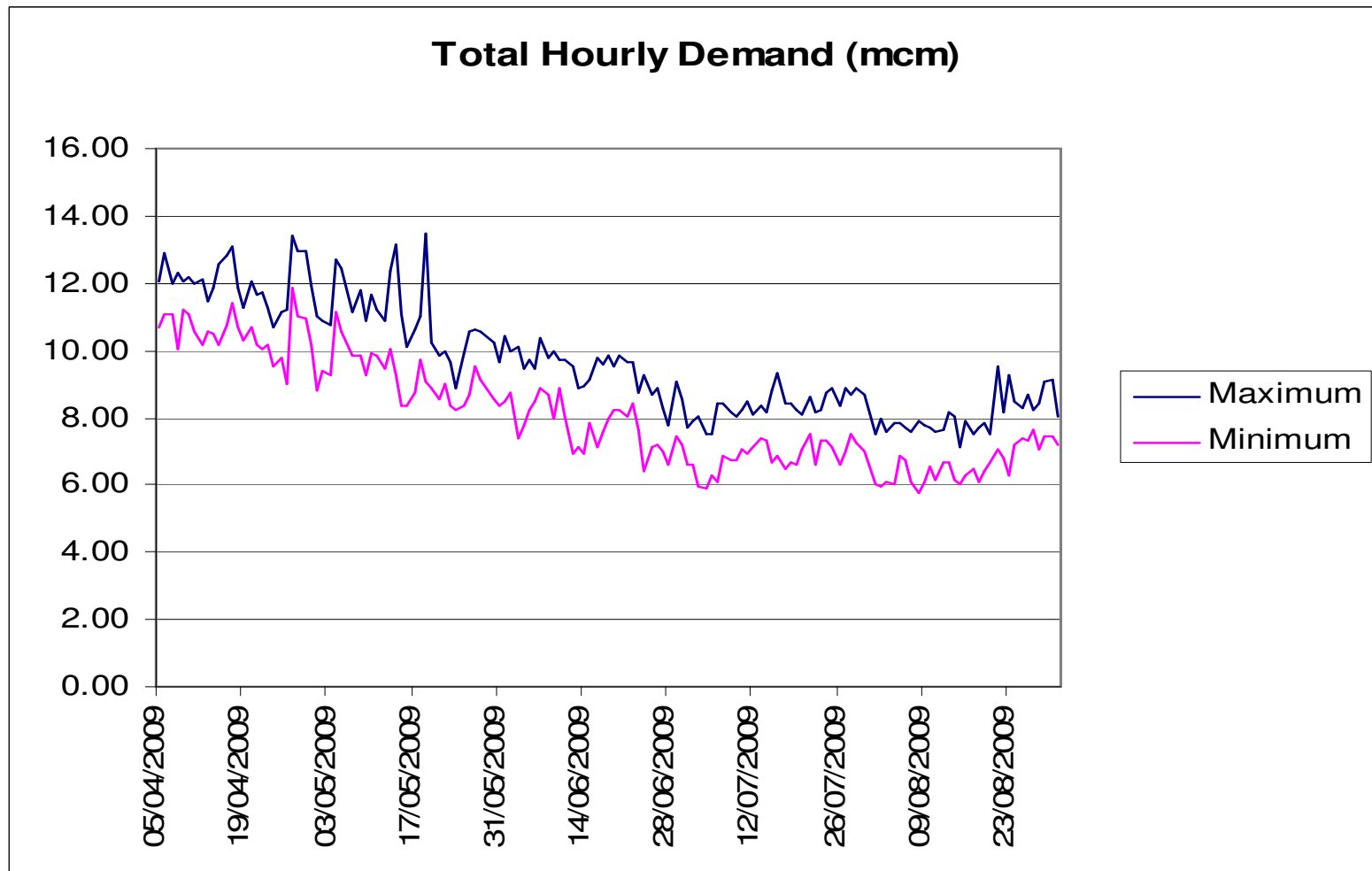
'Leading' Demand Indicator 1: Within day linepack change



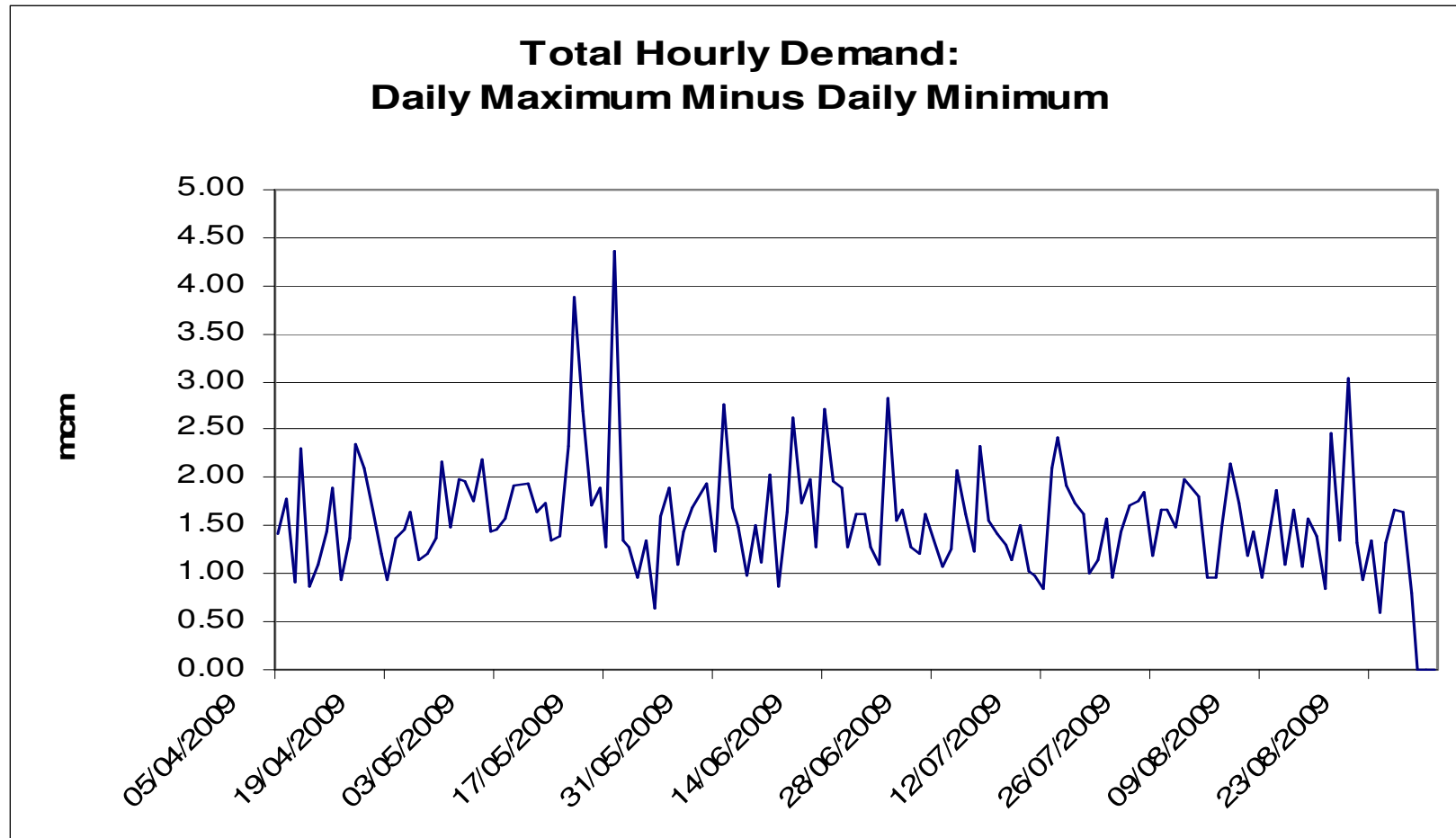
'Leading' Demand Indicator 1: Within day linepack change



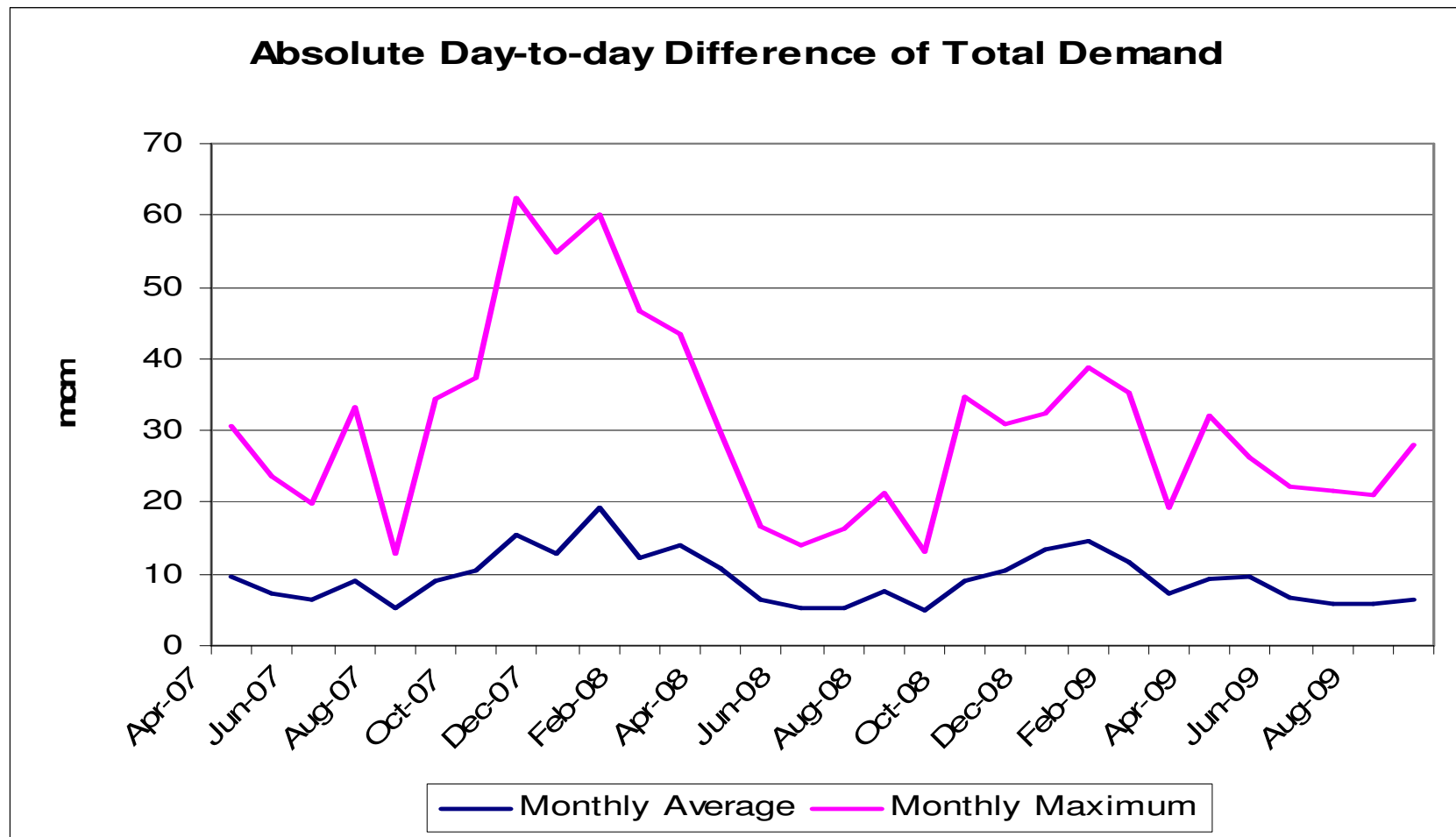
'Leading' Demand Indicator 2: Within day variation



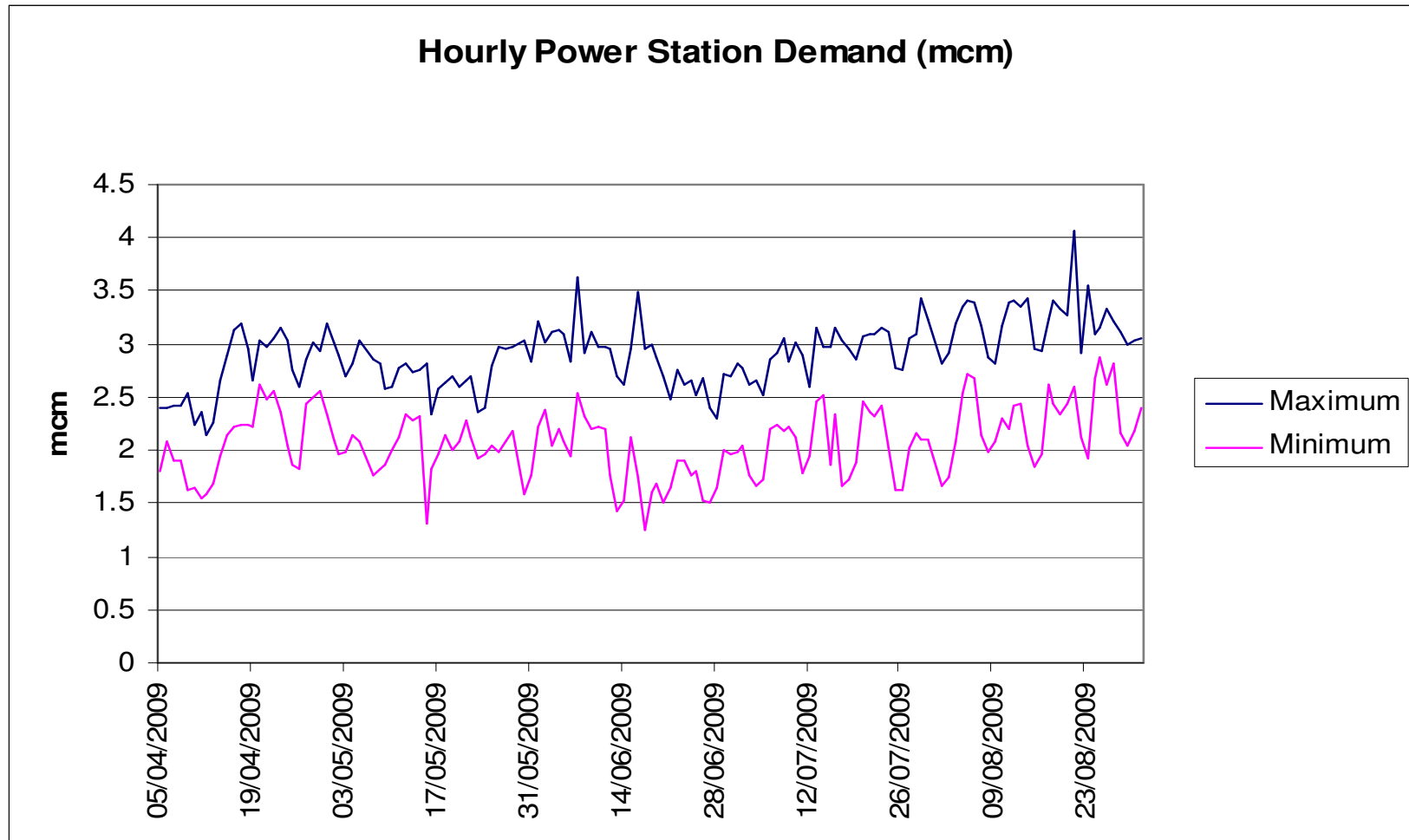
Leading Demand Indicator 2: Within day variation



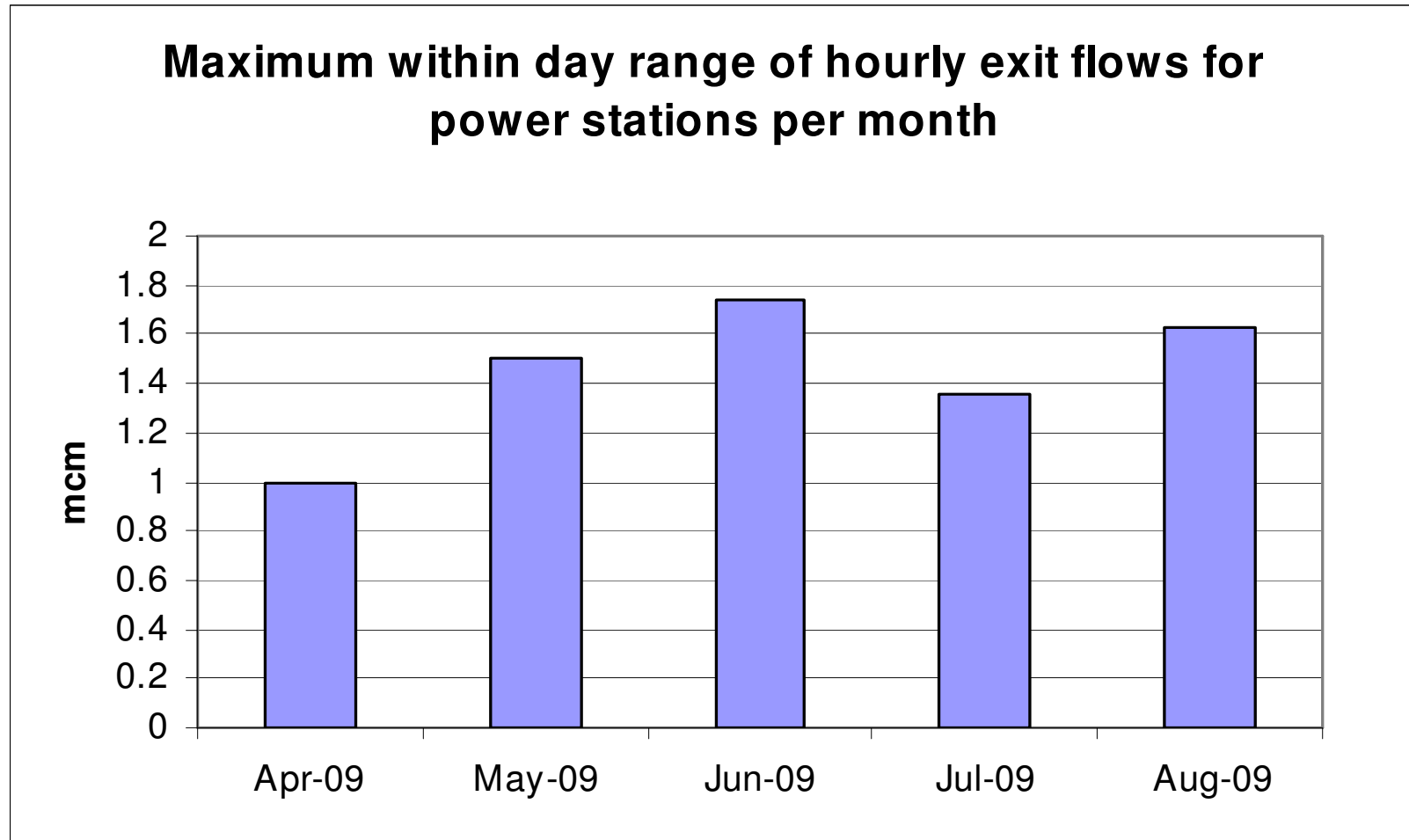
Leading Demand Indicator 2: Inter-day demand variation



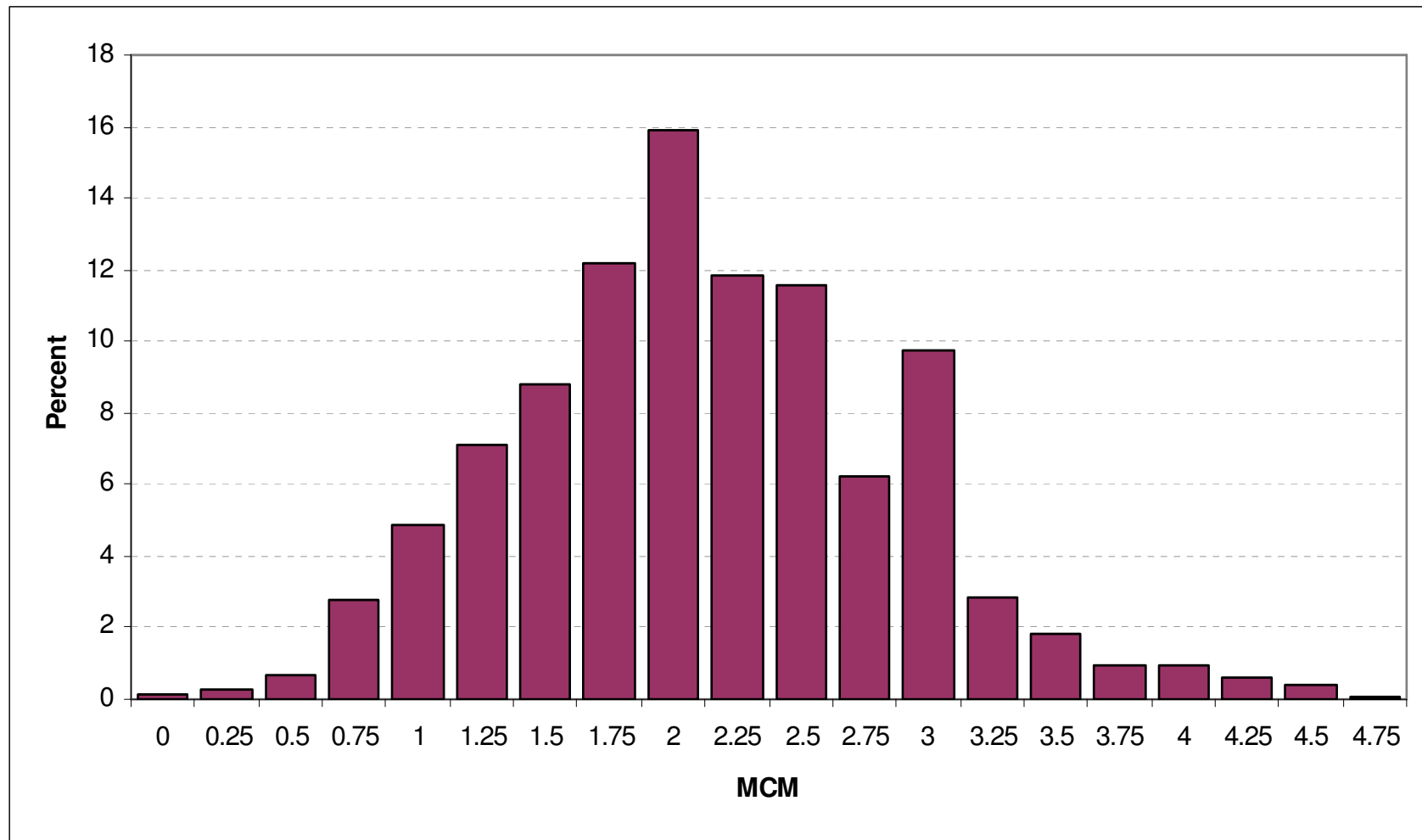
Leading Demand Indicator 2: Within day flow variation



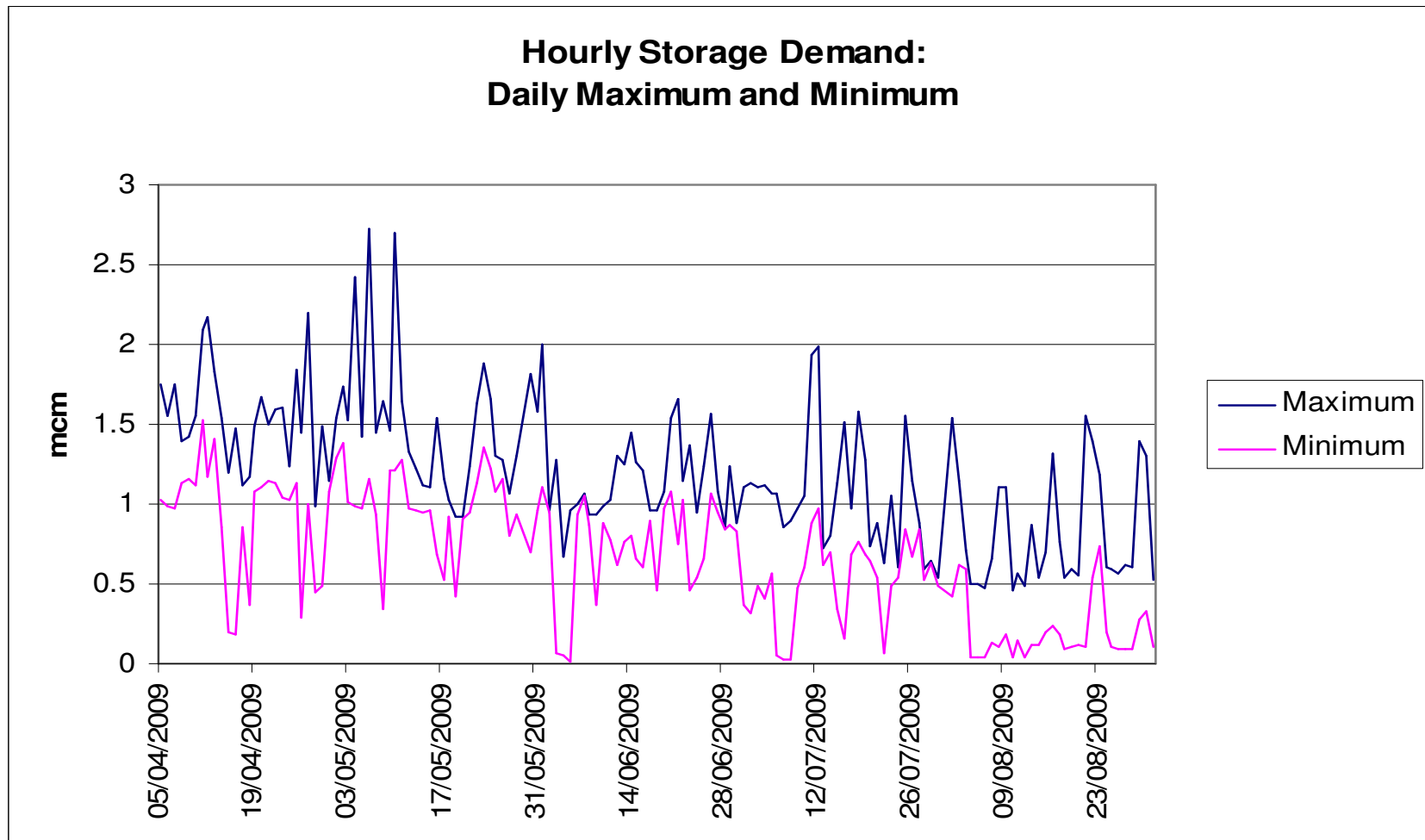
Leading Demand Indicator 2: Within day flow variation



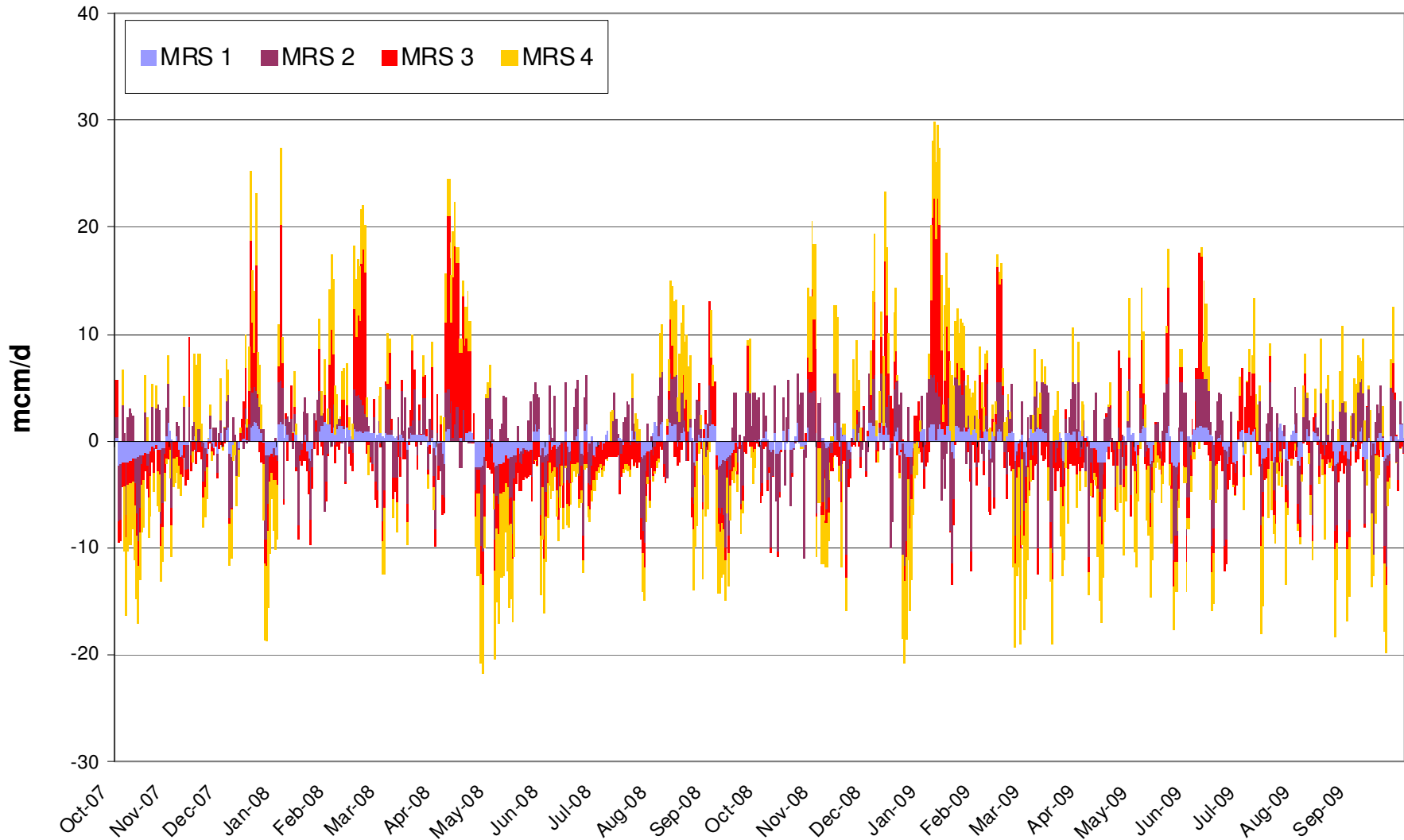
Modelling of within day flow variation by power stations in 2020



'Leading' Demand Indicator 2: Within day flow variation – storage



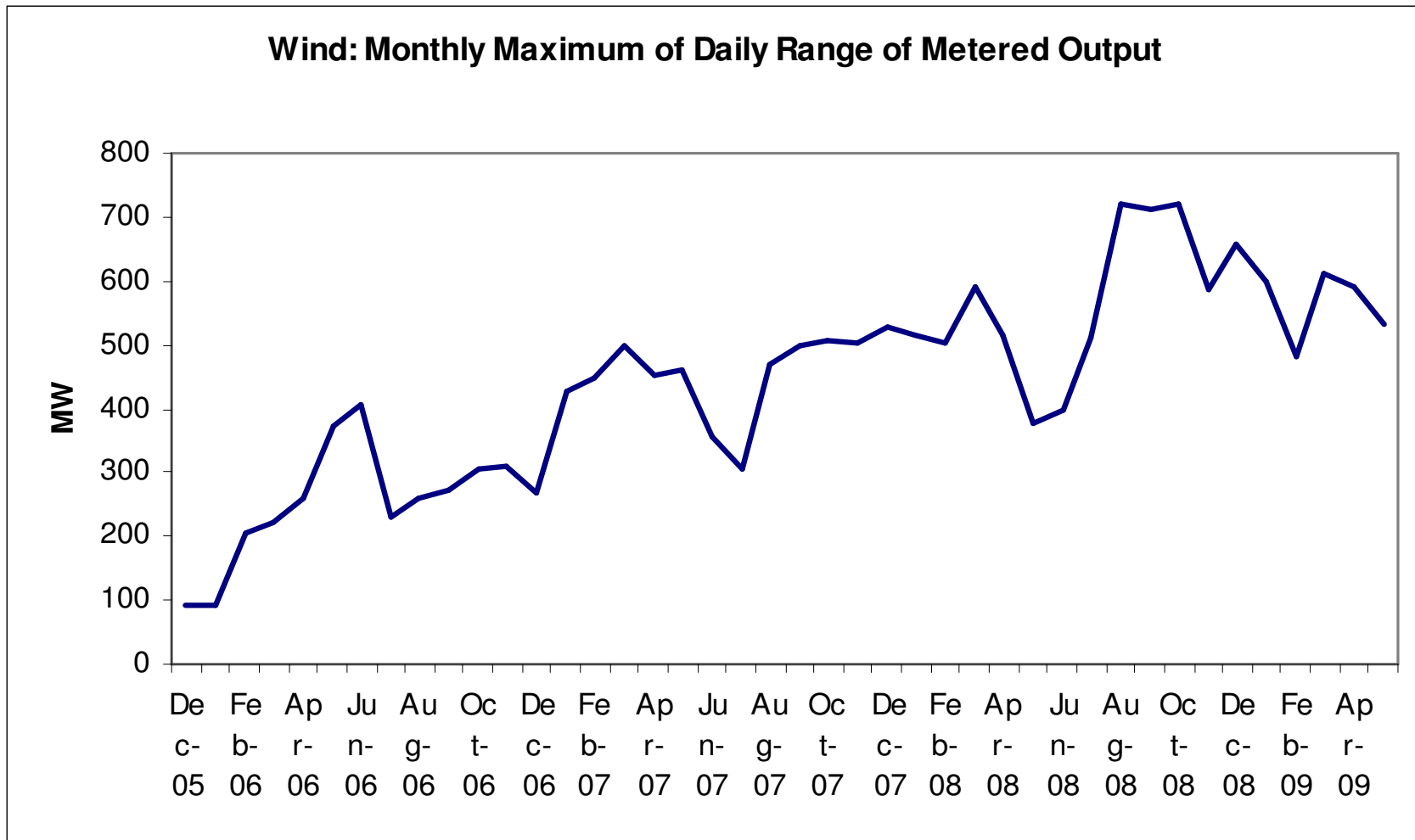
MRS volatility



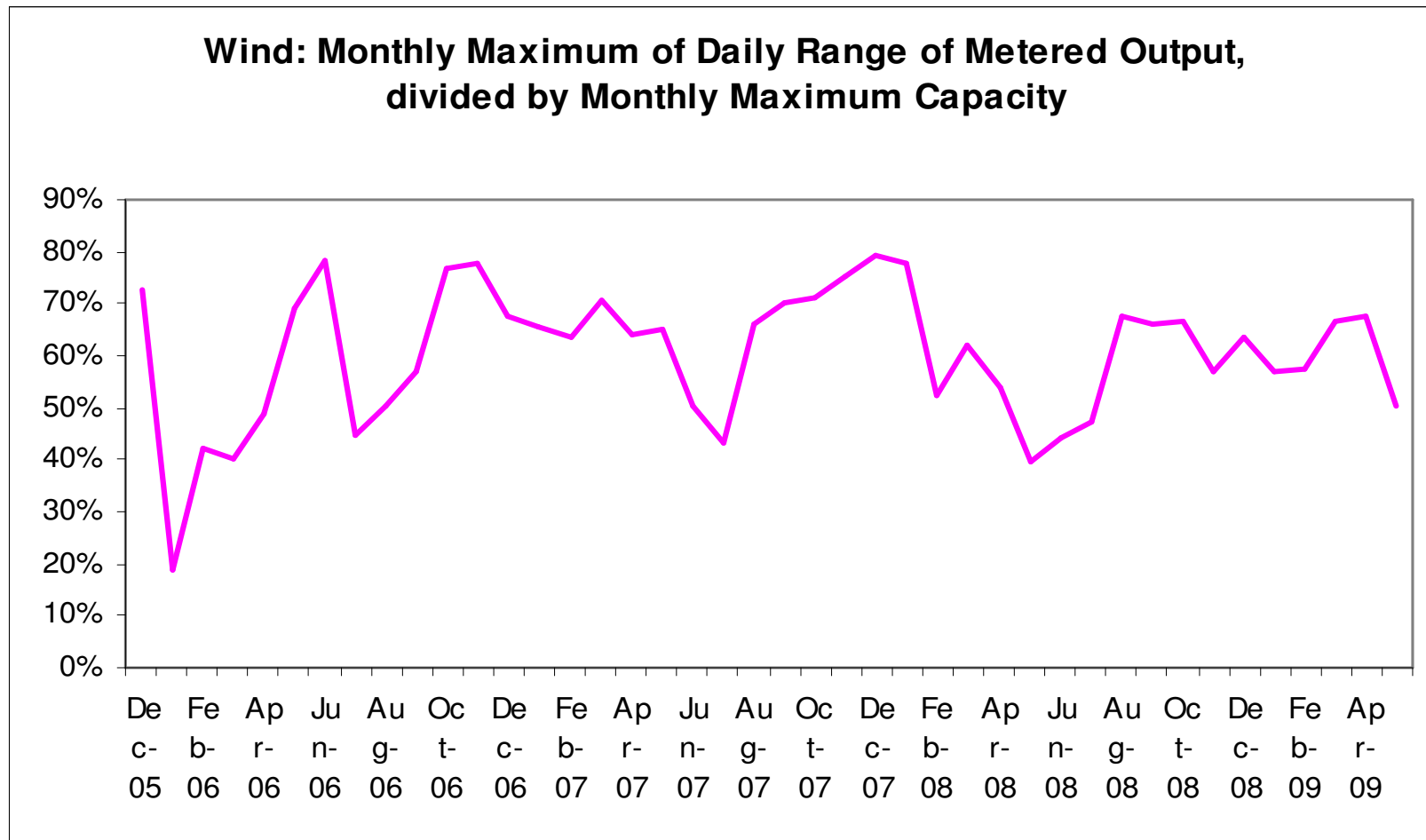
'Leading' Demand Indicator 3: Diurnal exit flexibility usage by demand sector

FLEX UTILIZATION BY Category						
For Gas Day 20/10/2009 D+6						
	Category					Total
	IND	INT	OT	PS	STOR	
Zonal Offtake: 06:00 to 22:00 (mcm)	9.69	19.93	108.25	51.19	0.16	189.22
End of Day Zonal Offtake (mcm)	14.38	27.63	160.25	73.58	0.25	276.09
Zonal Flex Utilization (mcm)	-0.04	1.21	-0.21	1.37	0.00	2.33

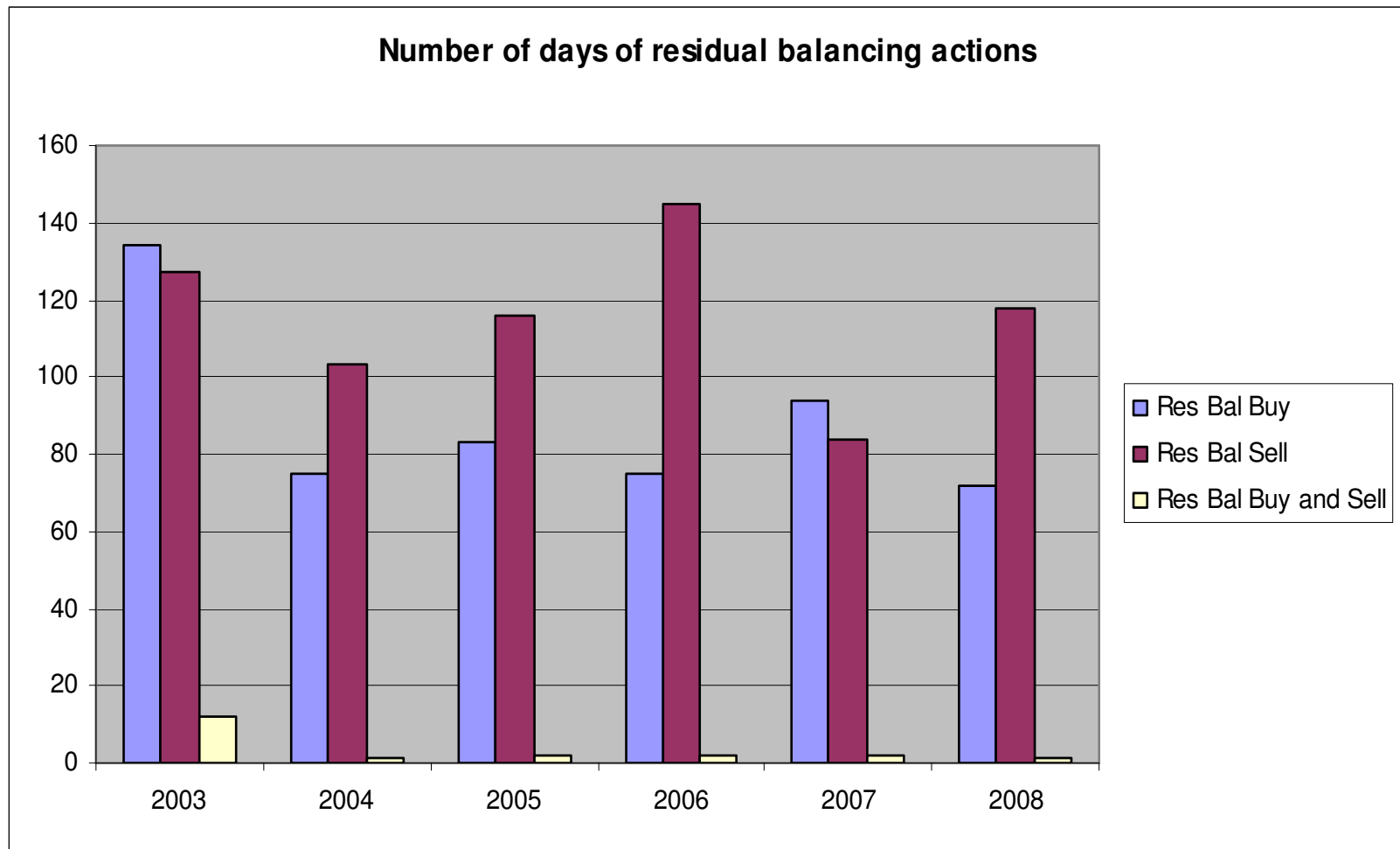
'Leading' Demand Indicator 4: Within day wind output variability



Leading Demand Indicator 4: Within day wind output variability



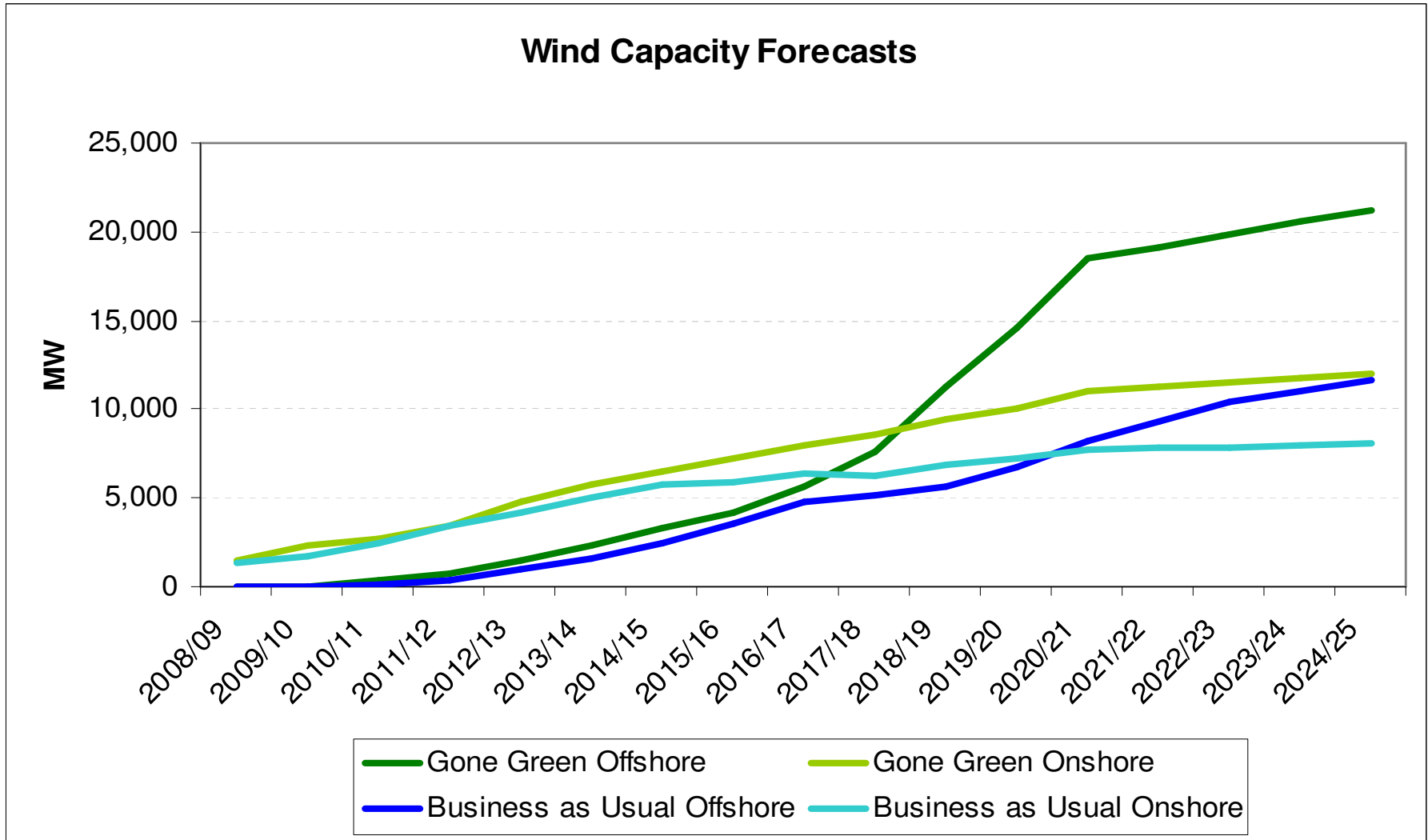
'Lagging' Demand Indicator: Residual Balancing Actions



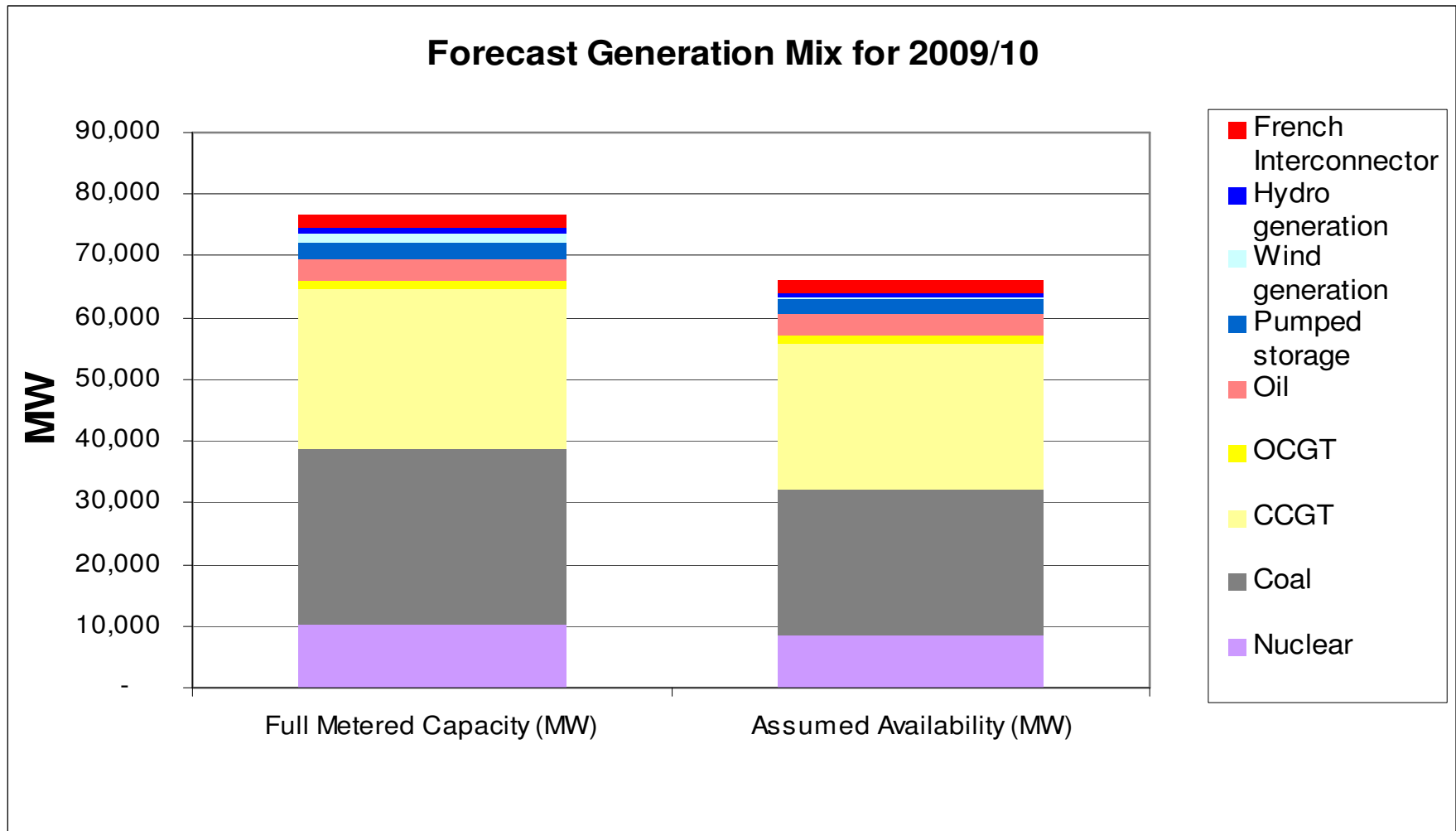
Other actions from the last workshop

- ◆ Scenarios around impact of wind on generation mix
 - ◆ Nearer term than 2020
 - ◆ ‘gone green’ levels of renewable generation not achieved
- ◆ What do our 2020 generation scenarios mean in terms of gas demand?

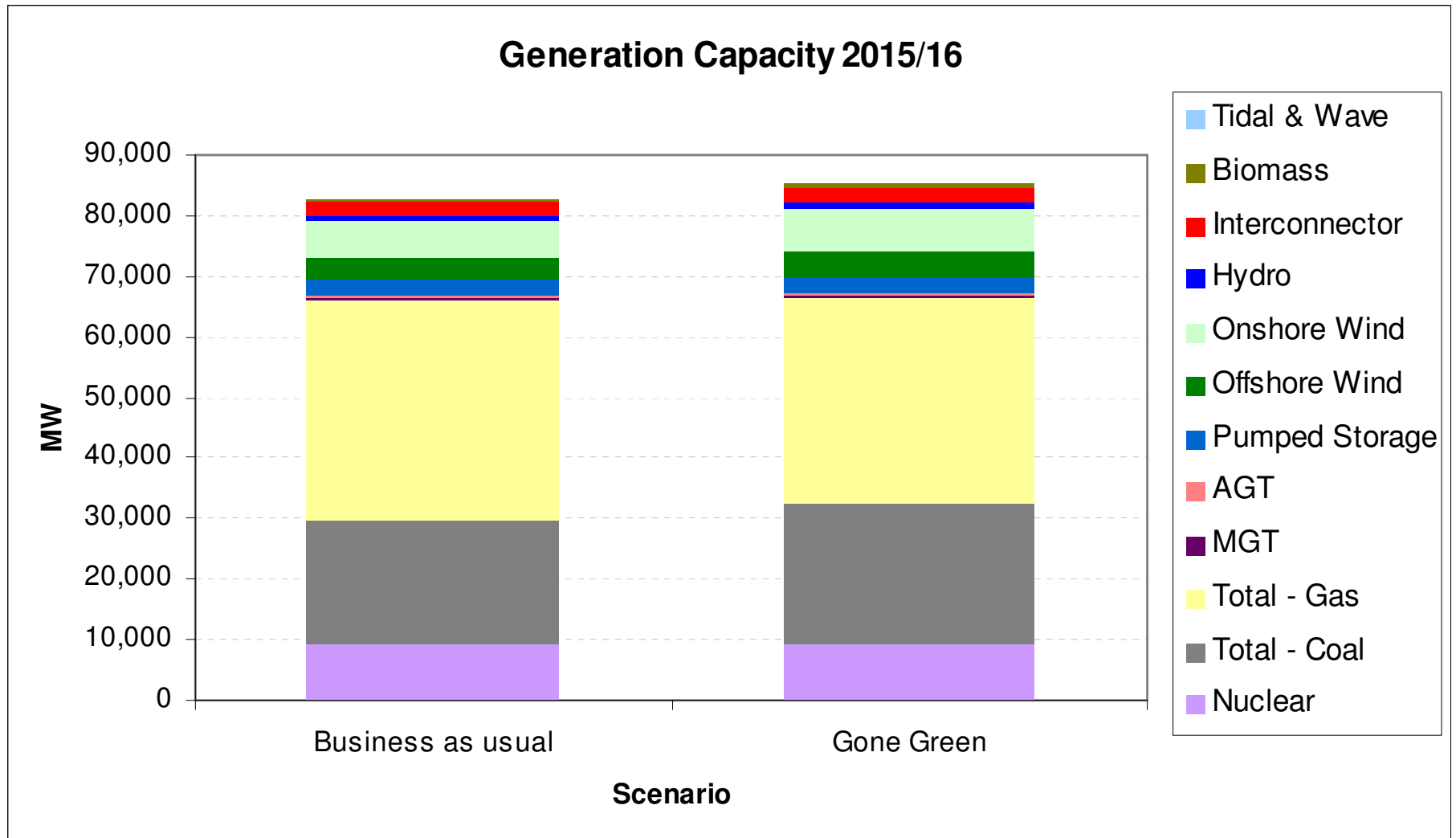
Wind Forecasts



Current Generation Mix

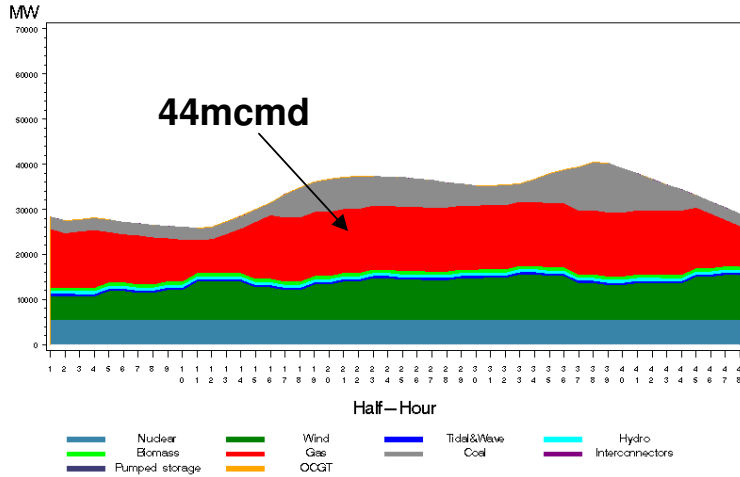


Generation Mix Forecast

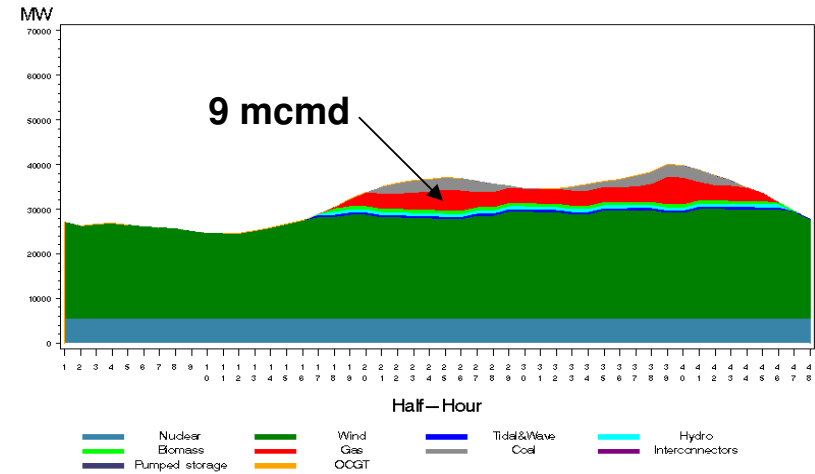


What do our 2020 Gone Green Scenarios mean in terms of CCGT gas demand? (Summer days)

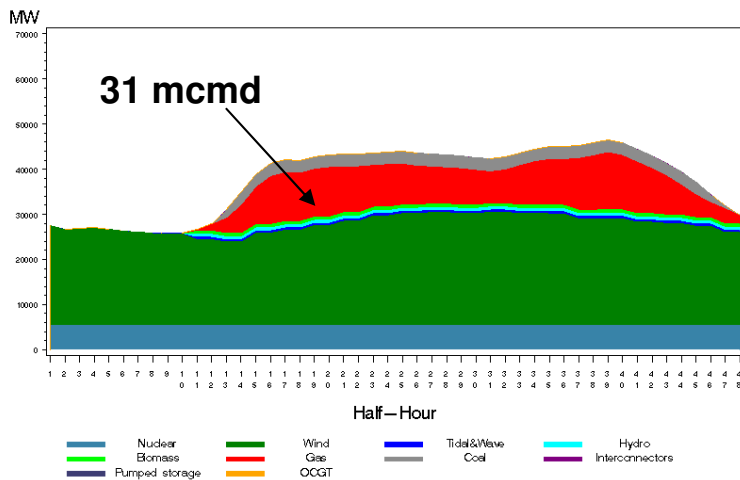
Half-hour electricity generation
sy= 2003 date= 12SEP21 dowshift= 1



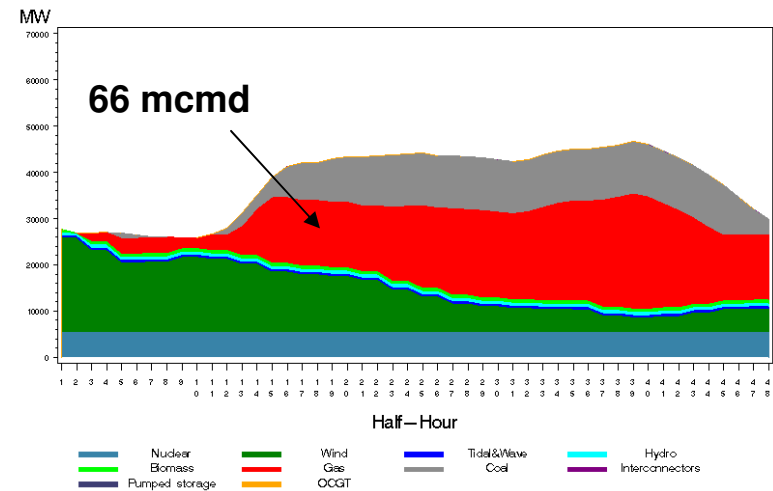
Half-hour electricity generation
sy= 2003 date= 13SEP21 dowshift= 1



Half-hour electricity generation
sy= 2003 date= 14SEP21 dowshift= 1



Half-hour electricity generation
sy= 2003 date= 15SEP21 dowshift= 1



Conclusions

- ◆ Limited case for regime change / additional system management tools now
- ◆ Potentially long leadtimes to develop and implement any solutions
- ◆ We won't predict the future perfectly, but use of 'indicators' can inform the possible scenarios
- ◆ Industry views on these proposals?

Way Forward

- ◆ Consider feedback on proposed indicators from today's meeting
- ◆ Ofgem consultation expected later this month
- ◆ Indicators published in January
- ◆ Periodic updates on the indicators at Operational Forum – first one post this Winter
- ◆ No fixed timeframe for monitoring

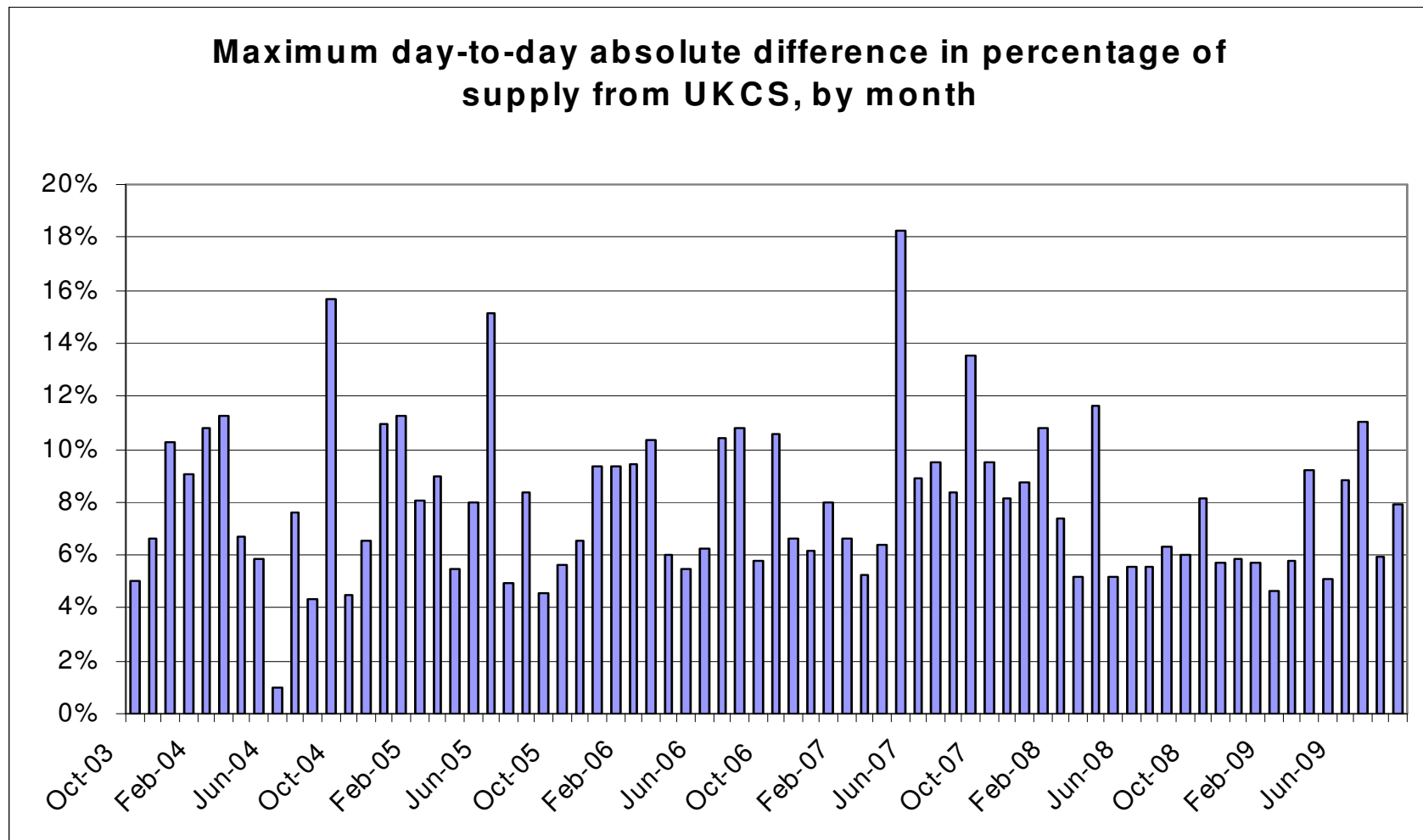
Appendix

Supplementary Datasets

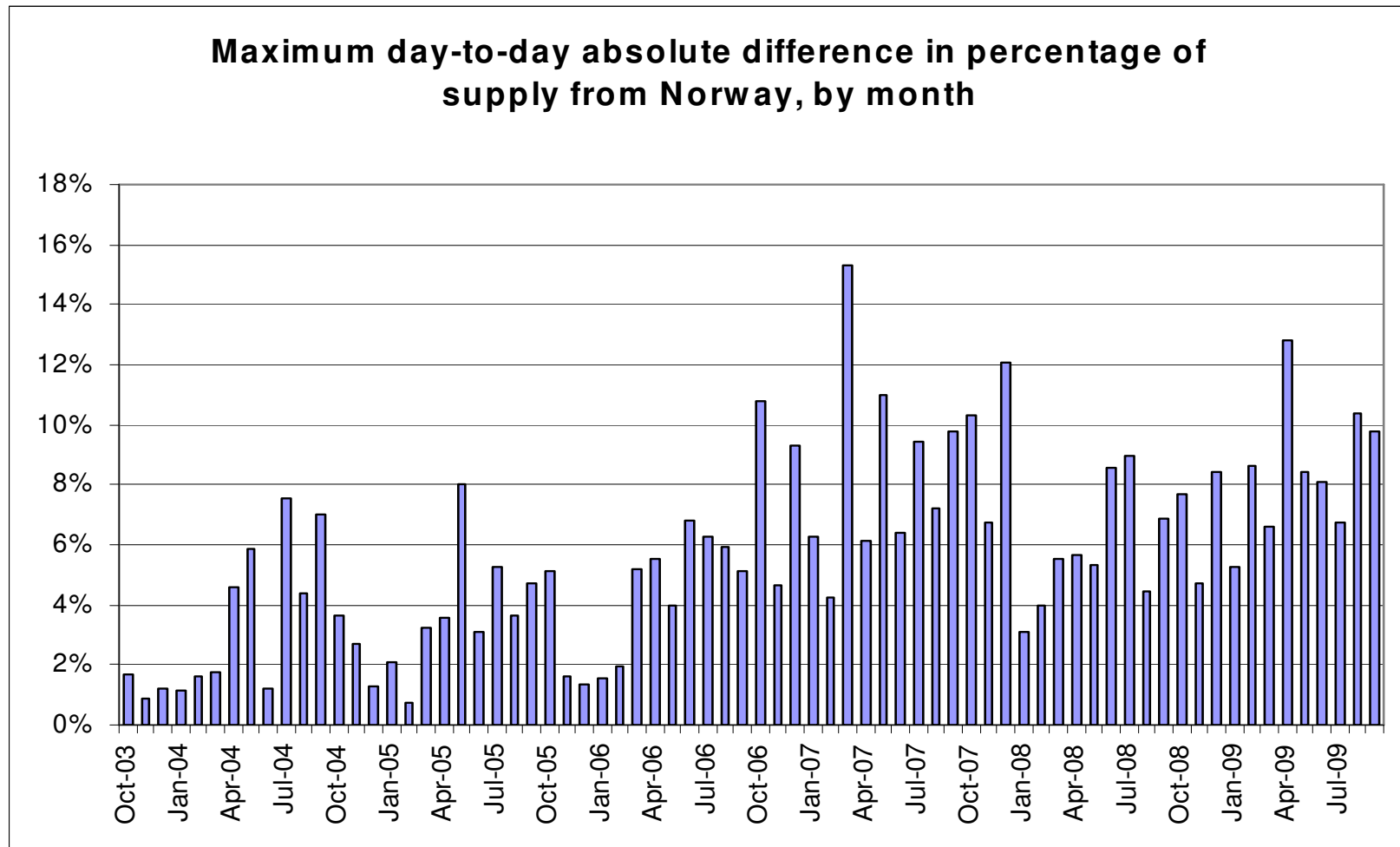
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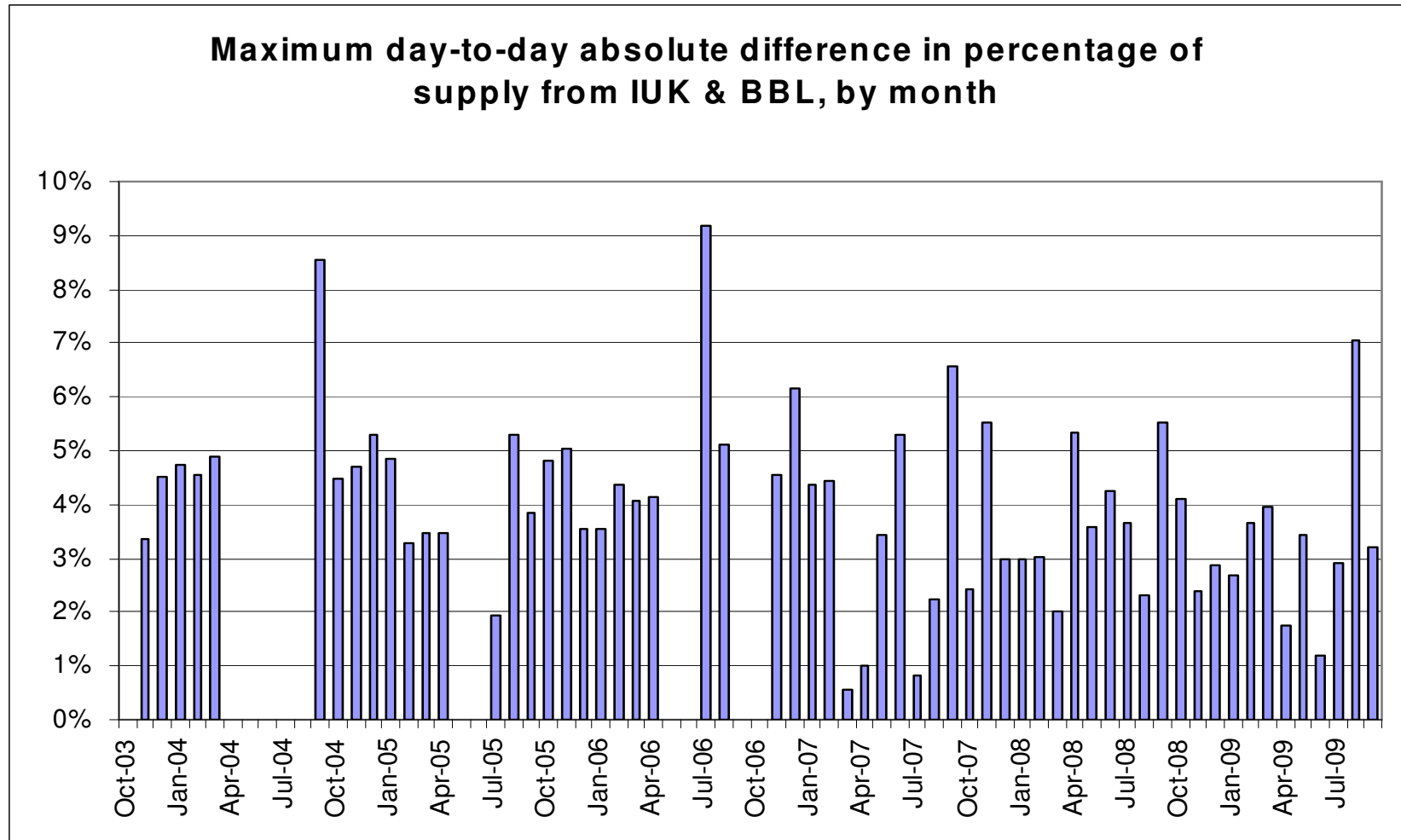
'Leading' Supply Indicator 2: Percentage of demand accounted for by supply group



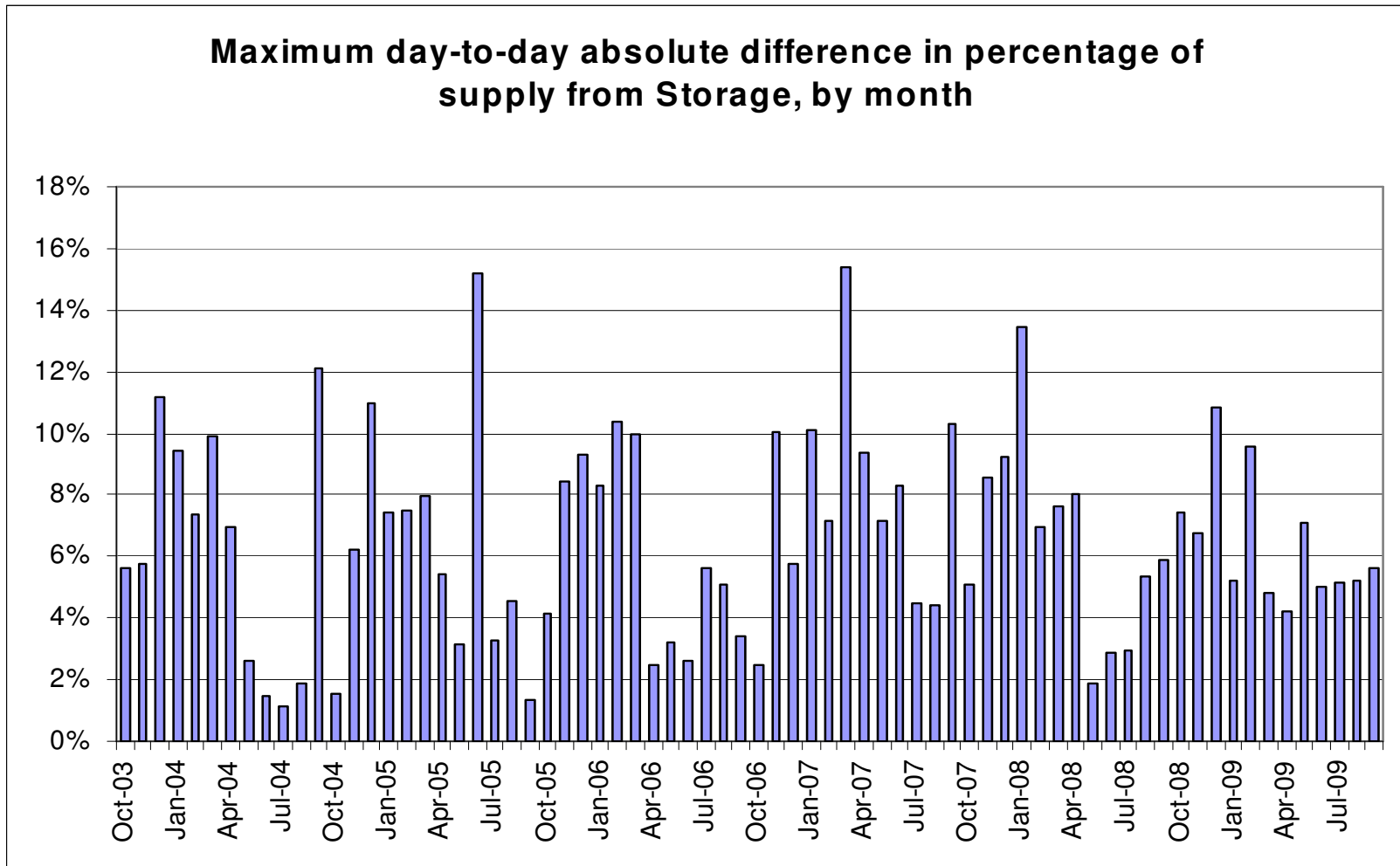
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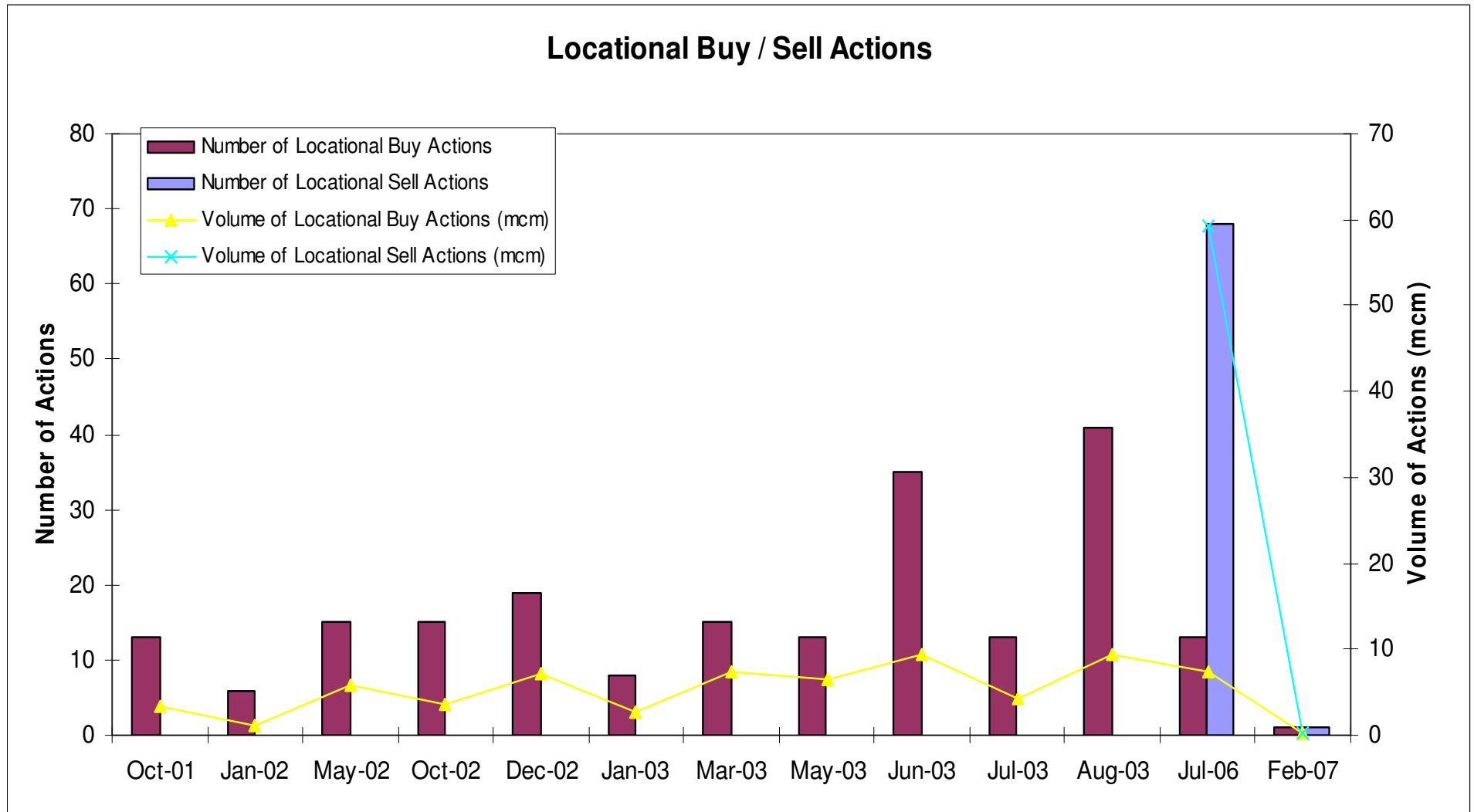
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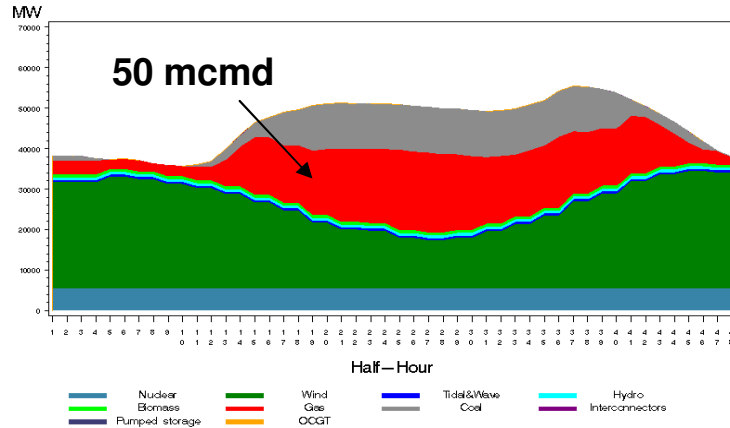
Locational Balancing Actions



What do our 2020 Gone Green Scenarios mean in terms of CCGT gas demand? (Winter days)

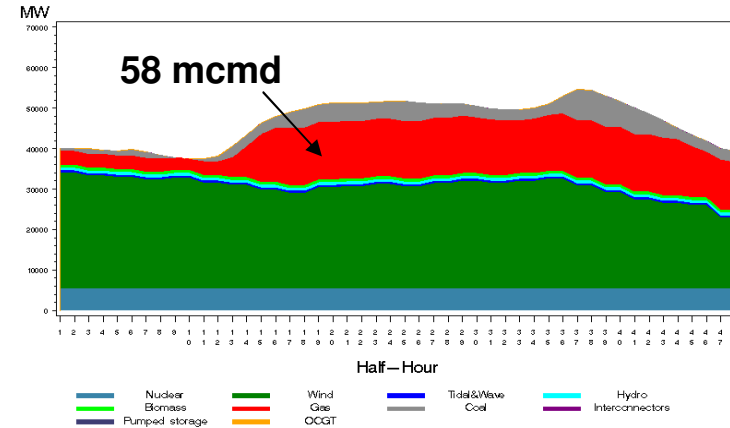
Half-hour electricity generation

sy= 2001 date= 19FEB21 dowshift= 1



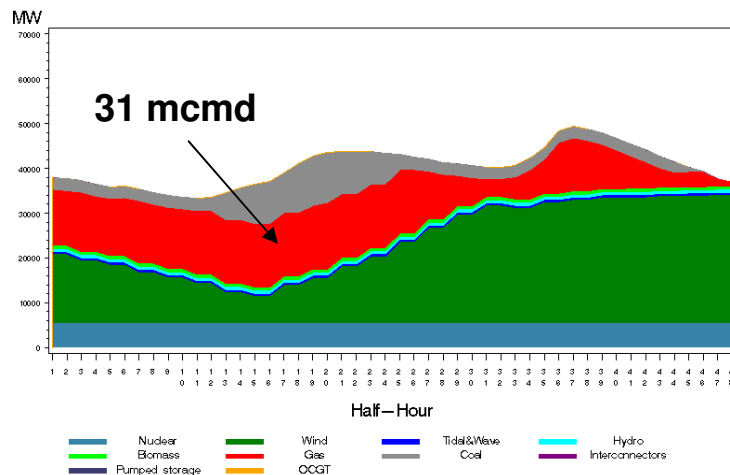
Half-hour electricity generation

sy= 2001 date= 20FEB21 dowshift= 1



Half-hour electricity generation

sy= 2001 date= 21FEB21 dowshift= 1



Half-hour electricity generation

sy= 2001 date= 22FEB21 dowshift= 1

