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System Flexibility Indicators



Operational Forum 2011

Introduction

- Following on from Modification 195AV NG agreed to develop and monitor a range of indicators that show system flexibility
  - Discussed at Industry workshops and Transmission workstreams
  - Presented at previous Operations Forums
    - The last presentation given at the January 2011 Operational Forum and covered a subset of the agreed indicators
    - The full pack is made available online shortly after the presentation
    - http://www.nationalgrid.com/uk/Gas/OperationalInfo/operationsforum
    - http://www.nationalgrid.com/uk/Gas/OperationalInfo/operationaldocuments/SystemFlexibility

- Work is still ongoing to produce simple / meaningful indicators as there is potential for increases in the volatility of gas flows in future years, driven in particular by:
  - Growth in renewable sources of electricity generation and the impact upon CCGTs
  - New sources of gas supply (more LNG, more fast cycling storage etc.)

Flexibility Indicators & RIIO

- Workshops held with industry stakeholders to discuss future requirements for flexibility in the NTS
  - 1st workshop discussed changing gas supplies, new developments (such as fast cycling storage), security of supply in 2020 etc.
  - Stakeholders requested more details
    - Understand National Grids obligations
    - Scenarios to demonstrate issues being discussed and implications

Stakeholder feedback

- 2nd workshop discussed specific scenarios that are already happening (declining St Fergus flows & Central corridor congestion for example) and potential issues around wind intermittency
  - Stakeholders acknowledged scenarios were realistic
  - But concerns that scenarios did not fully demonstrate future network challenges
  - Questioned whether the 1 in 20 remains appropriate

For further RIIO information – please see

http://www.talkingnetworkstx.com/workshops.aspx

Phase 1 'Leading' Indicators Reminder – Full Set

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Supply

- Day on day difference in proportion of supply from the North & South
- Day on day difference in supply by group
- LNG
- UKCS
- Norway
- ICs
- Storage

Linepack

- Maximum daily range of within day linepack changes
- Frequency of linepack changes at particular thresholds
- Within day PCLP changes

Demand

- Within day demand variation by sector
- Flow flexibility usage by sector
- ICs
- Storage
- Power stations
- DN offtakes

Phase 1 'Lagging' Indicators Reminder – Full Set

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Supply

- Use of Operating Margins gas
- Use of entry buybacks
- Use of entry scalebacks

Supply & Demand

- Residual balancing frequency
- Residual balancing volumes
- Residual balancing costs

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‘Leading’ Supply Indicators

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

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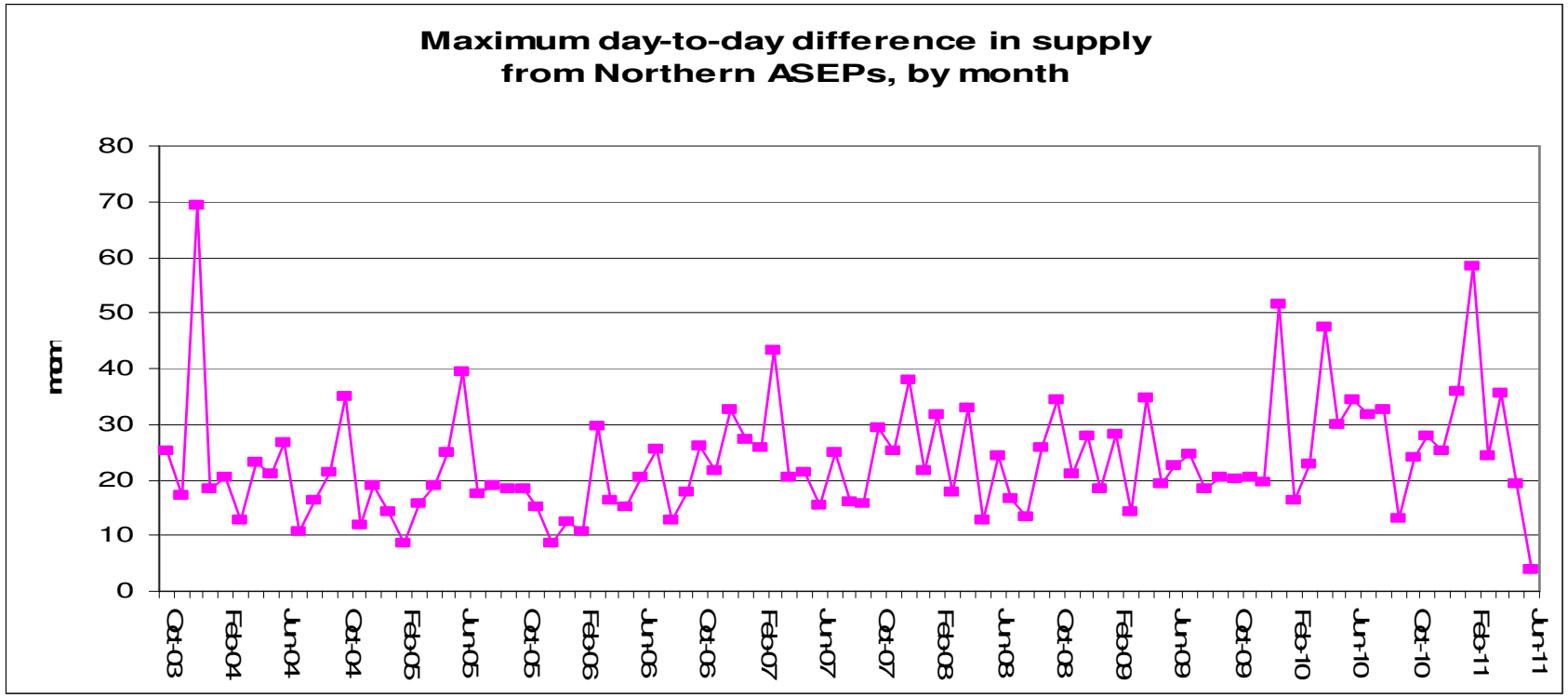

- This graph shows the maximum day on day change per month in the percentage of total supply from Northern ASEPs. Eg. if on one day 255 mcmd came from North and 117 mcmd from South (68% from North) then on the next day 257 mcmd came from North and 102 mcmd from South (71% from North), the day to day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

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

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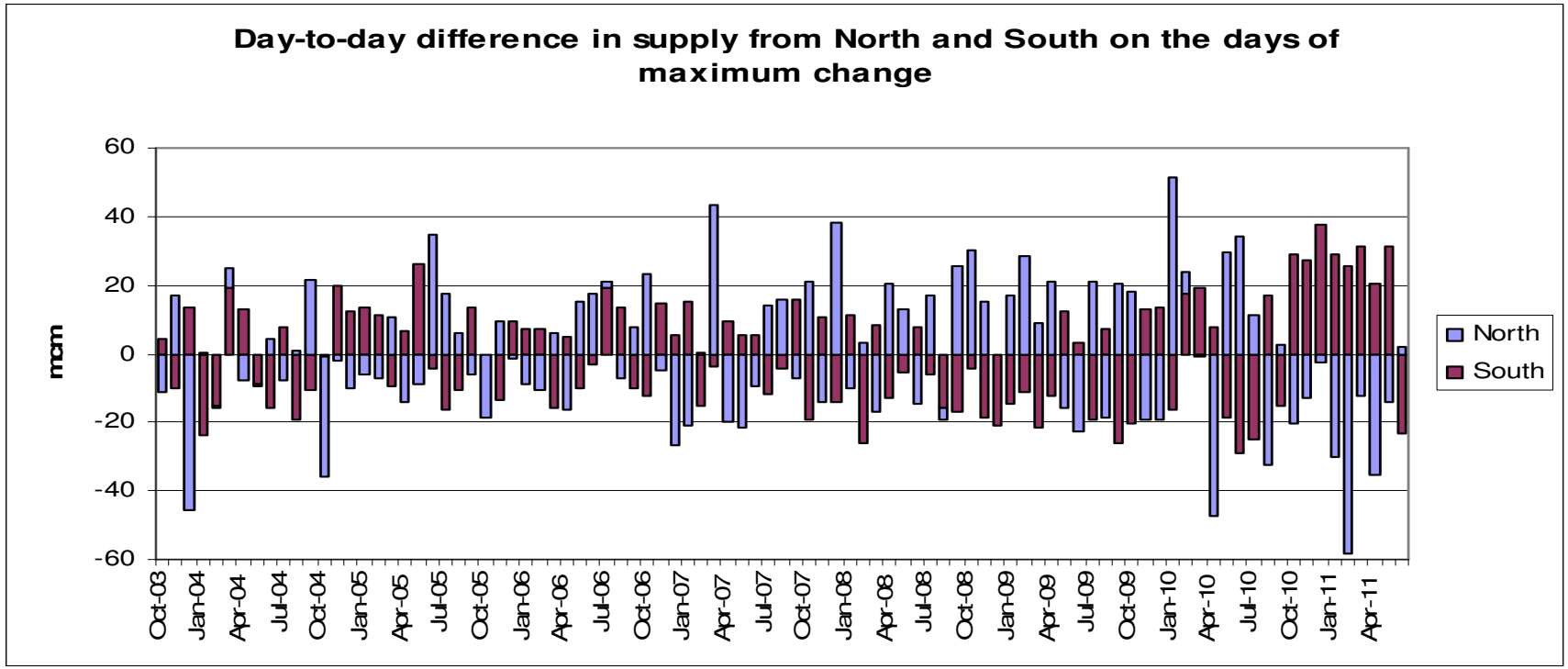

- This graph shows the associated volume changes from the previous graph.

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

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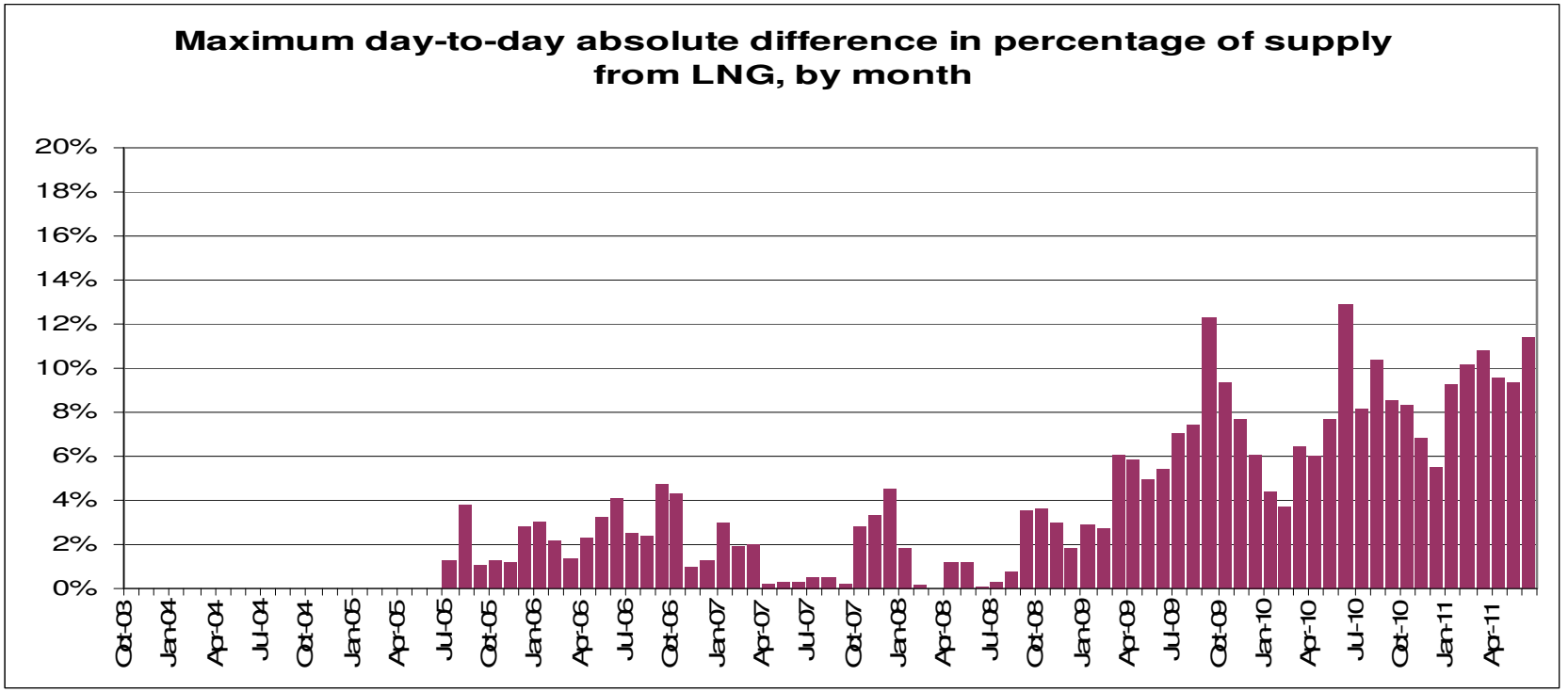

- This shows the maximum day on day change per month in the percentage of total supply from this supply group. Eg. if the supply from LNG was 50 mcmd on a day and 35 mcmd on the next day against total NTS supplies of 380 mcmd (13%) and 370 mcmd (9%) respectively, the day to day percentage change would 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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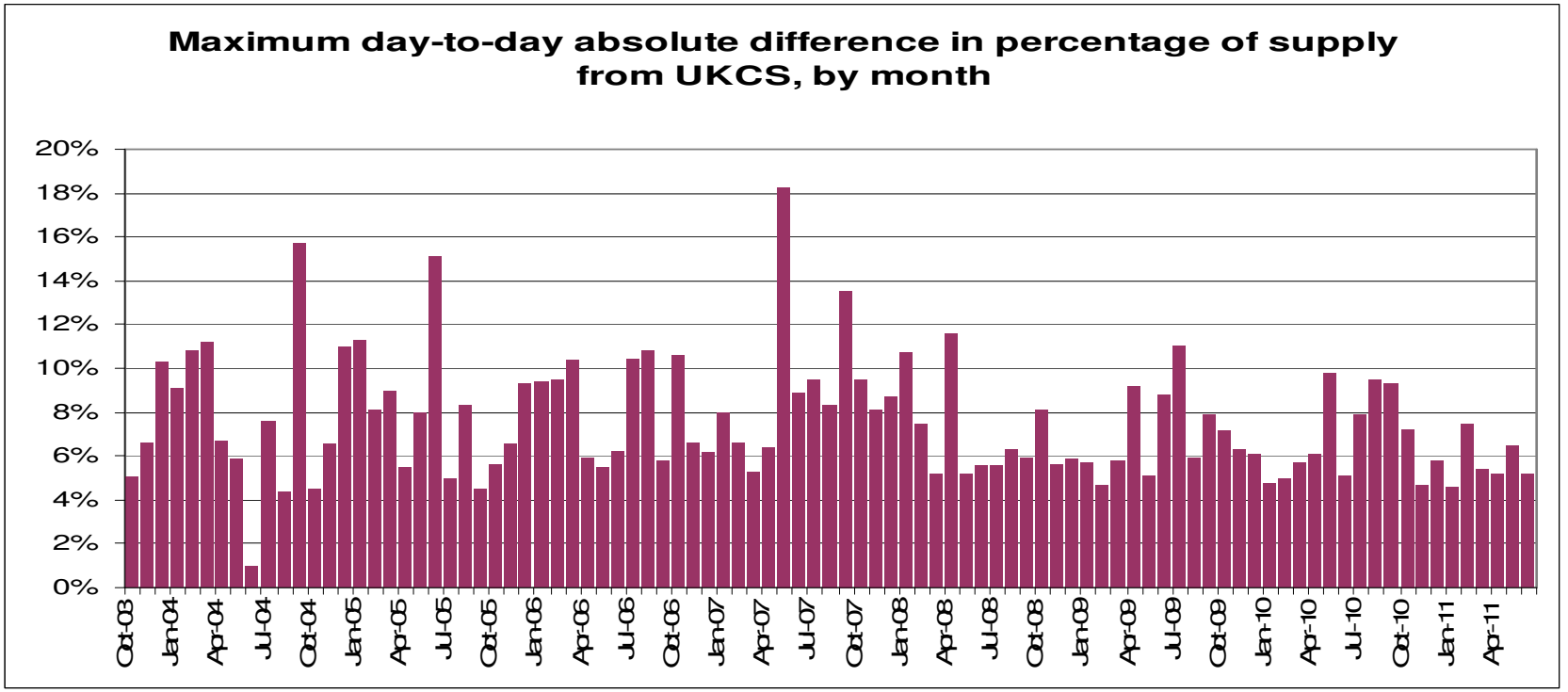

- This shows the maximum day on day change per month in the percentage of total supply from this supply group.

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

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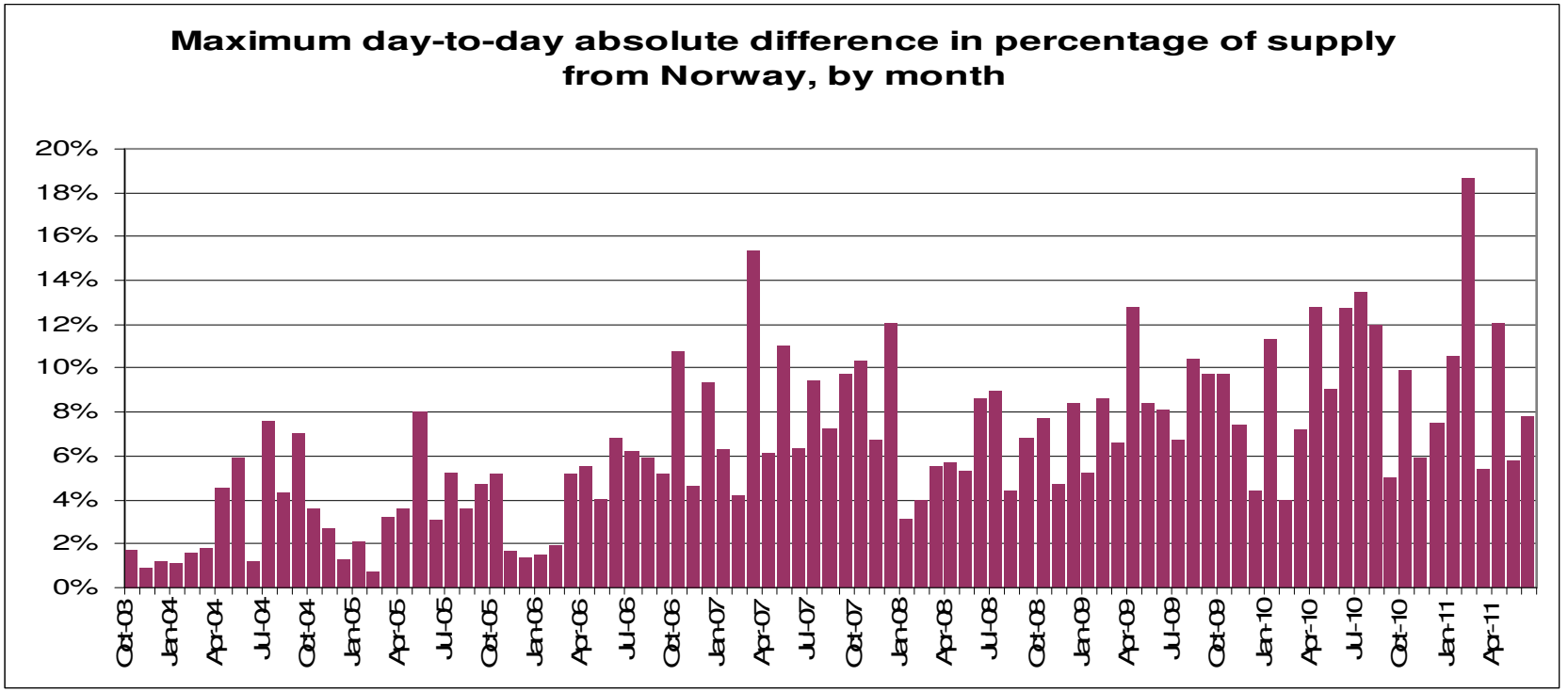

- This shows the maximum day on day change per month in the percentage of total supply from this supply group.
- Norwegian flows are estimated due to the unavailability of flow data by source for St Fergus terminal

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

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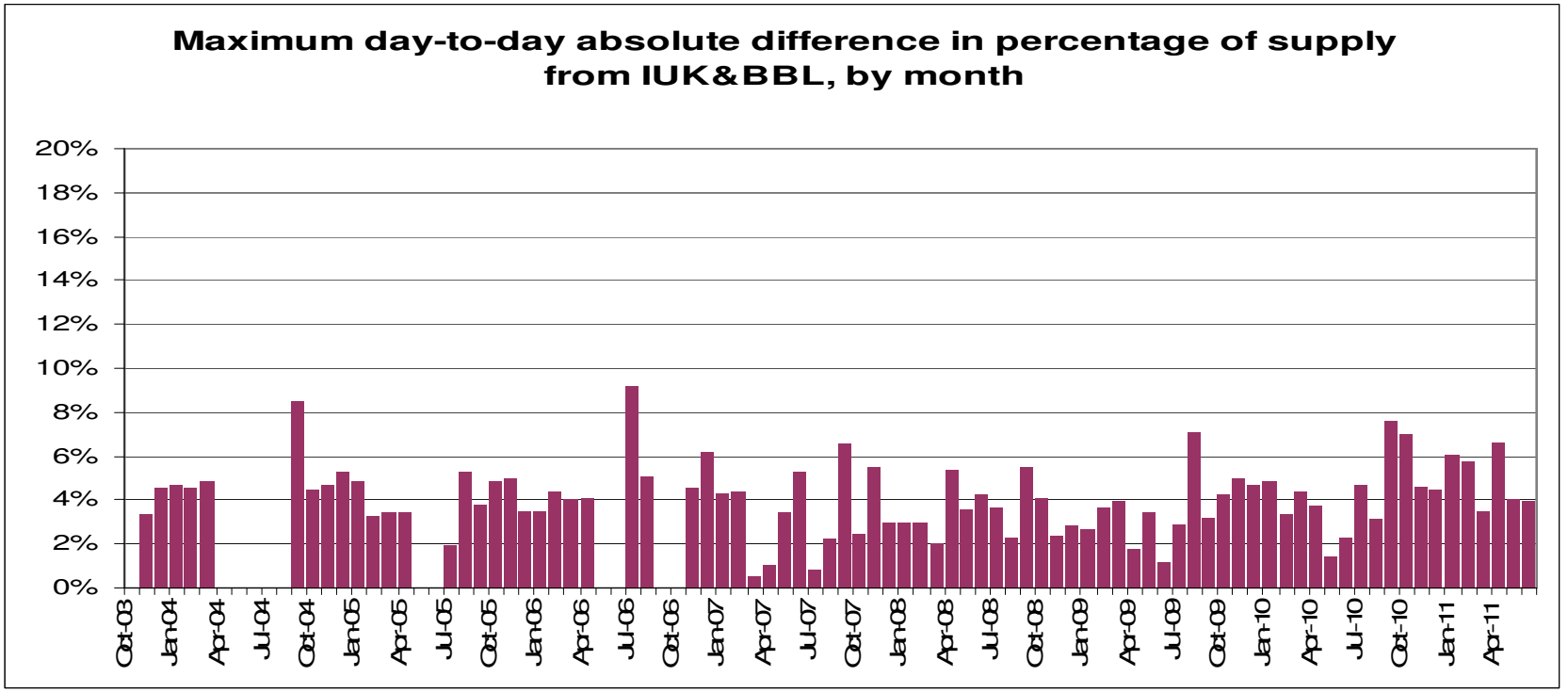

- This shows the maximum day on day change per month in the percentage of total supply from this supply group.

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

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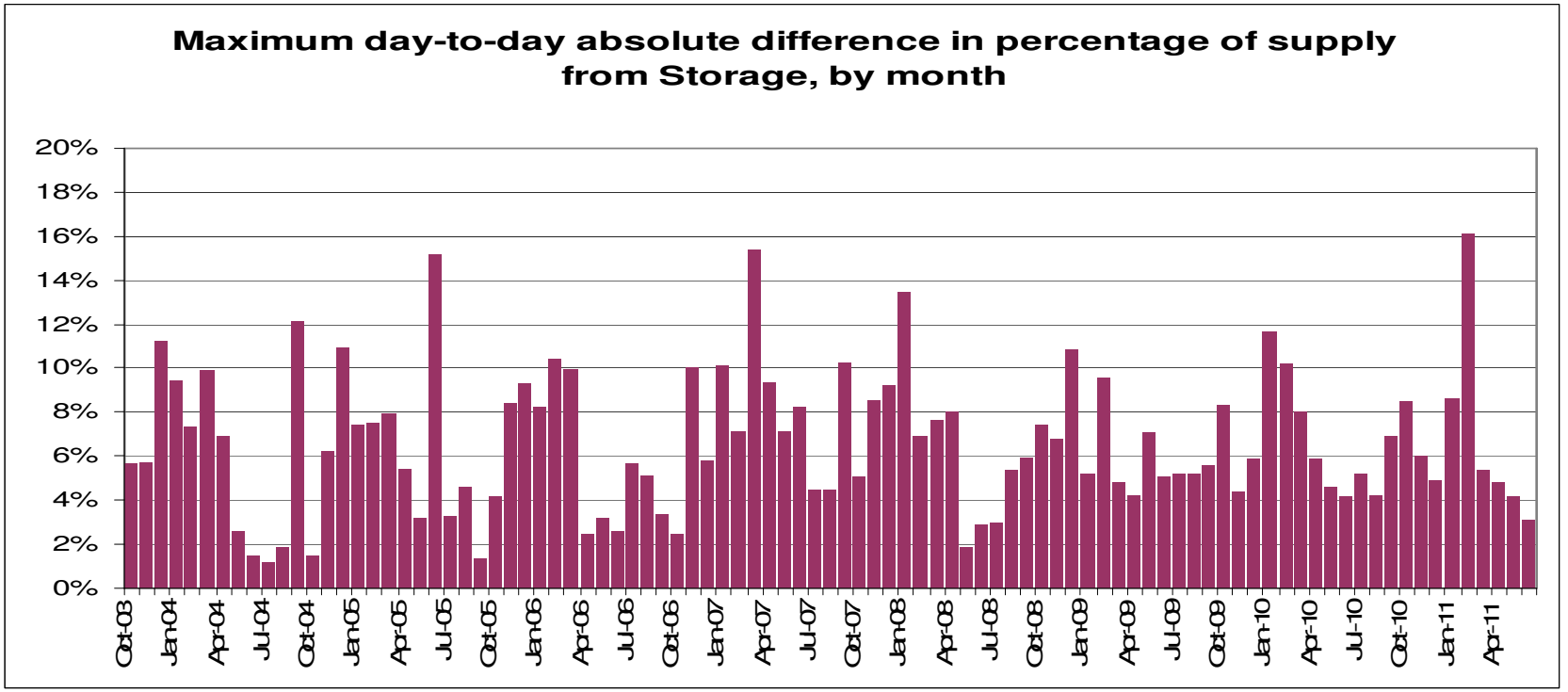

- This shows the maximum day on day change per month in the percentage of total supply from this supply group.

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‘Leading’ Linepack Indicators

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

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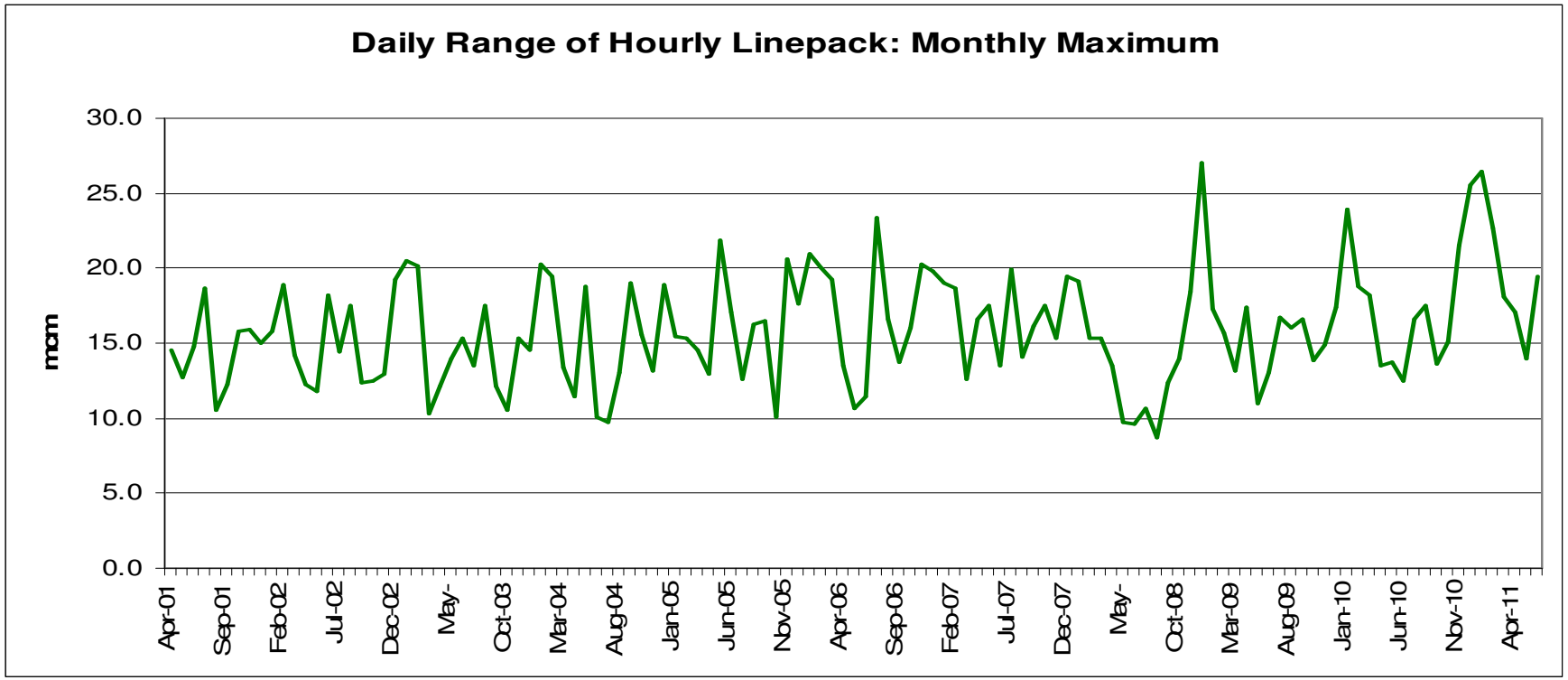

- This graph plots the maximum range on any day in each month between the highest and lowest hourly NTS linepack. Eg. if the highest hourly linepack recorded was 330 mcm and the lowest was 315 mcm on the same day and that constituted the largest daily range in that particular month, 15 mcm would be plotted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

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

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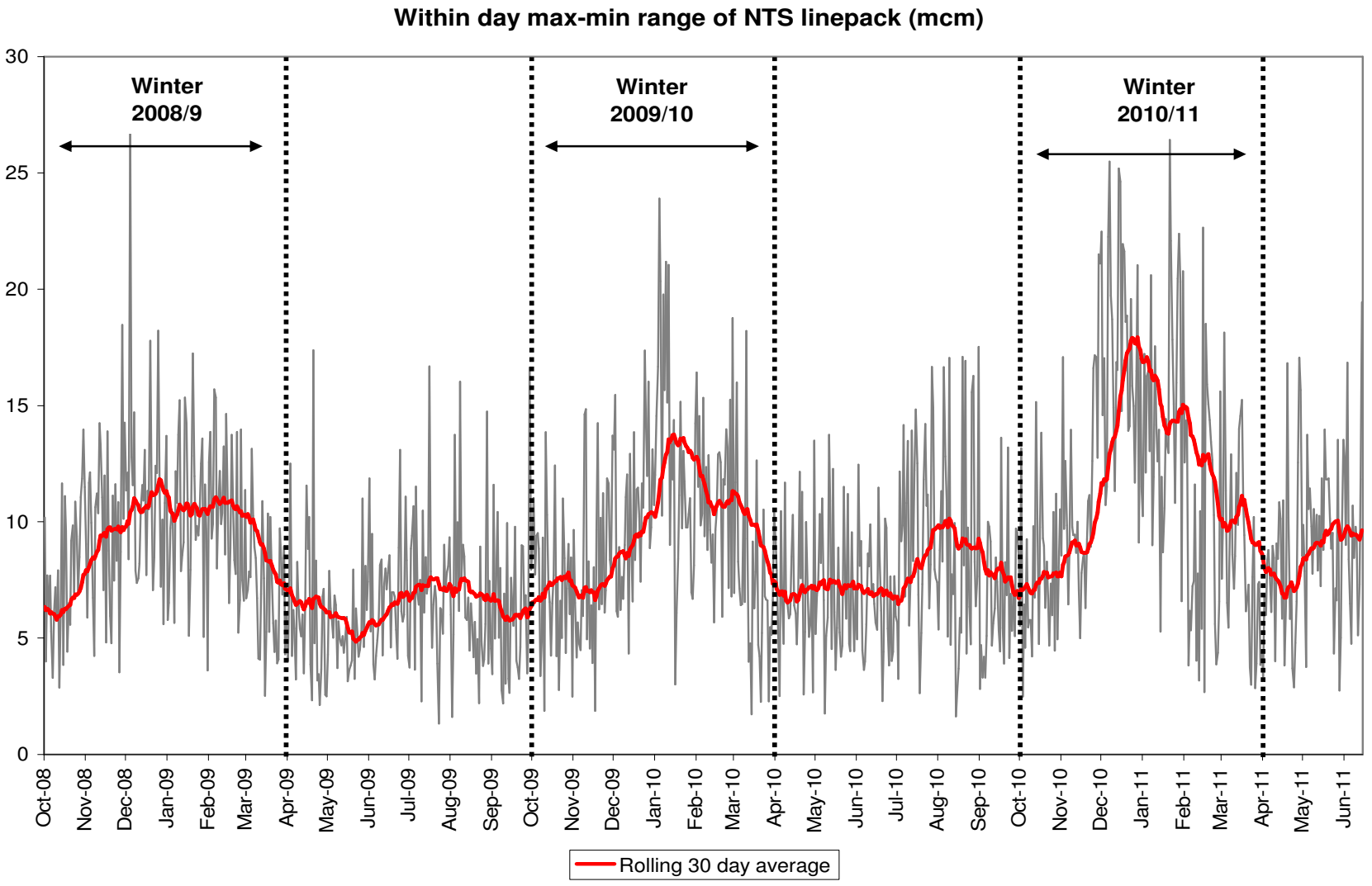

Leading Linepack Indicator 1:
Maximum daily range of within day linepack changes

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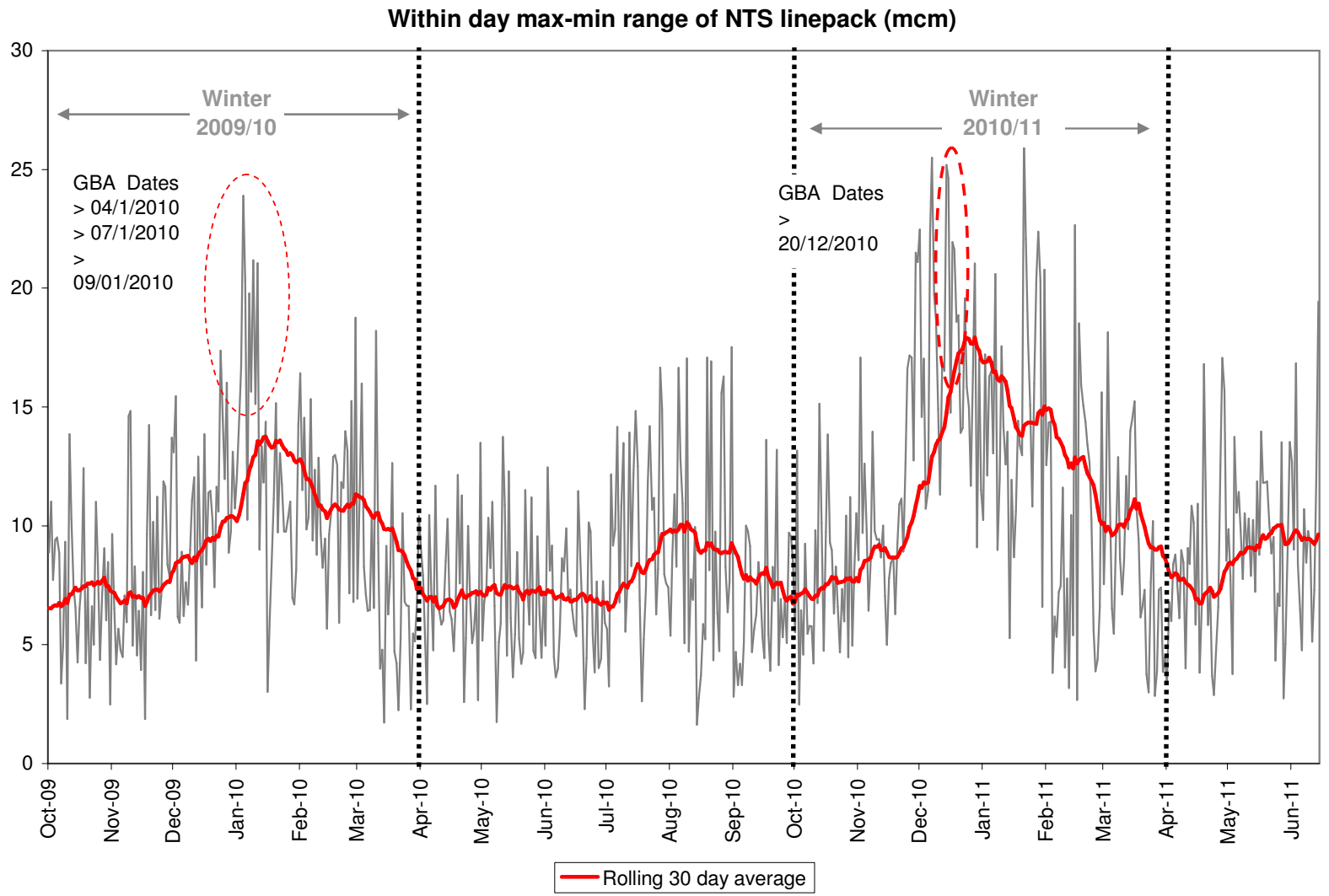

Leading Linepack Indicator 2:
Frequency of within day changes

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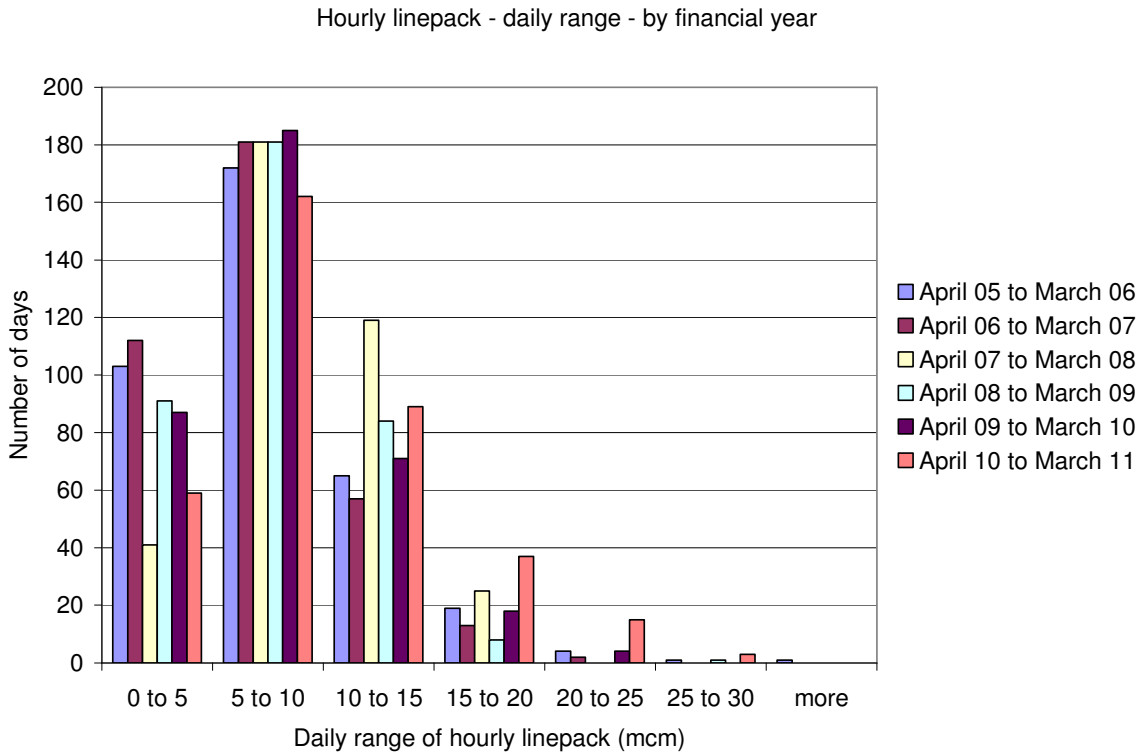
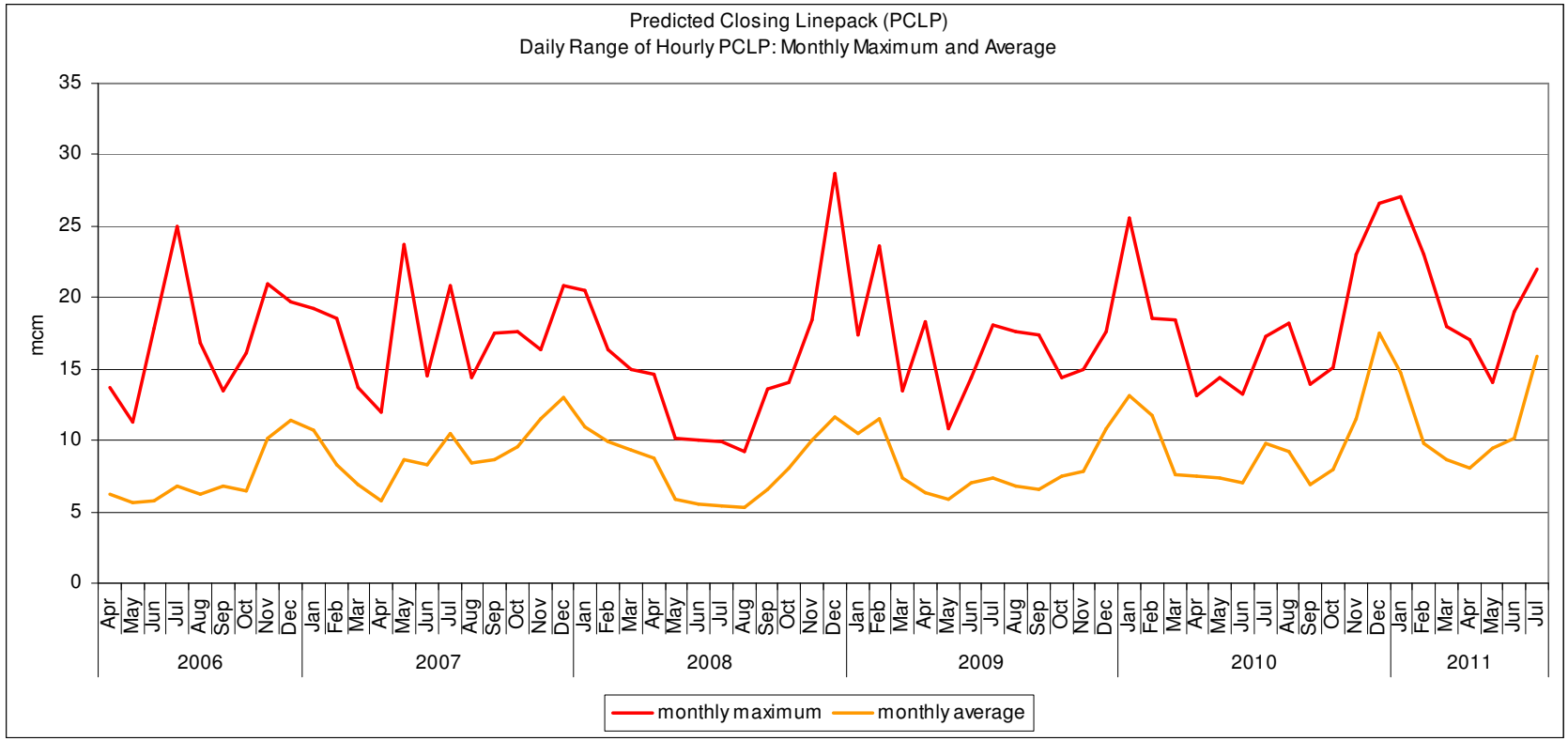


- This graph shows, for April 2005 to date, the distribution of the maximum daily range of hourly linepack. Eg. for Apr-05 to Mar-06, the maximum daily range was less than 5 mcm on just below 100 days, was between 5 and 10 mcm on approximately 160 days etc.

Leading Linepack Indicator 2:
Within-day PCLP swings



PCLP = Opening linepack

+ System Inputs (Daily Flow Nominations and Storage Flow Nominations)

– System Demand (Offtake Profile Notifications)

This graph shows ranges of hourly PCLP values during the gas day.

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‘Leading’ Demand Indicators

Leading Demand Indicator 1:
Within day demand variation by sector

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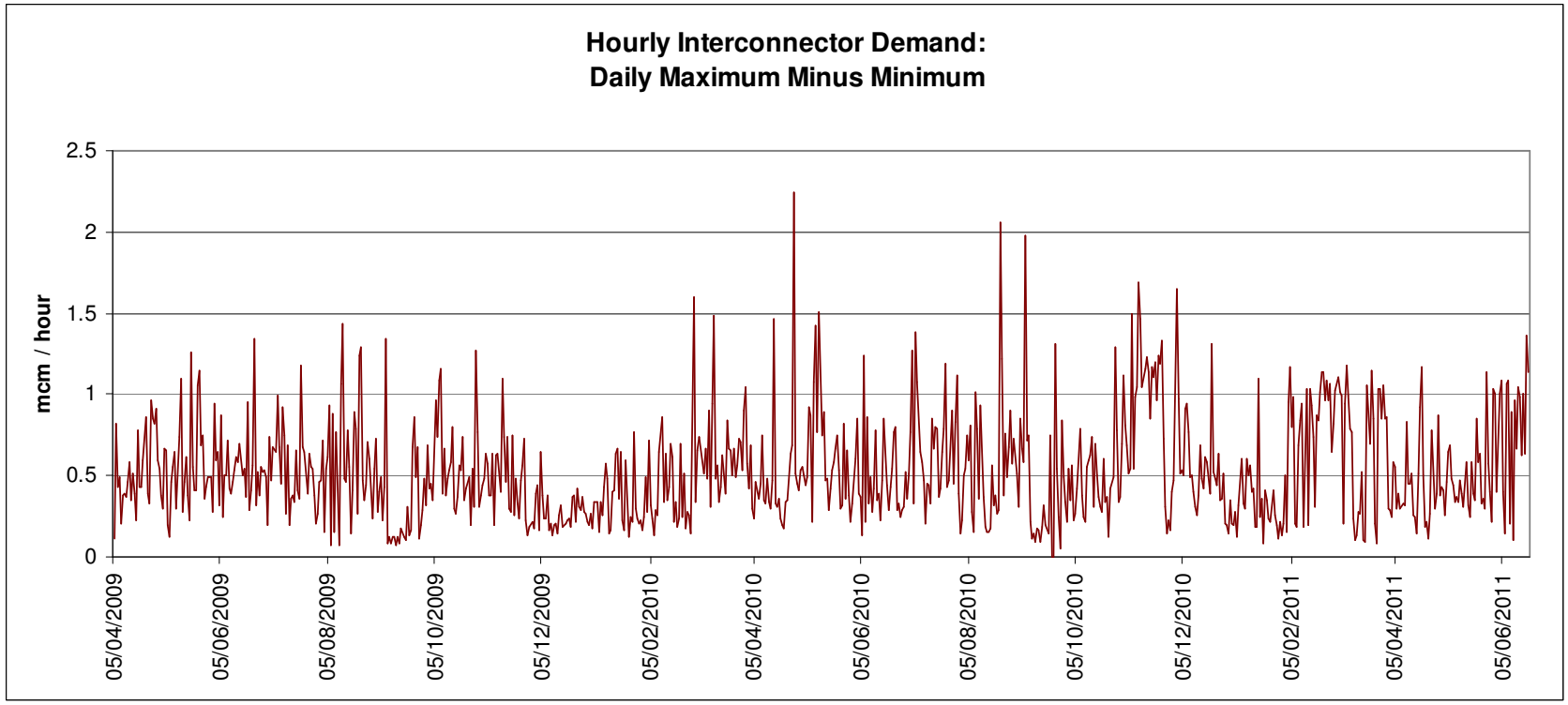

- This graph (and the next 3) shows the difference between the maximum hourly volume offtaken and the minimum hourly volume offtaken for each demand sector. This graph displays the results for the Bacton and Moffat interconnectors.

Leading Demand Indicator 1:
Within day demand variation by sector

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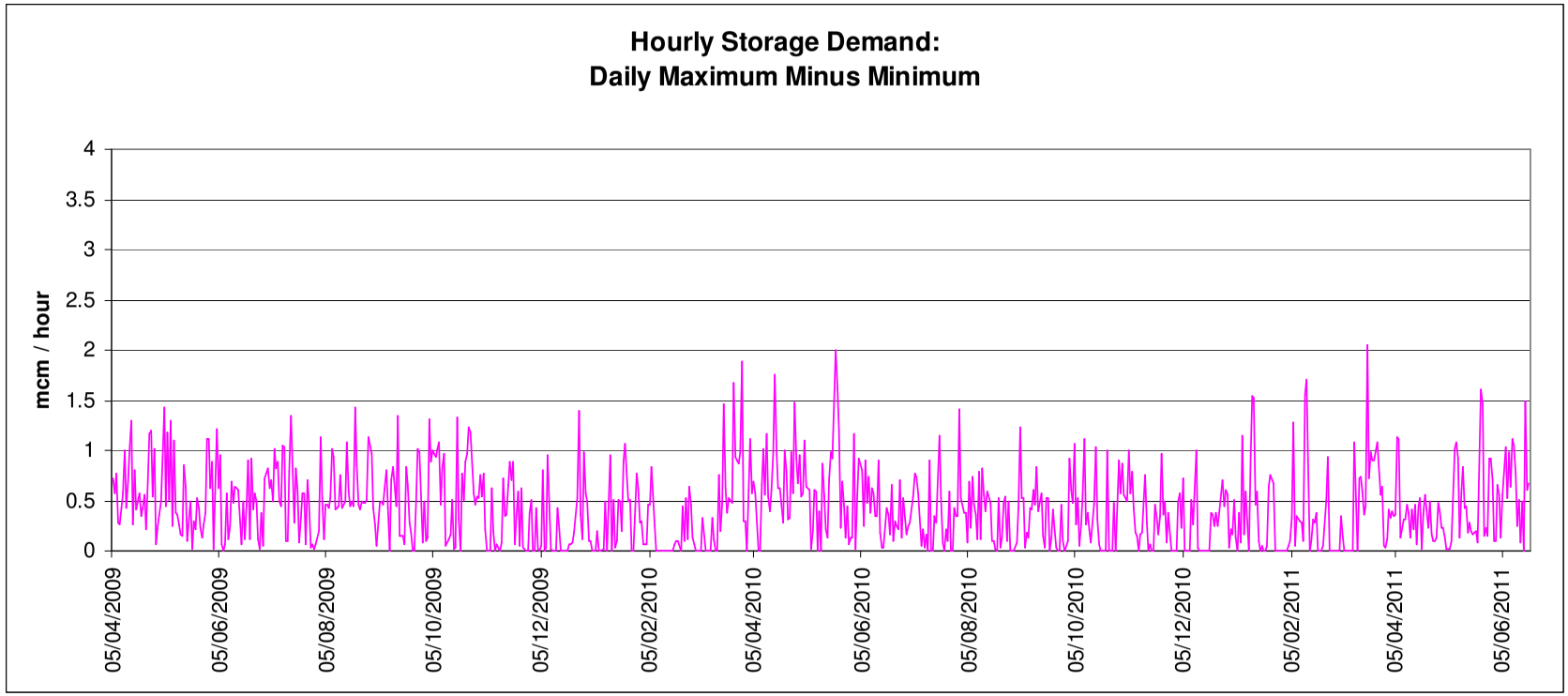

Leading Demand Indicator 1:
Within day demand variation by sector

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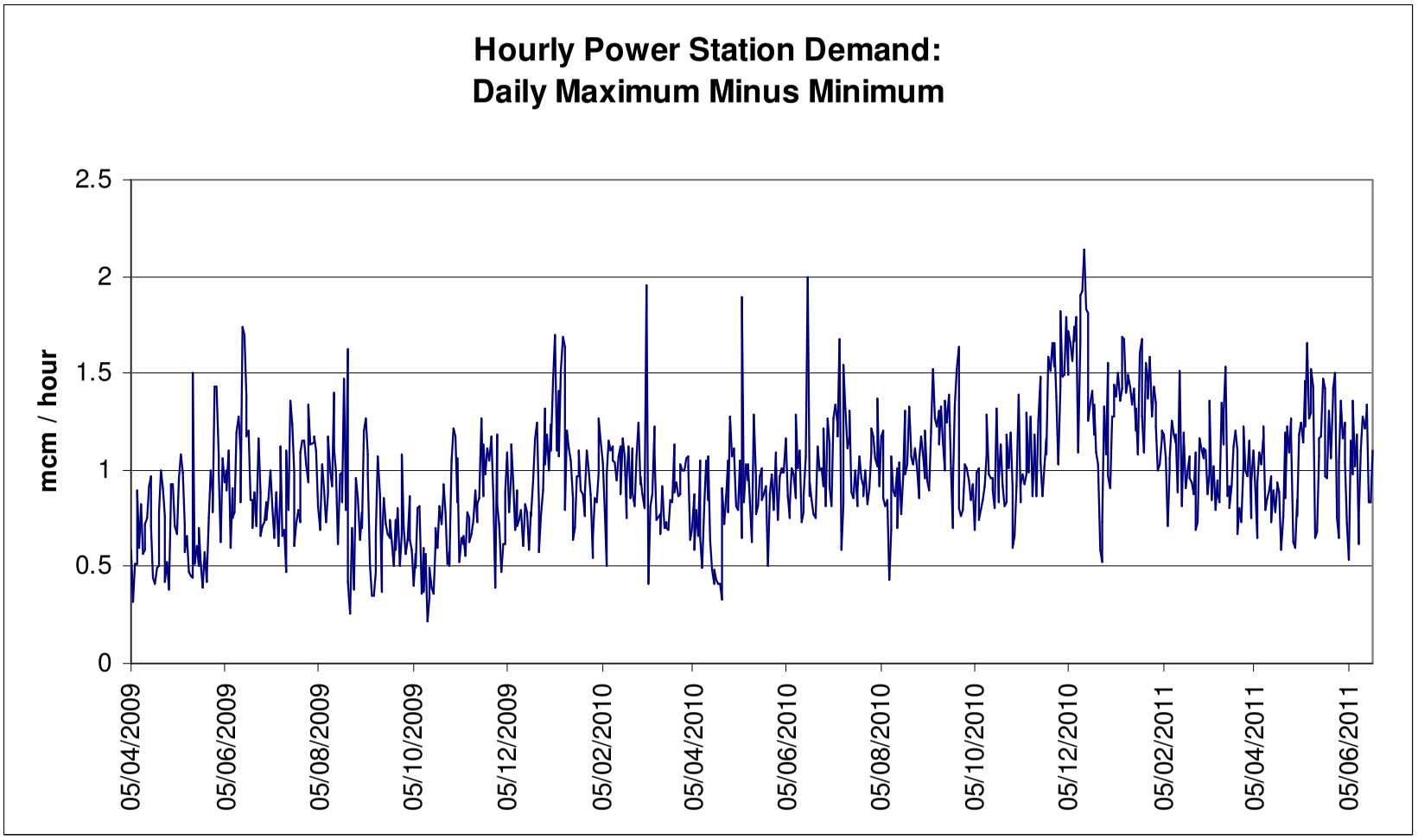

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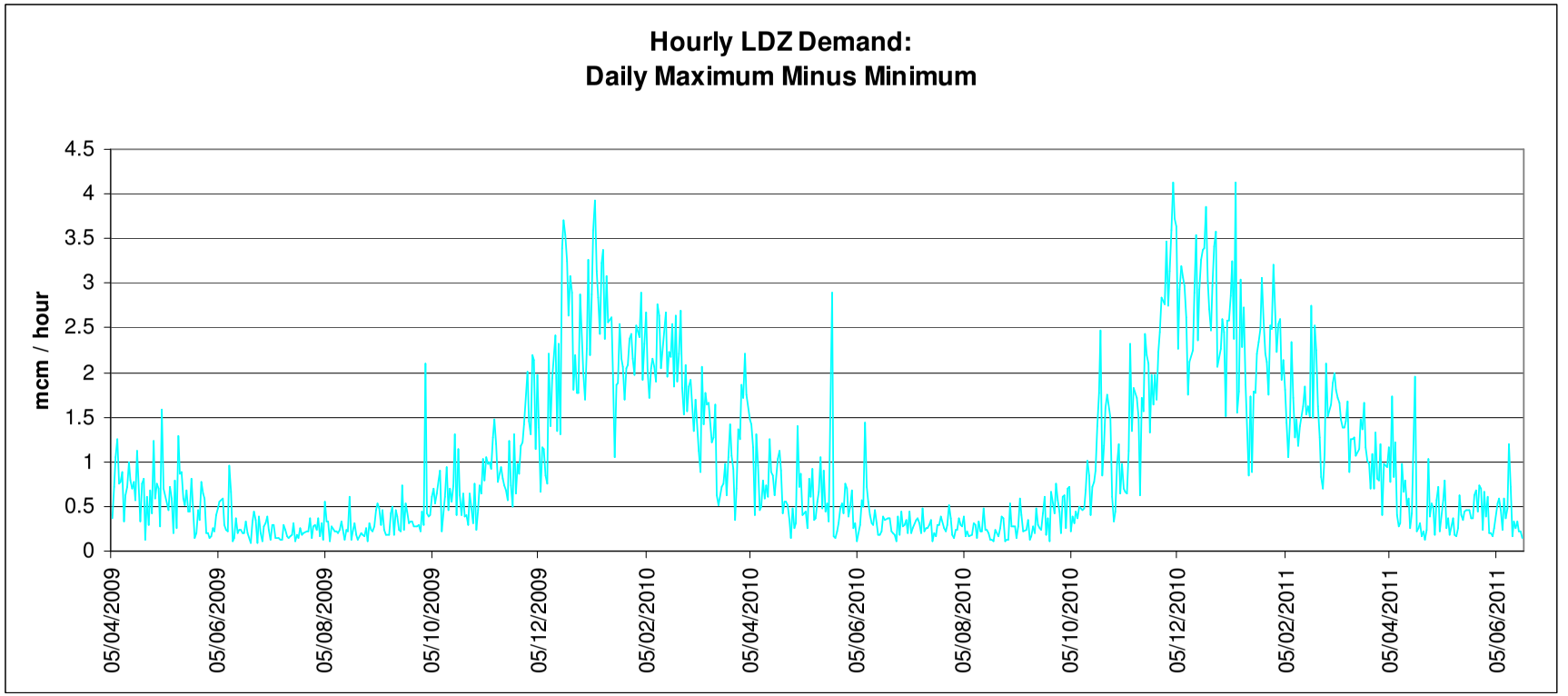

‘Leading’ Demand Indicator 2:
Flow flexibility usage by sector

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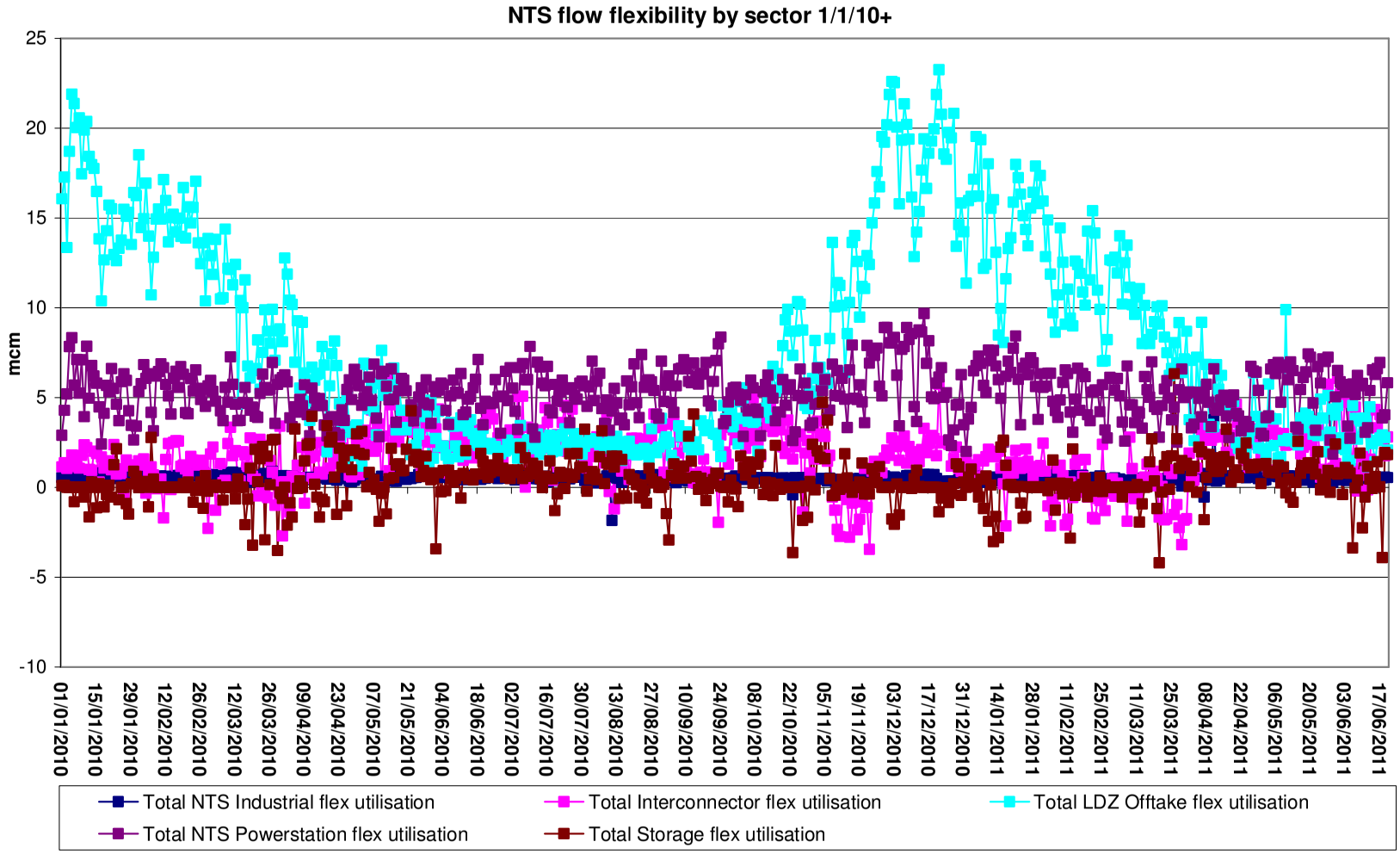

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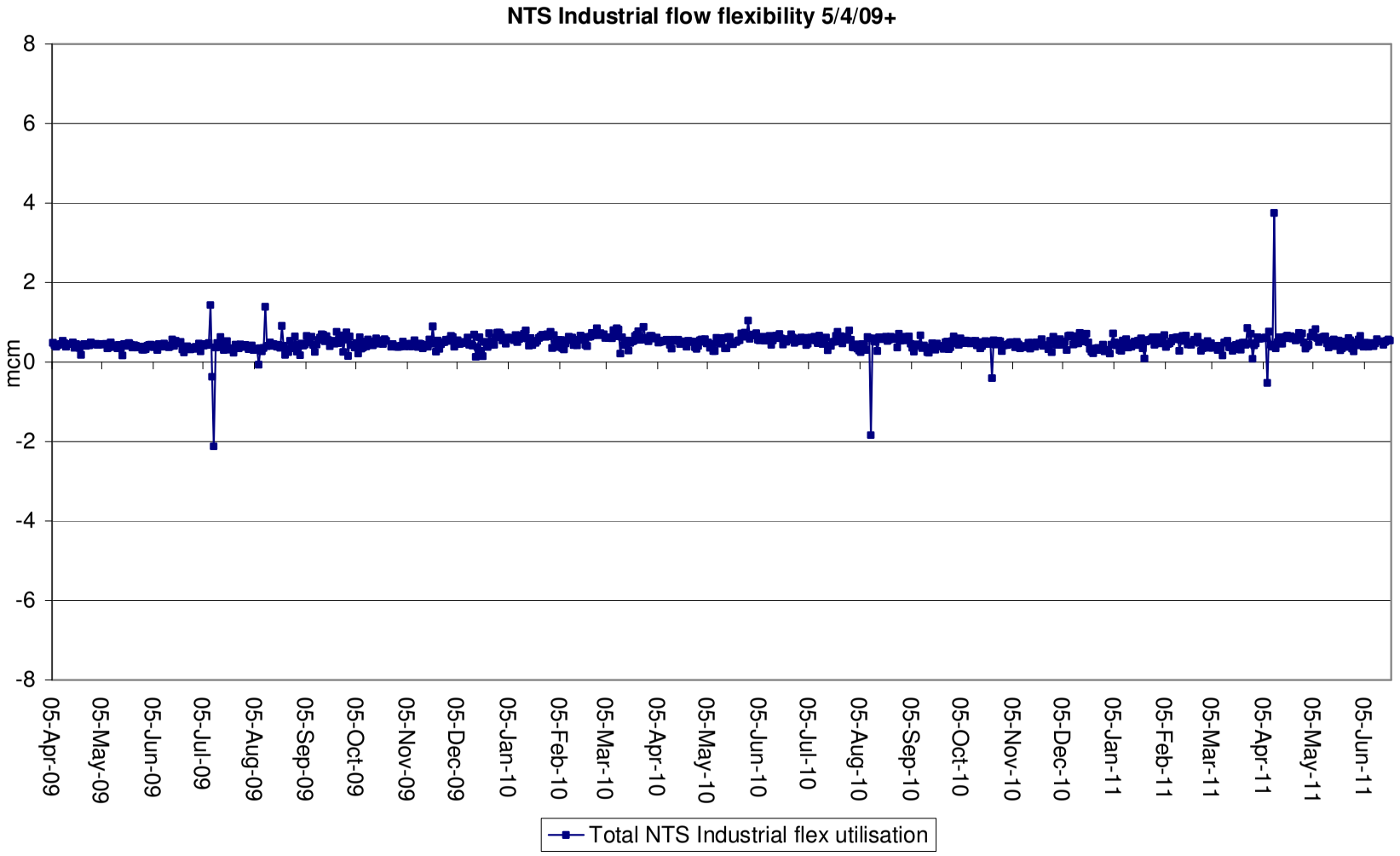

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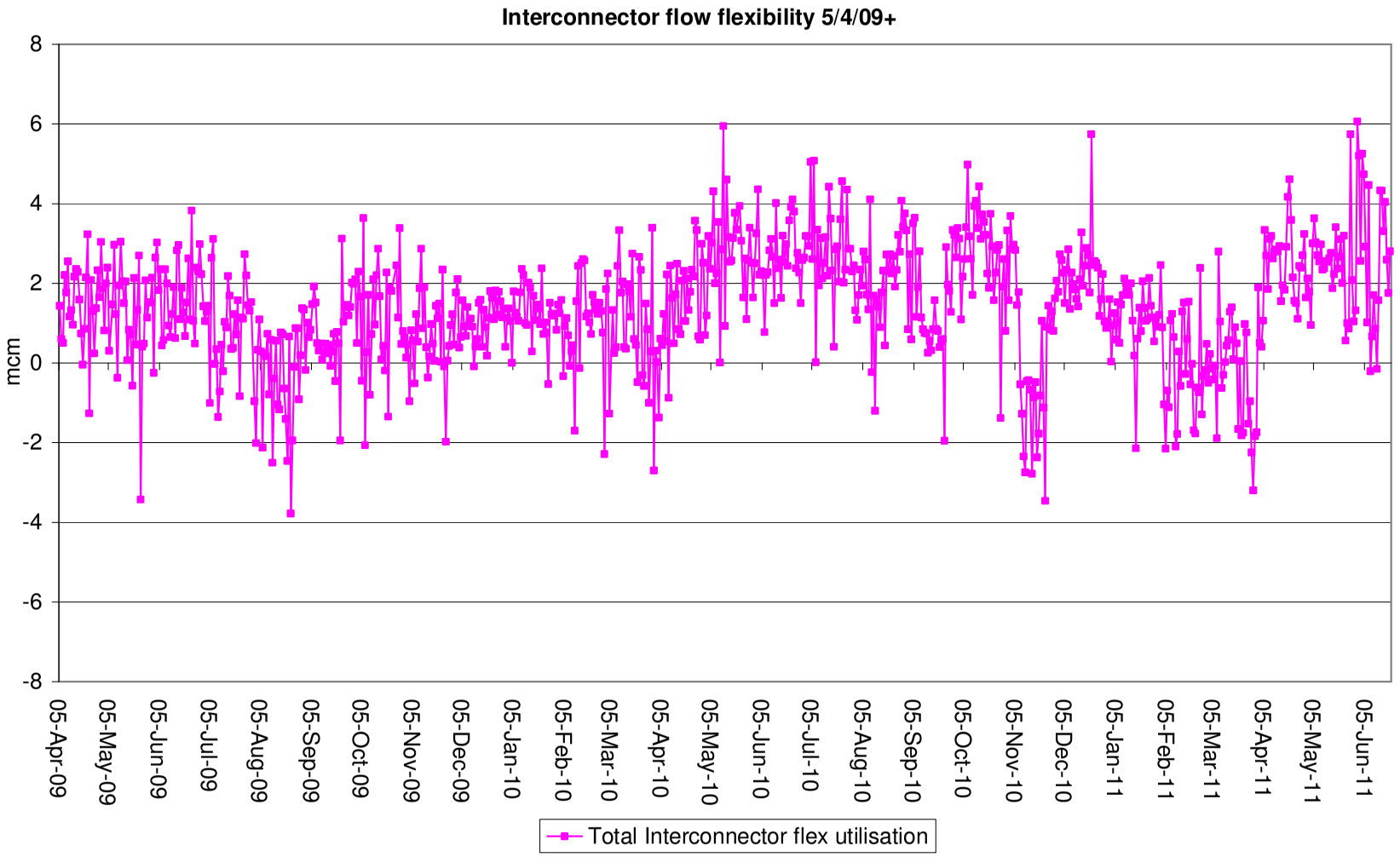

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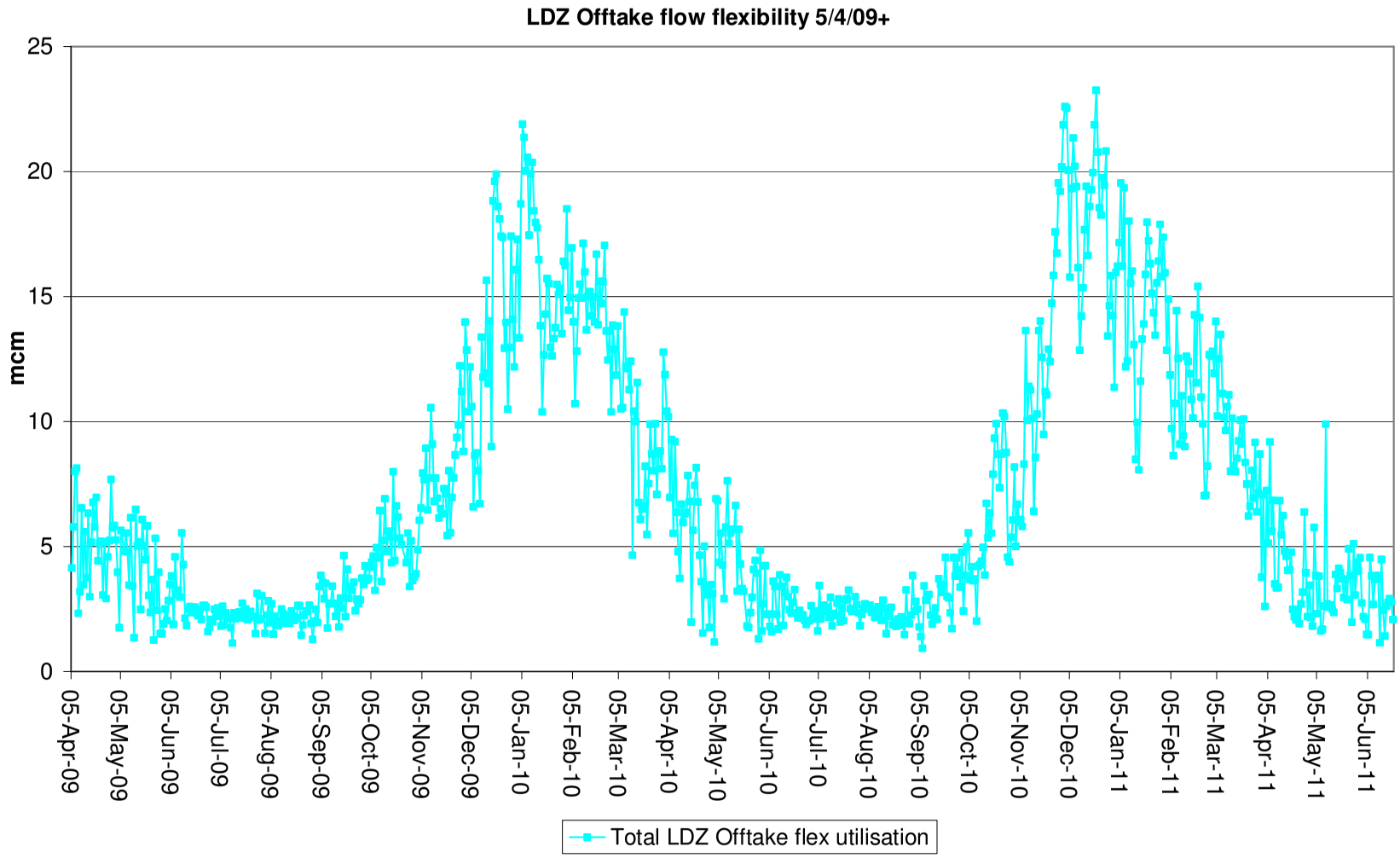

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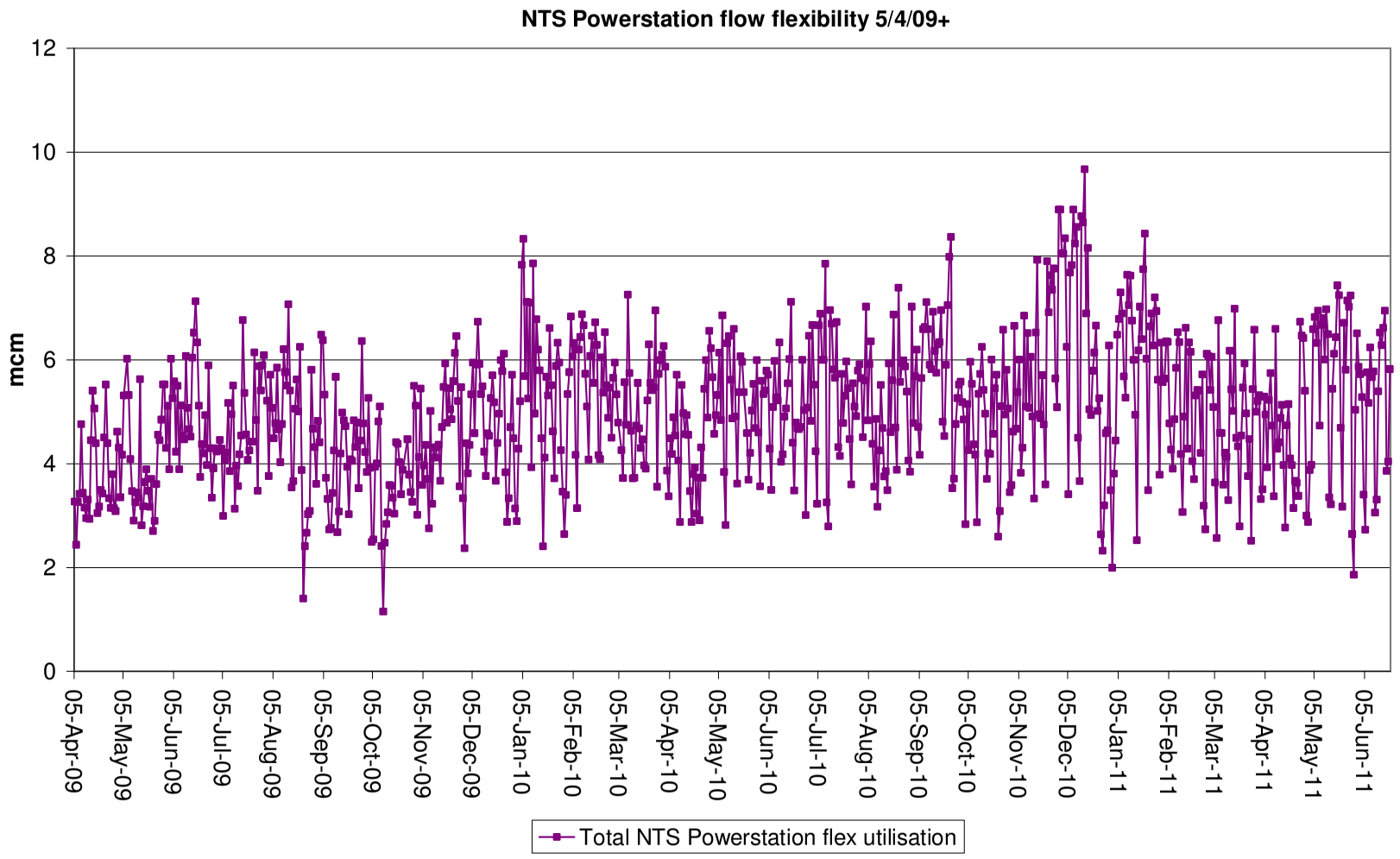

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Flow flexibility usage by sector

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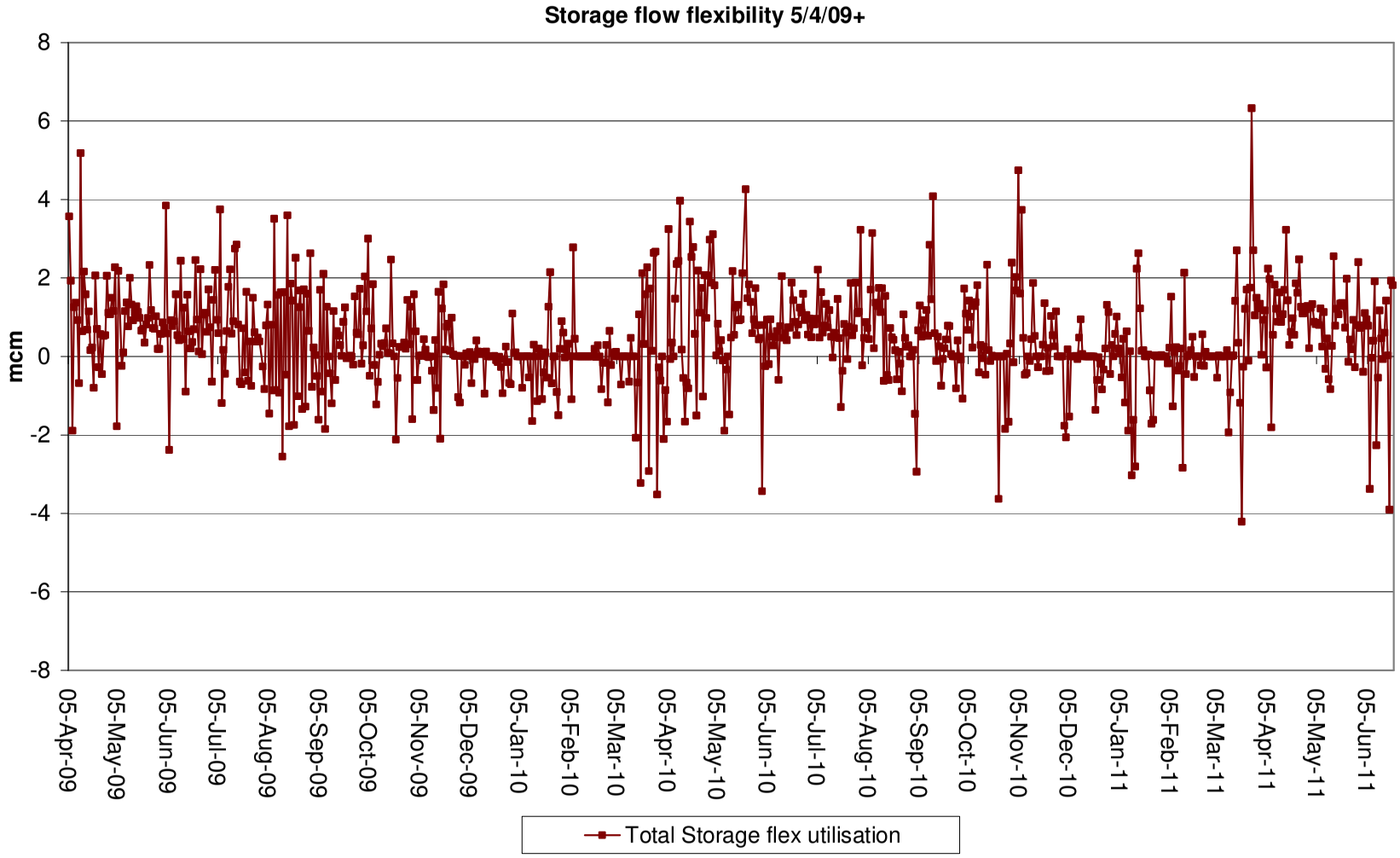

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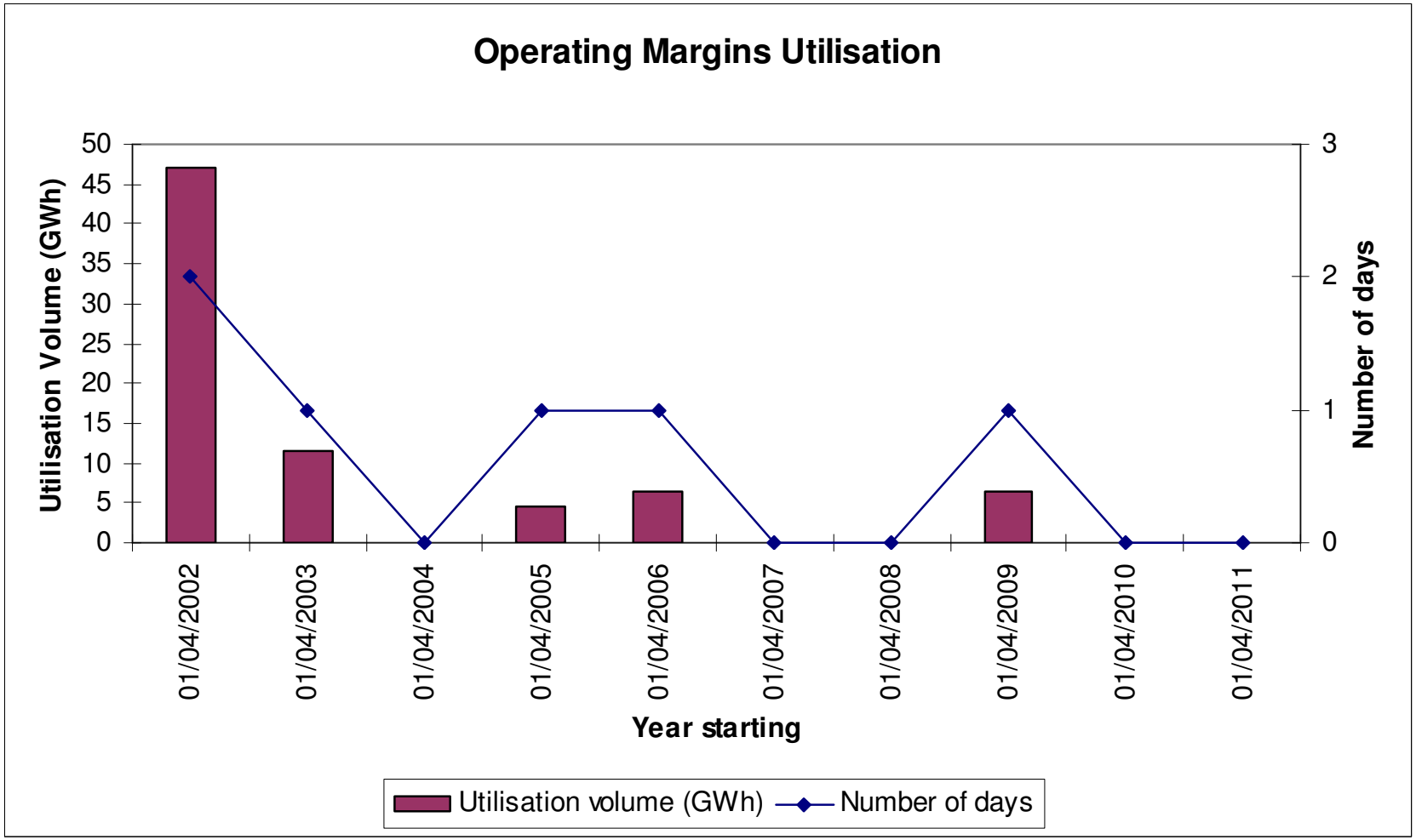
‘Lagging’ Indicators

Lagging Supply Indicator 1:
Use of Operating Margins Gas



Lagging Supply Indicator 2:
Entry Capacity Buybacks

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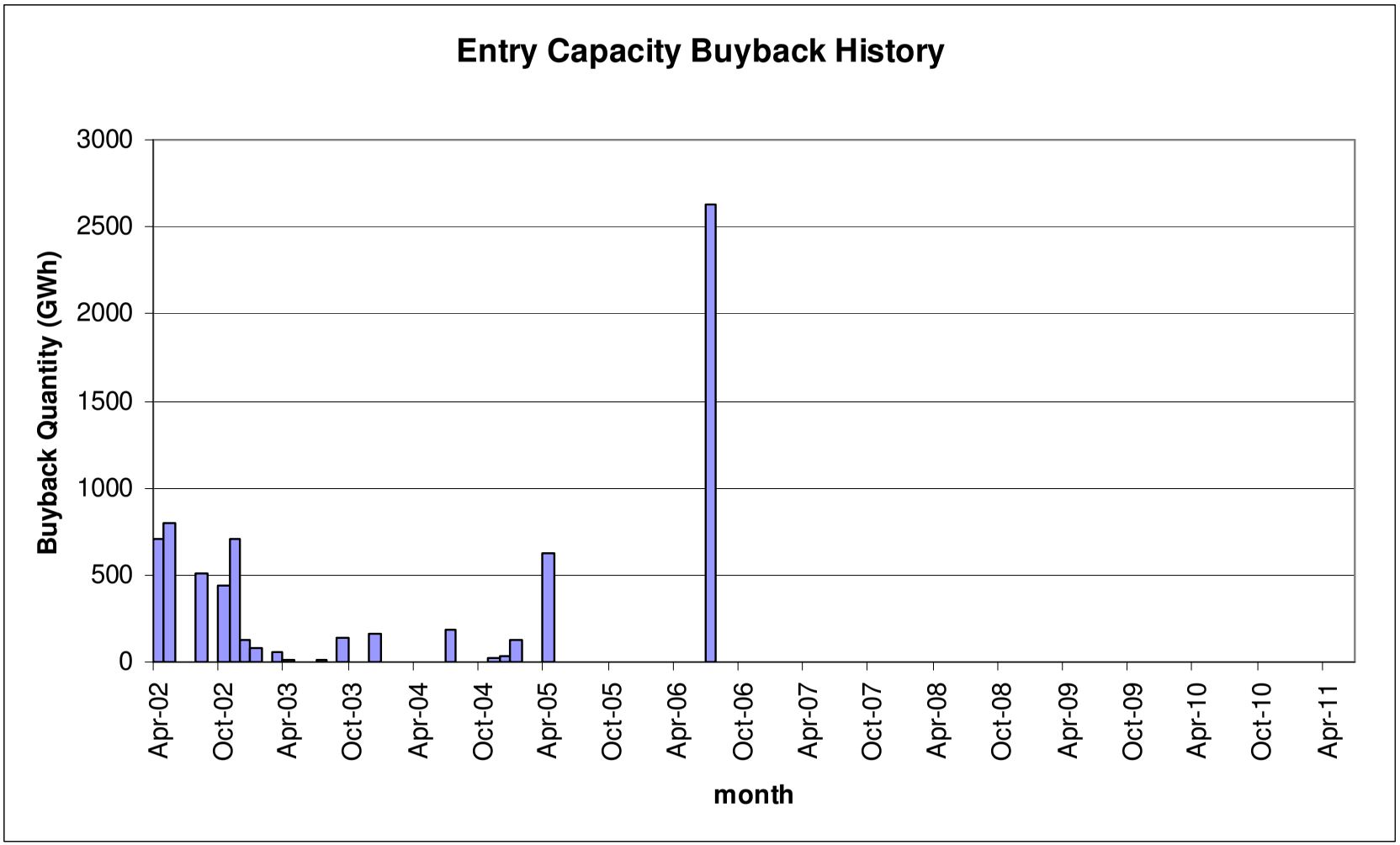

Lagging Supply Indicator 3:
Interruptible Entry Capacity Scaleback

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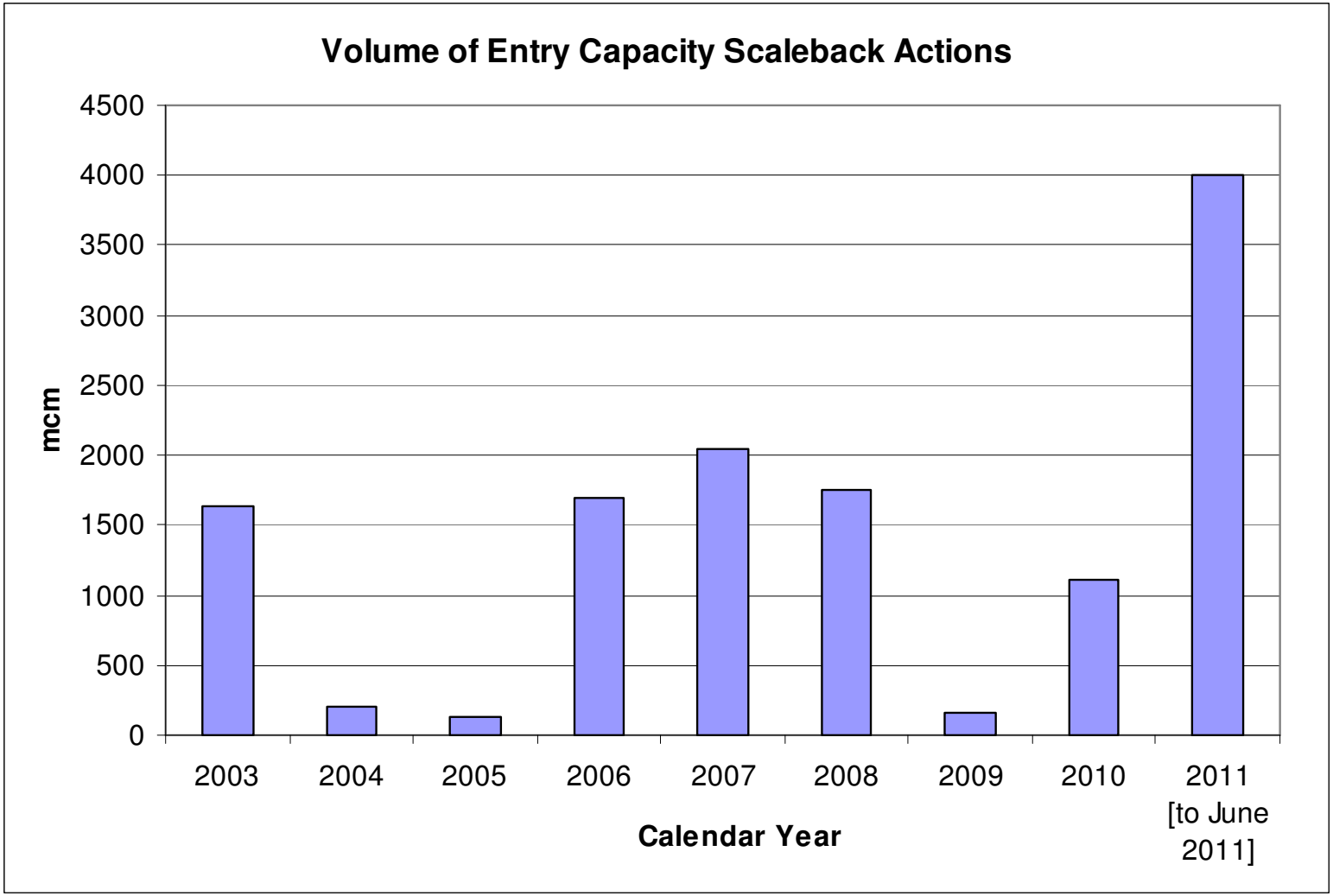
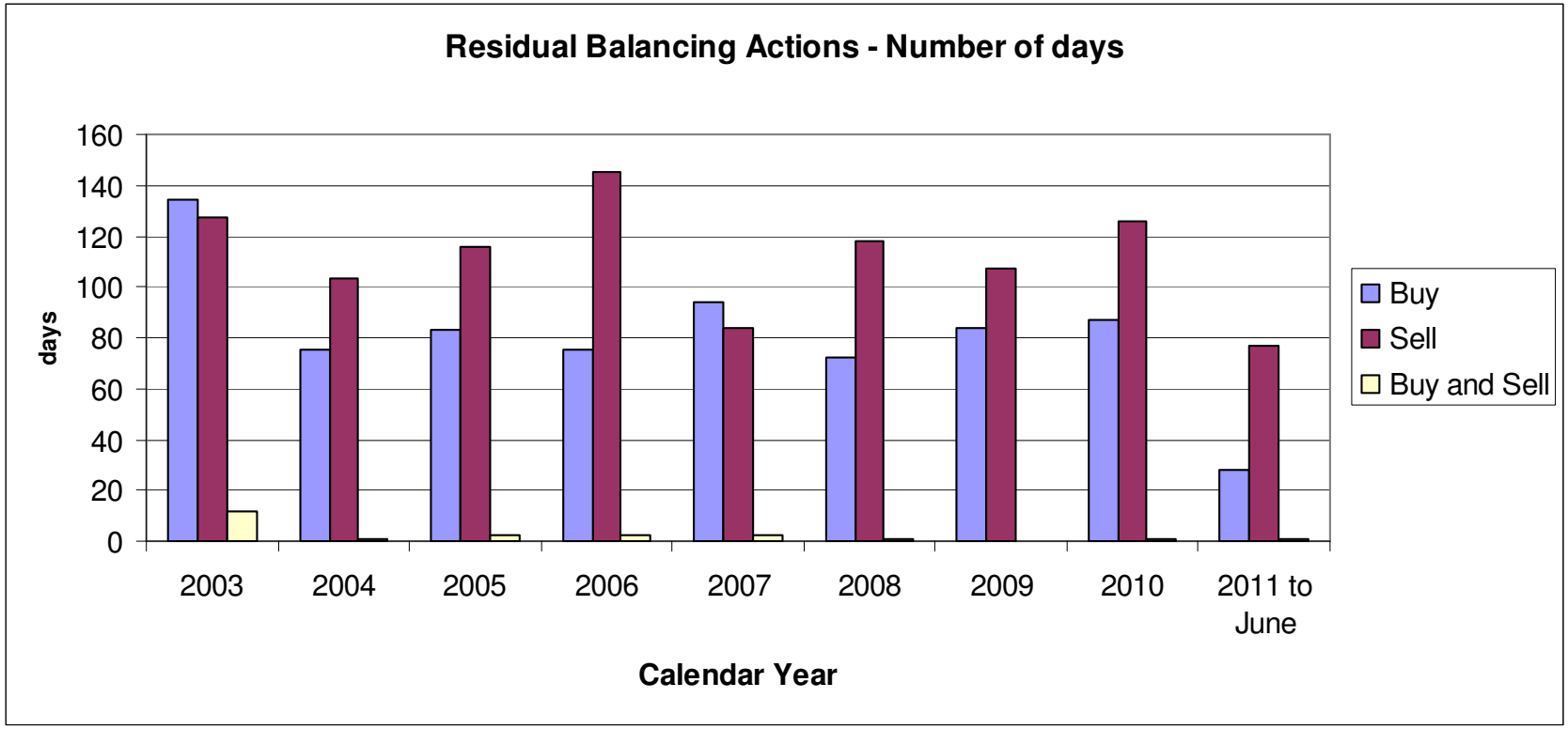
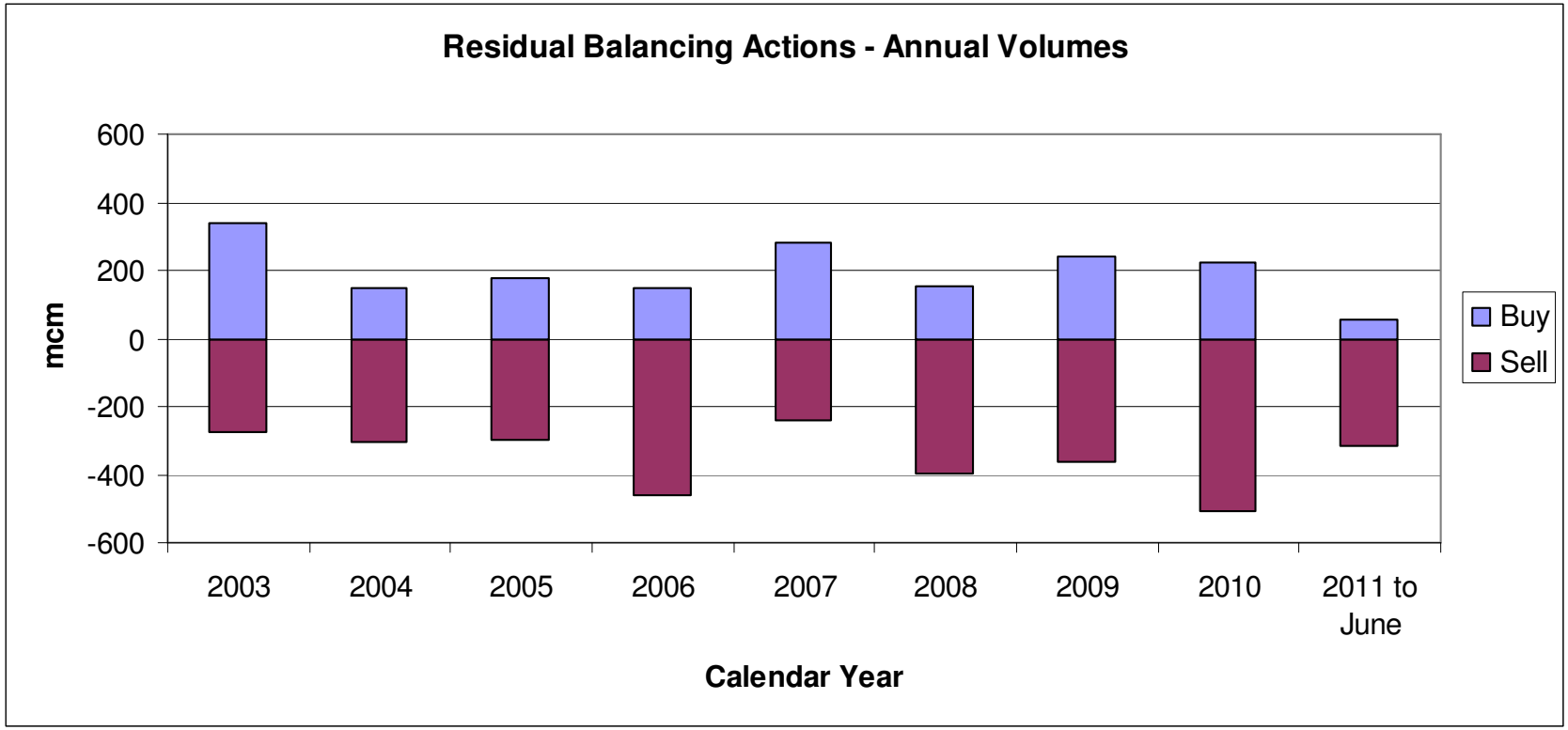


Lagging Supply & Demand Indicator 1:
Number of days of residual balancing actions



Lagging Supply and Demand Indicator 2:
Residual Balancing Annual Volumes



Lagging Supply and Demand Indicator 3:
Residual Balancing Annual Costs

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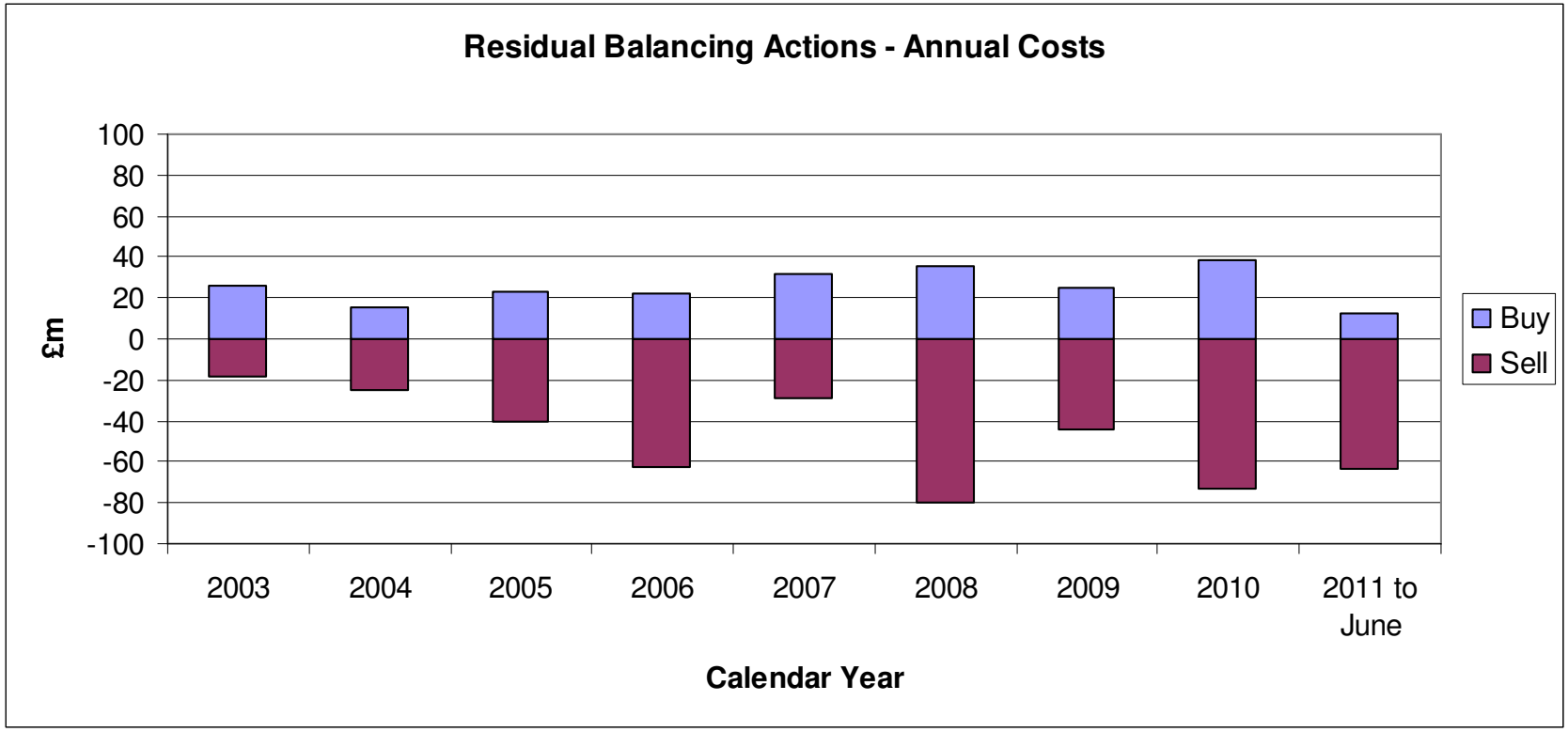

Summary

- We continue to see a number of the daily supply indicators being driven by the increased usage of LNG
- Increased trends of within-day linepack usage
- Looking at potential indicators on ‘information provision’ accuracy (System Input and Offtake) and the impact of wind generation in the electricity industry