

Cross-subsidies tied to the introduction of intermittent renewable electricity

An analysis based on a model of the French day-ahead market

Supplementary materials

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Index

1	Fit visualisation	3
1.1	January	3
1.2	February	4
1.3	March	5
1.4	April	6
1.5	May.....	7
1.6	June	8
1.7	July.....	9
1.8	August.....	10
1.9	September	11
1.10	October.....	12
1.11	November	13
1.12	December	14
2	Model parameters values.....	14

1 Fit visualisation

The data fitting and the fit visualisation have been made possible by using the freeware GNUPLOT [1].

1.1 January

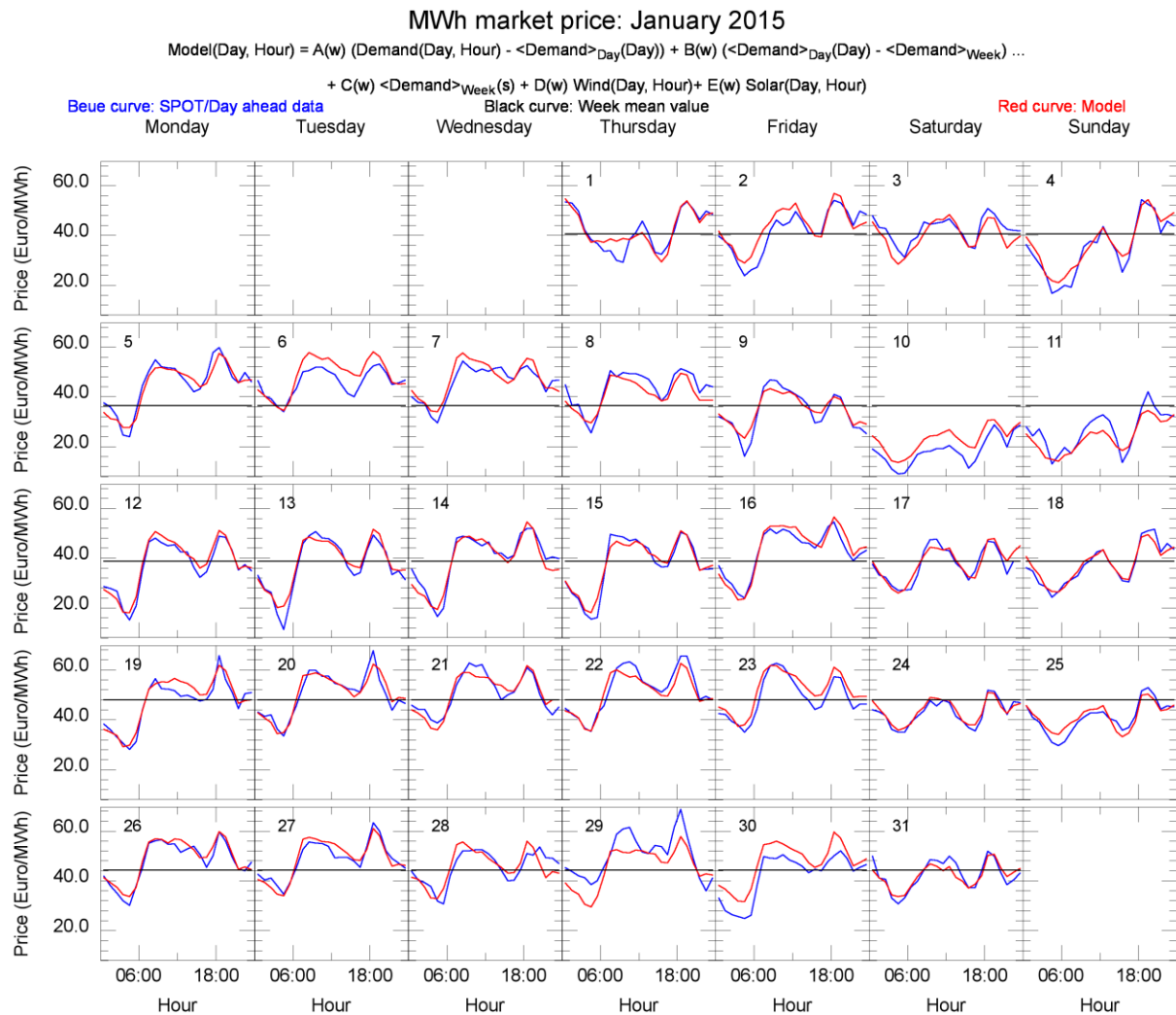


Figure S1: January SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.2 February

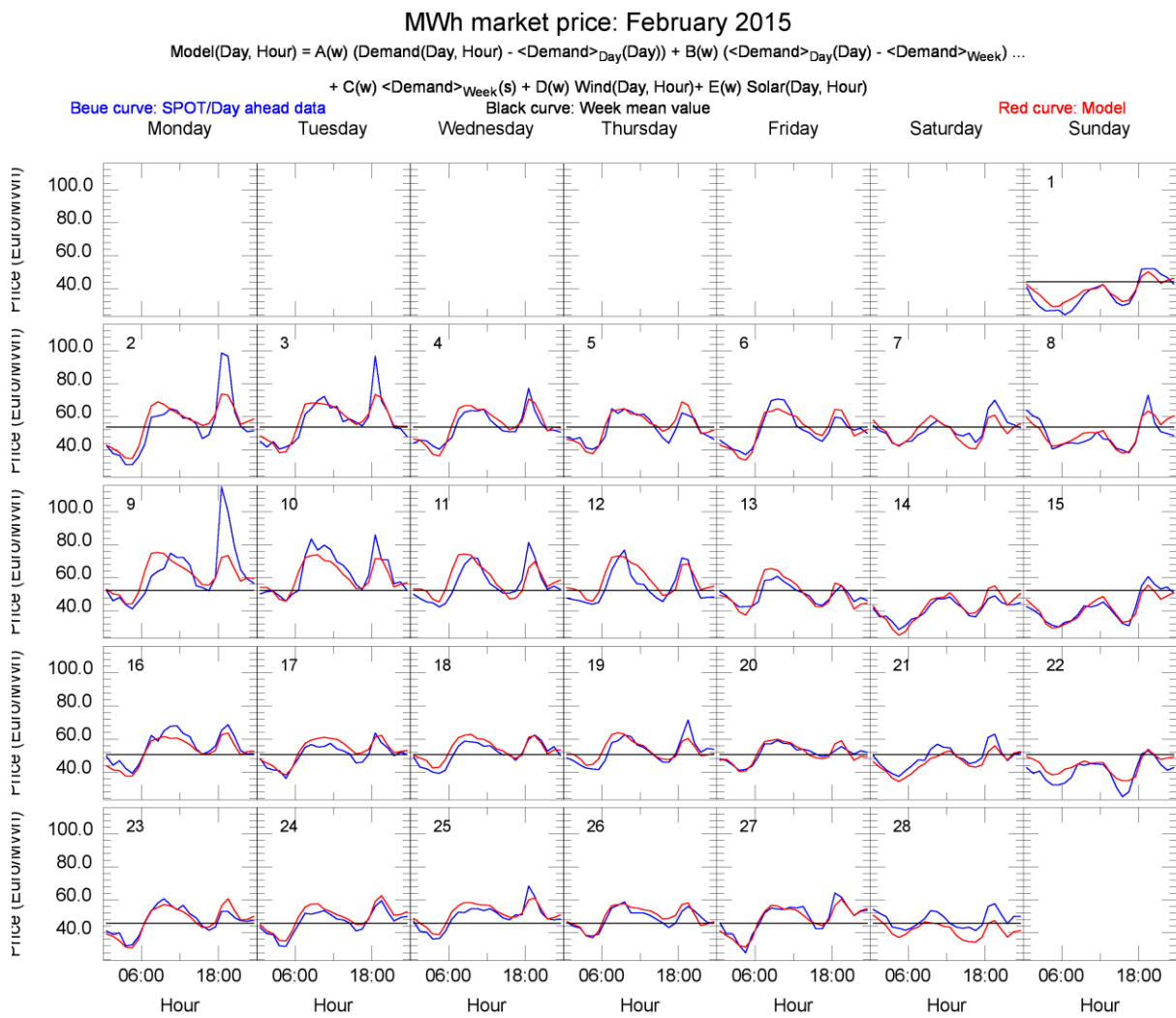


Figure S2: February SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.3 March

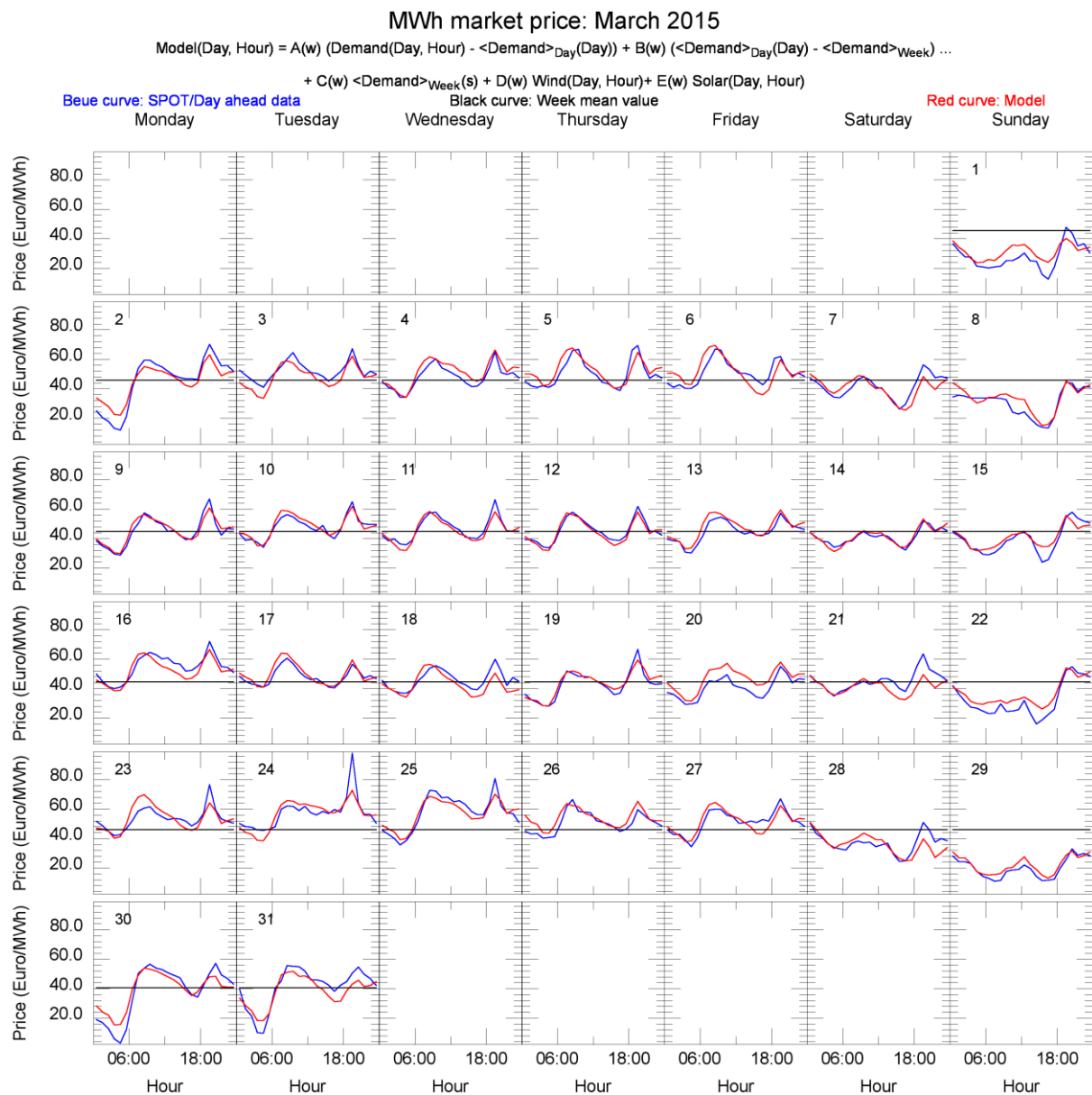


Figure S3: March SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.4 April

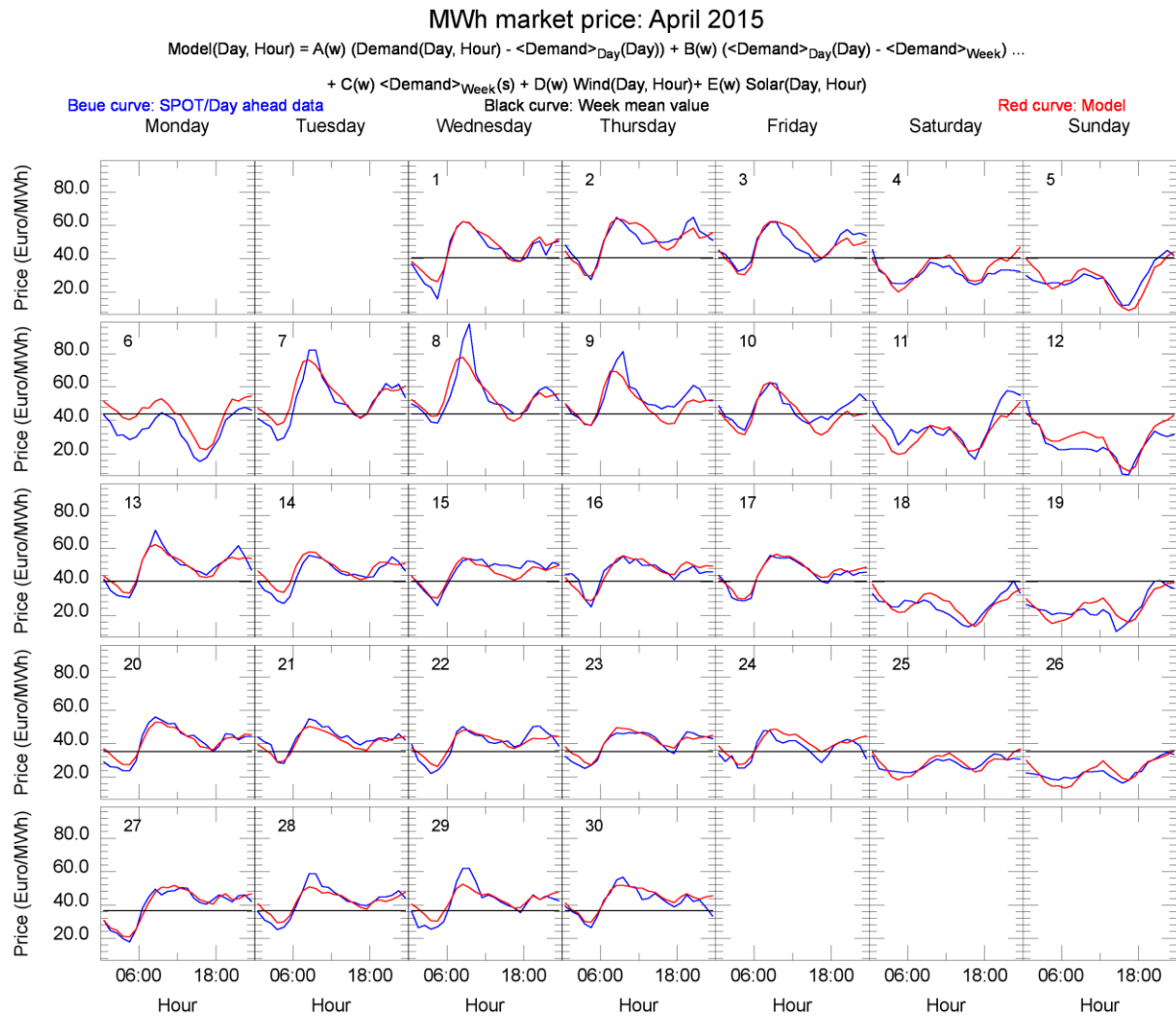


Figure S4: April SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.5 May

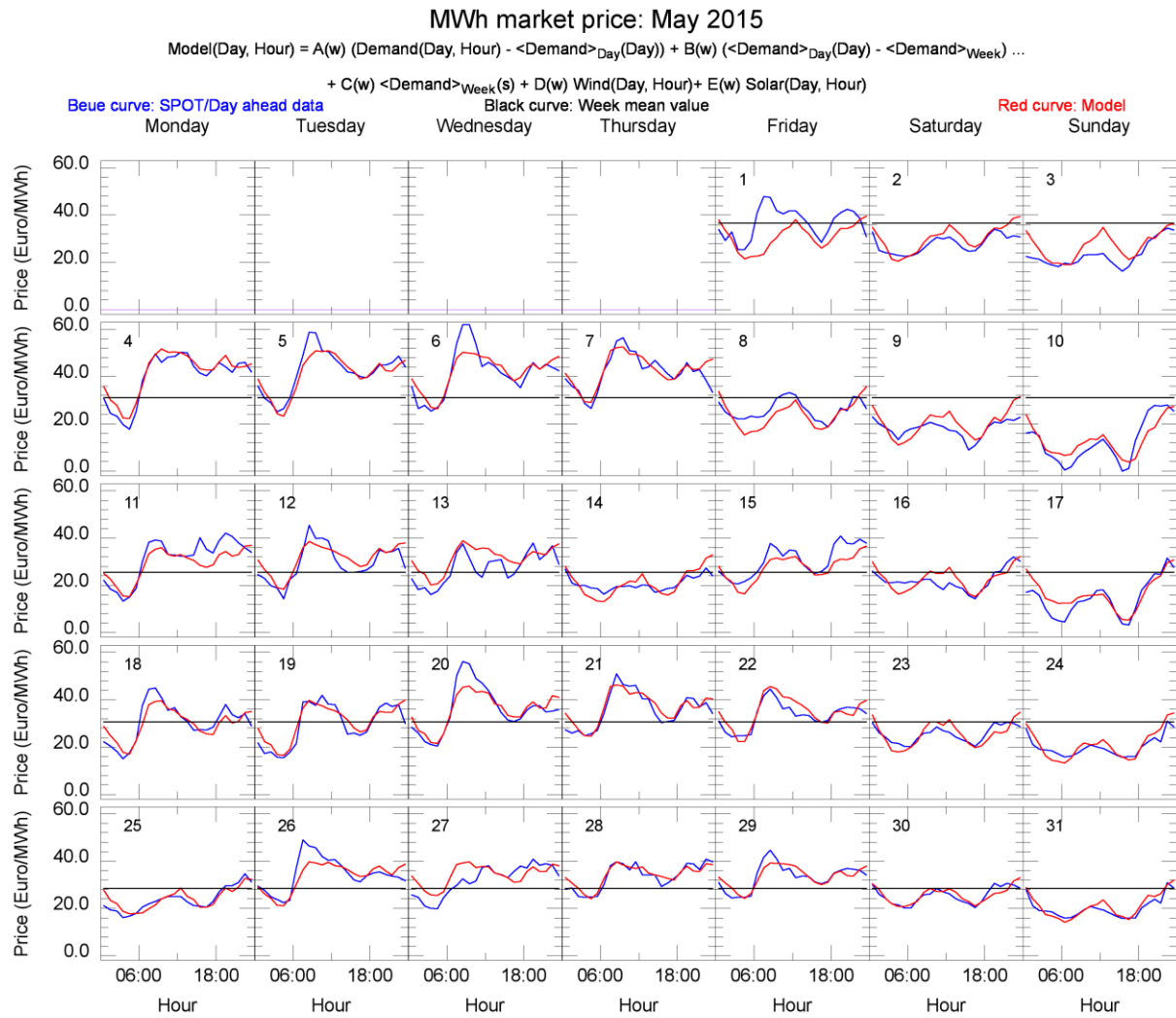


Figure S5: May SPOT day ahead data fitting visualisation using GNUPLLOT [1].

1.6 June

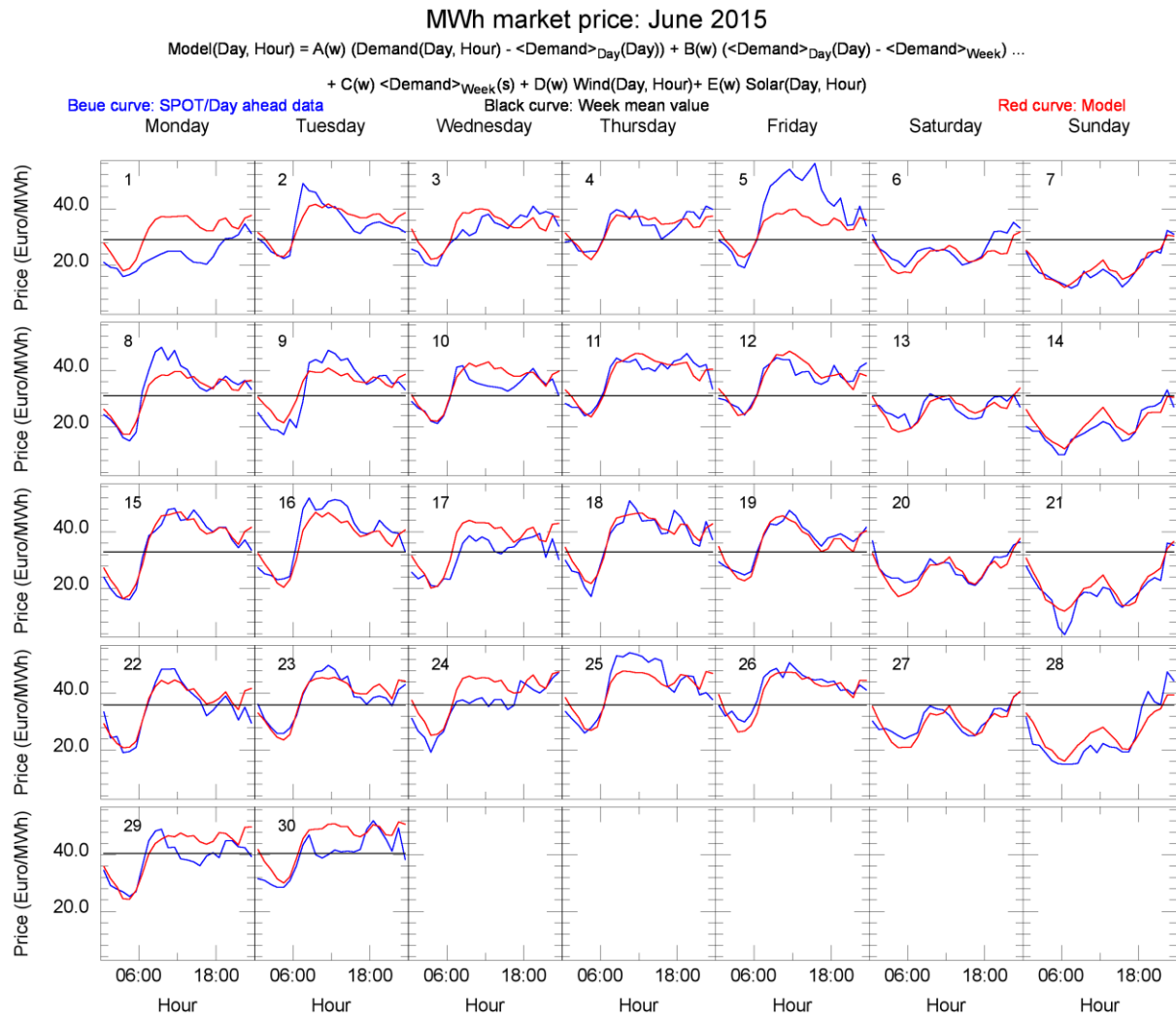


Figure S6: June SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.7 July

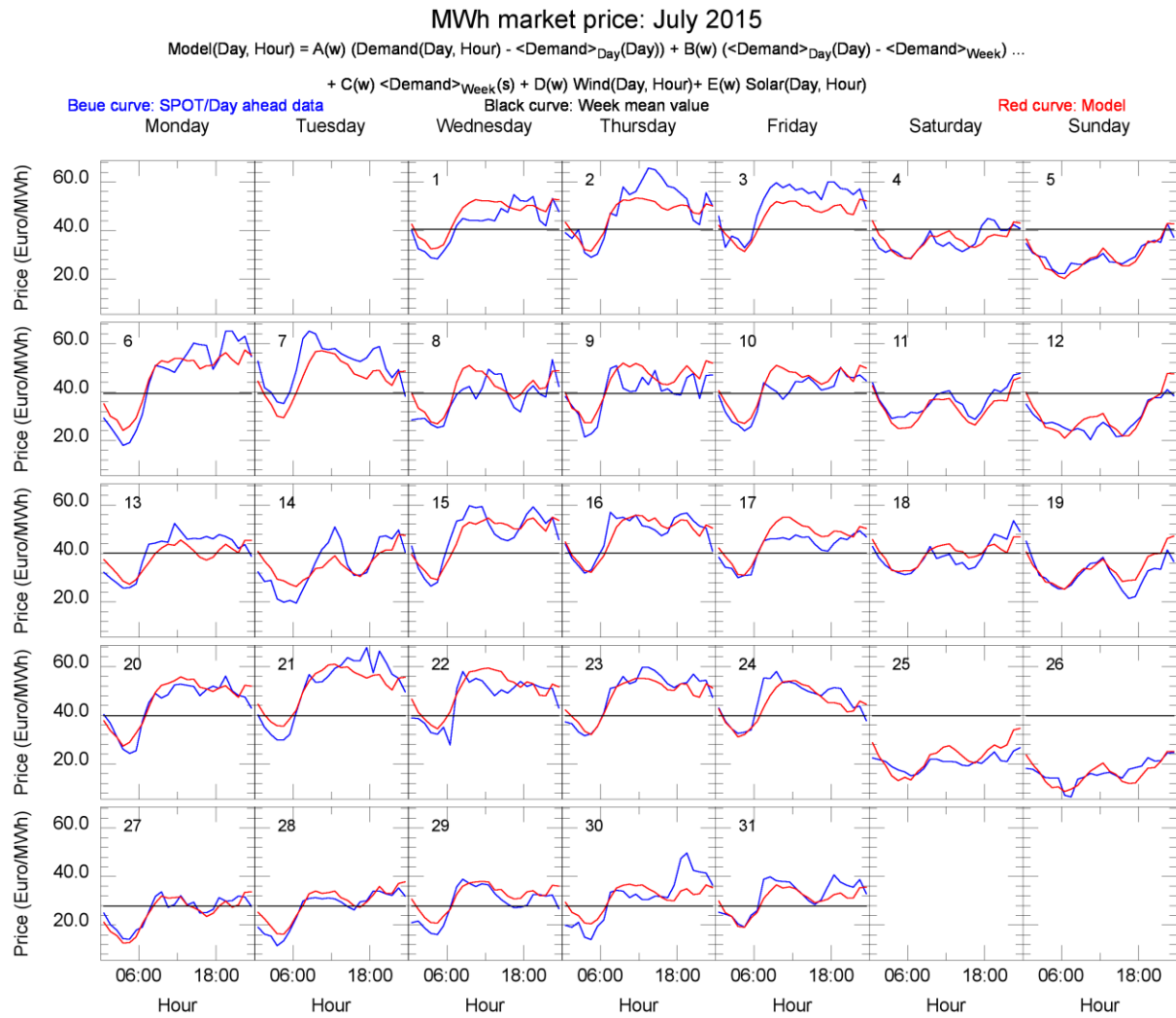


Figure S7: July SPOT day ahead data fitting visualisation using GNUPLLOT [1].

1.8 August

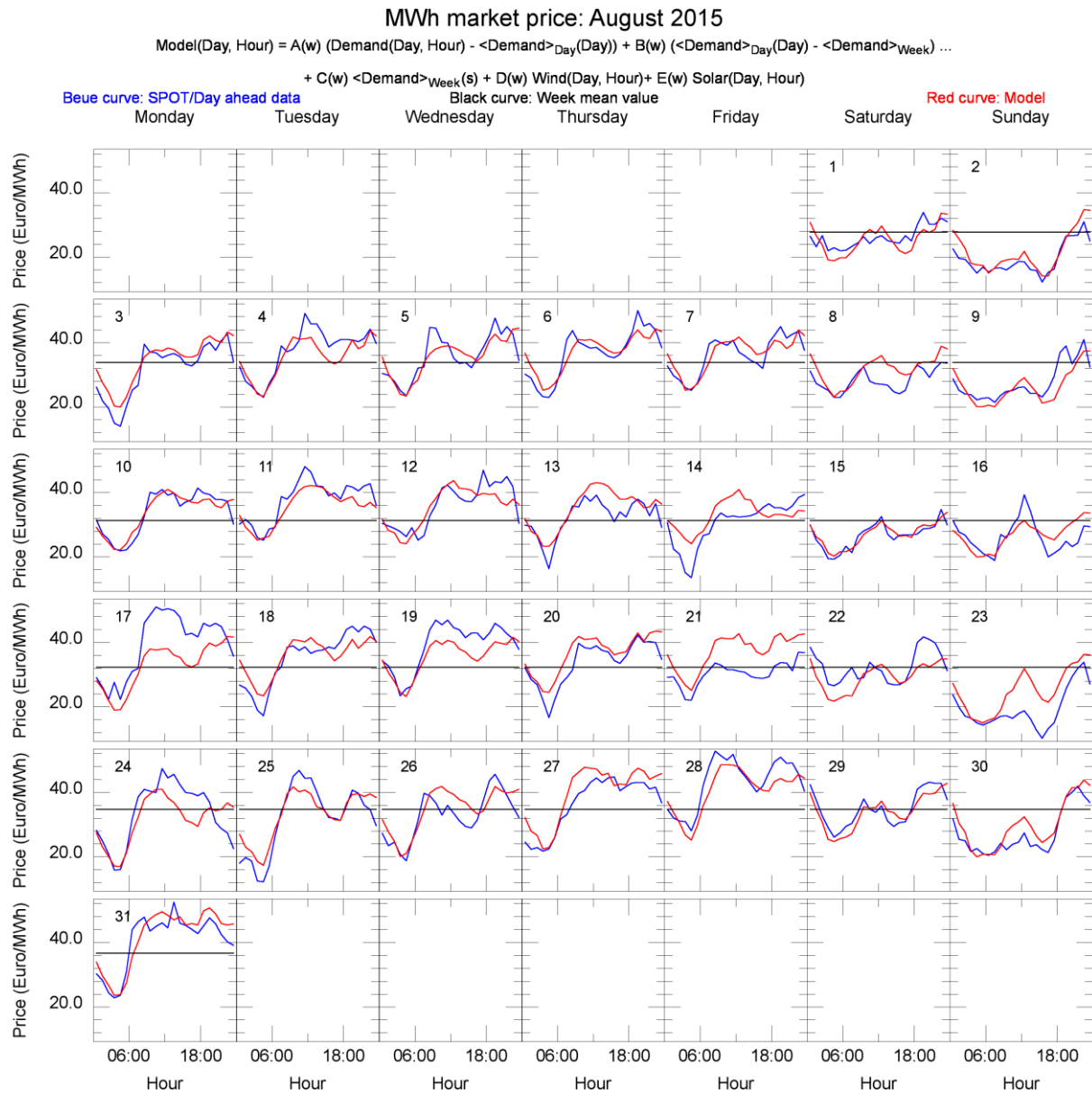


Figure S8: August SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.9 September

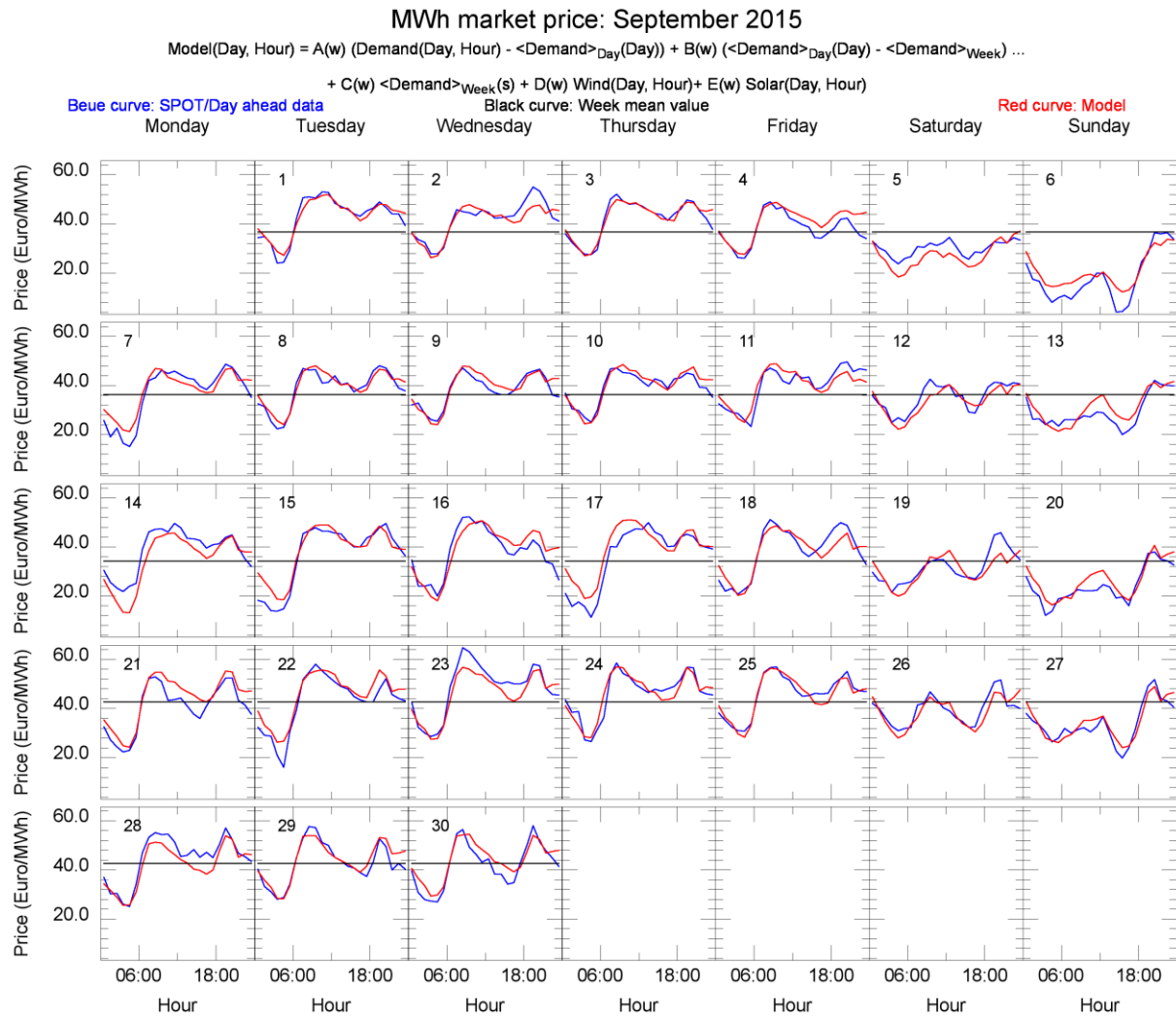


Figure S9: September SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.10 October

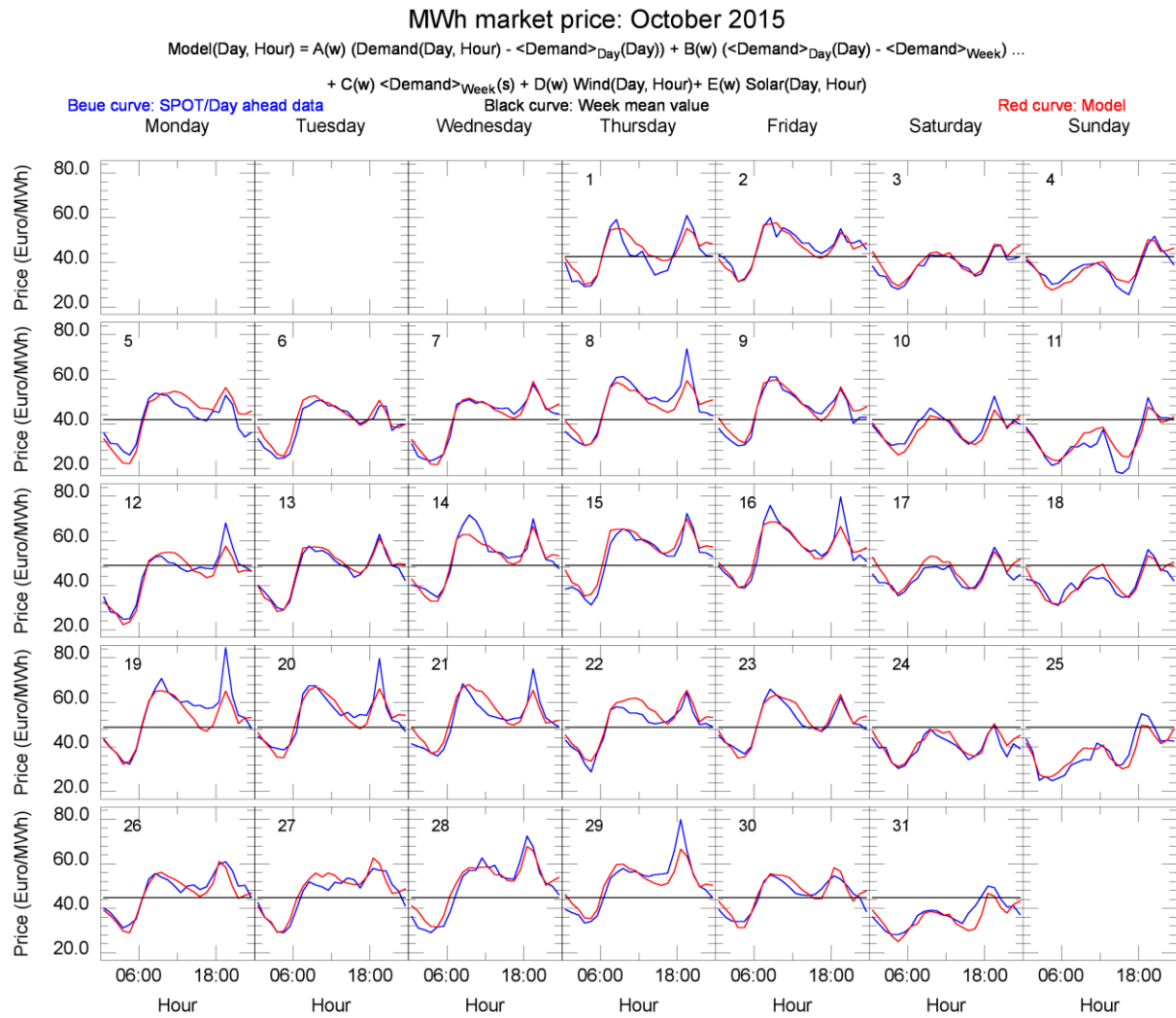


Figure S10: October SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.11 November

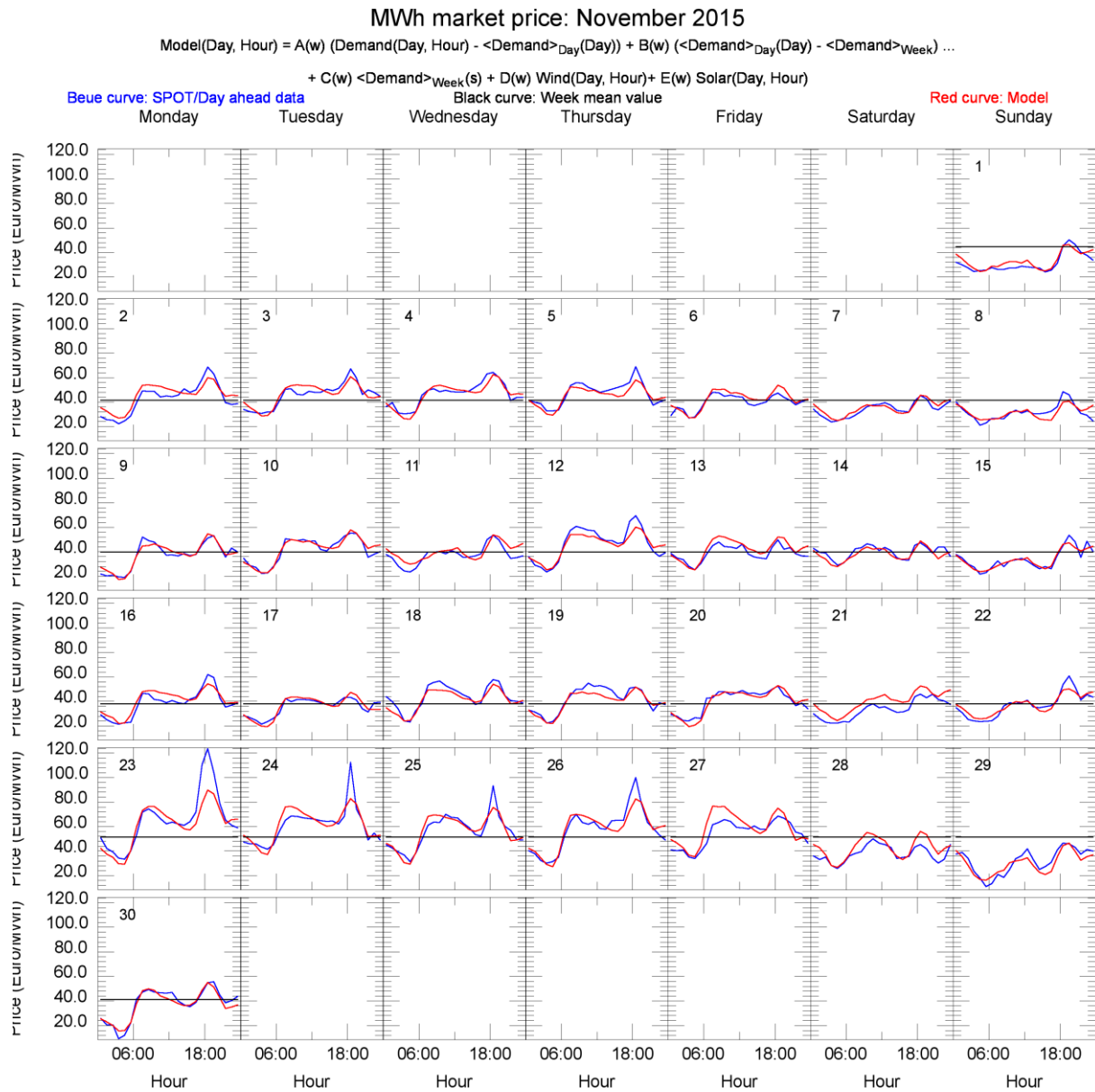


Figure S11: November SPOT day ahead data fitting visualisation using GNUPLOT [1].

1.12 December

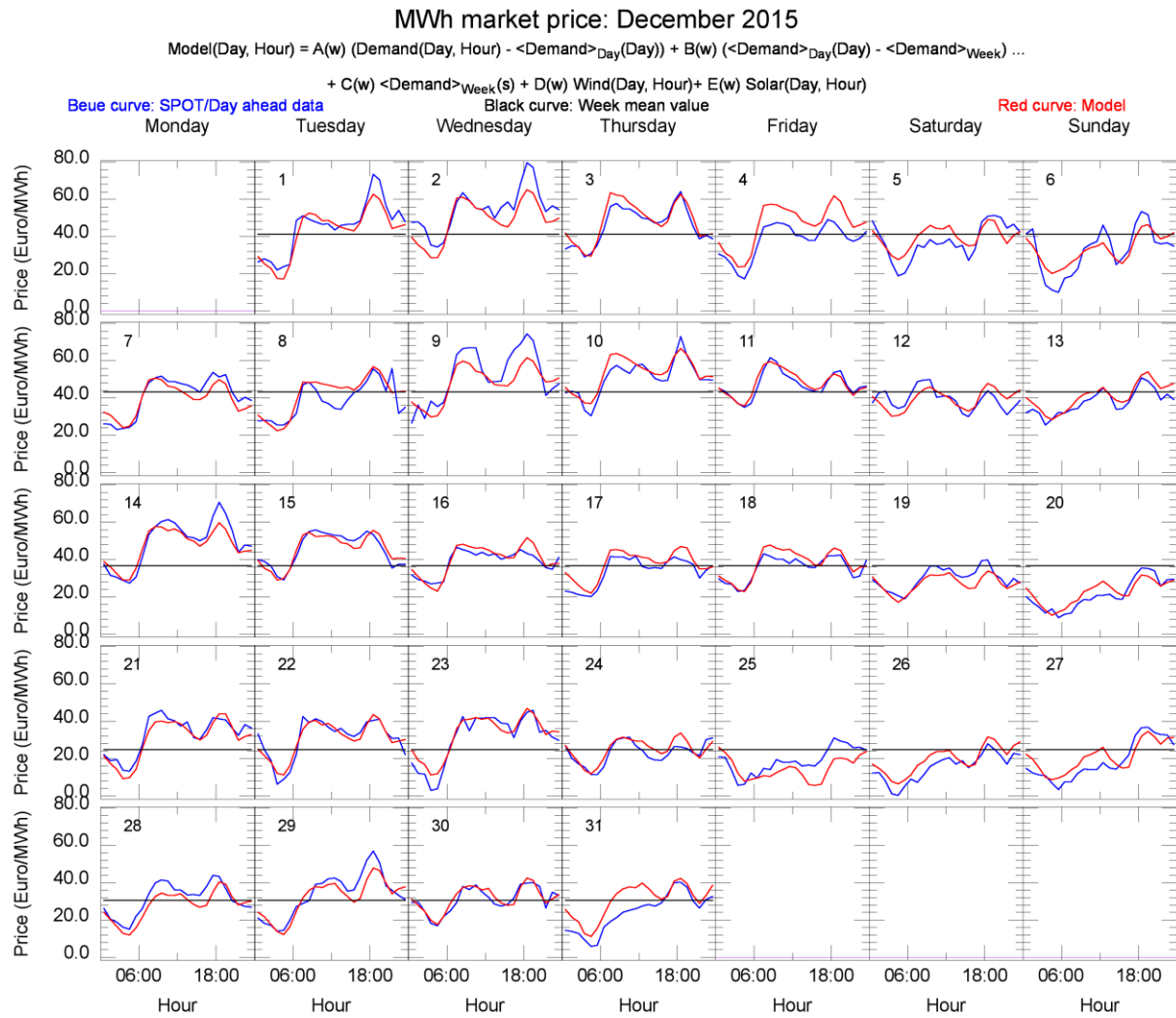


Figure S12: December SPOT day ahead data fitting visualisation using GNUPLOT [1].

2 Model parameters values

Week	A (€ MWh ⁻²)	B (€ MWh ⁻²)	C (€ MWh ⁻²)	D (€ MWh ⁻²)	E (€ MWh ⁻²)	σ _A (€ MWh ⁻²)	σ _B (€ MWh ⁻²)	σ _D (€ MWh ⁻²)	σ _E (€ MWh ⁻²)
1	2.04 10 ⁻³	7.17 10 ⁻⁴	6.41 10 ⁻⁴	-2.70 10 ⁻⁴	-1.96 10 ⁻³	9.87 10 ⁻⁵	1.01 10 ⁻⁴	2.44 10 ⁻⁴	7.27 10 ⁻⁴
2	1.26 10 ⁻³	1.22 10 ⁻³	6.00 10 ⁻⁴	-9.70 10 ⁻⁴	-1.47 10 ⁻³	5.68 10 ⁻⁵	5.45 10 ⁻⁵	1.69 10 ⁻⁴	5.93 10 ⁻⁴
3	1.66 10 ⁻³	1.74 10 ⁻³	6.53 10 ⁻⁴	-1.42 10 ⁻³	-1.26 10 ⁻³	3.84 10 ⁻⁵	1.93 10 ⁻⁴	1.41 10 ⁻⁴	3.85 10 ⁻⁴
4	1.41 10 ⁻³	1.00 10 ⁻³	6.60 10 ⁻⁴	-1.29 10 ⁻³	-1.72 10 ⁻³	4.26 10 ⁻⁵	7.11 10 ⁻⁵	3.18 10 ⁻⁴	4.14 10 ⁻⁴
5	1.45 10 ⁻³	1.19 10 ⁻³	6.77 10 ⁻⁴	-1.09 10 ⁻³	-2.37 10 ⁻³	6.67 10 ⁻⁵	1.26 10 ⁻⁴	2.20 10 ⁻⁴	7.14 10 ⁻⁴
6	1.86 10 ⁻³	3.62 10 ⁻⁴	7.50 10 ⁻⁴	-1.38 10 ⁻³	-2.70 10 ⁻³	8.46 10 ⁻⁵	1.04 10 ⁻⁴	2.40 10 ⁻⁴	6.59 10 ⁻⁴
7	1.99 10 ⁻³	1.43 10 ⁻³	7.95 10 ⁻⁴	-1.67 10 ⁻³	-1.96 10 ⁻³	1.20 10 ⁻⁴	9.15 10 ⁻⁵	3.90 10 ⁻⁴	6.54 10 ⁻⁴
8	1.43 10 ⁻³	1.13 10 ⁻³	7.45 10 ⁻⁴	-3.66 10 ⁻⁴	-1.47 10 ⁻³	6.83 10 ⁻⁵	9.67 10 ⁻⁵	2.12 10 ⁻⁴	3.83 10 ⁻⁴
9	1.54 10 ⁻³	1.22 10 ⁻³	7.85 10 ⁻⁴	-1.73 10 ⁻³	-2.34 10 ⁻³	8.40 10 ⁻⁵	7.64 10 ⁻⁵	2.50 10 ⁻⁴	5.07 10 ⁻⁴
10	1.96 10 ⁻³	1.49 10 ⁻³	7.71 10 ⁻⁴	-6.45 10 ⁻⁴	-2.20 10 ⁻³	9.11 10 ⁻⁵	9.18 10 ⁻⁵	2.98 10 ⁻⁴	3.85 10 ⁻⁴
11	1.76 10 ⁻³	1.64 10 ⁻³	7.96 10 ⁻⁴	-9.23 10 ⁻⁴	-2.65 10 ⁻³	5.47 10 ⁻⁵	1.48 10 ⁻⁴	3.45 10 ⁻⁴	2.53 10 ⁻⁴

12	$1.65 \cdot 10^{-3}$	$9.12 \cdot 10^{-4}$	$9.10 \cdot 10^{-4}$	$-4.16 \cdot 10^{-3}$	$-3.83 \cdot 10^{-3}$	$9.17 \cdot 10^{-5}$	$1.92 \cdot 10^{-4}$	$5.66 \cdot 10^{-4}$	$4.64 \cdot 10^{-4}$
13	$1.85 \cdot 10^{-3}$	$1.39 \cdot 10^{-3}$	$9.38 \cdot 10^{-4}$	$-3.16 \cdot 10^{-3}$	$-2.19 \cdot 10^{-3}$	$9.62 \cdot 10^{-5}$	$1.08 \cdot 10^{-4}$	$2.81 \cdot 10^{-4}$	$4.71 \cdot 10^{-4}$
14	$2.22 \cdot 10^{-3}$	$2.53 \cdot 10^{-3}$	$7.98 \cdot 10^{-4}$	$-9.11 \cdot 10^{-4}$	$-2.90 \cdot 10^{-3}$	$9.08 \cdot 10^{-5}$	$1.30 \cdot 10^{-4}$	$1.99 \cdot 10^{-4}$	$4.12 \cdot 10^{-4}$
15	$2.23 \cdot 10^{-3}$	$1.96 \cdot 10^{-3}$	$9.89 \cdot 10^{-4}$	$-2.78 \cdot 10^{-3}$	$-3.72 \cdot 10^{-3}$	$1.35 \cdot 10^{-4}$	$1.11 \cdot 10^{-4}$	$7.14 \cdot 10^{-4}$	$3.94 \cdot 10^{-4}$
16	$1.94 \cdot 10^{-3}$	$2.49 \cdot 10^{-3}$	$1.03 \cdot 10^{-3}$	$-2.89 \cdot 10^{-3}$	$-3.73 \cdot 10^{-3}$	$8.33 \cdot 10^{-5}$	$2.08 \cdot 10^{-4}$	$4.75 \cdot 10^{-4}$	$2.99 \cdot 10^{-4}$
17	$1.73 \cdot 10^{-3}$	$2.30 \cdot 10^{-3}$	$8.27 \cdot 10^{-4}$	$-3.51 \cdot 10^{-4}$	$-2.39 \cdot 10^{-3}$	$8.01 \cdot 10^{-5}$	$9.20 \cdot 10^{-5}$	$3.45 \cdot 10^{-4}$	$2.83 \cdot 10^{-4}$
18	$1.68 \cdot 10^{-3}$	$1.78 \cdot 10^{-3}$	$7.45 \cdot 10^{-4}$	$1.06 \cdot 10^{-3}$	$-2.50 \cdot 10^{-3}$	$1.11 \cdot 10^{-4}$	$1.12 \cdot 10^{-4}$	$5.17 \cdot 10^{-4}$	$5.02 \cdot 10^{-4}$
19	$1.92 \cdot 10^{-3}$	$2.89 \cdot 10^{-3}$	$7.71 \cdot 10^{-4}$	$-1.07 \cdot 10^{-4}$	$-3.03 \cdot 10^{-3}$	$8.85 \cdot 10^{-5}$	$8.77 \cdot 10^{-5}$	$1.89 \cdot 10^{-4}$	$3.21 \cdot 10^{-4}$
20	$1.58 \cdot 10^{-3}$	$1.88 \cdot 10^{-3}$	$6.69 \cdot 10^{-4}$	$-1.73 \cdot 10^{-4}$	$-3.75 \cdot 10^{-3}$	$9.20 \cdot 10^{-5}$	$1.18 \cdot 10^{-4}$	$5.17 \cdot 10^{-4}$	$3.40 \cdot 10^{-4}$
21	$1.78 \cdot 10^{-3}$	$1.53 \cdot 10^{-3}$	$8.29 \cdot 10^{-4}$	$-2.63 \cdot 10^{-3}$	$-3.03 \cdot 10^{-3}$	$7.61 \cdot 10^{-5}$	$7.00 \cdot 10^{-5}$	$2.98 \cdot 10^{-4}$	$2.76 \cdot 10^{-4}$
22	$1.28 \cdot 10^{-3}$	$1.45 \cdot 10^{-3}$	$7.25 \cdot 10^{-4}$	$-4.24 \cdot 10^{-4}$	$-2.41 \cdot 10^{-3}$	$6.76 \cdot 10^{-5}$	$6.88 \cdot 10^{-5}$	$2.80 \cdot 10^{-4}$	$2.52 \cdot 10^{-4}$
23	$1.30 \cdot 10^{-3}$	$1.45 \cdot 10^{-3}$	$6.69 \cdot 10^{-4}$	$6.57 \cdot 10^{-4}$	$-1.80 \cdot 10^{-3}$	$1.23 \cdot 10^{-4}$	$1.21 \cdot 10^{-4}$	$3.67 \cdot 10^{-4}$	$4.61 \cdot 10^{-4}$
24	$1.46 \cdot 10^{-3}$	$1.77 \cdot 10^{-3}$	$7.86 \cdot 10^{-4}$	$-8.18 \cdot 10^{-4}$	$-1.94 \cdot 10^{-3}$	$8.20 \cdot 10^{-5}$	$9.66 \cdot 10^{-5}$	$2.41 \cdot 10^{-4}$	$3.66 \cdot 10^{-4}$
25	$1.87 \cdot 10^{-3}$	$1.83 \cdot 10^{-3}$	$8.45 \cdot 10^{-4}$	$-1.47 \cdot 10^{-3}$	$-2.83 \cdot 10^{-3}$	$7.82 \cdot 10^{-5}$	$8.79 \cdot 10^{-5}$	$6.41 \cdot 10^{-4}$	$3.13 \cdot 10^{-4}$
26	$1.77 \cdot 10^{-3}$	$1.63 \cdot 10^{-3}$	$9.13 \cdot 10^{-4}$	$-2.60 \cdot 10^{-3}$	$-2.82 \cdot 10^{-3}$	$8.83 \cdot 10^{-5}$	$9.90 \cdot 10^{-5}$	$5.19 \cdot 10^{-4}$	$3.27 \cdot 10^{-4}$
27	$1.62 \cdot 10^{-3}$	$1.69 \cdot 10^{-3}$	$9.09 \cdot 10^{-4}$	$8.25 \cdot 10^{-4}$	$-2.69 \cdot 10^{-3}$	$1.11 \cdot 10^{-4}$	$1.15 \cdot 10^{-4}$	$7.22 \cdot 10^{-4}$	$4.47 \cdot 10^{-4}$
28	$2.13 \cdot 10^{-3}$	$1.59 \cdot 10^{-3}$	$1.06 \cdot 10^{-3}$	$-2.50 \cdot 10^{-3}$	$-4.09 \cdot 10^{-3}$	$1.20 \cdot 10^{-4}$	$1.14 \cdot 10^{-4}$	$4.13 \cdot 10^{-4}$	$4.45 \cdot 10^{-4}$
29	$1.69 \cdot 10^{-3}$	$1.34 \cdot 10^{-3}$	$1.02 \cdot 10^{-3}$	$-1.63 \cdot 10^{-3}$	$-2.90 \cdot 10^{-3}$	$1.09 \cdot 10^{-4}$	$9.88 \cdot 10^{-5}$	$5.69 \cdot 10^{-4}$	$4.25 \cdot 10^{-4}$
30	$1.71 \cdot 10^{-3}$	$2.94 \cdot 10^{-3}$	$9.58 \cdot 10^{-4}$	$-1.37 \cdot 10^{-3}$	$-2.05 \cdot 10^{-3}$	$9.87 \cdot 10^{-5}$	$1.01 \cdot 10^{-4}$	$3.06 \cdot 10^{-4}$	$4.23 \cdot 10^{-4}$
31	$1.61 \cdot 10^{-3}$	$1.12 \cdot 10^{-3}$	$7.98 \cdot 10^{-4}$	$-1.62 \cdot 10^{-3}$	$-3.23 \cdot 10^{-3}$	$9.09 \cdot 10^{-5}$	$1.06 \cdot 10^{-4}$	$2.30 \cdot 10^{-4}$	$3.47 \cdot 10^{-4}$
32	$1.70 \cdot 10^{-3}$	$1.49 \cdot 10^{-3}$	$9.29 \cdot 10^{-4}$	$-1.08 \cdot 10^{-3}$	$-3.68 \cdot 10^{-3}$	$9.16 \cdot 10^{-5}$	$1.10 \cdot 10^{-4}$	$7.28 \cdot 10^{-4}$	$3.50 \cdot 10^{-4}$
33	$1.21 \cdot 10^{-3}$	$1.32 \cdot 10^{-3}$	$8.70 \cdot 10^{-4}$	$-1.55 \cdot 10^{-3}$	$-5.98 \cdot 10^{-4}$	$9.00 \cdot 10^{-5}$	$1.07 \cdot 10^{-4}$	$4.51 \cdot 10^{-4}$	$3.51 \cdot 10^{-4}$
34	$1.73 \cdot 10^{-3}$	$1.69 \cdot 10^{-3}$	$9.40 \cdot 10^{-4}$	$-2.35 \cdot 10^{-3}$	$-3.01 \cdot 10^{-3}$	$1.52 \cdot 10^{-4}$	$3.69 \cdot 10^{-4}$	$1.33 \cdot 10^{-3}$	$5.50 \cdot 10^{-4}$
35	$1.83 \cdot 10^{-3}$	$1.31 \cdot 10^{-3}$	$9.59 \cdot 10^{-4}$	$-1.86 \cdot 10^{-3}$	$-3.26 \cdot 10^{-3}$	$9.17 \cdot 10^{-5}$	$1.37 \cdot 10^{-4}$	$2.33 \cdot 10^{-4}$	$3.65 \cdot 10^{-4}$
36	$1.75 \cdot 10^{-3}$	$2.47 \cdot 10^{-3}$	$8.70 \cdot 10^{-4}$	$4.73 \cdot 10^{-4}$	$-3.76 \cdot 10^{-3}$	$7.18 \cdot 10^{-5}$	$8.65 \cdot 10^{-5}$	$5.78 \cdot 10^{-4}$	$3.19 \cdot 10^{-4}$
37	$1.72 \cdot 10^{-3}$	$1.18 \cdot 10^{-3}$	$9.02 \cdot 10^{-4}$	$-8.09 \cdot 10^{-4}$	$-3.10 \cdot 10^{-3}$	$6.45 \cdot 10^{-5}$	$7.57 \cdot 10^{-5}$	$5.07 \cdot 10^{-4}$	$2.58 \cdot 10^{-4}$
38	$1.94 \cdot 10^{-3}$	$1.45 \cdot 10^{-3}$	$8.32 \cdot 10^{-4}$	$-5.96 \cdot 10^{-4}$	$-2.40 \cdot 10^{-3}$	$7.91 \cdot 10^{-5}$	$1.53 \cdot 10^{-4}$	$3.26 \cdot 10^{-4}$	$4.00 \cdot 10^{-4}$
39	$1.95 \cdot 10^{-3}$	$1.12 \cdot 10^{-3}$	$1.01 \cdot 10^{-3}$	$-6.82 \cdot 10^{-4}$	$-3.19 \cdot 10^{-3}$	$6.47 \cdot 10^{-5}$	$8.67 \cdot 10^{-5}$	$2.76 \cdot 10^{-4}$	$2.67 \cdot 10^{-4}$
40	$1.72 \cdot 10^{-3}$	$1.11 \cdot 10^{-3}$	$9.55 \cdot 10^{-4}$	$-2.52 \cdot 10^{-4}$	$-3.27 \cdot 10^{-3}$	$6.12 \cdot 10^{-5}$	$1.08 \cdot 10^{-4}$	$2.19 \cdot 10^{-4}$	$2.59 \cdot 10^{-4}$
41	$1.79 \cdot 10^{-3}$	$1.56 \cdot 10^{-3}$	$9.77 \cdot 10^{-4}$	$-2.00 \cdot 10^{-3}$	$-2.50 \cdot 10^{-3}$	$5.92 \cdot 10^{-5}$	$9.70 \cdot 10^{-5}$	$2.42 \cdot 10^{-4}$	$3.10 \cdot 10^{-4}$
42	$1.74 \cdot 10^{-3}$	$1.31 \cdot 10^{-3}$	$9.12 \cdot 10^{-4}$	$-5.94 \cdot 10^{-4}$	$-2.27 \cdot 10^{-3}$	$5.24 \cdot 10^{-5}$	$6.56 \cdot 10^{-5}$	$4.71 \cdot 10^{-4}$	$3.19 \cdot 10^{-4}$
43	$1.80 \cdot 10^{-3}$	$1.48 \cdot 10^{-3}$	$9.84 \cdot 10^{-4}$	$-3.15 \cdot 10^{-3}$	$-2.69 \cdot 10^{-3}$	$6.59 \cdot 10^{-5}$	$7.26 \cdot 10^{-5}$	$7.21 \cdot 10^{-4}$	$4.19 \cdot 10^{-4}$
44	$1.81 \cdot 10^{-3}$	$2.01 \cdot 10^{-3}$	$9.58 \cdot 10^{-4}$	$-2.26 \cdot 10^{-3}$	$-2.66 \cdot 10^{-3}$	$6.47 \cdot 10^{-5}$	$8.84 \cdot 10^{-5}$	$4.61 \cdot 10^{-4}$	$3.59 \cdot 10^{-4}$
45	$1.66 \cdot 10^{-3}$	$1.18 \cdot 10^{-3}$	$8.91 \cdot 10^{-4}$	$-1.88 \cdot 10^{-3}$	$-2.00 \cdot 10^{-3}$	$6.87 \cdot 10^{-5}$	$6.82 \cdot 10^{-5}$	$4.32 \cdot 10^{-4}$	$4.13 \cdot 10^{-4}$
46	$1.71 \cdot 10^{-3}$	$8.09 \cdot 10^{-4}$	$8.70 \cdot 10^{-4}$	$-1.85 \cdot 10^{-3}$	$-2.02 \cdot 10^{-3}$	$6.37 \cdot 10^{-5}$	$1.14 \cdot 10^{-4}$	$2.14 \cdot 10^{-4}$	$3.97 \cdot 10^{-4}$
47	$1.56 \cdot 10^{-3}$	$3.27 \cdot 10^{-3}$	$7.76 \cdot 10^{-4}$	$-1.06 \cdot 10^{-3}$	$-1.14 \cdot 10^{-3}$	$6.44 \cdot 10^{-5}$	$5.87 \cdot 10^{-4}$	$2.55 \cdot 10^{-4}$	$5.47 \cdot 10^{-4}$
48	$2.67 \cdot 10^{-3}$	$1.64 \cdot 10^{-3}$	$9.44 \cdot 10^{-4}$	$-2.71 \cdot 10^{-3}$	$-4.04 \cdot 10^{-3}$	$1.20 \cdot 10^{-4}$	$1.96 \cdot 10^{-4}$	$4.04 \cdot 10^{-4}$	$9.62 \cdot 10^{-4}$
49	$2.00 \cdot 10^{-3}$	$1.11 \cdot 10^{-3}$	$7.94 \cdot 10^{-4}$	$-2.01 \cdot 10^{-3}$	$-3.00 \cdot 10^{-3}$	$1.01 \cdot 10^{-4}$	$1.50 \cdot 10^{-4}$	$2.70 \cdot 10^{-4}$	$7.78 \cdot 10^{-4}$
50	$1.52 \cdot 10^{-3}$	$1.54 \cdot 10^{-3}$	$8.23 \cdot 10^{-4}$	$-3.25 \cdot 10^{-3}$	$-2.67 \cdot 10^{-3}$	$8.12 \cdot 10^{-5}$	$1.23 \cdot 10^{-4}$	$4.99 \cdot 10^{-4}$	$6.75 \cdot 10^{-4}$
51	$1.50 \cdot 10^{-3}$	$1.47 \cdot 10^{-3}$	$6.77 \cdot 10^{-4}$	$-1.57 \cdot 10^{-3}$	$-8.18 \cdot 10^{-4}$	$6.35 \cdot 10^{-5}$	$6.64 \cdot 10^{-5}$	$3.82 \cdot 10^{-4}$	$6.57 \cdot 10^{-4}$
52	$1.93 \cdot 10^{-3}$	$1.85 \cdot 10^{-3}$	$5.77 \cdot 10^{-4}$	$-1.49 \cdot 10^{-3}$	$-1.54 \cdot 10^{-3}$	$8.82 \cdot 10^{-5}$	$1.11 \cdot 10^{-4}$	$3.04 \cdot 10^{-4}$	$6.22 \cdot 10^{-4}$
53	$1.94 \cdot 10^{-3}$	$2.51 \cdot 10^{-3}$	$6.56 \cdot 10^{-4}$	$-1.74 \cdot 10^{-3}$	$-2.36 \cdot 10^{-3}$	$1.36 \cdot 10^{-4}$	$9.88 \cdot 10^{-4}$	$5.10 \cdot 10^{-4}$	$1.09 \cdot 10^{-3}$

Table S 1: Model fitting results. Values of parameters A, B, C, D et E and standard deviation of parameters A, B, D et E ($\sigma_A, \sigma_B, \sigma_D, \sigma_E$).