System Flexibility
Final Proposals on Indicators

Transmission Workstream, 4th February 2010

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Background

- 2 workshops held last year (June & Nov)* covering:
  - Definition of Flexibility
  - Drivers
  - Indicators
- November workshop discussed draft indicators
- Purpose today is to share our final proposals
- A ‘two phase release’ is proposed as further work is necessary in some areas

http://www.nationalgrid.com/uk/Gas/OperationalInfo/operationaldocuments/SystemFlexibility/

Presentation Content

- System Flexibility definition
- Final views on key drivers
- Phase 1 Indicators
- Phase 2 Indicators
- Way forward
- Appendix – phase 1 graphs

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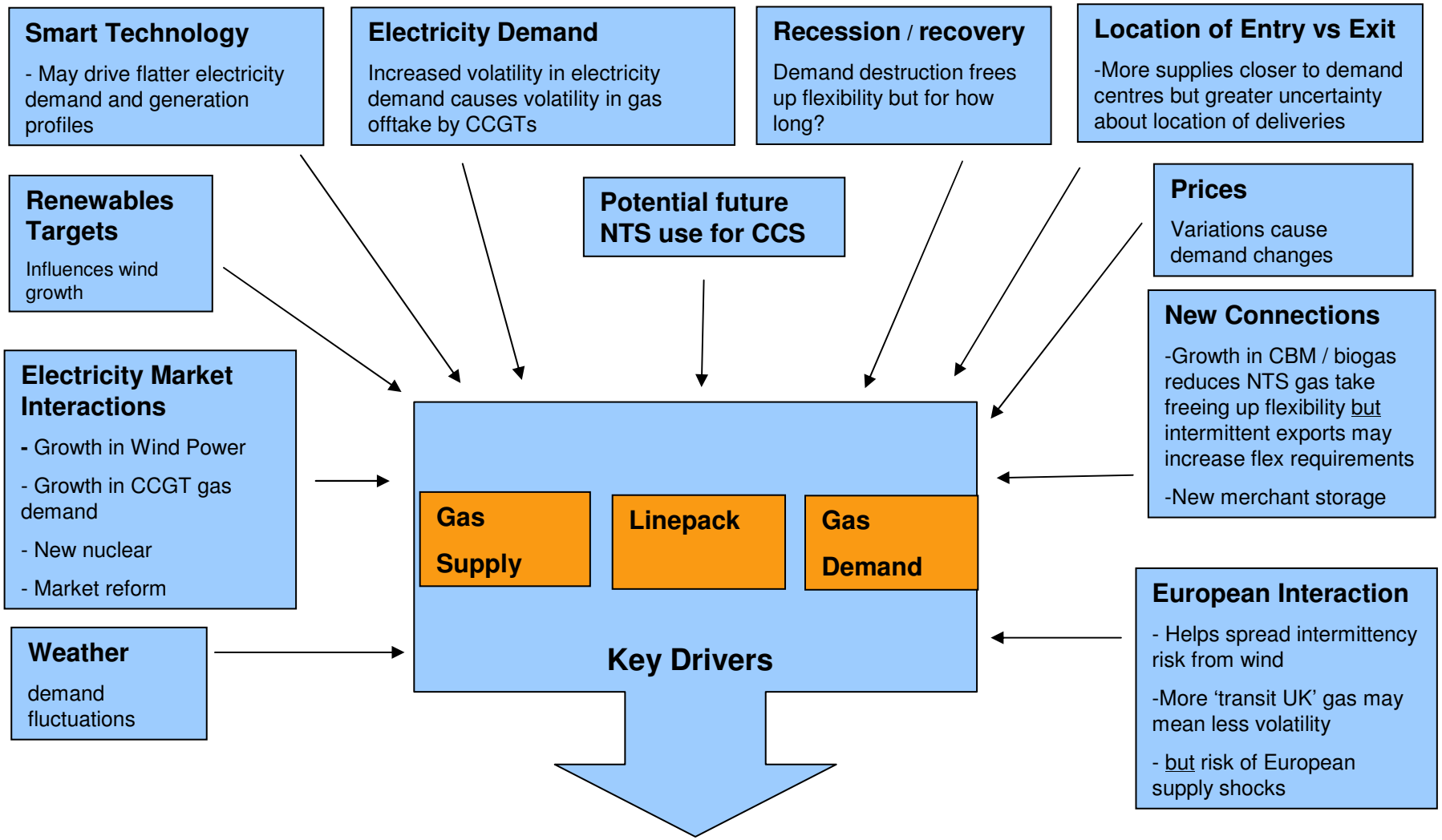
System Flexibility Definition

- The ability of the NTS to manage supply and demand mismatch without compromising safety
  - Manifests within day at a system level through:
    - linepack changes (national energy imbalance)
    - local pressure variations
  - Manifests within day at individual points on the system as flow variation from 1/24th across the day
  - Manifests across days as changes in system configuration caused by changes in the location and rate of supplies and changes in demand

Key Drivers and Influences



‘Leading’ Indicators – Phase 1

Supply

1) Day on day difference in supply from Northern and Southern ASEPs
2) Day on day difference in supply by group

Linepack

1) Maximum daily range of within day linepack changes
2) Frequency of linepack changes at particular thresholds
3) Hourly zonal linepack

Demand

1) Within day demand variation by sector

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‘Lagging’ Indicators – Phase 1

Supply

1) Use of Operating Margins gas
2) Use of entry buybacks
3) Use of entry scalebacks

Supply & Demand

1) Residual balancing frequency
2) Residual balancing volumes
3) Residual balancing costs

Phase 2 Indicators (in development)

Supply

1) Within day changes in supply vs forecast and actual demand
2) DFN correlations to within day supply flows
3) Investigate additional locational indicators

Demand

1) Correlation of OPNs to demand

Other

1) Correlate forecast wind output with actual
2) Investigate accuracy of wind forecasts and implications for leadtimes
3) Compressor usage patterns

Way Forward

- Phase 1 indicators are included in this slide pack and will be updated for the May 2010 Operational Forum
- Phase 1 and Phase 2 indicators to be reported to the November 2010 Operational Forum and at 6 month intervals thereafter.

Appendix

Phase 1 Indicators

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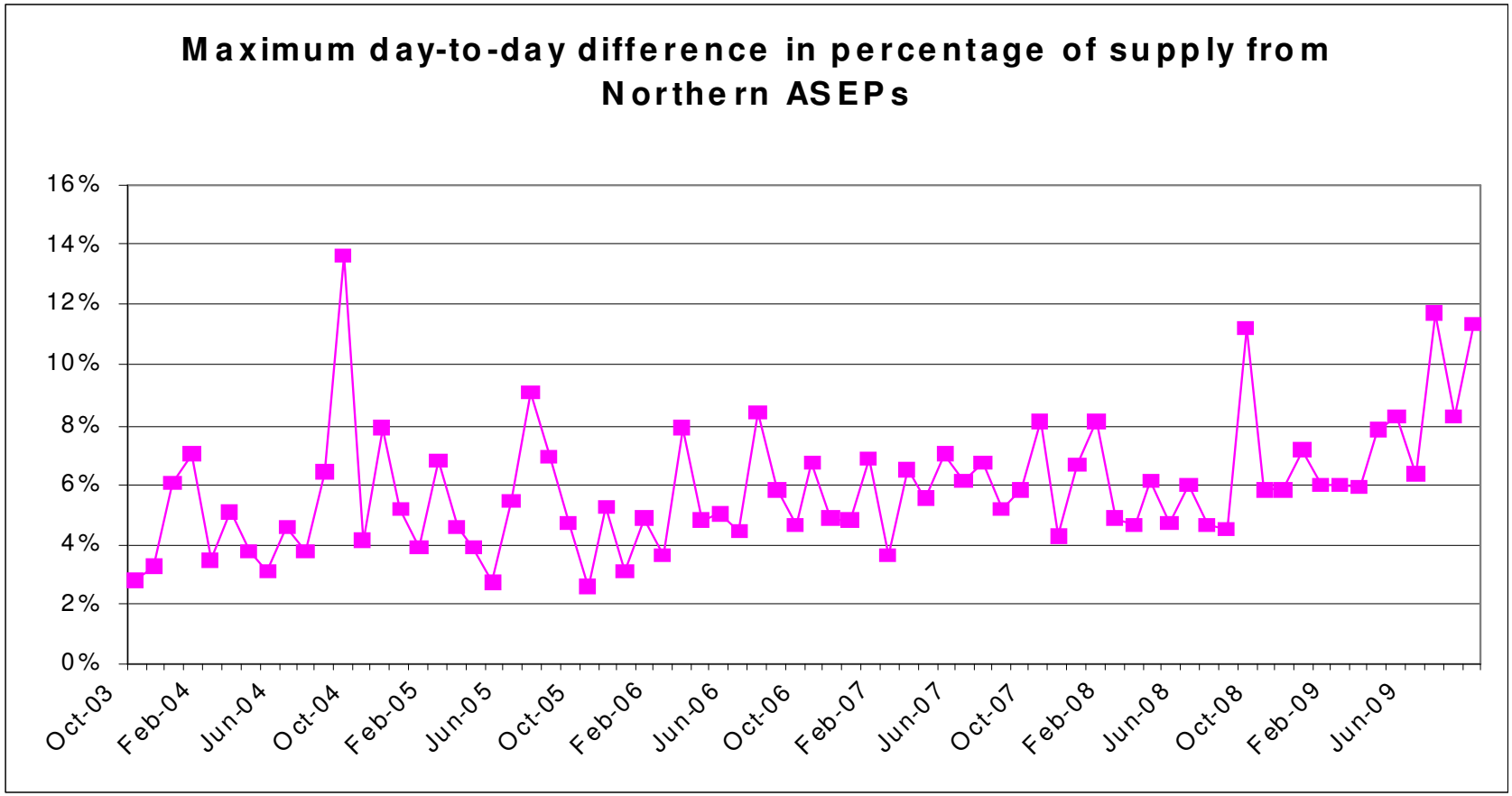
‘Leading’ Supply Indicator 1:
Day to Day North / South Supply Volatility



This graph shows the maximum day on day change per month in the percentage of total supply from Northern ASEPs. Eg. if on one day 255 mcmd came from North and 117 mcmd from South (68% from North) then on the next day 257 mcmd came from North and 102 mcmd from South (71% from North), the day to day percentage change would be 3%. If this was the highest in that month, 3% would be plotted on the graph.

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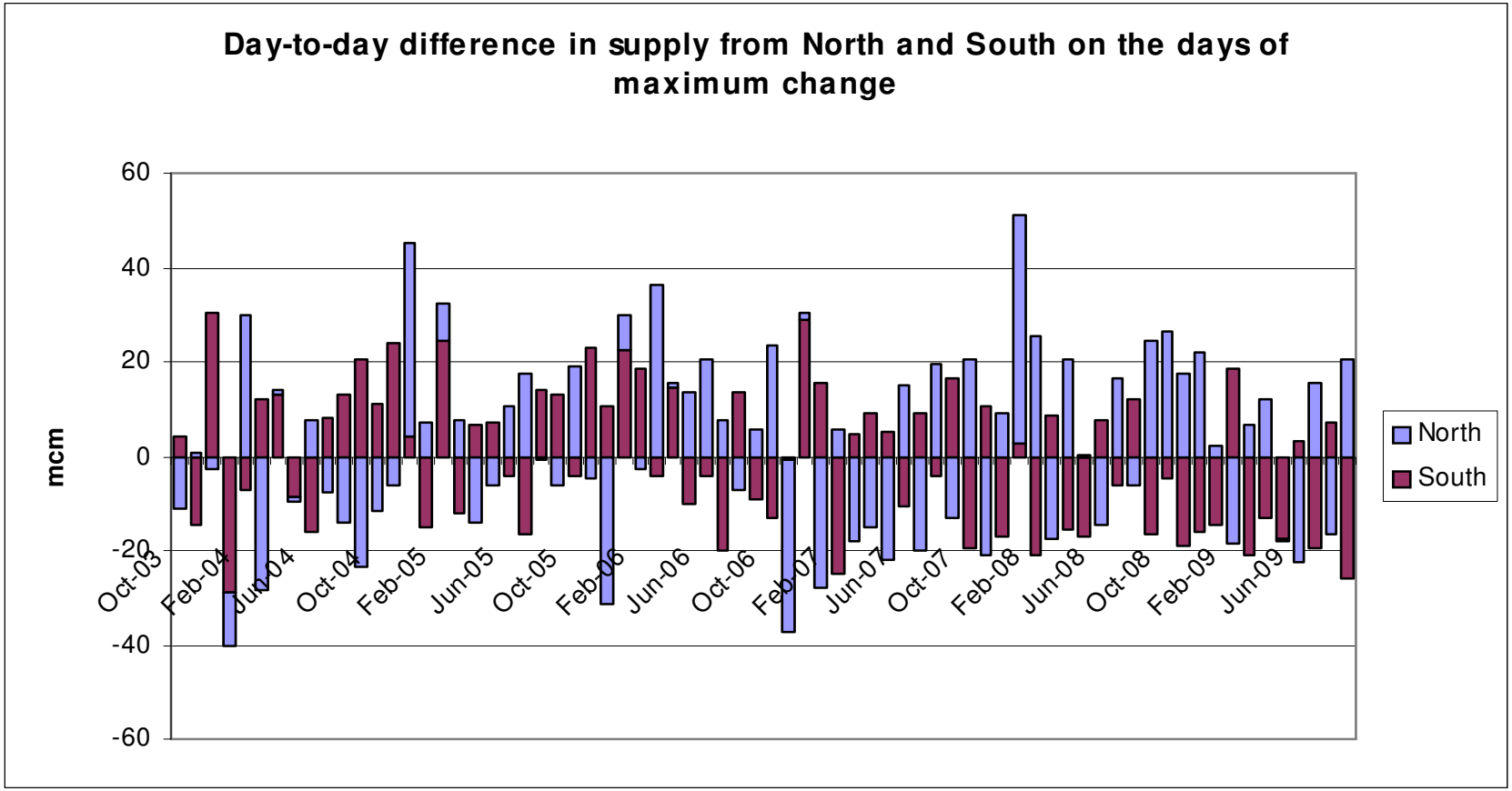
‘Leading’ Supply Indicator 1:
Day to Day North / South Supply Volatility



This graph shows the associated volume changes from the previous graph. Using the example numbers from the previous graph, +2 mcmd would be plotted against 'North' and -15 mcmd against 'South'.

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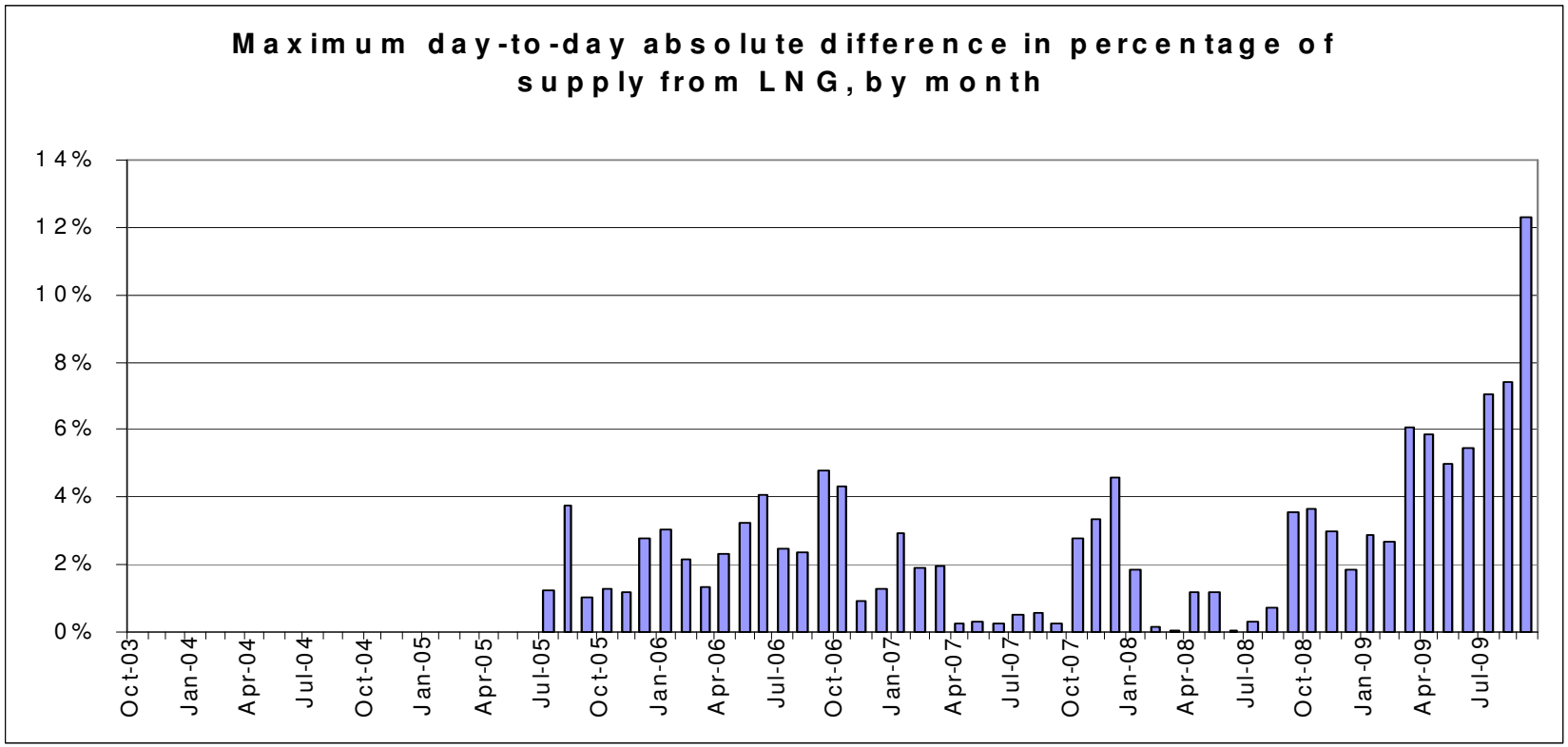
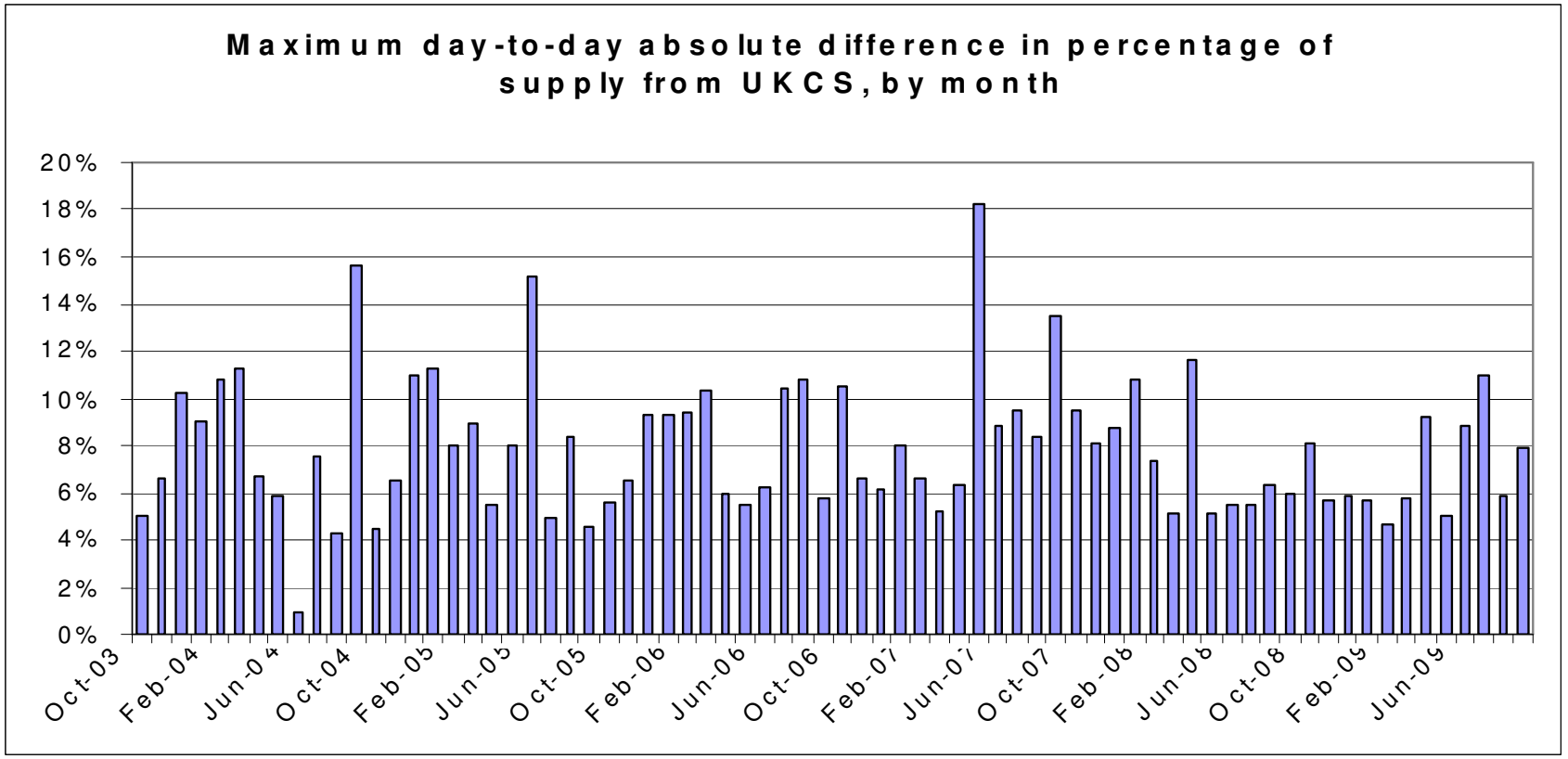
‘Leading’ Supply Indicator 2: Percentage of supply accounted for by group



This (and the following 3 graphs) shows the maximum day on day change per month in the percentage of total supply from different supply groups. Eg. if the supply from LNG was 50 mcmd on a day and 35 mcmd on the next day against total NTS supplies of 380 mcmd (13%) and 370 mcmd (9%) respectively, the day to day percentage change would be 4%. If this was the highest in that month, 4% would be plotted on the graph.

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



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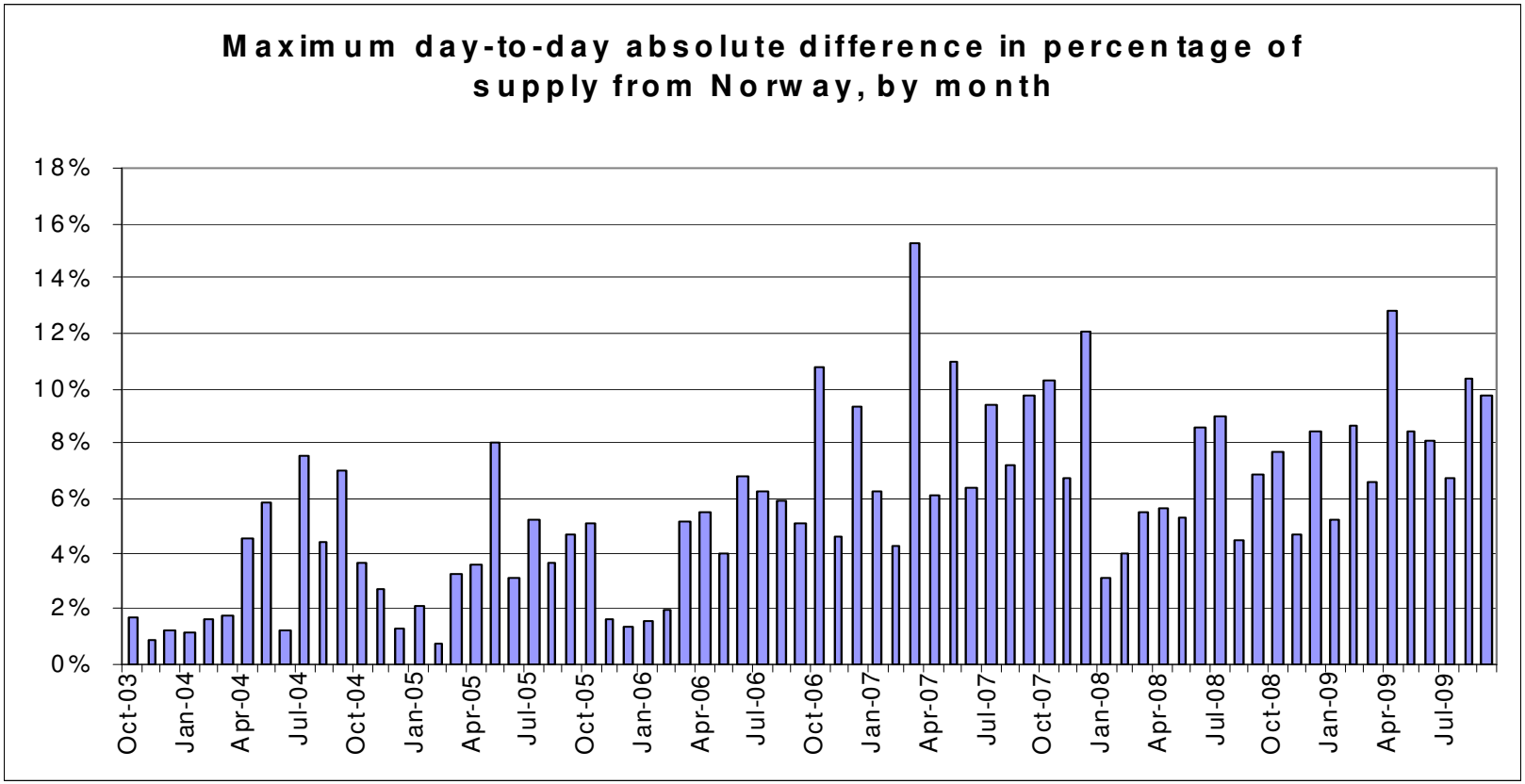
‘Leading’ Supply Indicator 2: Percentage of supply accounted for by group



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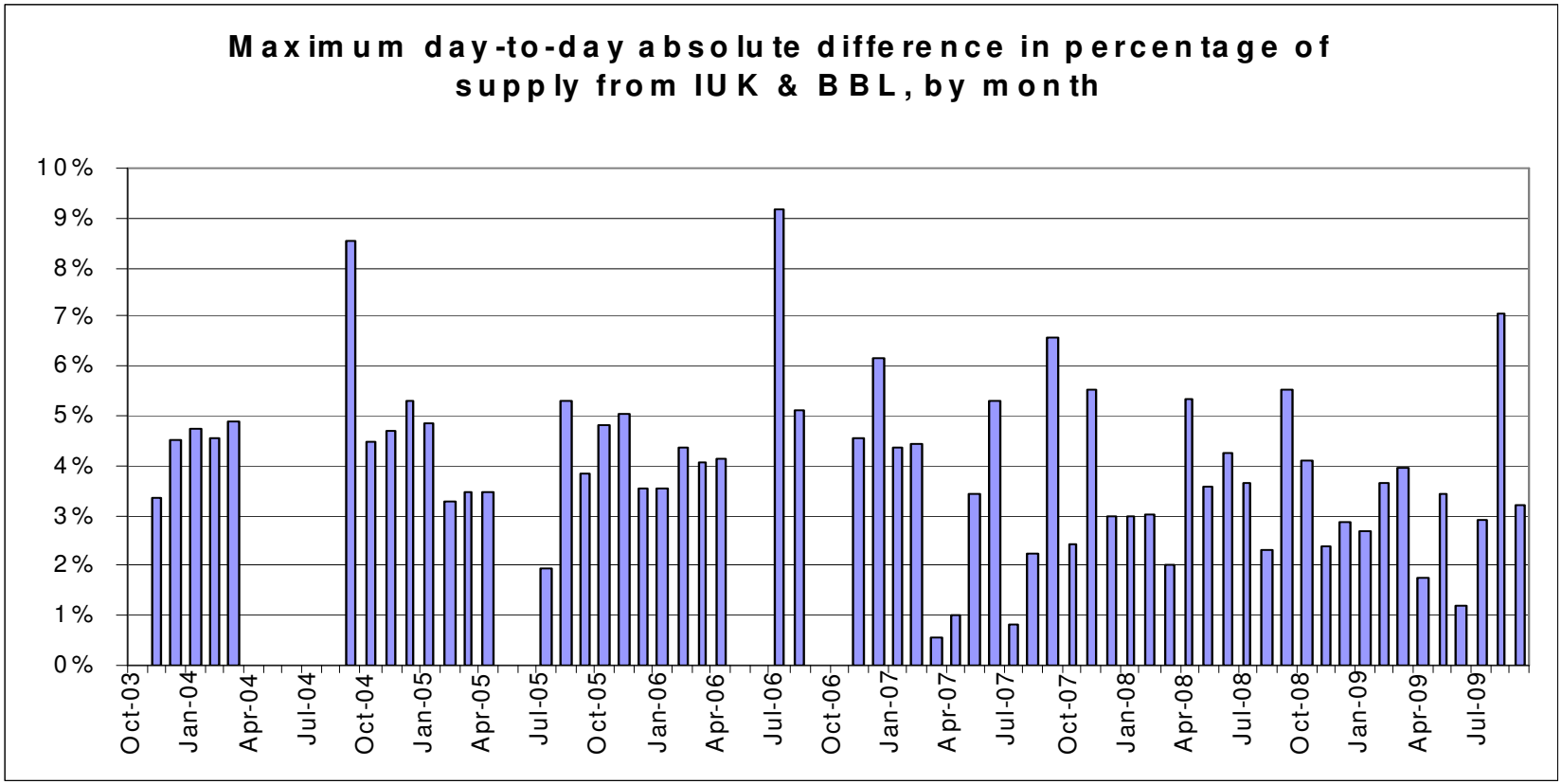
‘Leading’ Supply Indicator 2: Percentage of supply accounted for by group



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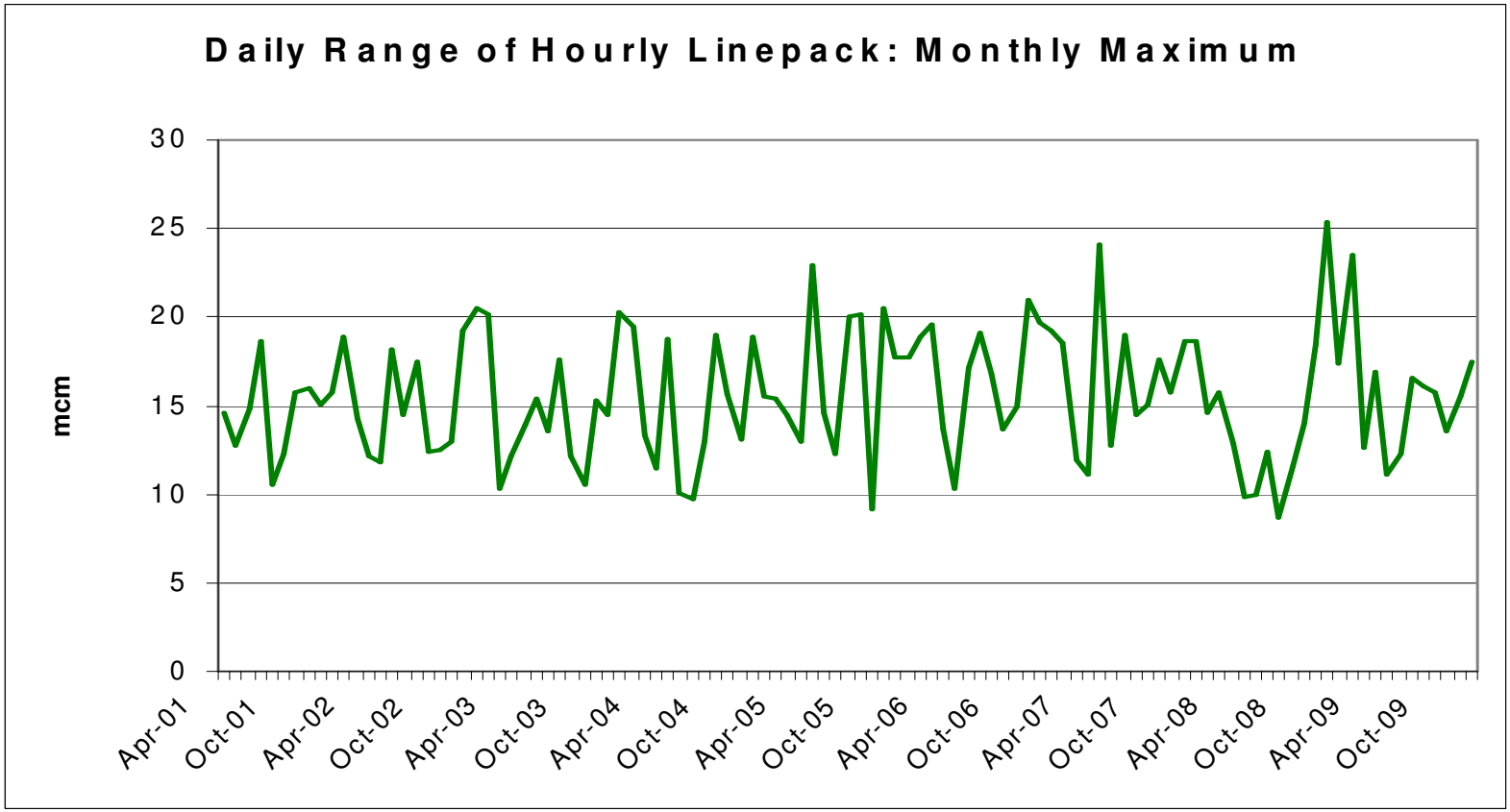
Leading Linepack Indicator 1:
Maximum daily range of within day changes



This graph plots the maximum range on any day in each month between the highest and lowest hourly NTS linepack. Eg. if the highest hourly linepack recorded was 330 mcm and the lowest was 315 mcm on the same day and that constituted the largest daily range in that particular month, 15 mcm would be plotted on the graph for that month.

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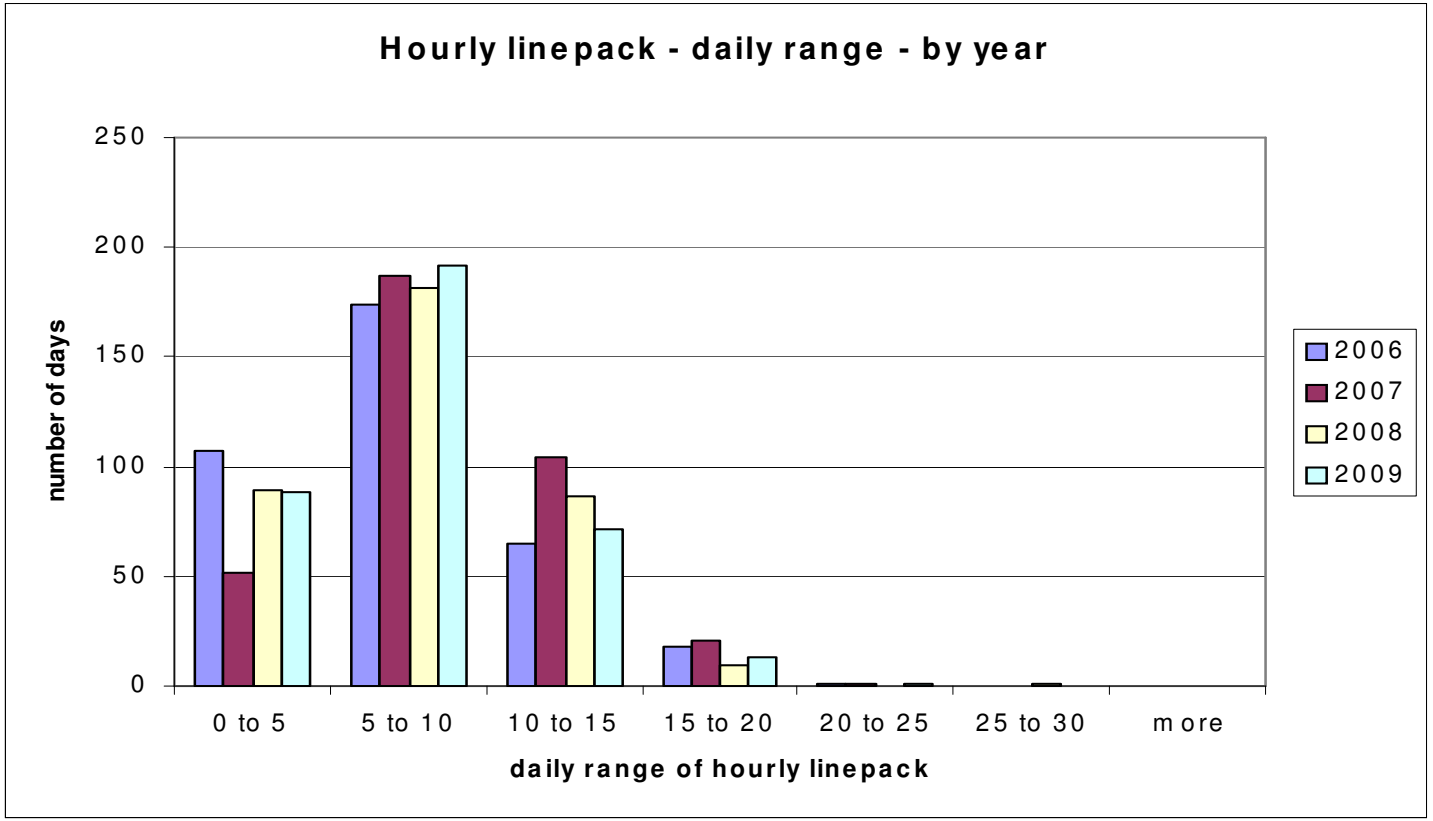
Leading Linepack Indicator 2: Frequency of within day changes



This graph shows, for the last 4 years, the distribution of the maximum daily range of hourly linepack. Eg. In 2006, the maximum daily range was less than 5 mcmd on just over 100 days, was between 5 and 10 mcm on approximately 175 days etc.

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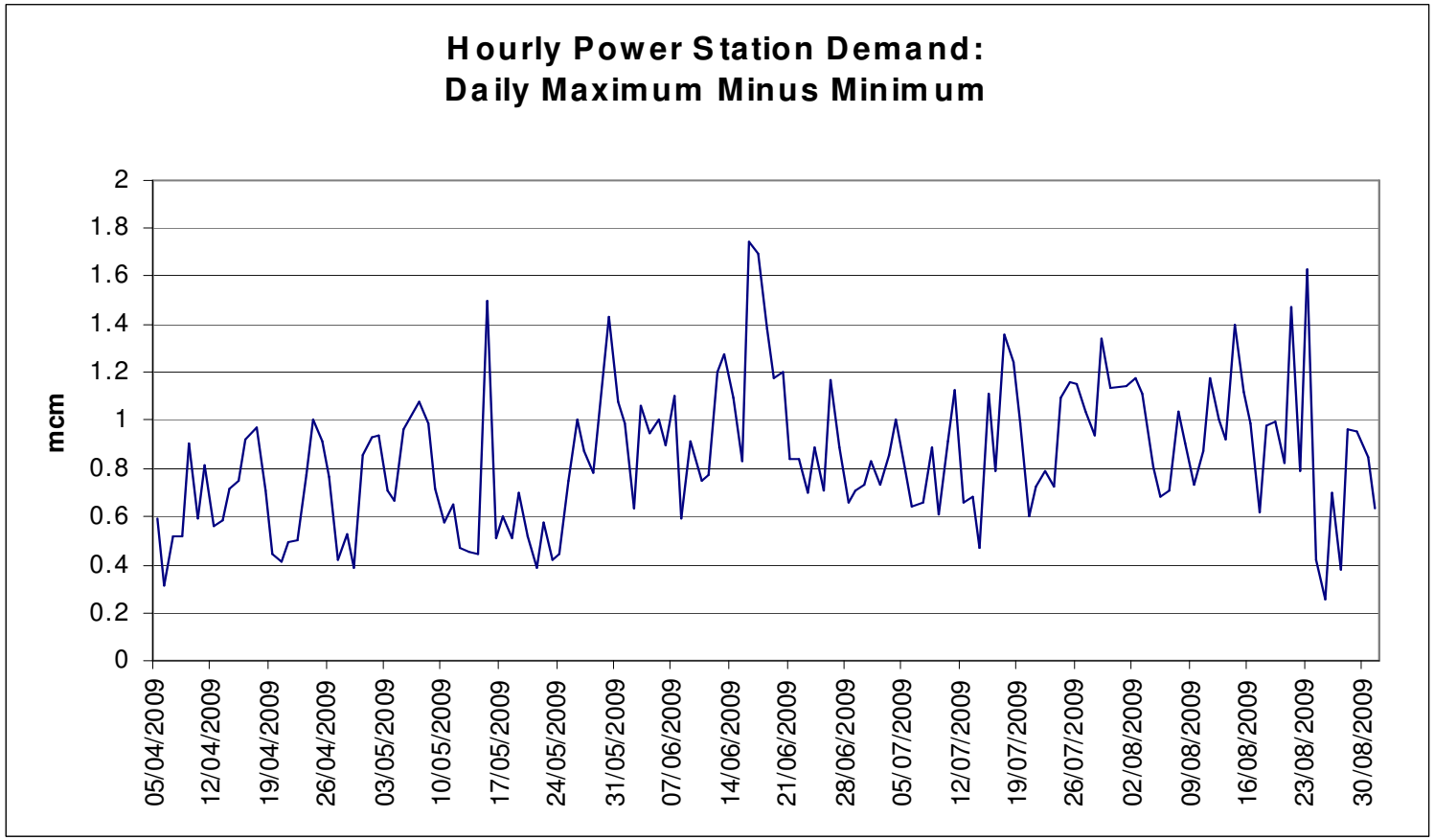
Leading Demand Indicator 1: Within day demand variation by sector



This graph (and the next 3) shows the difference between the hourly maximum gas offtake and hourly minimum gas offtake for each demand sector on each day.

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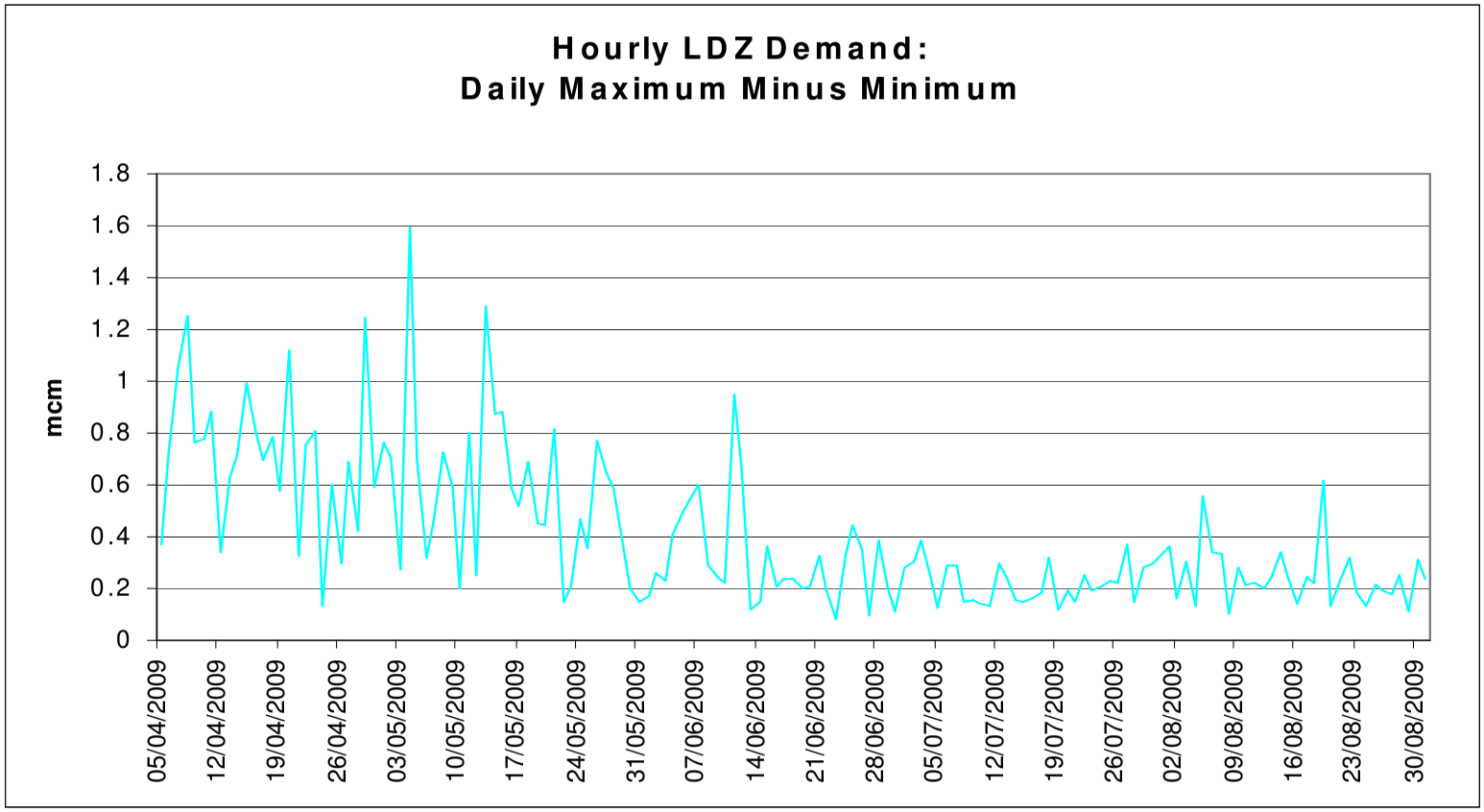
Leading Demand Indicator 1:
Within day demand variation by sector



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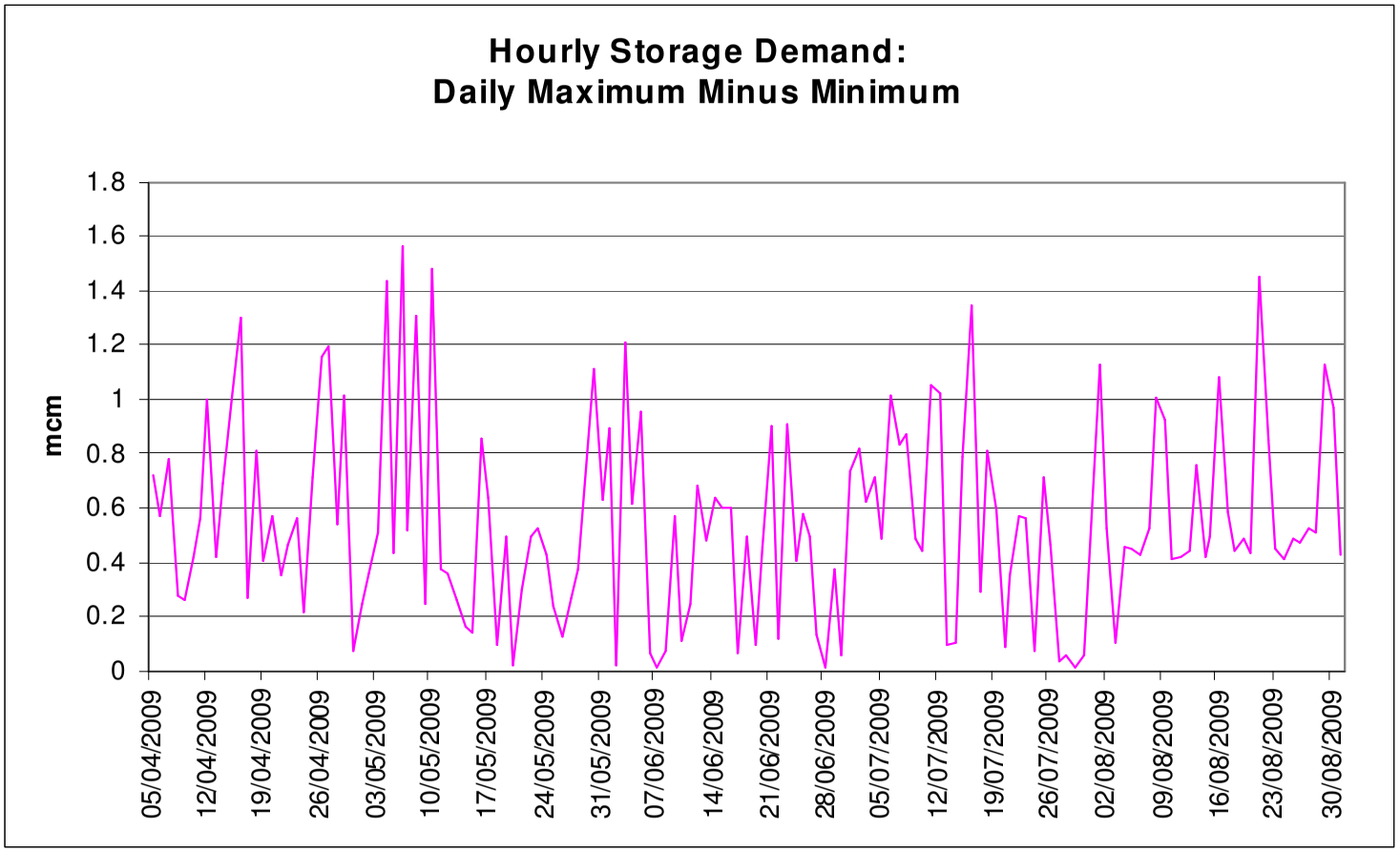

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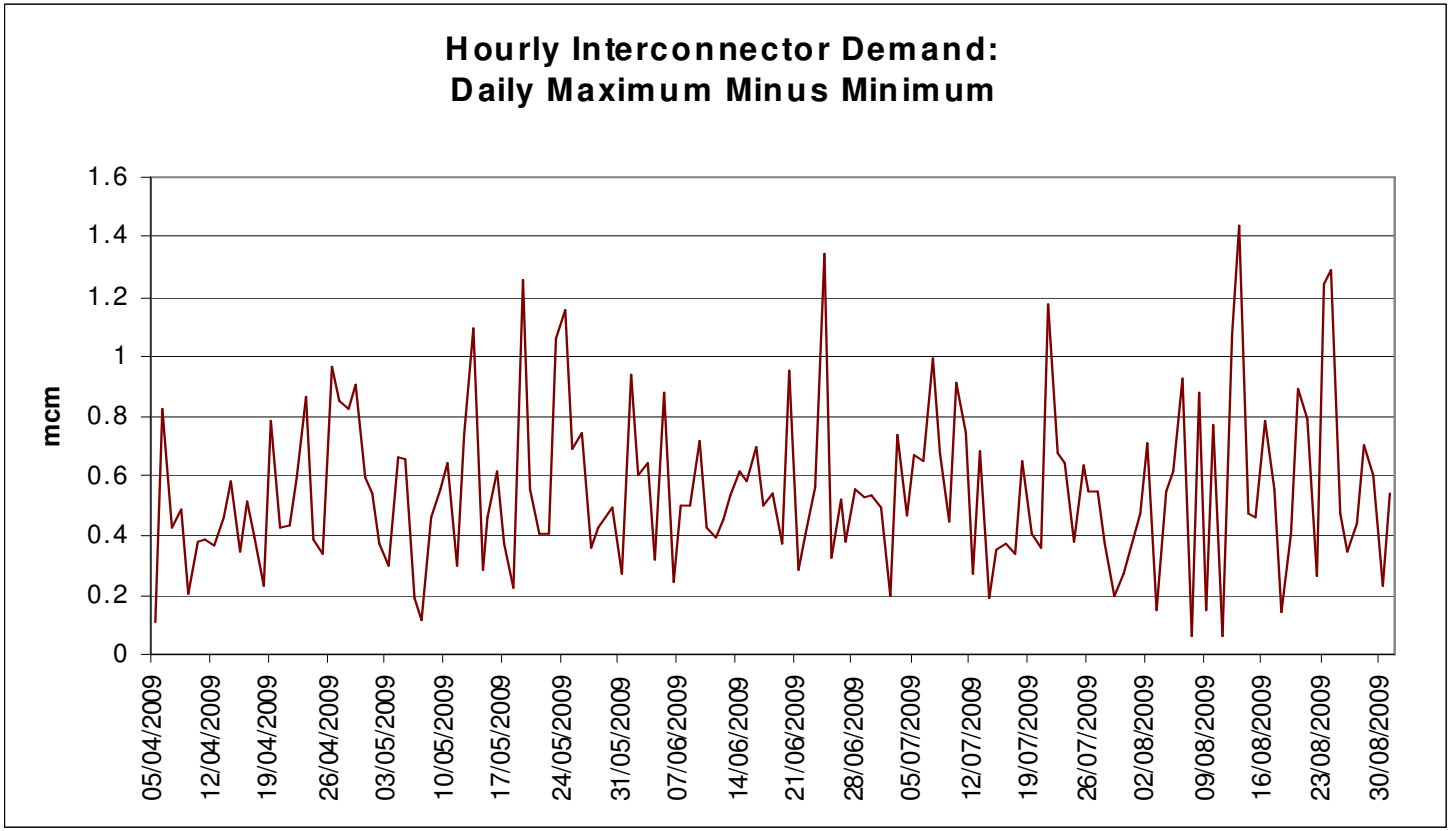

This graph shows the difference between the hourly maximum gas offtake and hourly minimum gas offtake for IUK and Moffat interconnectors.

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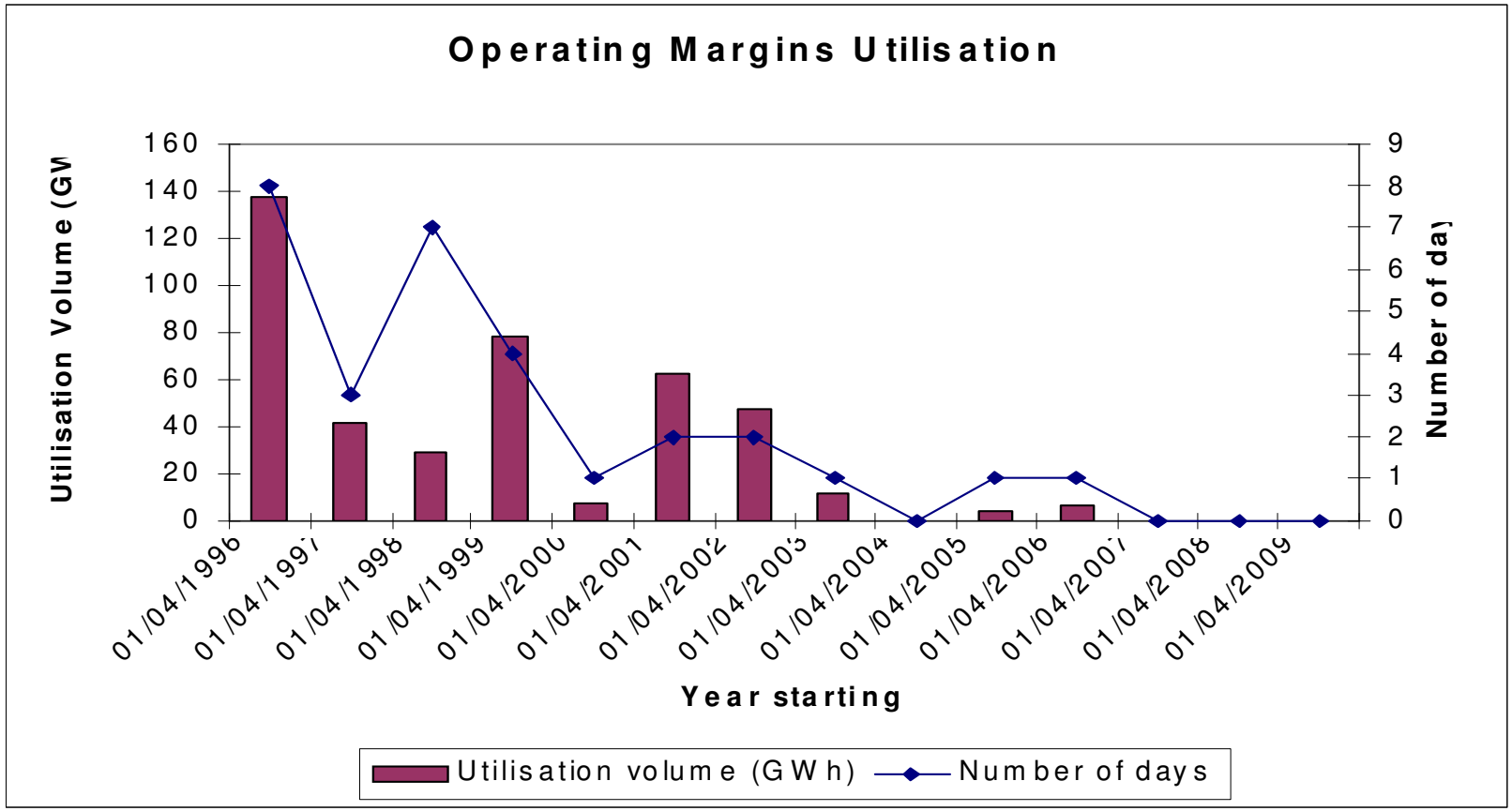
Lagging Supply Indicator 1:
Use of Operating Margins Gas



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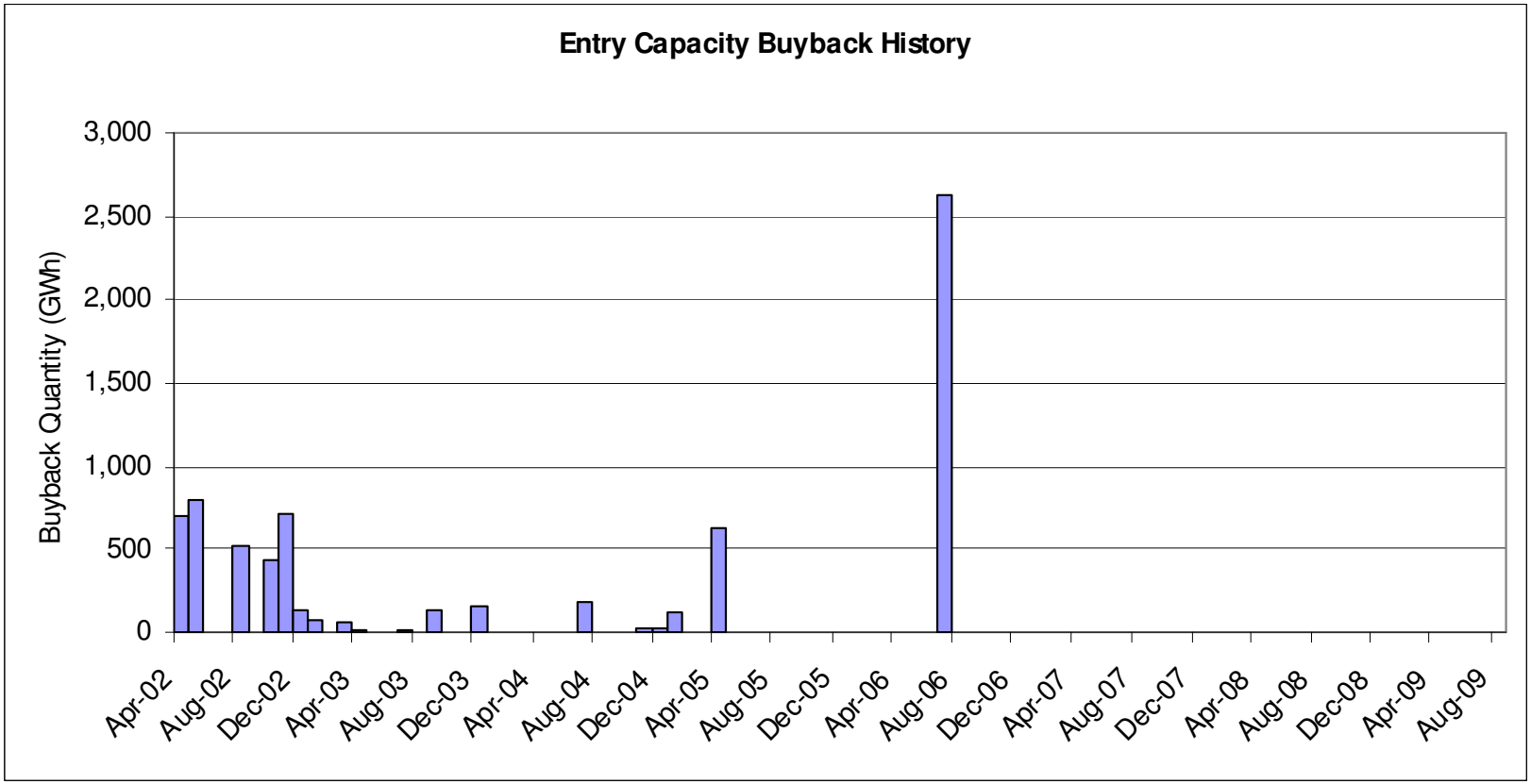
Lagging Supply Indicator 2:
Entry Capacity Buybacks



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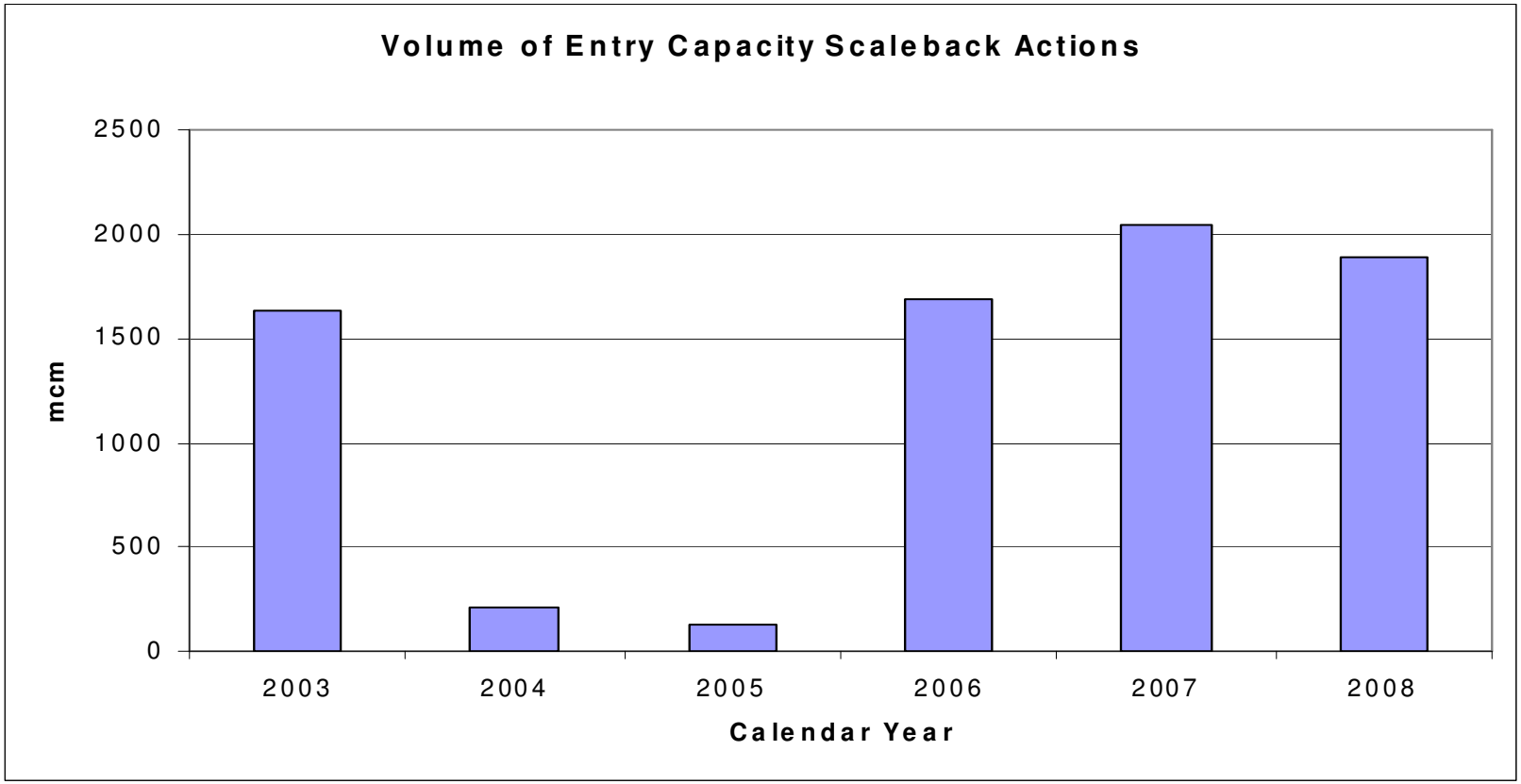
Lagging Supply Indicator 3:
Interruptible Entry Capacity Scaleback



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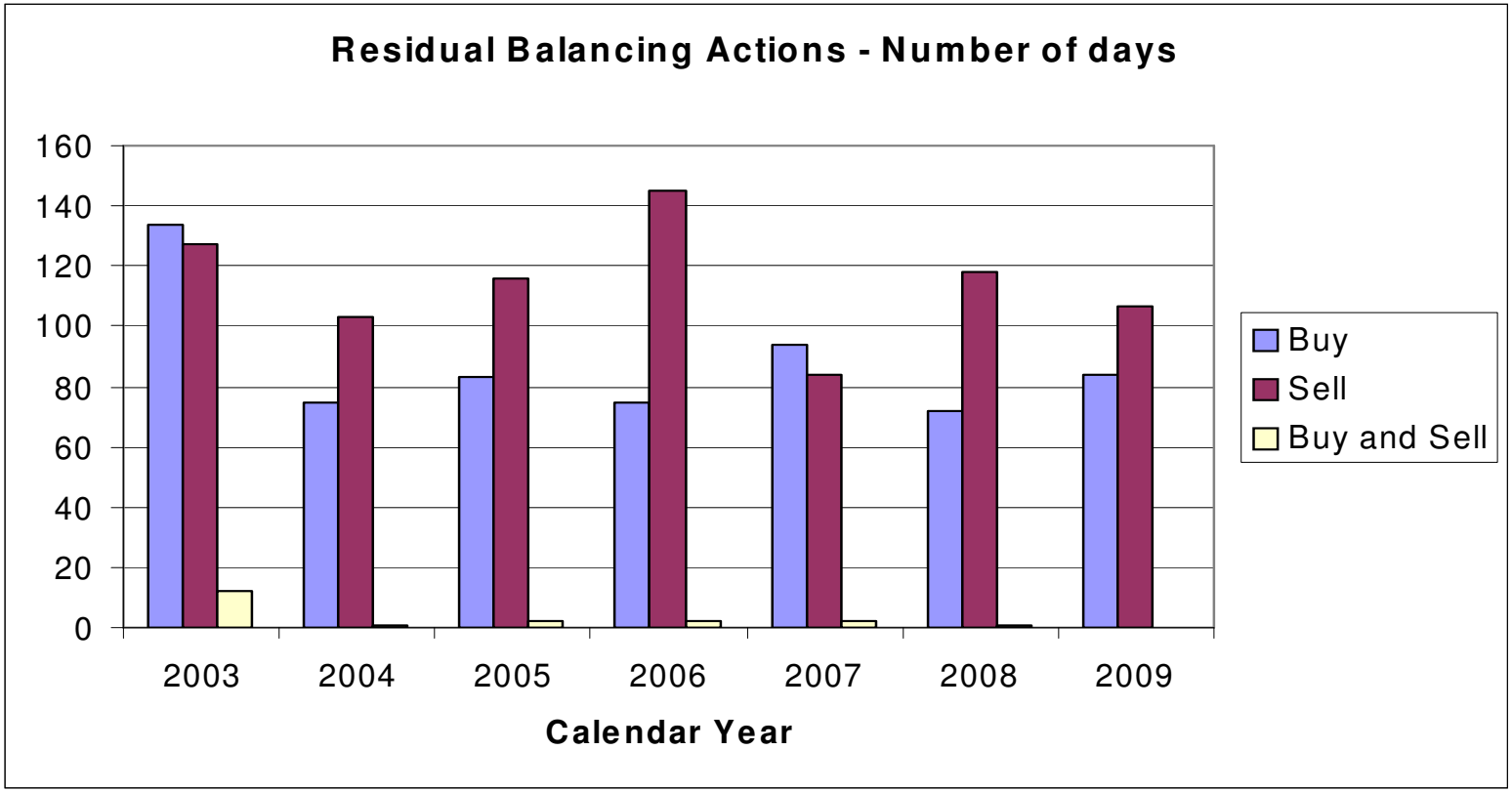
Lagging Supply & Demand Indicator 1: Number of days of residual balancing actions



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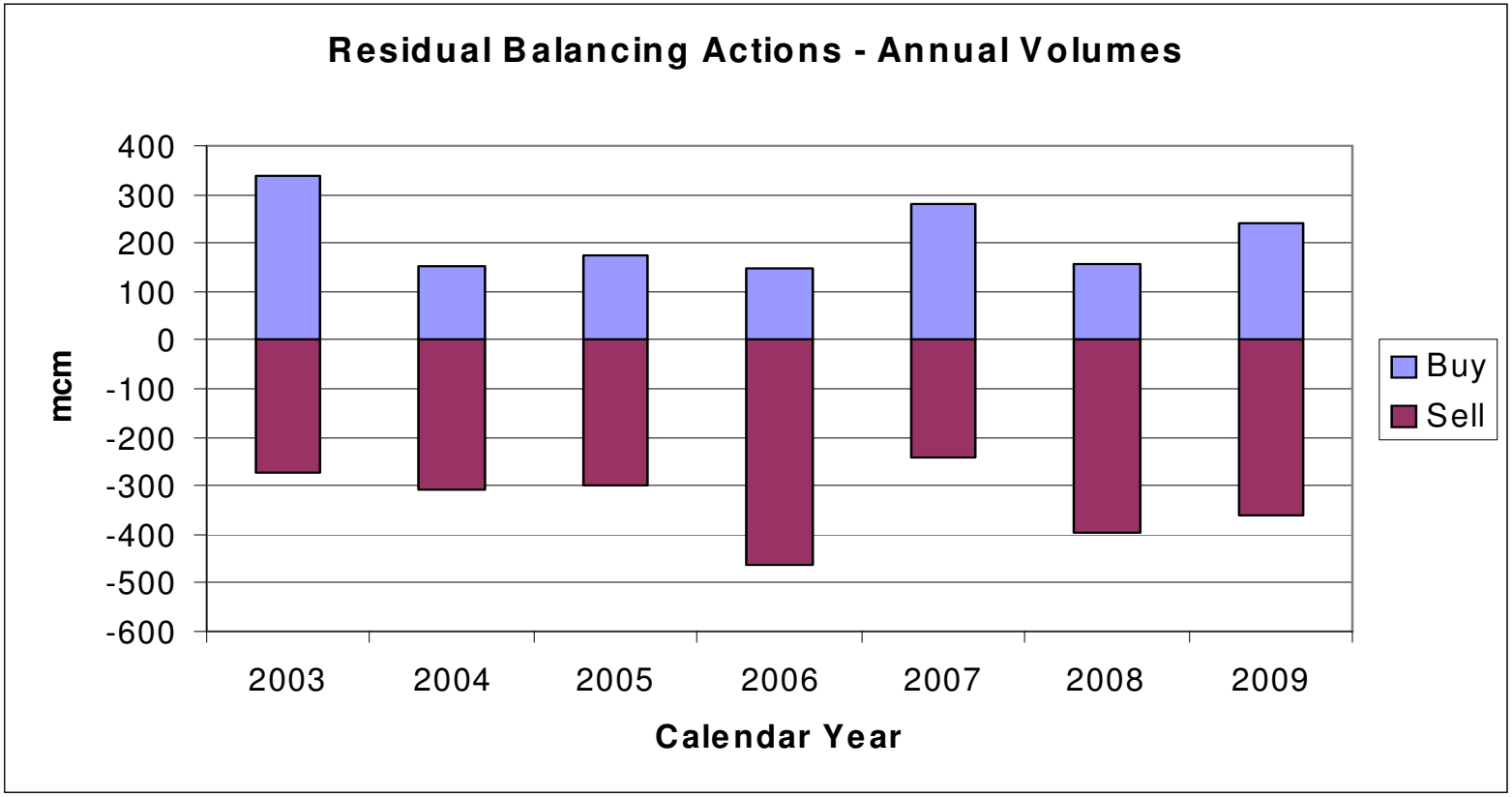
Lagging Supply and Demand Indicator 2: Residual Balancing Annual Volumes



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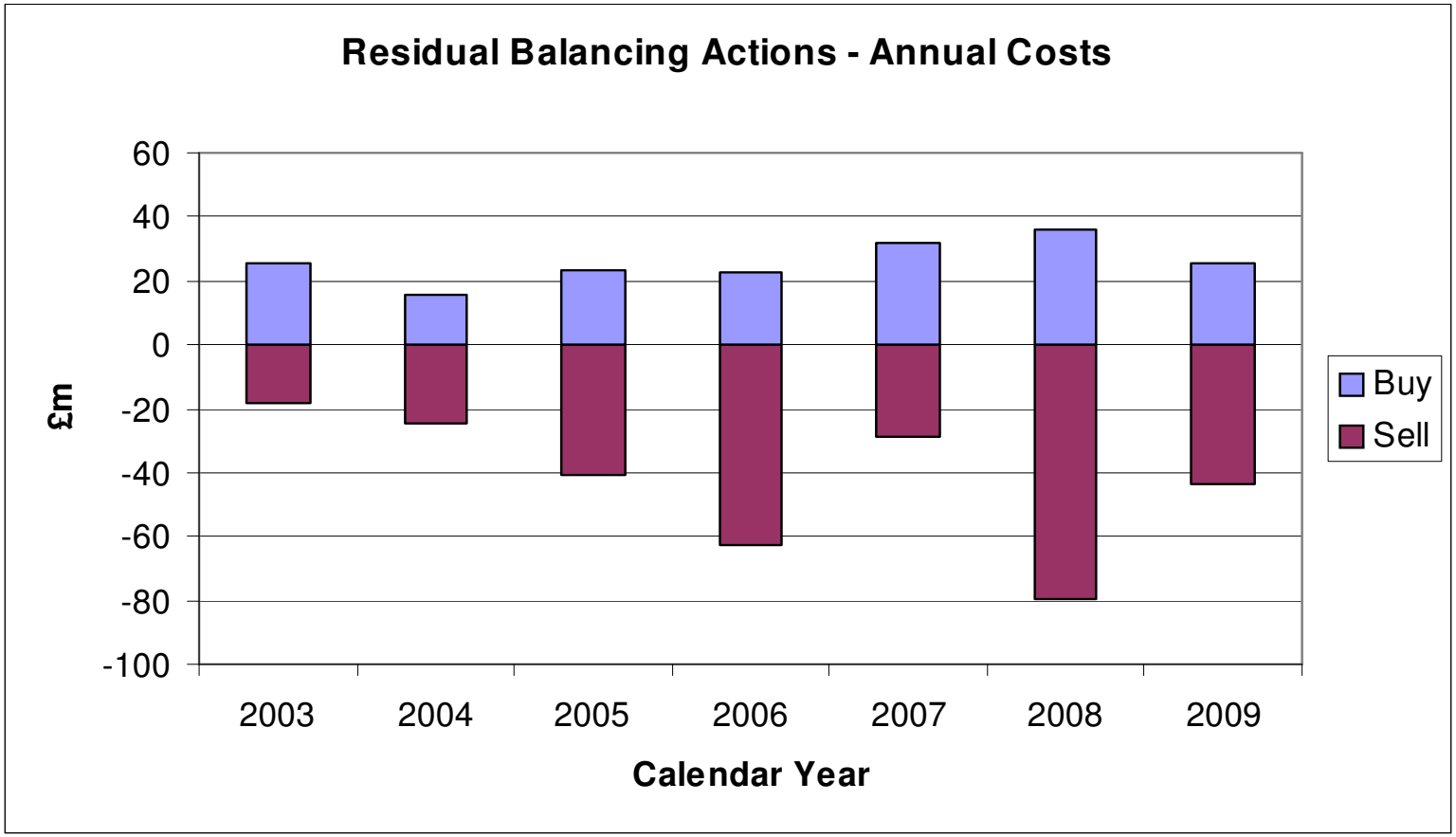
Lagging Supply and Demand Indicator 3: Residual Balancing Annual Costs



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