



DESC Technical Workgroup

CWV Optimisation Trial Phase Update

15th October 2014

- Trial Phase Update
 - Objective
 - Background
 - Explanation of results provided
- Preliminary Results for WM, NE, SC and SW
- Recommendations and Next Steps

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Trial Phase Update

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Trial Phase Update - Objective

- To review the outcomes from the CWV optimisation Trial phase
- The purpose of the Trial calculation phase is to
 - Agree all of the key dates
 - Select the number of years to use in the main calculation phase in Q4. These are 18, 13 or 10 years

Note: *The Trial will undertake analysis for 17, 12 and 9 as gas year 2013/14 was not complete at the start of the Trial phase*
- 4 LDZs were selected for the Trial phase, these were NE, SC, SW and WM.
 - The weather stations associated with these LDZs had minimal requirements for data infilling
 - Covered a wide geographical area

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Trial Phase Update - Background

- As per the approved Approach document: *“The objective of the Trial phase is to establish key principles and approaches for how the main CWV optimisation analysis will be carried out during the Production phase”*
- The Trial phase has analysed results for the following periods, namely:
 - 17 years – 1996/97 to 2012/13 for all 4 LDZ’s
 - 12 years – 2001/02 to 2012/13 for all 4 LDZ’s
 - 9 years – 2004/05 to 2012/13 for all 4 LDZ’s
- The values of the CWV parameters are chosen to give the best fit to demand on average across a number of years

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Trial Phase – Assessment of alternative periods

- Derive alternative CWVs for 4 LDZs (SC, NE, WM and SW) based on 17, 12 and 9 gas years' data and derive aggregate NDM demand models for 4 LDZs for alternative CWVs (plus current CWV)
- Calculate revised SNET values for alternative periods
- Assess average fit of CWVs to aggregate NDM demand and Assess change to 1 in 20 peak aggregate NDM demand estimates from current CWV (using demand models and 1 in 20 peak CWVs)
- Where results have been benchmarked to the current CWV, it should be appreciated that 'current' is based on EXISTING parameters but with the NEW weather data series.

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Trial Phase – Explanation of results provided

Results 1 – Example Format

- Objective: To provide a summary of all the iterations attempted with best option highlighted. This will be provided for each ‘run’ – i.e. 17yrs, 12yrs etc

LDZ	Station
NE	WAT

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE
Previous Optimisation	3	15	0.692	0.0150	0	0	14.8	17.9	0.43	0.00%	0.00%
Old Param - New SNET	3	15	0.692	0.0150	0	0	14.8	17.9	0.43	0.02%	0.43%
New alternative	3	15	0.623	0.0150	0.11	0	15	18.1	0.39	-0.05%	-1.58%
New alternative	2	15	0.626	0.0148	0.09	1	15	18.1	0.40	-0.04%	-1.33%
New alternative	2	16	0.621	0.0155	0.07	2	15.3	18.5	0.32	-0.07%	-2.03%
New alternative	3	16	0.618	0.0158	0.07	2	15.3	18.5	0.33	-0.07%	-2.17%
New alternative	4	16	0.606	0.0179	0.04	3	15.4	18.6	0.30	-0.09%	-2.81%
New alternative	3	20	0.562	0.0199	0.08	3	15.8	19	0.25	-0.28%	-8.73%
New alternative	3	25	0.541	0.0211	0.16	3	16	19.7	0.20	-0.38%	-11.91%

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

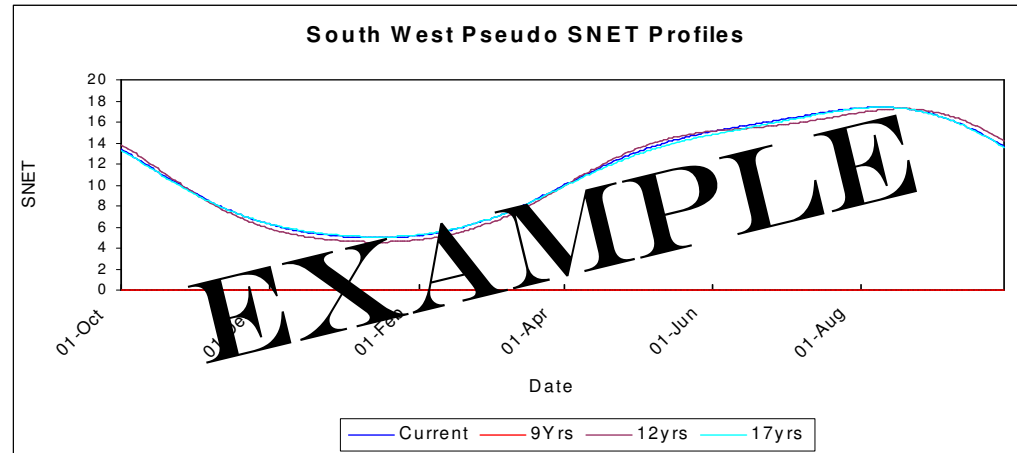


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Trial Phase – Explanation of results provided

Results 2 – Example Format

- Objective: For selected run compare all pseudo SNET profiles – 17yr, 12yr and Current (9 yr provided only where runs have been completed)
- Analysis: Calculate revised pseudo Seasonal Normal Effective Temperature (SNET) and visually compare profiles. High level observations on results provided



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Trial Phase – Explanation of results provided

Results 3 – Example Format

- Objective: To confirm which period provides the best fit between CWV and demand over a range of gas years
- Analysis: Derive aggregate NDM demand models for all alternative periods. Assess average 'fit' of CWVs to aggregate NDM demand. Results of current vs revised are represented as Green: better fit; Red: worse fit.

Gas Year Period TESTED against	Fit Statistic	Current CWV	9 year CWV	12 year CWV	17 year CWV
1996/97 - 2012/13	Adj. R-sq.	99.12%		99.12%	99.13%
	RMSE (MWh)	4,817		4,552	4,521
2001/02 - 2012/13	Adj. R-sq.	99.05%		99.11%	99.10%
	RMSE (MWh)	4,788		4,652	4,670

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Trial Phase – Explanation of results provided

Results 4 – Example Format

- Objective: Assess change to estimated 1 in 20 peak aggregate NDM demand estimates for alternative periods from current CWV
- Analysis: Use demand models and 1 in 20 peak CWVs to assess estimated 1 in 20 peak demand and compare with levels from current CWV

Gas Year Period	9 year CWV	12 year CWV	17 year CWV
1996/97 – 2012/13		6.26%	7.34%
2001/02 – 2012/13		6.16%	7.24%
2004/05 – 2012/13		6.12%	7.19%
2009/10 – 2012/13		5.85%	6.86%

- Note a positive value represents an increase in peak demand and a negative value represents an decrease in peak demand

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Trial Phase

Preliminary Results - WM

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Results 1: WM LDZ – Iterations Summary – 17 years

- Preferred iteration is highlighted

LDZ	Station
WM	BIR

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	3	13	0.698	0.0104	0.23	1	14	17.9	0.39	0.00%	0.00%	6,722,618
Old Param - New SNET	3	13	0.698	0.0104	0.23	1	14	17.9	0.39	-0.03%	-1.78%	6,849,264
New alternative	3	13	0.703	0.0118	0.15	3	14	17.7	0.41	0.01%	0.47%	6,689,327
New alternative	2	12	0.699	0.0112	0.17	3	13.7	17.6	0.43	0.01%	0.45%	6,690,298
New alternative	2	13	0.709	0.0113	0.17	3	14	17.8	0.40	0.01%	0.28%	6,702,844
New alternative	2	14	0.726	0.0116	0.16	3	14.4	17.9	0.38	0.00%	-0.43%	6,753,472
New alternative	3	12	0.692	0.0117	0.18	3	13.7	17.7	0.42	0.01%	0.46%	6,690,175
New alternative	3	14	0.719	0.0122	0.18	3	14.4	17.8	0.39	0.00%	-0.40%	6,751,271
New alternative	4	12	0.682	0.0124	0.18	3	13.6	17.6	0.43	0.01%	0.16%	6,711,508
New alternative	4	12	0.682	0.0124	0.18	3	13.6	17.6	0.43	0.01%	0.16%	6,718,642

Pos - improvement against benchmark
 Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years



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Results 1: WM LDZ – Iterations Summary – 12 years

- Preferred iteration is highlighted

LDZ	Station
WM	BIR

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	3	13	0.698	0.0104	0.23	1	14	17.9	0.39	0.00%	0.00%	6,683,638
Old Param - New SNET	3	13	0.698	0.0104	0.23	1	14	17.9	0.39	0.01%	0.61%	6,642,836
New alternative	3	13	0.711	0.0118	0.15	3	14	17.8	0.40	0.03%	1.33%	6,594,999
New alternative	3	13	0.711	0.0118	0.42	1	14	17.8	0.40	0.02%	0.69%	6,637,351
New alternative	2	12	0.716	0.0113	0.09	3	13.9	17.7	0.40	0.02%	1.24%	6,600,720
New alternative	2	13	0.719	0.0113	0.14	3	14	17.8	0.39	0.02%	1.19%	6,603,845
New alternative	2	14	0.734	0.0116	0.13	3	14.3	17.8	0.39	0.01%	0.25%	6,666,771
New alternative	3	12	0.706	0.0119	0.16	3	13.9	17.7	0.41	0.03%	1.41%	6,589,451
New alternative	3	14	0.725	0.0122	0.15	3	14.3	17.8	0.40	0.01%	0.39%	6,657,725
New alternative	4	12	0.696	0.0127	0.17	3	13.9	17.9	0.39	0.02%	0.88%	6,624,659
New alternative	4	13	0.7	0.0127	0.16	3	13.9	17.6	0.42	0.02%	0.93%	6,621,160
New alternative	4	14	0.717	0.0131	0.17	3	14.5	18.2	0.35	0.01%	0.16%	6,673,017

Pos - improvement against benchmark
 Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years



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Results 1: WM LDZ – Iterations Summary – 9 years

- Preferred iteration is highlighted

LDZ	Station
WM	BIR

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	3	13	0.698	0.0104	0.23	1	14	17.9	0.39	0.00%	0.00%	6,547,912
Old Param - New SNET	3	13	0.698	0.0104	0.23	1	14	17.9	0.39	0.02%	1.30%	6,462,504
New alternative	3	13	0.718	0.0114	0.14	3	13.8	17.4	0.41	0.05%	2.96%	6,353,853
New alternative	2	12	0.73	0.0110	0.11	3	13.6	17.1	0.45	0.05%	2.55%	6,381,034
New alternative	2	13	0.725	0.0109	0.13	3	13.7	17.2	0.43	0.05%	3.00%	6,351,374
New alternative	2	14	0.74	0.0113	0.13	3	14.1	17.2	0.43	0.04%	2.01%	6,416,108
New alternative	3	12	0.723	0.0115	0.14	3	13.7	17	0.47	0.05%	2.74%	6,368,586
New alternative	3	14	0.731	0.0118	0.16	3	14.2	17.4	0.41	0.04%	2.04%	6,414,357
New alternative	4	12	0.713	0.0125	0.15	3	13.7	17.2	0.44	0.04%	2.24%	6,401,356
New alternative	4	13	0.706	0.0124	0.16	3	13.7	17.2	0.43	0.04%	2.36%	6,393,258
New alternative	4	14	0.722	0.0129	0.16	3	14.2	17.7	0.39	0.03%	1.42%	6,455,231

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

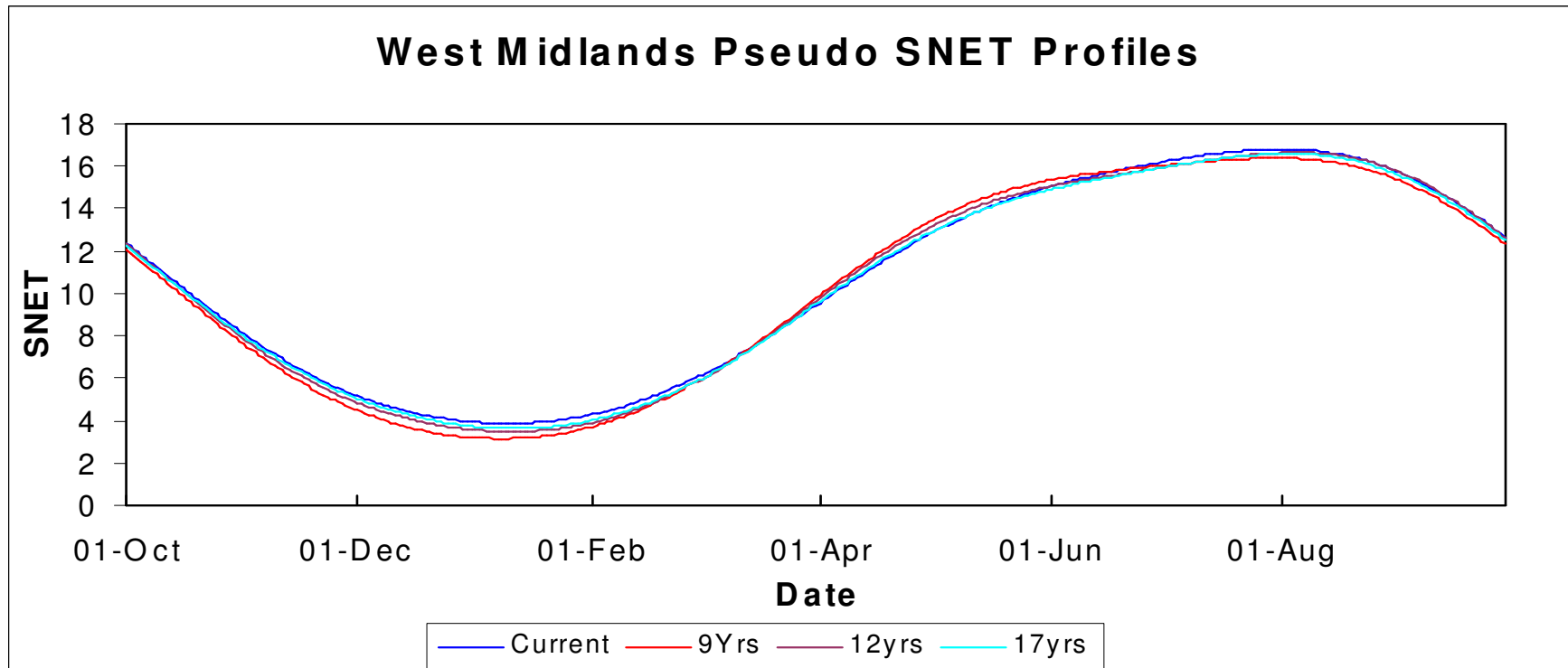
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Results 2: WM LDZ - Pseudo SNET profiles

- Comparison of current to proposed Pseudo SNET



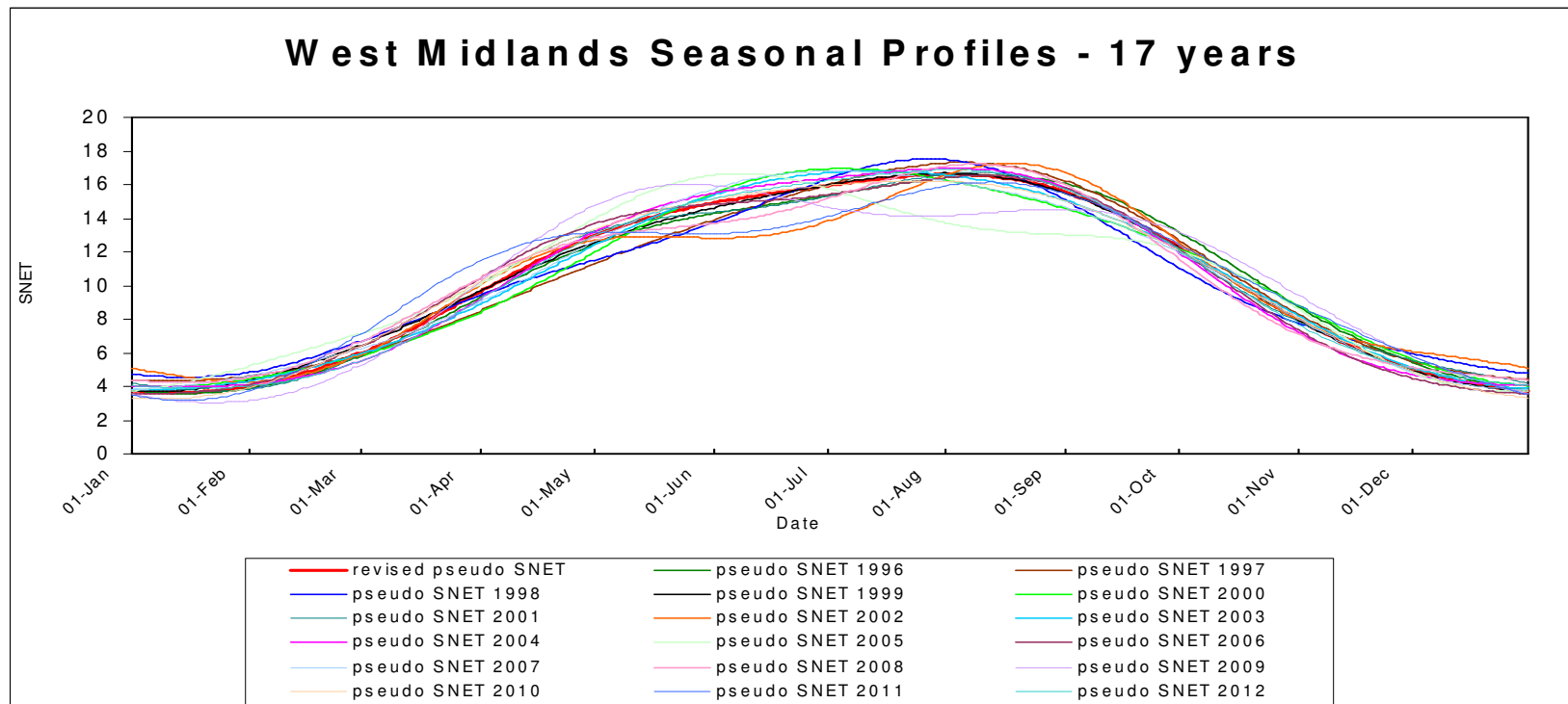
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Results 2a: WM LDZ - Pseudo SNET 17 year

- Individual years influence on proposed 17 year Pseudo SNET (ET: 3 to 13)



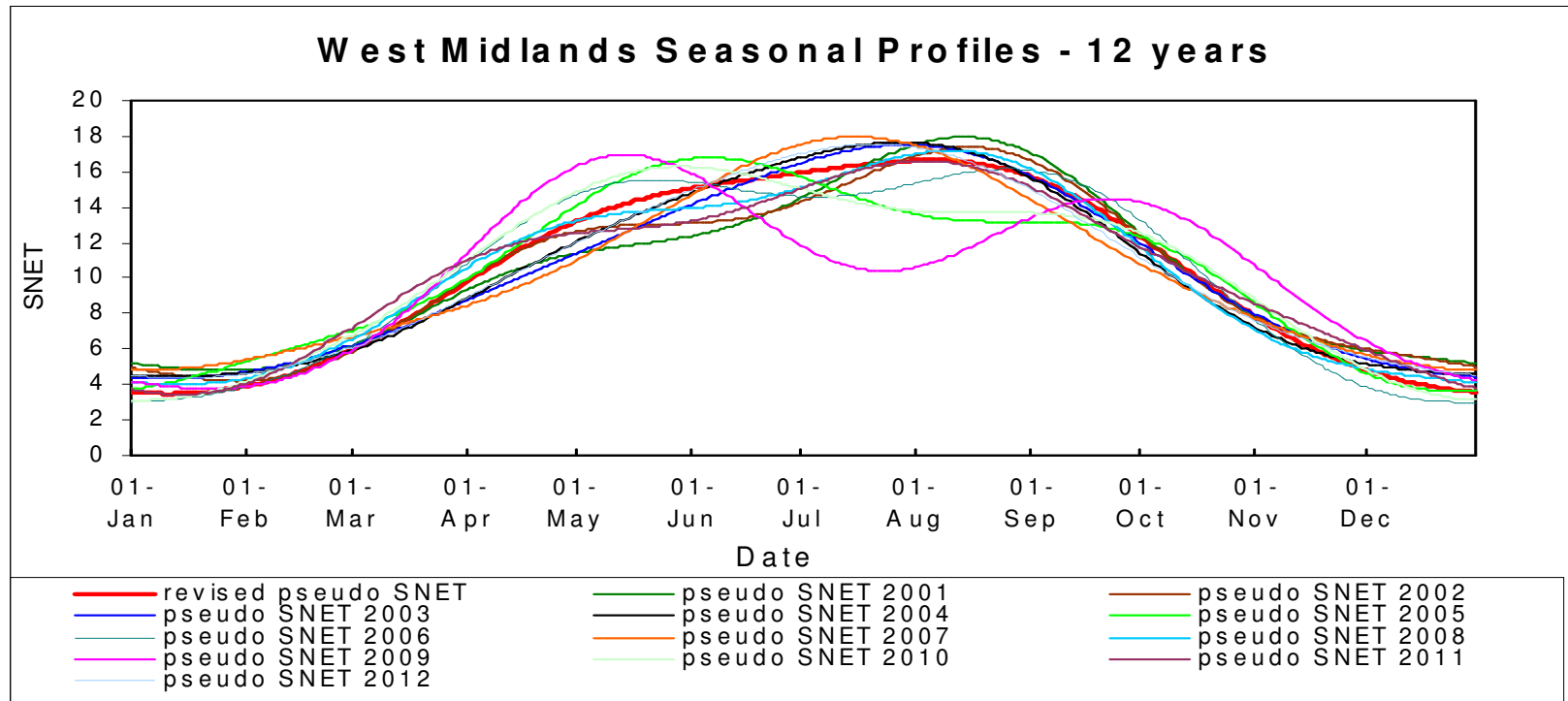
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Results 2b: WM LDZ - Pseudo SNET 12 year

- Individual years influence on proposed 12 year Pseudo SNET (ET: 3 to 12)



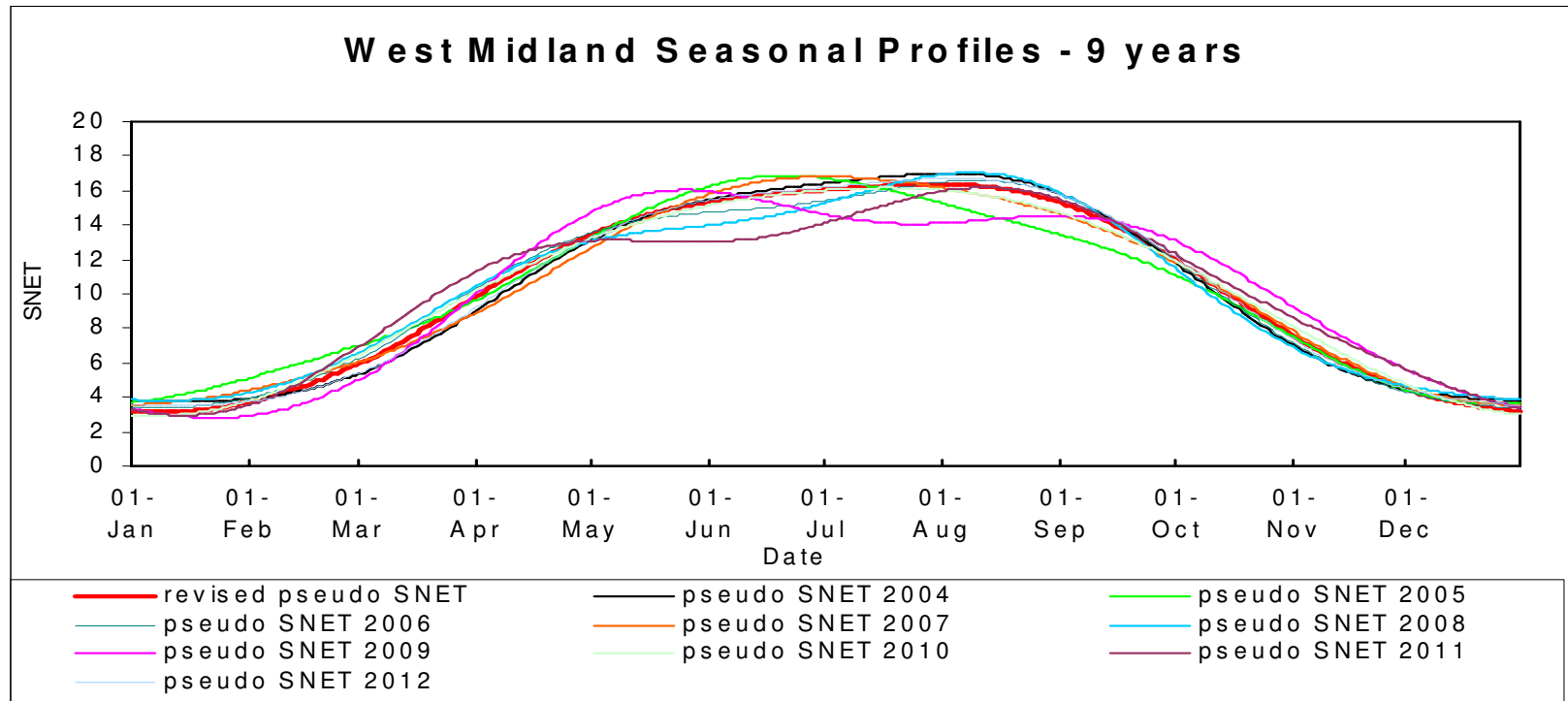
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Results 2c: WM LDZ - Pseudo SNET 9 year

- Individual years influence on proposed 9 year Pseudo SNET (ET: 2 to 13)



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Results 3: WM LDZ – Fit between CWV and Demand

Gas Year Period TESTED against	Fit Statistic	Current CWV	9 year CWV	12 year CWV	17 year CWV
1996/97 - 2012/13	Adj. R-sq.	99.26%	99.23%	99.26%	99.27%
	RMSE (MWh)	6723	6879	6727	6689
2001/02 - 2012/13	Adj. R-sq.	99.27%	99.28%	99.29%	99.29%
	RMSE (MWh)	6684	6664	6589	6616
2004/05 - 2012/13	Adj. R-sq.	99.28%	99.33%	99.32%	99.30%
	RMSE (MWh)	6548	6351	6388	6475
2009/10 – 2012/13	Adj. R-sq.	99.21%	99.33%	99.30%	99.27%
	RMSE (MWh)	6660	6123	6261	6407

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Results 4: WM LDZ – change in estimated peak demand (compared to current CWV)

Gas Year Period	9 year CWV	12 year CWV	17 year CWV
1996/97 – 2012/13	0.19%	0.47%	-0.07%
2001/02 – 2012/13	0.15%	0.44%	-0.10%
2004/05 – 2012/13	0.10%	0.41%	-0.13%
2009/10 – 2012/13	-0.08%	0.31%	-0.20%

- Note a positive value represents an increase in peak demand and a negative value represents a decrease in peak demand

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Trial Phase

Preliminary Results - NE

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Results 1: NE LDZ – Iterations Summary – 17 years

- Preferred iteration is highlighted

LDZ	Station
NE	WAT

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	3	15	0.692	0.0150	0	0	14.8	17.9	0.41	0.00%	0.00%	5,675,507
Old Param - New SNET	3	15	0.692	0.0150	0	0	14.8	17.9	0.41	0.00%	0.04%	5,673,362
New alternative	3	15	0.68	0.0164	0	0	14.7	17.8	0.43	0.01%	0.26%	5,660,048
New alternative	2	15	0.683	0.0159	0	0	14.7	17.9	0.42	0.01%	0.26%	5,659,917
New alternative	2	16	0.679	0.0167	0	0	14.9	17.9	0.40	0.00%	-0.03%	5,677,357
New alternative	3	16	0.675	0.0173	0	0	14.9	17.9	0.42	0.00%	-0.10%	5,681,575
New alternative	4	16	0.665	0.0194	0	0	14.9	17.8	0.43	-0.02%	-0.61%	5,712,047
New alternative	4	14	0.675	0.0178	0	0	14.7	17.9	0.42	0.00%	0.09%	5,669,948
New alternative	3	14	0.684	0.0160	0	0	14.7	17.8	0.42	0.01%	0.30%	5,657,605
New alternative	4	15	0.67	0.0183	0	0	14.7	17.9	0.43	0.00%	-0.08%	5,680,409
New alternative	3	20	0.604	0.0222	0	0	15.8	19.5	0.26	-0.18%	-6.06%	6,039,470
New alternative	3	20	0.604	0.0222	3	0	15.8	19.5	0.26	-0.18%	-6.08%	6,040,797
New alternative	3	25	0.577	0.0233	0	0	16	19.9	0.23	-0.29%	-9.63%	6,254,163
New alternative	3	25	0.577	0.0233	3	0	16	19.9	0.23	-0.28%	-9.46%	6,244,093

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

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Results 1: NE LDZ – Iterations Summary – 12 years

- Preferred iteration is highlighted

LDZ	Station
NE	WAT

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	3	15	0.692	0.0150	0	0	14.8	17.9	0.43	0.00%	0.00%	5,674,644
Old Param - New SNET	3	15	0.692	0.0150	0	0	14.8	17.9	0.43	0.01%	0.31%	5,656,771
New alternative	3	15	0.684	0.0164	0	0	14.9	18	0.37	0.02%	0.69%	5,635,236
New alternative	2	15	0.673	0.0160	0	0	14.9	18.2	0.37	0.02%	0.72%	5,633,837
New alternative	2	16	0.668	0.0169	0	0	15.1	18.3	0.35	0.01%	0.29%	5,658,403
New alternative	3	16	0.663	0.0172	0	0	15.1	18.3	0.35	0.01%	0.22%	5,662,269
New alternative	4	16	0.651	0.0195	0	0	15.1	18.2	0.36	-0.01%	-0.47%	5,701,494
New alternative	3	20	0.589	0.0227	0	0	15.6	18.8	0.30	-0.18%	-6.70%	6,054,652
New alternative	3	25	0.559	0.0240	0	0	15.7	18.7	0.31	-0.29%	-10.93%	6,294,913
New alternative	4	14	0.667	0.0178	0	0	14.8	17.9	0.41	0.01%	0.43%	5,650,325
New alternative	3	14	0.679	0.0158	0	0	14.8	17.9	0.40	0.02%	0.70%	5,635,102
New alternative	4	15	0.658	0.0183	0	0	14.8	17.9	0.41	0.01%	0.24%	5,661,100

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

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Results 1: NE LDZ – Iterations Summary – 9 years

- Preferred iteration is highlighted

LDZ	Station
NE	WAT

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	3	15	0.692	0.0150	0	0	14.8	17.9	0.41	0.00%	0.00%	5,644,924
Old Param - New SNET	3	15	0.692	0.0150	0	0	14.8	17.9	0.41	0.01%	0.39%	5,622,807
New alternative	3	15	0.67	0.0162	1	0	14.8	18.1	0.37	0.02%	0.71%	5,604,648
New alternative	2	15	0.674	0.0158	1	0	14.8	18.1	0.37	0.02%	0.81%	5,598,992
New alternative	2	16	0.666	0.0167	3	0	14.9	18.1	0.38	0.01%	0.22%	5,632,529
New alternative	3	16	0.66	0.0172	3	0	15.1	18.3	0.33	0.00%	0.06%	5,641,392
New alternative	4	16	0.645	0.0198	3	0	15.1	18.3	0.34	-0.02%	-1.18%	5,711,267
New alternative	4	14	0.663	0.0179	0	0	14.7	17.9	0.39	0.01%	0.24%	5,631,592
New alternative	3	14	0.679	0.0156	0	0	14.7	17.9	0.39	0.03%	0.89%	5,594,775
New alternative	4	15	0.655	0.0185	0	0	14.7	17.9	0.40	0.00%	-0.16%	5,654,023

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

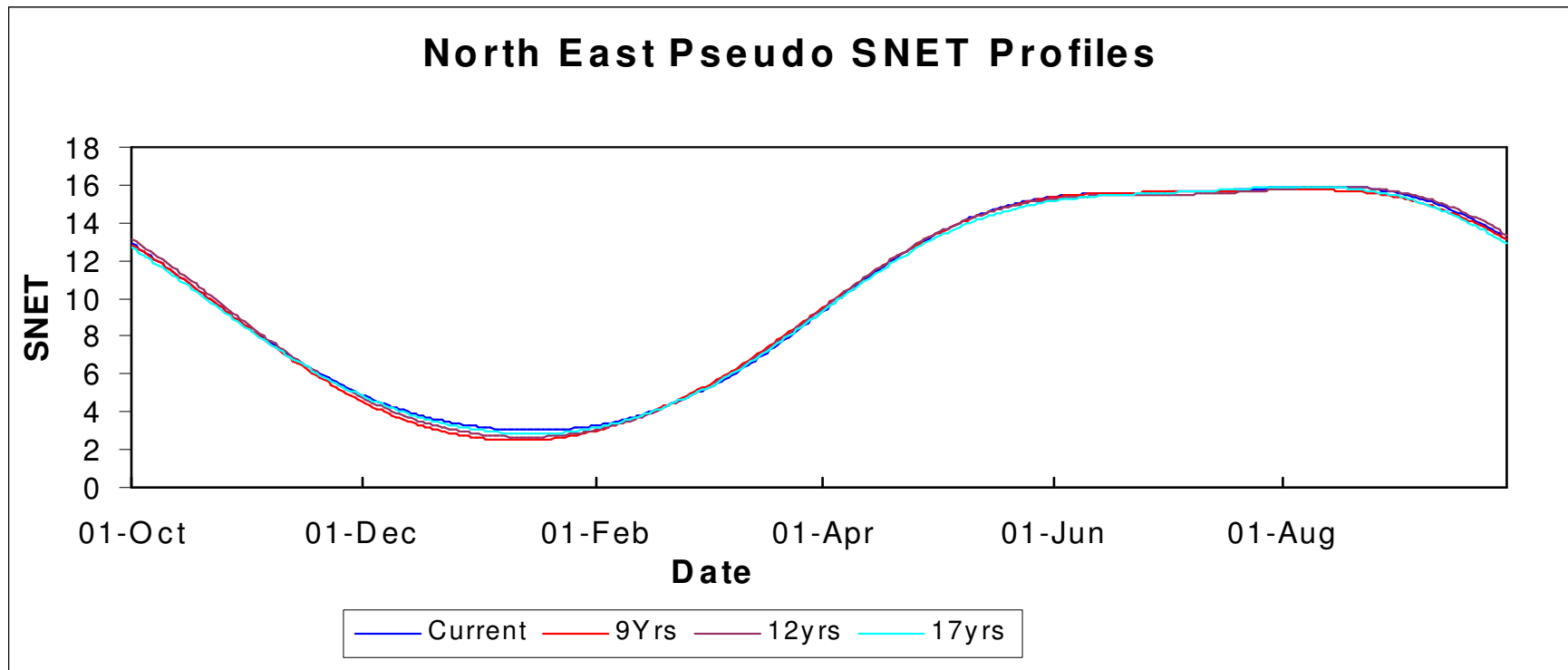
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Results 2: NE LDZ - Pseudo SNET profiles

- Comparison of current to proposed Pseudo SNET



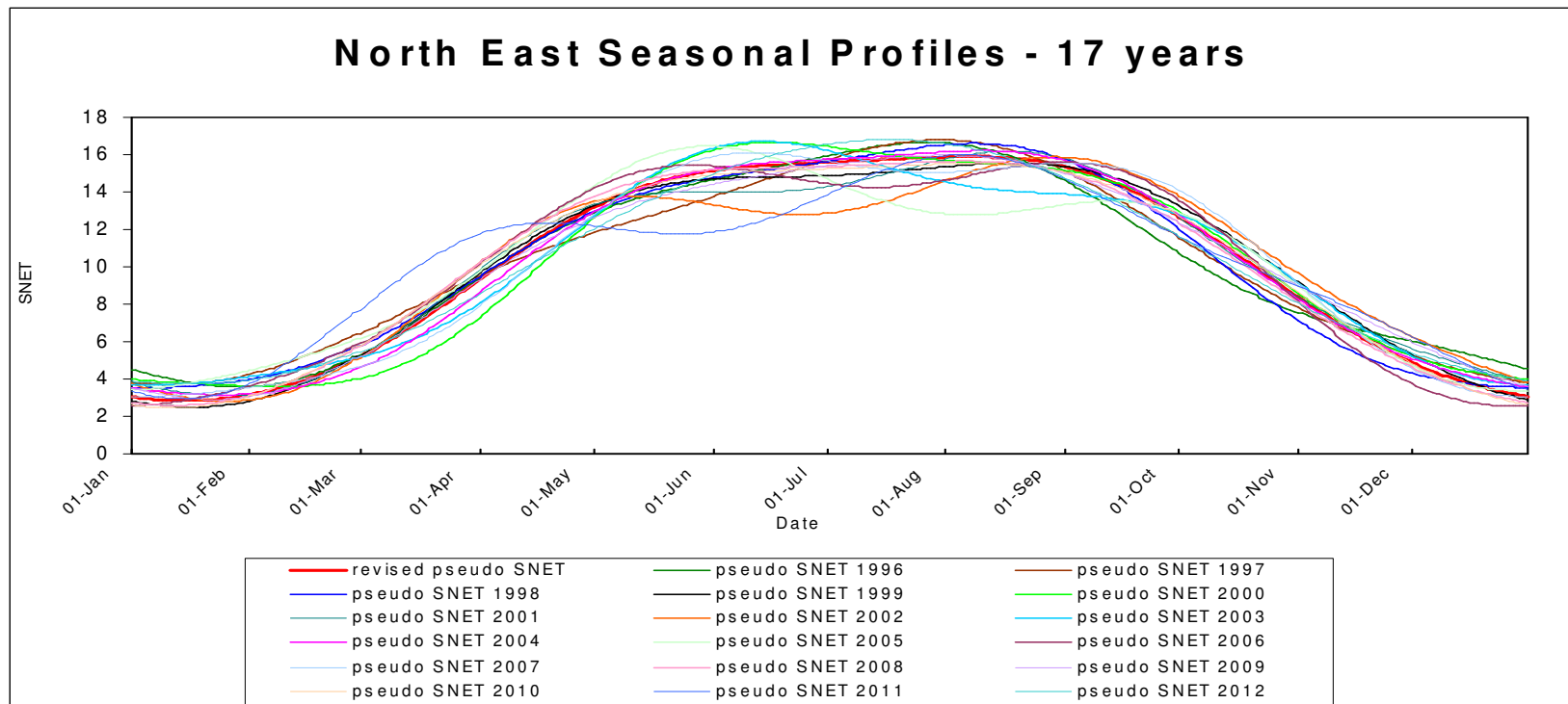
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Results 2a: NE LDZ - Pseudo SNET 17 year

- Individual years influence on proposed 17 year Pseudo SNET (ET: 3 to 14)



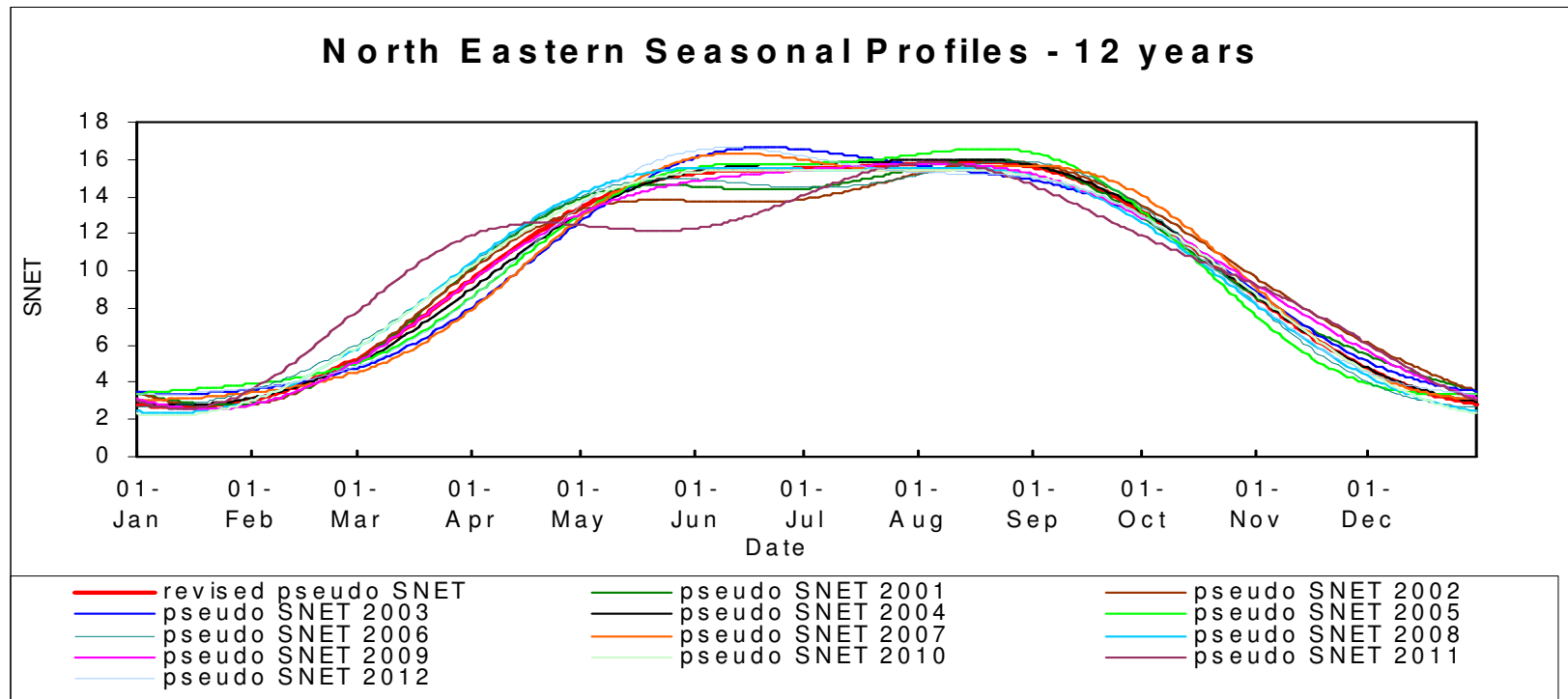
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Results 2b: NE LDZ - Pseudo SNET 12 year

- Individual years influence on proposed 12 year Pseudo SNET (ET: 2 to 15)



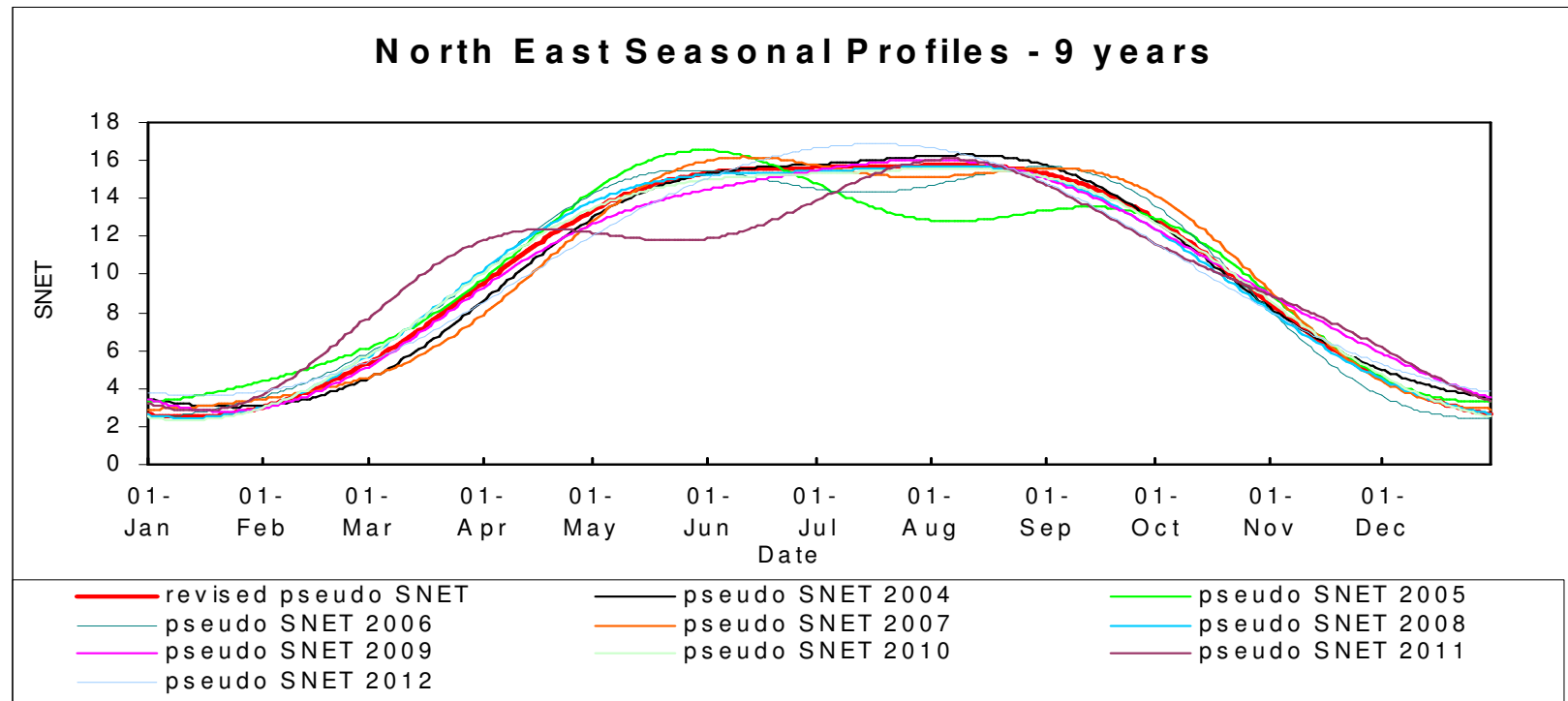
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Results 2c: NE LDZ - Pseudo SNET 9 year

- Individual years influence on proposed 9 year Pseudo SNET (ET: 3 to 14)



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Results 3: NE LDZ – Fit between CWV and Demand

Gas Year Period TESTED against	Fit Statistic	Current CWV	9 year CWV	12 year CWV	17 year CWV
1996/97 - 2012/13	Adj. R-sq.	98.72%	98.72%	98.72%	98.73%
	RMSE (MWh)	5676	5681	5679	5658
2001/02 - 2012/13	Adj. R-sq.	98.78%	98.79%	98.80%	98.80%
	RMSE (MWh)	5675	5658	5634	5644
2004/05 - 2012/13	Adj. R-sq.	98.77%	98.79%	98.79%	98.79%
	RMSE (MWh)	5645	5616	5611	5617
2009/10 – 2012/13	Adj. R-sq.	98.72%	98.76%	98.74%	98.75%
	RMSE (MWh)	5651	5562	5580	5587

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Results 4: NE LDZ – change in estimated peak demand (compared to current CWV)

Gas Year Period	9 year CWV	12 year CWV	17 year CWV
1996/97 – 2012/13	0.05%	0.27%	0.83%
2001/02 – 2012/13	0.06%	0.30%	0.86%
2004/05 – 2012/13	0.07%	0.32%	0.87%
2009/10 – 2012/13	0.08%	0.41%	0.88%

- Note a positive value represents an increase in peak demand and a negative value represents a decrease in peak demand

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CWV Optimisation

Trial Phase

Preliminary Results - SC

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Results 1: SC LDZ – Iterations Summary – 17 years

- Preferred iteration is highlighted

LDZ	Station
SC	BIS

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	4	13	0.653	0.0118	0.19	3	13.2	16	0.64	0.00%	0.00%	6,081,741
Old Param - New SNET	4	13	0.653	0.0118	0.19	3	13.2	16	0.64	0.00%	0.25%	6,065,595
New alternative	4	13	0.649	0.0123	0.16	3	13.2	16.3	0.62	0.01%	0.48%	6,051,098
New alternative	3	12	0.653	0.0117	0.13	3	12.8	16.1	0.64	0.01%	0.55%	6,046,288
New alternative	3	13	0.658	0.0119	0.14	3	13.2	16.3	0.62	0.01%	0.42%	6,054,787
New alternative	3	14	0.658	0.0119	0.15	3	13.6	16.4	0.58	0.00%	0.17%	6,070,539
New alternative	4	12	0.643	0.0120	0.15	3	12.7	16.1	0.65	0.01%	0.61%	6,042,389
New alternative	4	14	0.648	0.0125	0.17	3	13.6	16.4	0.58	0.00%	0.26%	6,064,725
New alternative	4	15	0.642	0.0128	0.19	3	13.8	16.4	0.58	-0.01%	-0.22%	6,095,850
New alternative	5	12	0.63	0.0127	0.17	3	12.6	16.1	0.65	0.01%	0.62%	6,041,851
New alternative	5	13	0.636	0.0131	0.17	3	12.9	16.1	0.66	0.00%	0.33%	6,060,205

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

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Results 1: SC LDZ – Iterations Summary – 12 years

- Preferred iteration is highlighted

LDZ	Station
SC	BIS

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	4	13	0.653	0.0118	0.19	3	13.2	16	0.64	0.00%	0.00%	6,000,847
Old Param - New SNET	4	13	0.653	0.0118	0.19	3	13.2	16	0.64	0.01%	0.83%	5,950,790
New alternative	4	13	0.662	0.0127	0.17	3	13.1	16	0.64	0.02%	1.30%	5,922,594
New alternative	3	12	0.66	0.0120	0.14	3	12.6	16	0.64	0.04%	1.94%	5,884,522
New alternative	3	13	0.672	0.0123	0.15	3	13.1	16	0.64	0.03%	1.27%	5,924,657
New alternative	3	14	0.672	0.0123	0.16	3	13.3	16	0.65	0.02%	0.70%	5,958,844
New alternative	4	12	0.65	0.0123	0.16	3	12.6	16	0.63	0.04%	1.96%	5,883,257
New alternative	4	14	0.661	0.0128	0.16	3	13.3	16	0.64	0.02%	0.80%	5,953,080
New alternative	4	15	0.654	0.0131	0.21	3	13.9	16.7	0.53	0.00%	0.14%	5,992,169
New alternative	5	12	0.635	0.0132	0.17	3	12.9	16.6	0.55	0.03%	1.54%	5,908,588

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

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Results 1: SC LDZ – Iterations Summary – 9 years

- Preferred iteration is highlighted

LDZ	Station
SC	BIS

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	4	13	0.653	0.0118	0.19	3	13.2	16	0.64	0.00%	0.00%	6,121,980
Old Param - New SNET	4	13	0.653	0.0118	0.19	3	13.2	16	0.64	0.02%	0.99%	6,061,411
New alternative	4	13	0.659	0.0123	0.15	3	12.8	15.8	0.68	0.03%	1.45%	6,033,173
New alternative	3	12	0.662	0.0115	0.11	3	12.1	15.7	0.70	0.05%	2.45%	5,971,912
New alternative	3	13	0.669	0.0118	0.13	3	12.9	16	0.65	0.03%	1.49%	6,030,962
New alternative	3	14	0.669	0.0118	0.16	3	13.2	16	0.65	0.01%	0.57%	6,087,100
New alternative	4	12	0.65	0.0118	0.14	3	12.2	15.8	0.69	0.05%	2.47%	5,970,477
New alternative	4	14	0.656	0.0123	0.17	3	13.2	16	0.66	0.01%	0.45%	6,094,527
New alternative	4	15	0.647	0.0126	0.19	3	13.4	16	0.66	-0.01%	-0.44%	6,148,855
New alternative	5	12	0.633	0.0125	0.14	3	12	15.8	0.67	0.04%	2.21%	5,986,499
New alternative	5	13	0.643	0.0132	0.16	3	12.6	15.8	0.69	0.02%	1.05%	6,057,714

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

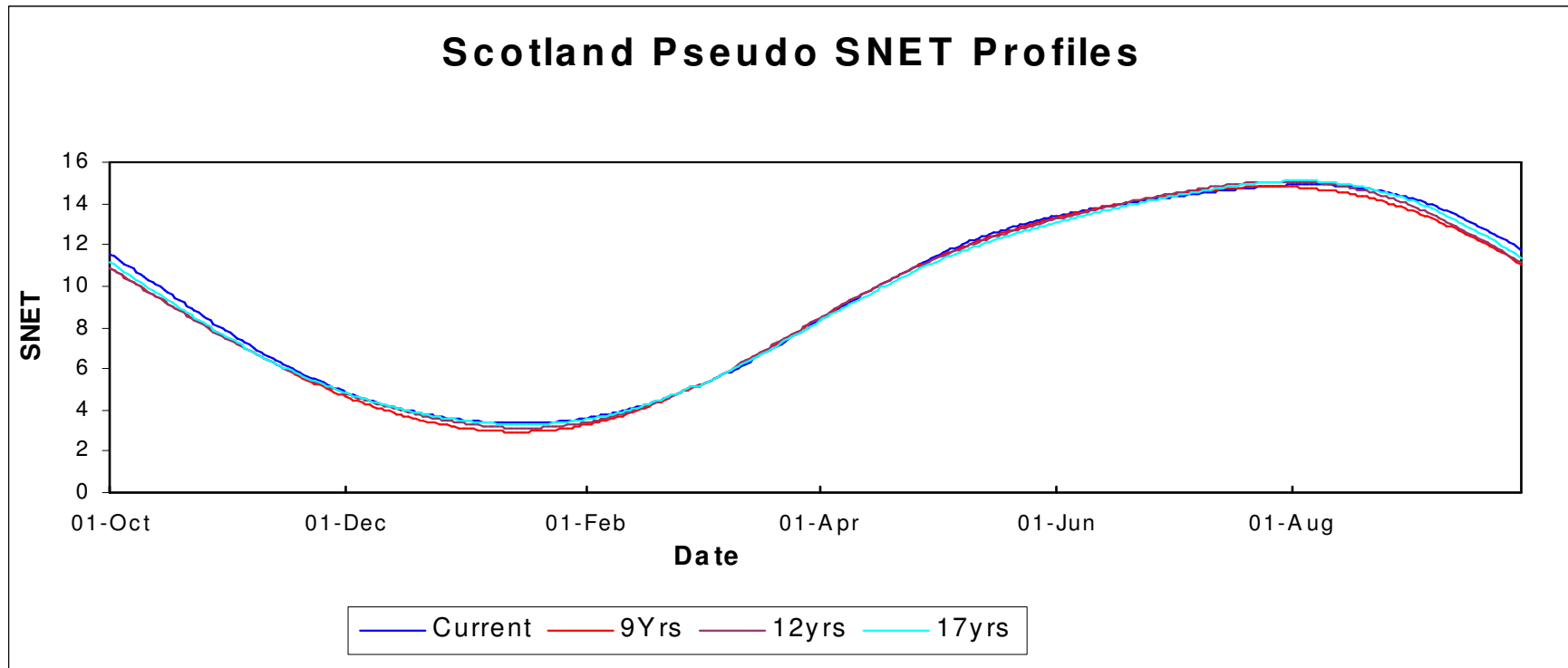
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Results 2: SC LDZ - Pseudo SNET profiles

- Comparison of current to proposed Pseudo SNET



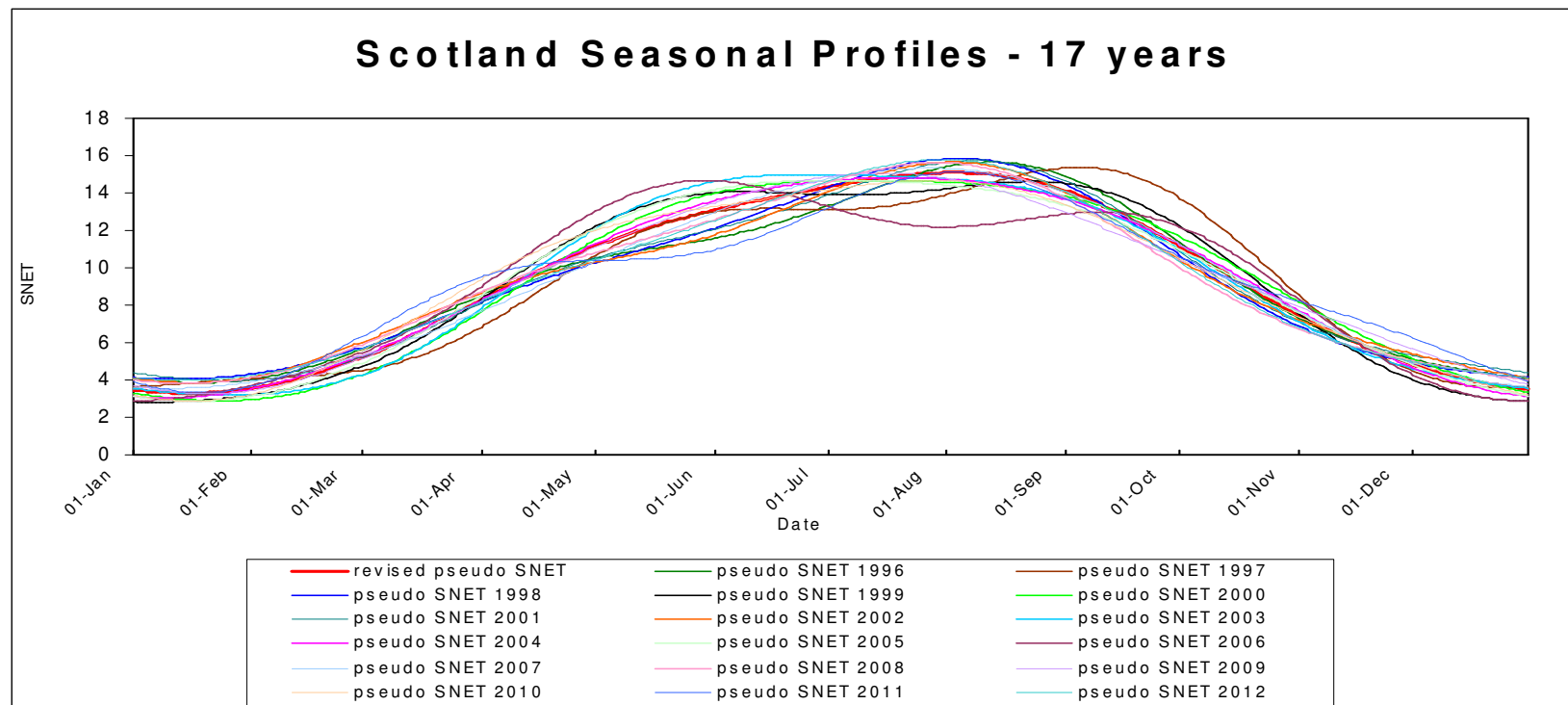
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Results 2a: SC LDZ - Pseudo SNET 17 year

- Individual years influence on proposed 17 year Pseudo SNET (ET: 5 to 12)



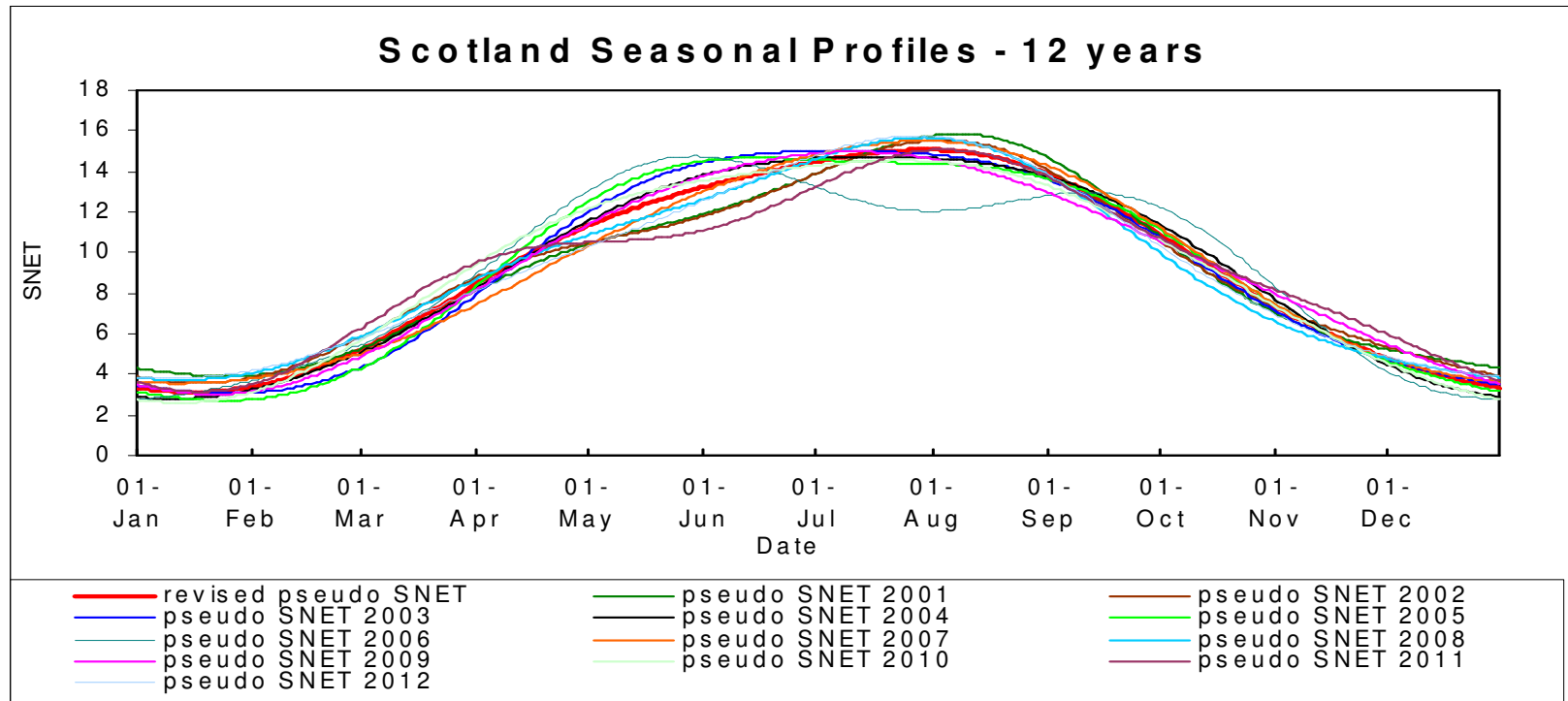
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Results 2b: SC LDZ - Pseudo SNET 12 year

- Individual years influence on proposed 12 year Pseudo SNET (ET: 4 to 12)



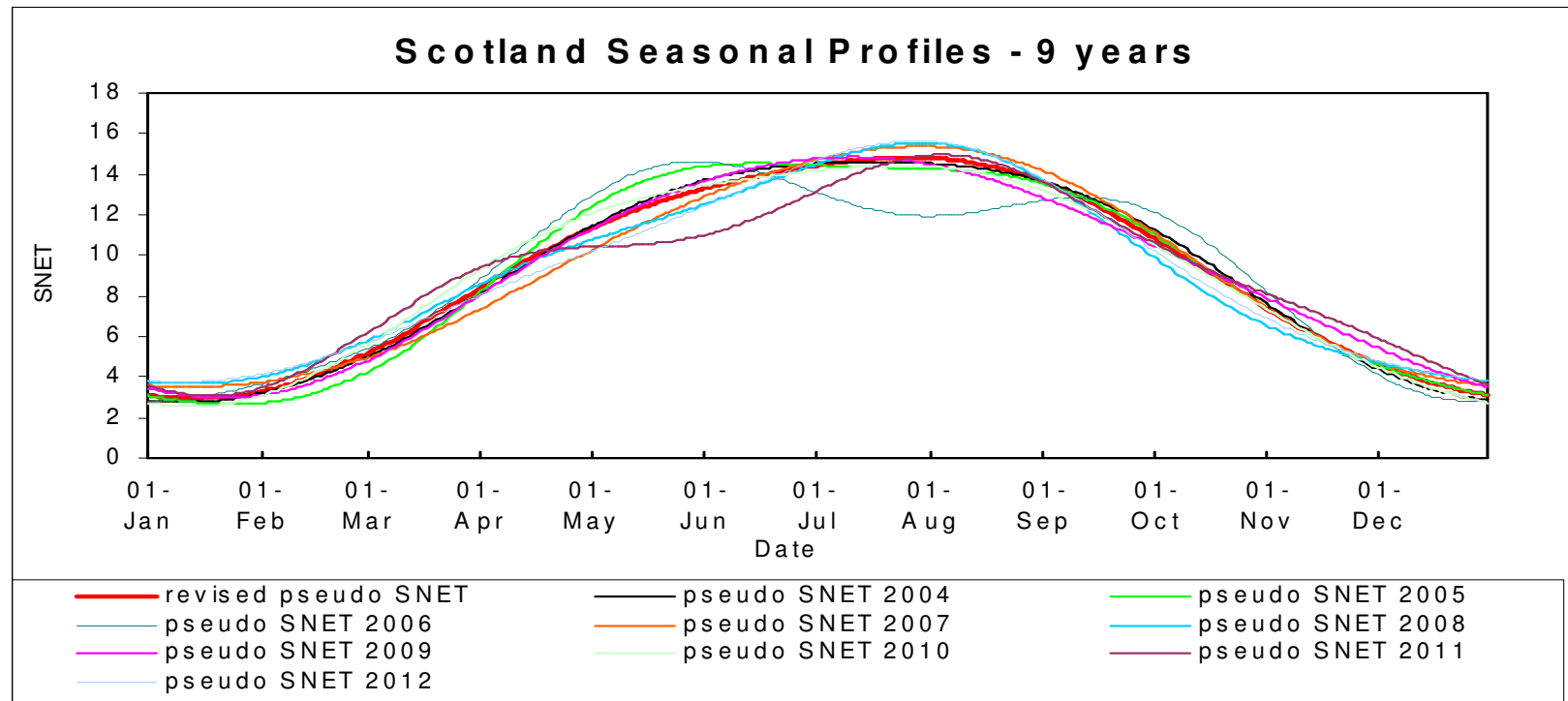
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Results 2c: SC LDZ - Pseudo SNET 9 year

- Individual years influence on proposed 9 year Pseudo SNET (ET: 4 to 12)



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Results 3: SC LDZ – Fit between CWV and Demand

Gas Year Period TESTED against	Fit Statistic	Current CWV	9 year CWV	12 year CWV	17 year CWV
1996/97 - 2012/13	Adj. R-sq.	99.06%	99.06%	99.07%	99.07%
	RMSE (MWh)	6082	6073	6041	6042
2001/02 - 2012/13	Adj. R-sq.	99.13%	99.16%	99.16%	99.14%
	RMSE (MWh)	6001	5899	5883	5944
2004/05 - 2012/13	Adj. R-sq.	99.09%	99.14%	99.14%	99.11%
	RMSE (MWh)	6122	5970	5984	6073
2009/10 – 2012/13	Adj. R-sq.	99.02%	99.10%	99.09%	99.04%
	RMSE (MWh)	6264	6014	6061	6201

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Results 4: SC LDZ – change in estimated peak demand (compared to current CWV)

Gas Year Period	9 year CWV	12 year CWV	17 year CWV
1996/97 – 2012/13	-0.43%	-0.09%	-1.01%
2001/02 – 2012/13	-0.41%	-0.06%	-0.98%
2004/05 – 2012/13	-0.40%	-0.06%	-0.96%
2009/10 – 2012/13	-0.39%	-0.08%	-0.86%

- Note a positive value represents an increase in peak demand and a negative value represents a decrease in peak demand

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CWV Optimisation

Trial Phase

Preliminary Results - SW

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Results 1: SW LDZ – Iterations Summary – 17 years

- Preferred iteration is highlighted

LDZ	Station
SW	FIL

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	4	14	0.637	0.0088	0.09	3	14.3	17.6	0.38	0.00%	0.00%	4,617,173
Old Param - New SNET	4	14	0.637	0.0088	0.09	3	14.3	17.6	0.38	-0.01%	-0.57%	4,645,040
New alternative	4	14	0.664	0.0091	0.27	3	14.2	17.5	0.40	0.04%	1.78%	4,530,328
New alternative	0	13	0.659	0.0090	0.25	3	13.9	17.6	0.37	0.04%	1.85%	4,526,598
New alternative	0	13	0.659	0.0090	0	0	13.9	17.6	0.37	0.02%	0.92%	4,572,071
New alternative	0	14	0.684	0.0093	0.22	3	14.3	17.6	0.38	0.03%	1.66%	4,535,818
New alternative	1	13	0.659	0.0090	0.32	3	13.9	17.6	0.37	0.02%	1.03%	4,566,885
New alternative	1	14	0.682	0.0092	0.23	3	14.3	17.6	0.38	0.03%	1.66%	4,536,056
New alternative	3	13	0.649	0.0090	0.3	3	13.9	17.6	0.37	0.04%	1.79%	4,529,814
New alternative	3	15	0.684	0.0097	0.32	3	14.6	0.39	0.39	0.02%	1.10%	4,563,357

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

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Results 1: SW LDZ – Iterations Summary – 12 years

- Preferred iteration is highlighted

LDZ	Station
SW	FIL

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	4	14	0.637	0.0088	0.09	3	14.3	17.6	0.38	0.00%	0.00%	4,787,866
Old Param - New SNET	4	14	0.637	0.0088	0.09	3	14.3	17.6	0.38	-0.02%	-0.81%	4,830,078
New alternative	4	14	0.672	0.0100	0.25	3	14.3	17.5	0.40	0.05%	2.57%	4,654,722
New alternative	0	13	0.678	0.0099	0.21	3	14.1	17.5	0.38	0.05%	2.21%	4,673,194
New alternative	0	13	0.678	0.0099	0	0	14.1	17.5	0.38	0.03%	1.18%	4,726,908
New alternative	0	14	0.695	0.0100	0.19	3	14.4	17.5	0.39	0.05%	2.18%	4,674,823
New alternative	1	13	0.677	0.0099	0.24	3	14.2	18	0.36	0.05%	2.39%	4,673,621
New alternative	1	14	0.692	0.0100	0.21	3	14.4	17.6	0.40	0.05%	2.50%	4,668,396
New alternative	3	13	0.667	0.0101	0.24	3	14.1	17.5	0.39	0.06%	2.62%	4,651,779
New alternative	3	15	0.688	0.0105	0.21	3	14.9	18.1	0.34	0.05%	2.49%	4,668,825

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

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Results 1: SW LDZ – Iterations Summary – 9 years

- Preferred iteration is highlighted

LDZ	Station
SW	FIL

Run Description	MIN_ET	MAX_ET	L1	L2	L3	V0	V1	V2	Q	Increase in R-sq	% decrease in RMSE	Average RMSE
Previous Optimisation	4	14	0.637	0.0088	0.09	3	14.3	17.6	0.38	0.00%	0.00%	4,823,063
Old Param - New SNET	4	14	0.637	0.0088	0.09	3	14.3	17.6	0.38	-0.01%	0.08%	4,818,974
New alternative	4	14	0.679	0.0096	0.25	3	14.2	17.1	0.44	0.10%	5.02%	4,581,024
New alternative	0	13	0.702	0.0096	0.19	3	14.2	17.2	0.41	0.09%	4.77%	4,593,202
New alternative	0	14	0.704	0.0096	0.18	3	14.2	17.1	0.44	0.09%	4.71%	4,596,062
New alternative	1	13	0.701	0.0095	0.2	3	14.2	17.1	0.43	0.09%	4.69%	4,596,765
New alternative	1	14	0.7	0.0094	0.19	3	14.2	17.1	0.44	0.09%	4.72%	4,595,228
New alternative	3	13	0.69	0.0097	0.22	3	14.2	17.2	0.42	0.10%	5.03%	4,580,362
New alternative	3	15	0.694	0.0101	0.24	3	14.6	17.1	0.43	0.09%	4.60%	4,601,192

Pos - improvement against benchmark
Neg - worse than benchmark

- Objective:** To identify the preferred run
- Note the percentages and RMSE values are only comparable to other iterations for this LDZ and this specific number of years

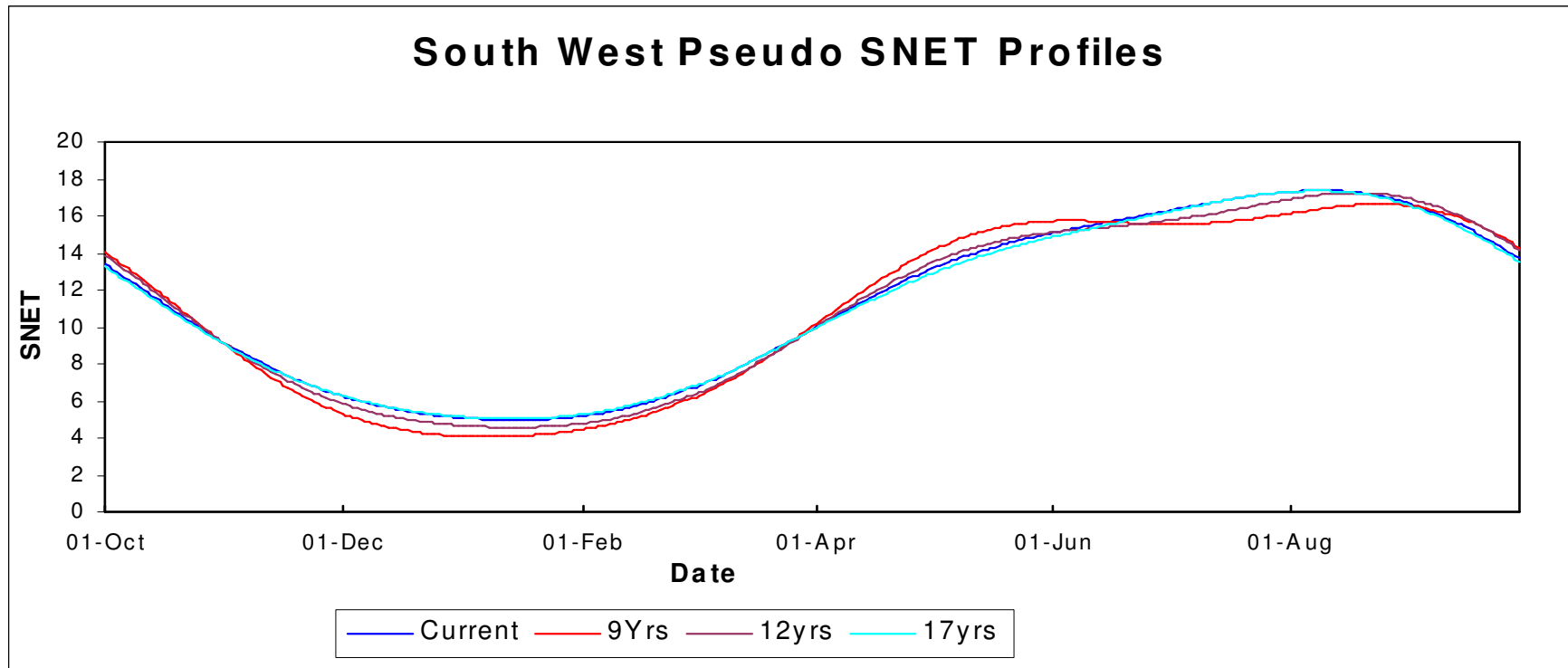
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Results 2: SW LDZ - Pseudo SNET profiles

- Comparison of current to proposed Pseudo SNET



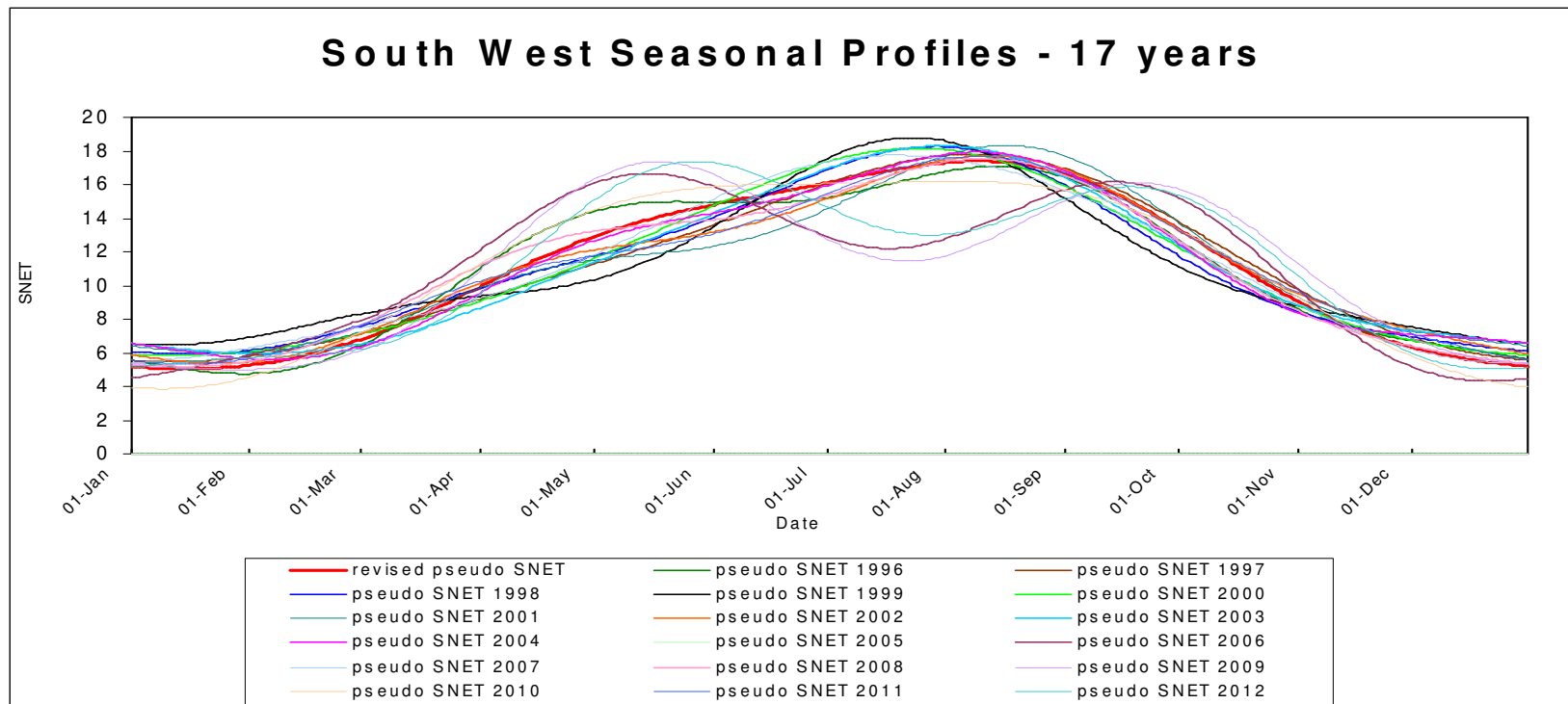
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Results 2a: SW LDZ - Pseudo SNET 17 year

- Individual years influence on proposed 17 year Pseudo SNET (ET: 0 to 13)



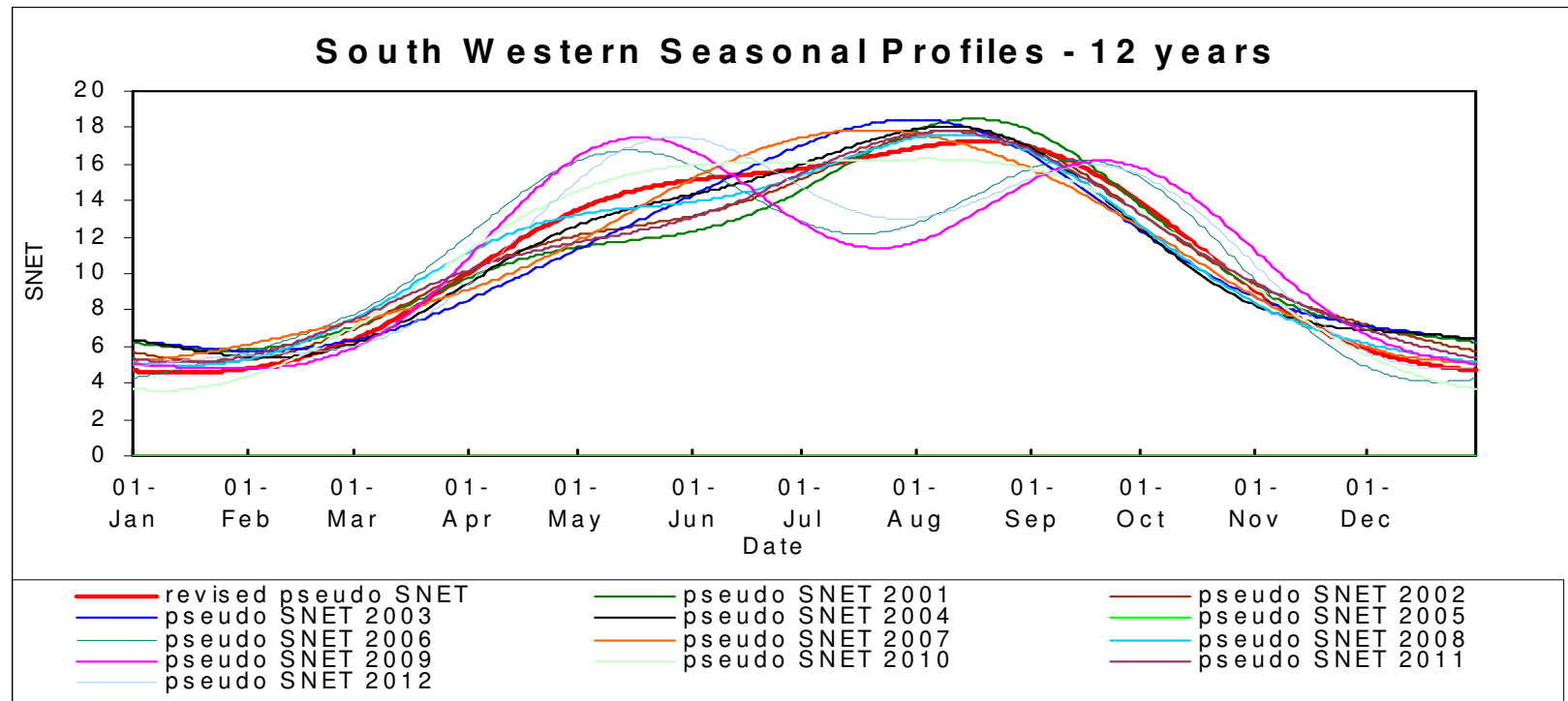
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Results 2b: SW LDZ - Pseudo SNET 12 year

- Individual years influence on proposed 12 year Pseudo SNET (ET: 3 to 13)



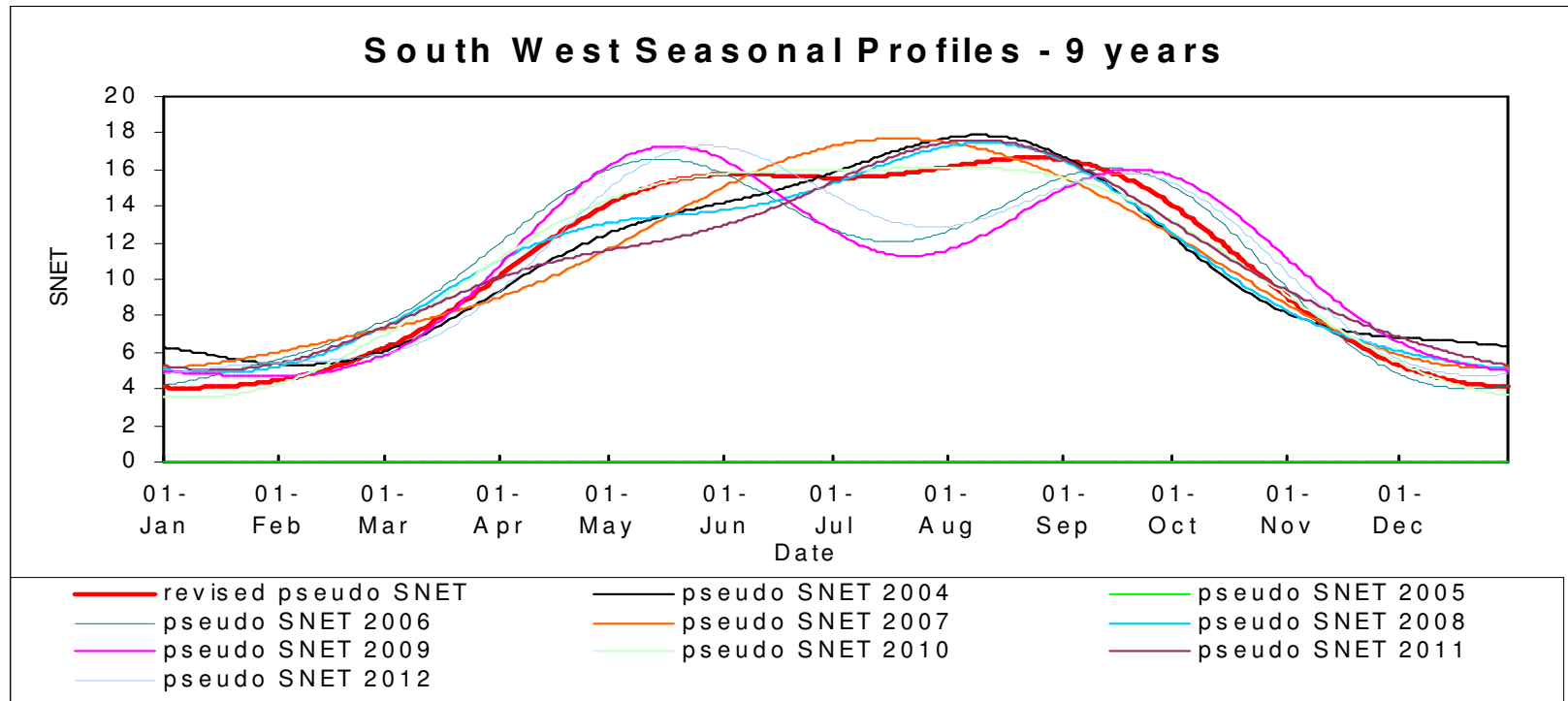
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Results 2c: SW LDZ - Pseudo SNET 9 year

- Individual years influence on proposed 9 year Pseudo SNET (ET: 3 to 13)



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Results 3: SW LDZ – Fit between CWV and Demand

Gas Year Period TESTED against	Fit Statistic	Current CWV	9 year CWV	12 year CWV	17 year CWV
1996/97 - 2012/13	Adj. R-sq.	99.09%	99.08%	99.12%	99.13%
	RMSE (MWh)	4,617	4628	4,552	4,527
2001/02 - 2012/13	Adj. R-sq.	99.05%	99.08%	99.11%	99.09%
	RMSE (MWh)	4,788	4704	4,652	4,691
2004/05 - 2012/13	Adj. R-sq.	99.03%	99.13%	99.12%	99.11%
	RMSE (MWh)	4,823	4580	4,603	4,648
2009/10 – 2012/13	Adj. R-sq.	98.86%	99.09%	99.08%	99.05%
	RMSE (MWh)	5,173	4602	4,659	4,738

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Results 4: SW LDZ – change in estimated peak demand (compared to current CWV)

Gas Year Period	9 year CWV	12 year CWV	17 year CWV
1996/97 – 2012/13	5.92%	6.26%	6.50%
2001/02 – 2012/13	5.81%	6.16%	6.40%
2004/05 – 2012/13	5.77%	6.12%	6.34%
2009/10 – 2012/13	5.48%	5.85%	6.02%

- Note a positive value represents an increase in peak demand and a negative value represents a decrease in peak demand

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Results and Recommendations

- The results suggest that models tended to have higher Adjusted R squared and lower RMSE values when they were tested against the similar period used to analyse and train the parameters.
- The optimisation has not resulted in significant change in 1 in 20 Peak demands for 3 of the 4 LDZs (WM, NE and SC).
- The 1 in 20 Peak demand for SW shows some material differences. Initial investigation suggest possibly due to using the WSSM datasets.
- Analysis using 12 year training seems to be the most consistent ?
- Xoserve suggest 12 year is a good balance between capturing recent experience and ensuring sufficient number of years to train parameters?

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Next steps

- Xoserve are looking for a recommendation from TWG to take to DESC on the number of years to be used in the Production phase of the optimisation.
- Pending DESC approval the next steps are:
 - Obtaining demand and weather data for the recently completed gas year (2013/14)
 - Commence Production phase of optimising all 13 LDZs based on chosen number of years

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