

Demand Estimation Sub Committee

14th November 2005

Agenda

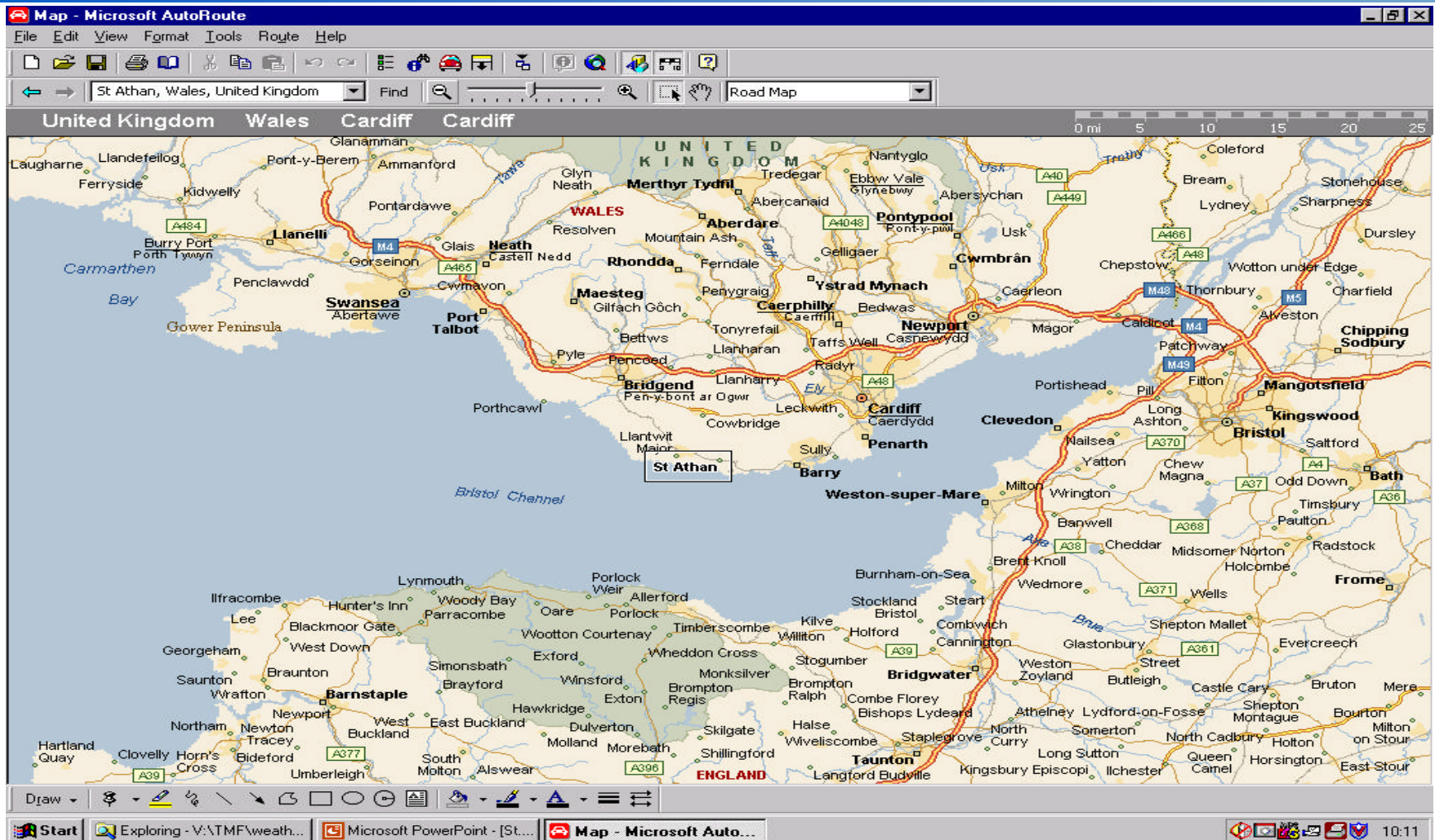
- Changes to Cardiff weather station
 - Backfilling history
 - Within day relationship (National Grid)
- Algorithm Performance 2004/5
 - WCF and SF
- Gas year 2004/5 Replication of demand attribution

Creating a St. Athan weather history from Cardiff

Background

- Temperatures and wind speeds from Cardiff weather station are currently used to create the composite weather variable for Wales South.
- Cardiff weather station will cease operating in the first few days of 2006.
- St.Athan is the nearest weather station to Cardiff.
- St.Athan weather starts in October 1998.
- A St.Athan weather history starting in April 1928 is required for demand modelling purposes.
- This presentation shows the equations that will be used to convert the Cardiff weather history to a St.Athan weather history.

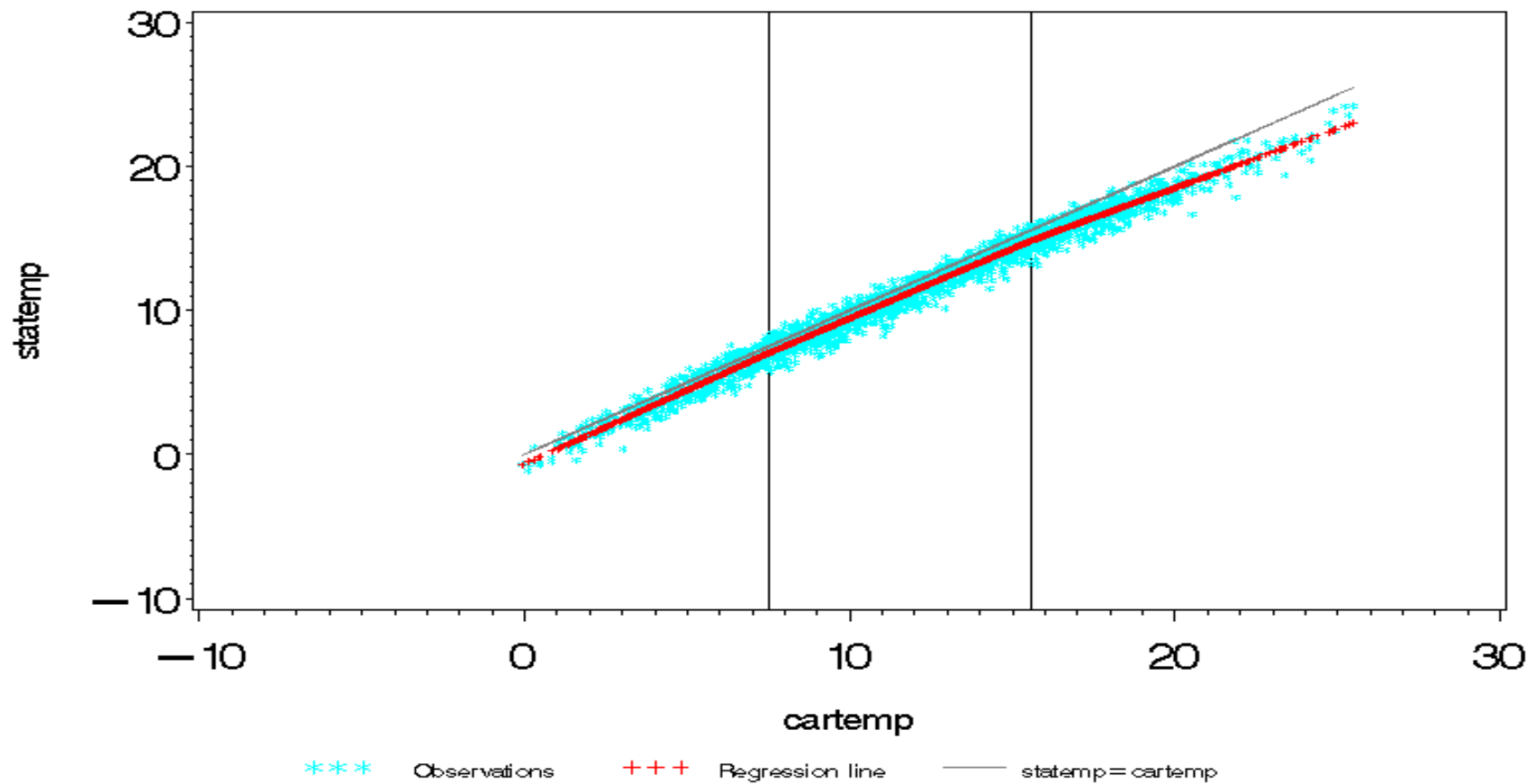
Location of St.Athan



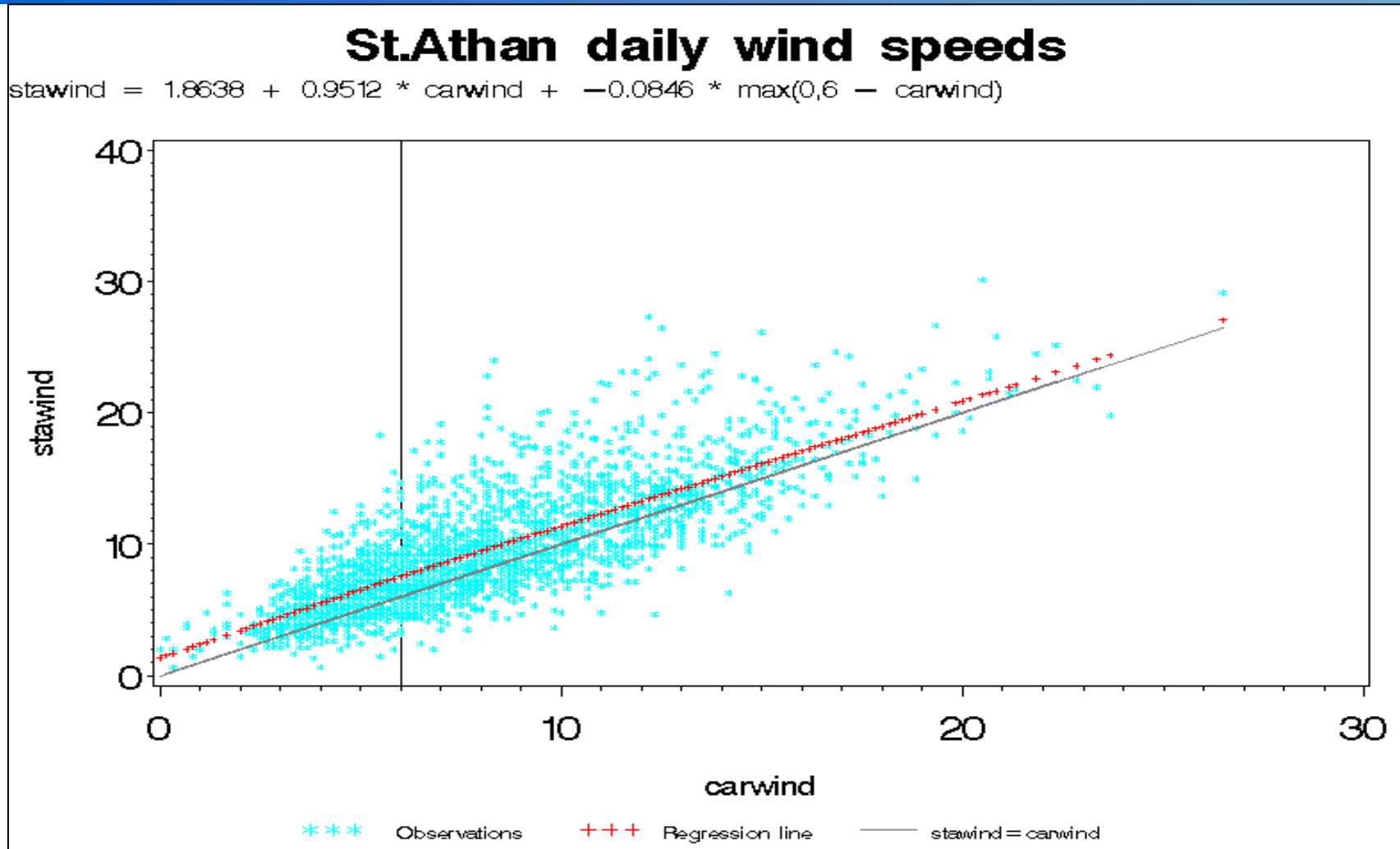
St.Athan daily temperatures

St Athan daily temperatures

$$\text{statemp} = -0.2009 + 0.9679 * \text{cartemp} + -0.0587 * \max(0, 7.5 - \text{cartemp}) + -0.1438 * \max(0, \text{cartemp} - 15.6)$$



St.Athan daily wind speeds



Backfilling Equations

- Daily Temperatures

$$\begin{aligned} \text{St.Athan} = & - 0.2009 + 0.9679 * \text{Cardiff} \\ & - 0.0587 * \max(0, 7.5 - \text{Cardiff}) \\ & - 0.1438 * \max(0, \text{Cardiff} - 15.6) \end{aligned}$$

- Daily Wind Speeds


$$\begin{aligned} \text{St.Athan} = & 1.8638 + 0.9512 * \text{Cardiff} \\ & - 0.0846 * \max(0, 6 - \text{Cardiff}) \end{aligned}$$

National Grid Within Day Relationship

Algorithm Performance

WCF and SF elements

Evaluation of performance

- Daily values of scaling factor and weather correction factor 
 - Figures 1-13
 - Tables 1-4
- Reconciliation variance data for each EUC
- Daily consumption data collected from the NDM sample

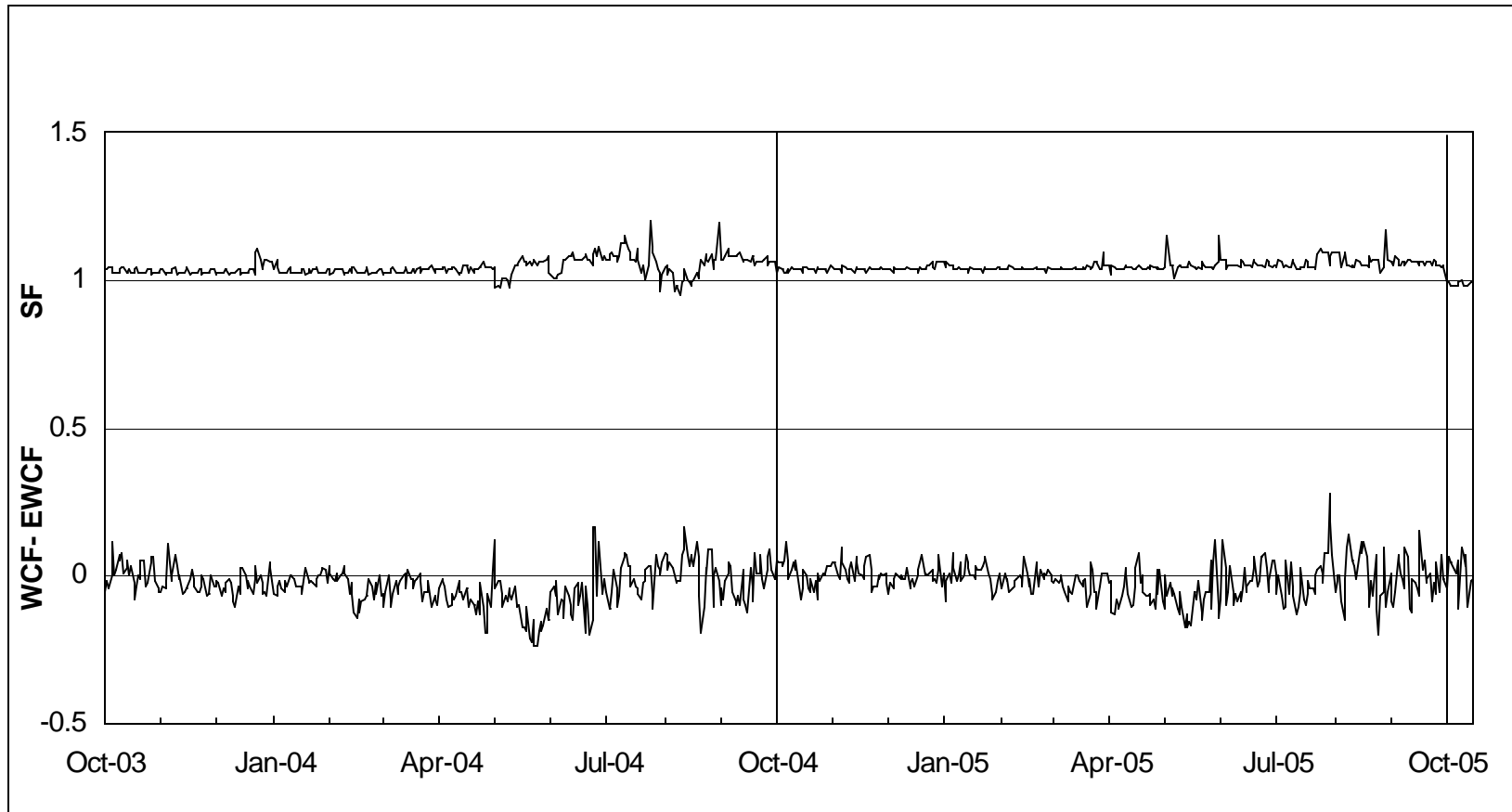
Commentary

- WCF-EWCF values show that bias is slightly worse in 2004/5 for most LDZs, consistent with SND being slightly too high.
 - Weekday 10 out of 13
 - Friday and Saturday 8 out of 13
 - Sunday 11 out of 13
- SF values are better in about half all LDZs
- Average monthly RMSE shows variability has improved, also true for most LDZs
- SF volatility still evident during the summer in a number of LDZs, likely impacts are from the warm weather cut-offs in the models

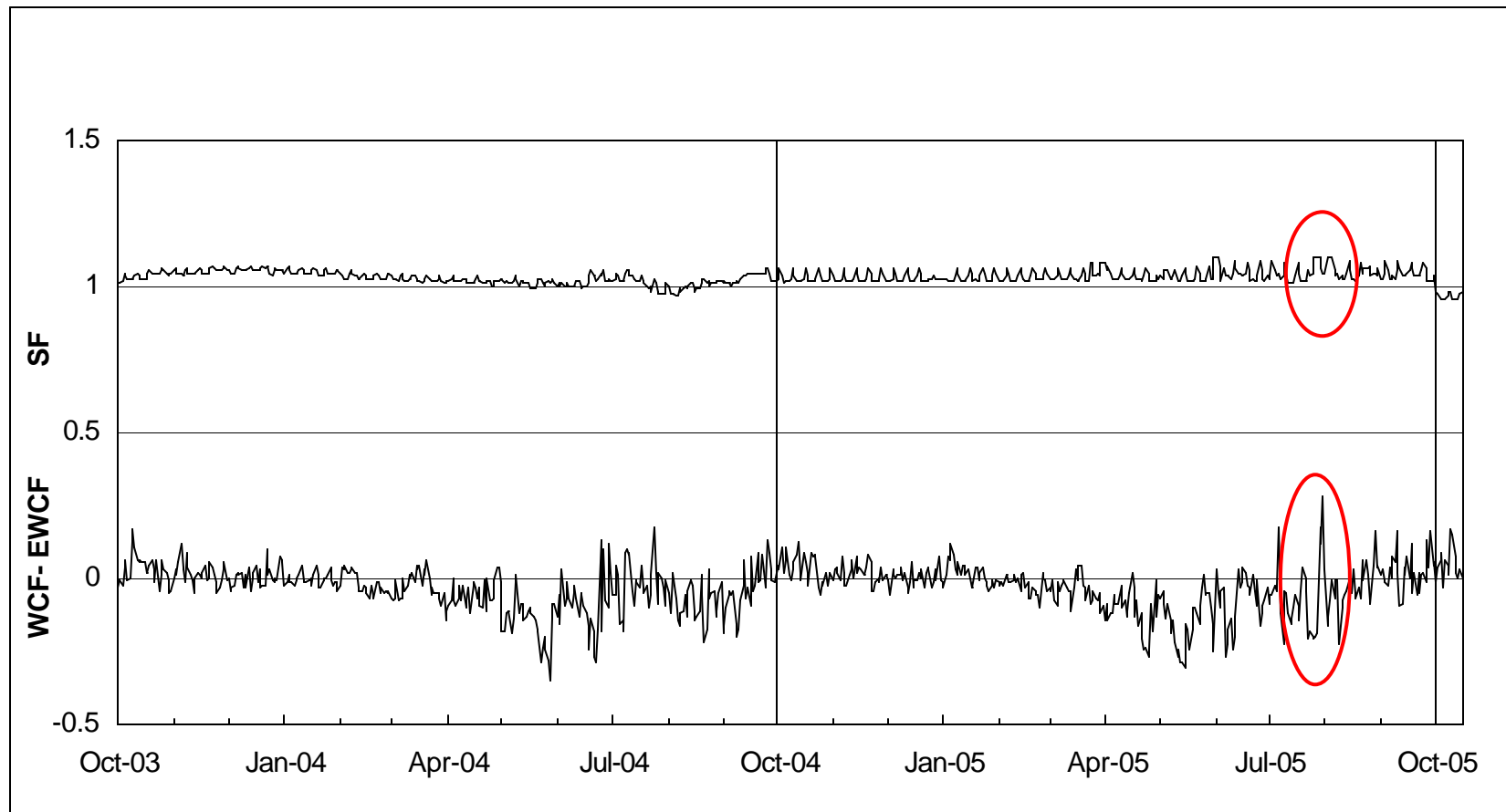
WCF and SF patterns

- Two specific instances to highlight
 - SC LDZ, two spikes in SF during May bank holiday days suggesting holiday demand reductions may be too high
 - Last week of July in SC, NO, NW, NE, WM show volatile WCF-EWCF values with generally unusual SF plateau. Possibly due to demand models not adequately representing the very unsettled weather.

Weather Correction & Scaling Factor: SC



Weather Correction & Scaling Factor: NO



Equilibrium SF analysis

- Uses WCF-EWCF close to zero
 - Tables 7 and 8
- Weather corrected aggregate NDM demand close to aggregate NDM SND
 - Tables 9 and 10
- Allows assessment of equilibrium SF
- Can be compared to AQ movement in the LDZ

SC LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
October	100.6%	74.3%	0.005	1.04	0.008
December	99.8%	82.6%	-0.084	1.04	-0.003
January	100.5%	82.3%	-0.096	1.04	0.005

“Equilibrium level” of SF: ~ 1.04

→ AQ ~4 % too low in 2004/05

Agg. NDM AQ change for new gas year: -0.1%

Seasonal Normal Weather Basis change for SC: -2.6%

⊃ new NDM AQs in aggregate could still be too low but October SF < 1

NO LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
December	100.0%	79.8%	-0.094	1.03	0.000

“Equilibrium level” of SF: ~ 1.03

→ AQ ~3 % too low in 2004/05

Agg. NDM AQ change for new gas year: -2.3%

Seasonal Normal Weather Basis Change for NO: -4.8%

⊕ new NDM AQs in aggregate could still be too low, but October SF < 1

NW LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
December	102.1%	82.9%	-0.073	1.00	0.021
February	98.7%	82.6%	-0.051	1.01	-0.012

“Equilibrium level” of SF: 1.00 – 1.01 → AQ broadly OK in 2004/05

Agg. NDM AQ change for new gas year: -4.8%

Seasonal Normal Weather Basis Change for NW: -4.5%

⊃ new NDM AQs in aggregate could be broadly OK, but October SF < 1

NE LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
February	99.8%	79.2%	-0.030	1.00	-0.001

“Equilibrium level” of SF: ~ 1.00

→ AQ OK in 2004/05

Agg. NDM AQ change for new gas year: -2.3%

Seasonal Normal Weather Basis Change for NE: -4.2%

⊃ new NDM AQs in aggregate could now be too high, October SF < 1

EM LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
December	100.1%	78.8%	-0.071	1.02	0.001
February	99.6%	76.8%	-0.035	1.02	-0.004

“Equilibrium level” of SF: 1.02

→ AQ 2 % too low

Agg. NDM AQ change for new gas year: -3.1%

Seasonal Normal Weather Basis Change for EM: -4.2%

⊃ new NDM AQs in aggregate could still be too low, but October SF < 1

WM LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
January	99.6%	87.8%	-0.159	1.01	-0.003

“Equilibrium level” of SF: ~ 1.01 → AQ slightly too low in 2004/05

Agg. NDM AQ change for new gas year: -5.4%

Seasonal Normal Weather Basis Change for WM: -6.0%

⊕ new NDM AQs in aggregate could be broadly OK, but October SF < 1

WN LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
November	99.6%	71.8%	-0.080	1.10	-0.002

“Equilibrium level” of SF: ~ 1.10 → AQ ~10 % too low in 2004/05

Agg. NDM AQ change for new gas year: -4.7%
 Seasonal Normal Weather Basis Change for WN: -4.4%

⊖ new NDM AQs in aggregate still too low, but October SF now closer to 1

Note: WN LDZ is impacted by some supply points that should be in WN, being assigned to adjacent LDZs. WN is much smaller than adjacent LDZs and is affected to a greater extent.

WS LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
December	100.0%	69.8%	-0.053	1.01	0.000

“Equilibrium level” of SF: 1.01

→ AQ slightly too low

Agg. NDM AQ change for new gas year: -2.8%

Seasonal Normal Weather Basis Change for WS: -2.9%

⊢ new NDM AQs in aggregate could be broadly OK, October SF ~ 1

EA LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
December	100.3%	86.3%	-0.069	1.02	0.003

“Equilibrium level” of SF: 1.02

→ AQ 2 % too low in 2004/05

Agg. NDM AQ change for new gas year: -5.3%

Seasonal Normal Weather Basis Change for EA: -6.2%

⊘ new NDM AQs in aggregate may still be too low, BUT October SF << 1
which suggests the opposite

NT LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
November	99.5%	86.6%	-0.087	0.99	-0.004
January	100.8%	88.5%	-0.136	1.00	0.009

“Equilibrium level” of SF: ~ 0.99 – 1.00 → AQ OK or slightly too high in 2004/05

Agg. NDM AQ change for new gas year: -5.7%

Seasonal Normal Weather Basis Change for NT: -5.9%

⊃ new NDM AQs in aggregate could be broadly OK, but October SF < 1

SE LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
December	101.5%	82.1%	-0.058	0.98	0.015
March	99.5%	80.4%	-0.110	0.98	-0.006

“Equilibrium level” of SF: ~ 0.98
2004/05

→ AQ 2 % too high in

Agg. NDM AQ change for new gas year: -6.1%

Seasonal Normal Weather Basis Change for SE: -6.3%

⊖ new NDM AQs in aggregate could still be too high, October SF < 1

SO LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
December	99.4%	86.3%	-0.077	1.04	-0.006
January	100.4%	86.8%	-0.158	1.04	0.004

“Equilibrium level” of SF: ~1.04

→ AQ ~ 4% too low in 2004/05

Agg. NDM AQ change for new gas year: -6.2%

Seasonal Normal Weather Basis Change for SO: -6.9%

⇒ new NDM AQs in aggregate could be still be too low, October SF close to 1

SW LDZ – 2004/05

Month	Agg. WC NDM as % of Agg. NDM SND	Agg WC NDM as % of Agg. WC LDZ	Average WCF	Average SF	WCF - EWCF
November	100.8%	84.2%	-0.071	1.01	0.010
December	99.1%	86.4%	-0.080	1.01	-0.009
January	99.1%	86.3%	-0.154	1.01	-0.009

“Equilibrium level” of SF: 1.01

→ AQ slightly too low in 2004/05

Agg. NDM AQ change for new gas year: -4.1%

Seasonal Normal Weather Basis Change for SE: -5.3%

⊕ new NDM AQs in aggregate could be broadly OK, but October SF < 1

-
- Any Questions?

Replication of Demand Attribution

Gas year 2004/5

Demand Attribution – Gas Year 2004/5

- Full year continuation of the part year presented in March
- Based on 2004/5 models using revised CWV and SNCWVs
- All EUCs re-modelled for the all LDZs with revised new basis CWVs and with new seasonal normal weather
- Models for data sets (analysis years) 2001/02, 2002/03 and 2003/04
(these 3 years were originally used for the smoothed model for the 2004/05 EUC profiles - the previous gas year)
- Smoothed models on new basis, created for gas year 2004/05 and relevant parameters computed (e.g. ALPs, DAFs, etc)

Demand Attribution – Gas Year 2004/5 (2)

- Inevitably different modelling outcomes apply: e.g. whether cut-offs and summer reductions apply
- AQs adjusted to new basis using AQ factors computed from smoothed EUC models
- Demand attribution replicated for gas year 2004/05 on this new basis
- Results compared with results of actual demand attribution over 2004/05

WCF-EWCFs

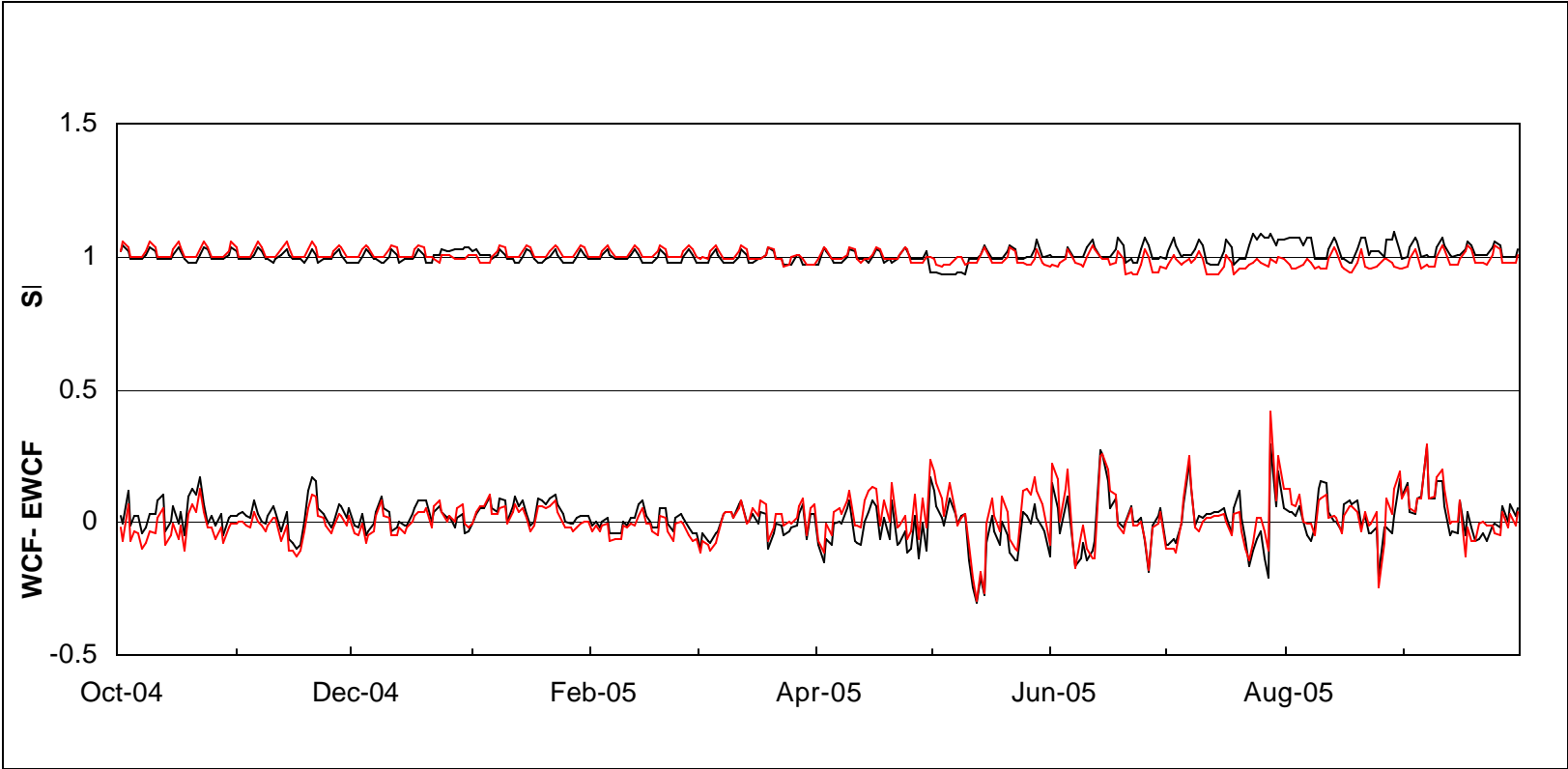
SFs

RMS deviations of SF from 1

NDM Demand Attribution - Gas Year 2004/05 - Caveats

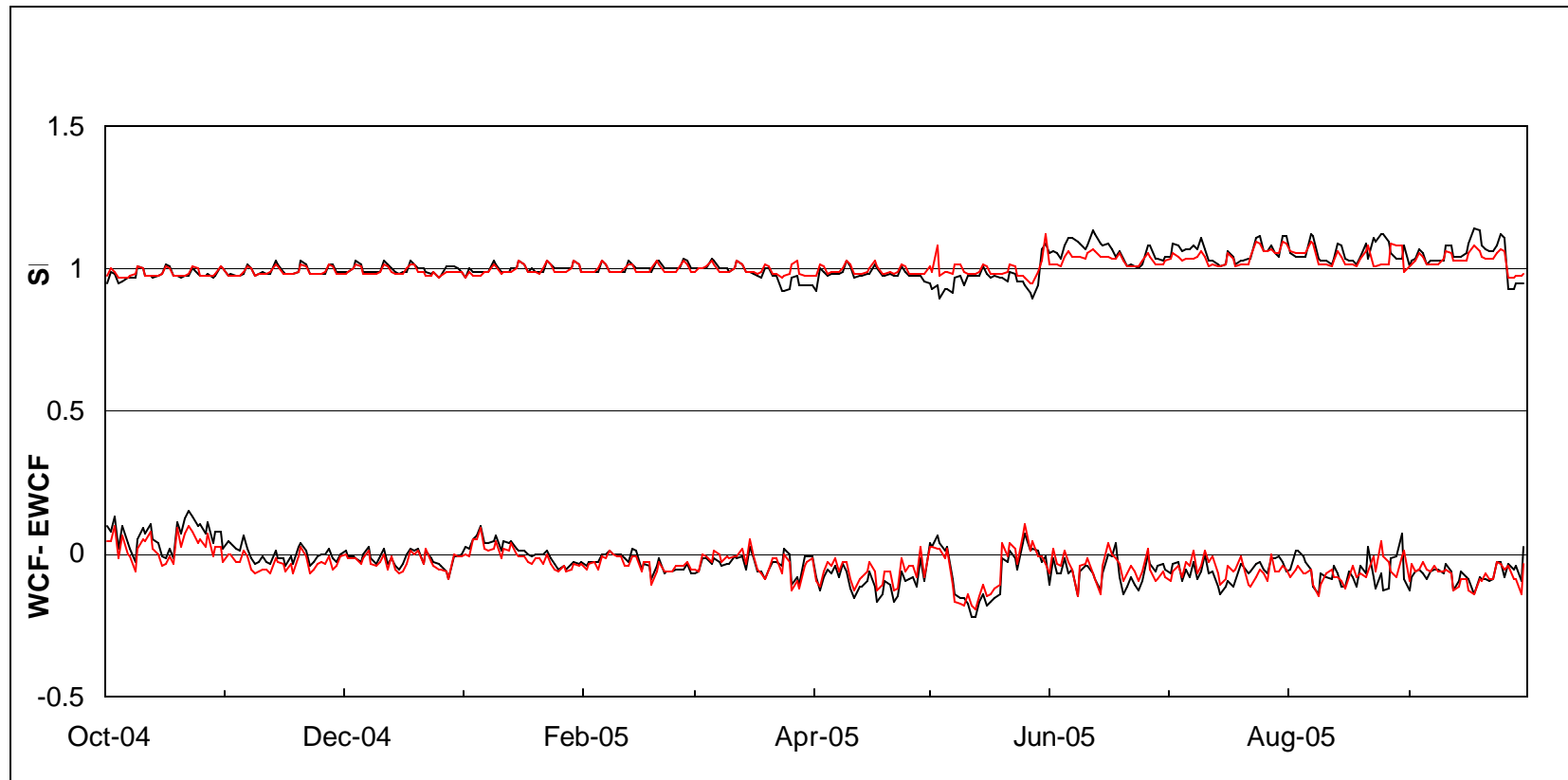
- AQ adjustment based on factors
- Underlying modelling is different
- New CWV definitions based on best overall fit to a range of years
- Underlying adjustments to the load levels of the constituent consumption bands of the revised basis aggregate NDM demand model are also based on the AQ factors

Demand Attribution: SF & WCF for LDZ: NE



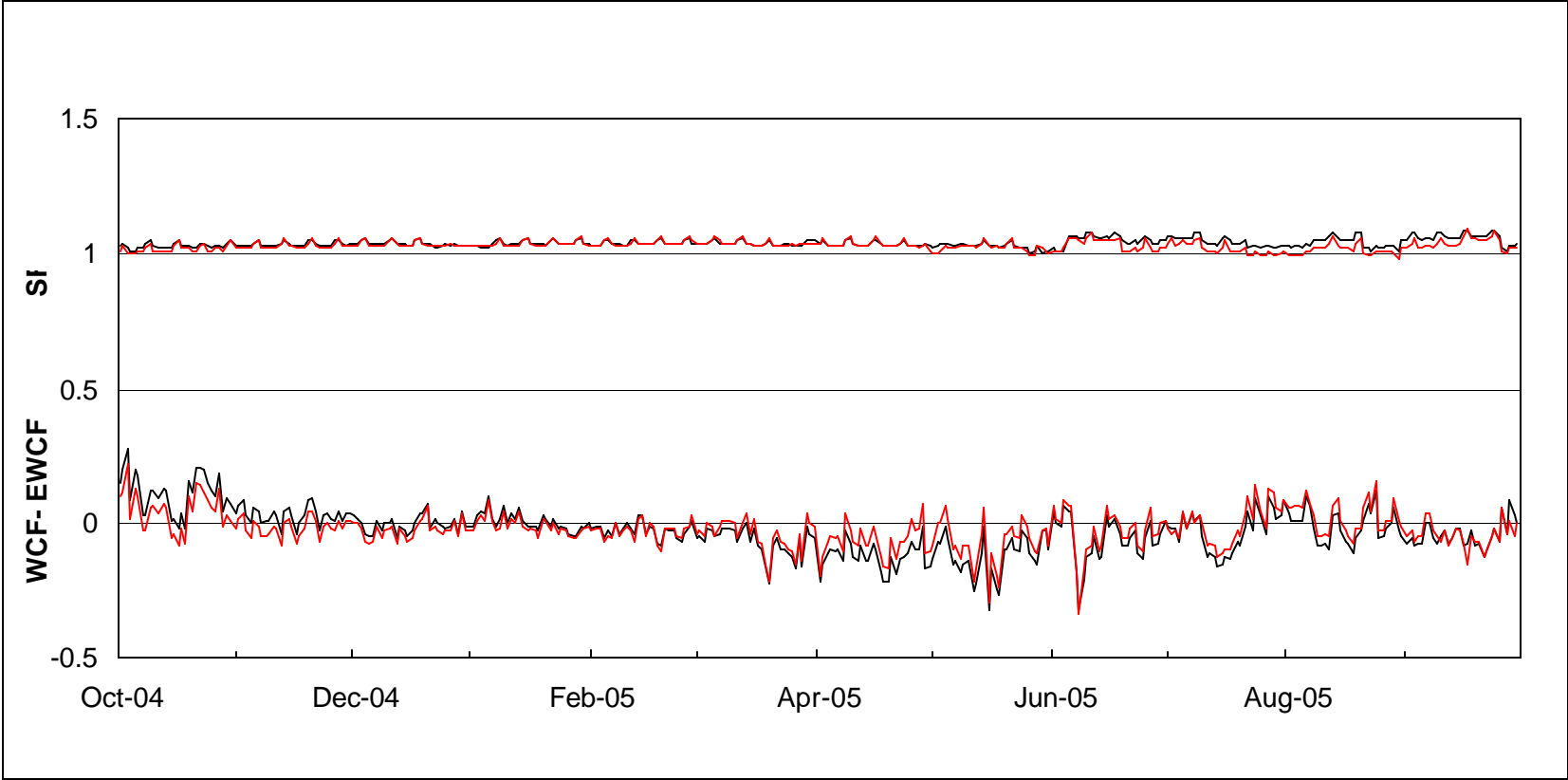
Black is current basis; Red is revised basis

Demand Attribution: SF & WCF for LDZ: NT



Black is current basis; Red is revised basis

Demand Attribution: SF & WCF for LDZ: SO



Black is current basis; Red is revised basis

Demand Attribution: Average Values of SFs

GY 2004/05 - Differences

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	0.003	-0.008	-0.010	-0.007	0.008	-0.011
NO	0.008	-0.001	0.000	0.007	0.009	0.001
NW	-0.017	-0.014	0.001	0.003	-0.010	-0.034
NE	-0.011	0.007	0.006	0.007	-0.007	-0.005
EM	-0.002	-0.002	-0.005	0.001	-0.003	-0.004
WM	0.002	0.003	0.002	-0.001	0.006	-0.002
WN	0.006	0.008	0.008	0.008	0.015	-0.001
WS	0.015	0.008	0.015	0.015	-0.003	0.031
EA	0.002	-0.001	-0.004	-0.004	0.003	0.008
NT	0.000	-0.004	0.004	0.005	0.001	0.005
SE	-0.004	-0.003	0.004	0.006	0.007	0.000
SO	0.011	0.012	0.002	0.010	0.003	0.016
SW	0.004	0.006	0.003	0.012	0.005	0.005

Better

Worse

Demand Attribution: Average Values of WCF – EWCF

GY 2004/05 - Differences

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.008	-0.017	-0.018	-0.017	-0.005	-0.019
NO	0.009	-0.004	0.004	0.010	-0.011	0.024
NW	0.019	0.007	-0.011	-0.001	0.014	0.044
NE	-0.005	0.005	0.003	0.001	0.012	-0.021
EM	-0.003	-0.012	-0.018	-0.002	0.017	0.005
WM	0.003	-0.007	-0.006	0.000	-0.010	0.009
WN	0.000	-0.006	-0.002	0.001	-0.001	-0.001
WS	-0.001	-0.013	-0.004	-0.005	-0.002	0.016
EA	-0.008	-0.010	-0.012	-0.012	0.008	-0.007
NT	0.000	-0.013	-0.006	-0.004	-0.016	0.009
SE	0.004	-0.001	-0.004	-0.013	0.015	0.022
SO	0.008	0.005	-0.002	0.007	-0.008	0.031
SW	0.002	-0.002	-0.001	0.009	-0.009	0.013

Gas Year 2004/05

Demand Attribution Results – Broad Conclusions

- Seasonal SF effects less evident
- On the whole slightly improved SF behaviour (e.g. better weekday and weekend averages, except Friday)
- Less SF volatility (RMS deviations of SF from 1 improved in most months/LDZ)
- In most cases (weekdays, weekends) WCF bias is not as good (except in summer) - adjusting aggregate NDM demand model constituent contributions using AQ factors may have played a part
- Differences may also be due to:
 - weekend effects
 - modelling outcomes on new basis
 - summer fit of new CWVs (e.g. NW)