

DRAFT *results*

Final benchmark results of
CWV calculation

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Approach

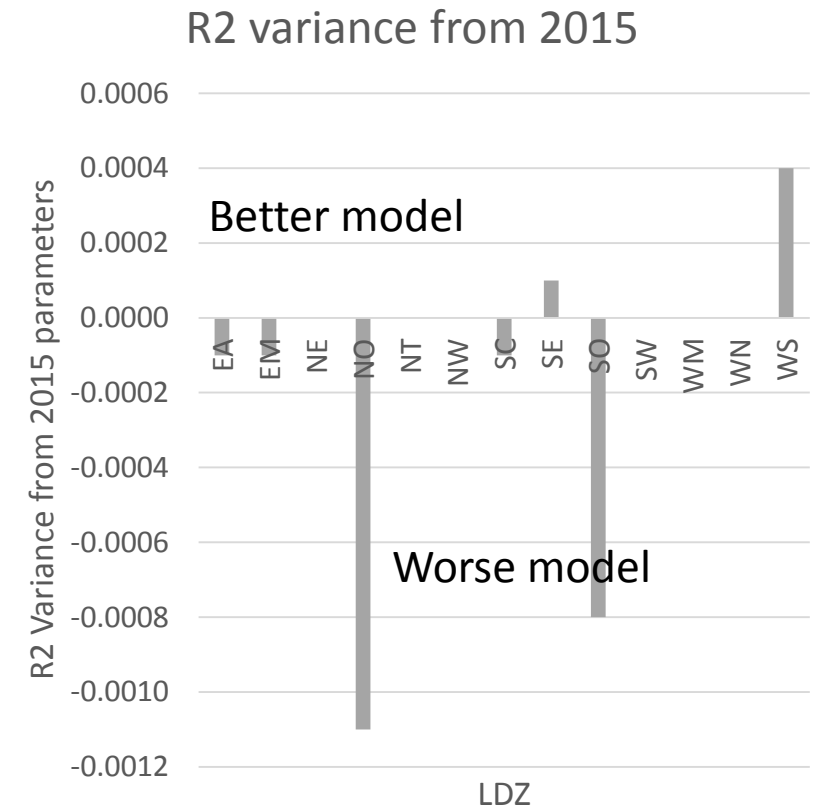
- Gas years used for deriving parameters are 2010/11 to 2017/18
- For these gas years the demand data used in CWV optimisation process is:
 - Aggregate NDM demand for LDZ. Note: All available Mon. to Thurs. non holiday demand data points used in analysis (bad NDM measurements excluded)
- For these gas years the weather data used in CWV optimisation process is:
 - Weather data from each weather station as listed in Appendix: LDZ/Weather Stations. Combination of WSSM and our weather provider history. LDZ WS is now based upon Yeovilton weather station observations.
- All gas years used to derive Pseudo SNET profile

Common Results across the LDZ so far

- R2 suggest little if any improvement or difference
- Winter results (MAPE, RMSE) are better, significant in most LDZs, offset by worse summer results. The SNET is driving these results.
- The subsequence CWV optimisation tends to further improve winter and worsen summer.

R2 Summary

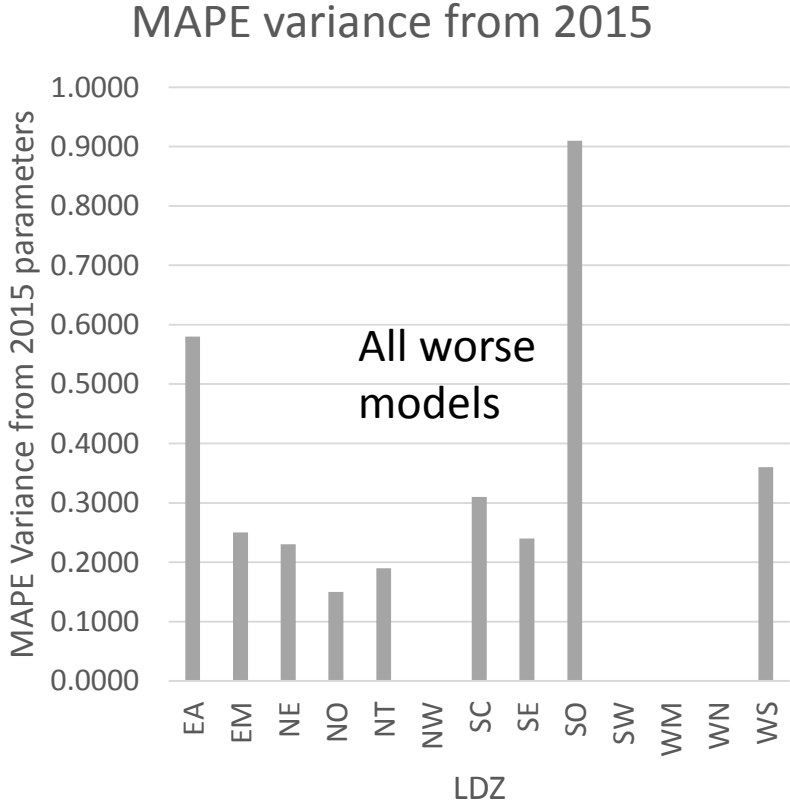
LDZ	2015	2020
EA	0.9910	0.9909
EM	0.9916	0.9915
NE	0.9862	0.9862
NO	0.9855	0.9844
NT	0.9928	0.9928
NW	Due 13 th May 2019	Due 13 th May 2019
SC	0.9887	0.9886
SE	0.9914	0.9915
SO	0.9916	0.9908
SW	Due 13 th May 2019	Due 13 th May 2019
WM	Due 13 th May 2019	Due 13 th May 2019
WN	Due 13 th May 2019	Due 13 th May 2019
WS	0.9825	0.9829



In only 2 LDZs the 2020 parameters are better

MAPE Summary

LDZ	2015	2020
EA	5.55	6.13
EM	6.67	6.92
NE	6.78	7.01
NO	7.27	7.42
NT	4.70	4.89
NW	Due 13 th May 2019	Due 13 th May 2019
SC	5.83	6.14
SE	5.20	5.44
SO	5.60	6.51
SW	Due 13 th May 2019	Due 13 th May 2019
WM	Due 13 th May 2019	Due 13 th May 2019
WN	Due 13 th May 2019	Due 13 th May 2019
WS	8.56	8.92



In all LDZs the 2020 parameters are worse

Thoughts on Results – early analysis

LDZ EA monthly MAPE variances

	Variance from 2015 Parameters								
	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	-0.28%	-0.10%	0.08%	-0.13%	-0.25%	0.12%	-0.34%	-0.04%	-0.12%
Feb	-0.23%	-0.35%	0.00%	-0.05%	0.11%	-0.35%	-0.32%	0.02%	-0.15%
Mar	-0.52%	-0.51%	0.19%	-0.22%	0.05%	0.09%	-0.14%	-0.14%	-0.15%
Apr	-0.27%	0.40%	0.04%	0.23%	0.47%	-0.34%	-0.34%	-0.44%	-0.03%
May	2.72%	0.87%	-0.26%	0.60%	-0.80%	-0.13%	-0.85%	0.79%	0.37%
Jun	3.07%	0.46%	-0.99%	2.52%	-0.03%	2.34%	1.71%	2.28%	1.42%
Jul	2.90%	3.97%	3.89%	3.22%	2.88%	1.20%	2.97%	-2.29%	2.34%
Aug	3.35%	2.99%	1.61%	3.76%	2.46%	0.16%	2.91%	0.93%	2.27%
Sep	0.76%	1.75%	1.09%	1.02%	-0.52%	4.53%	-1.47%	2.24%	1.18%
Oct	0.60%	-0.90%	0.73%	0.52%	-0.23%	0.51%	-0.86%	0.62%	0.12%
Nov	0.84%	-1.32%	-0.61%	0.10%	-1.45%	1.19%	0.16%	-0.63%	-0.21%
Dec	-0.08%	-0.21%	-0.30%	-0.05%	0.14%	0.22%	-0.03%	-0.27%	-0.07%
All Months	1.07%	0.59%	0.46%	0.96%	0.24%	0.79%	0.28%	0.26%	0.58%

Jul 2017 CWV was at Max for most LDZs while gas demands continue to decline.

2020 parameters improve MAPE (-2.29%), due to warmer SNET and slightly warmer CWV cut-off allowing forecast demand to be lower.

Gas demands continue to decline above 2015 CWV max – however the averaging of CWV parameters over X years tends to produce a lower CWV max.

The inclusion of 2017 data appears to worsen 2010-2016 results – is this representative of the future?

Next Steps

- Continue with remaining LDZ results ready for the 13th May
- Further analysis on the results so far
- Plus some results after applying some judgement (SNET, setting Max CWV higher)
- CWV+

Detailed LDZ Results Follow

Results: LDZ EA

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.4593	
Effective Temperature Weight (I1)	0.719	0.714	
Wind Chill Weight (I2)	0.014	0.012	
Cold Weather Sensitivity (I3)	0.090	0.203	
Cold Weather Upturn Threshold (V0)	3.000	0.666	
Lower Warm Weather Cut-Off (V1)	15.300	14.524	
Upper Warm Weather Cut-Off (V2)	19.200	19.278	
Slope Relating to Warm Weather Cut-Off (q)	0.340	0.450	
Wind Chill Wind Cut-Off (W0)	0.000	-1.354	
Wind Chill Temperature Cut-Off (T0)	14.000	14.376	
R2	0.9910	0.9909	

LDZ	Station
EA	Heathrow

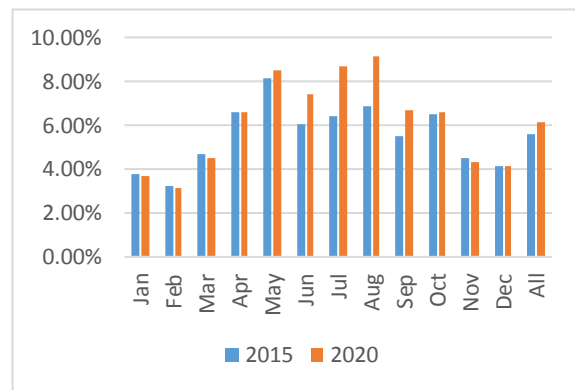
Gas Years	2010/11 to 2017/18
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Parameters	Avg. Mean Abs. %Error
2015	5.55%
2020	6.13%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9910	6636	
0.9909	6662	

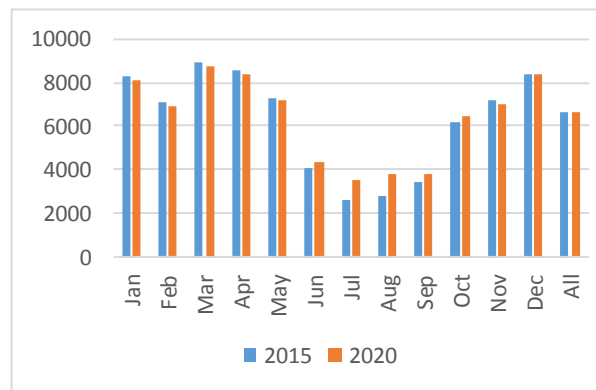
Month	2015	2020
Jan	3.77%	3.65%
Feb	3.24%	3.09%
Mar	4.65%	4.50%
Apr	6.63%	6.60%
May	8.13%	8.50%
Jun	6.01%	7.43%
Jul	6.38%	8.72%
Aug	6.86%	9.13%
Sep	5.50%	6.67%
Oct	6.49%	6.61%
Nov	4.51%	4.30%
Dec	4.17%	4.10%
All	5.55%	6.13%

MAPE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	3.74%	6.47%	6.42%	5.51%
2020	3.63%	6.53%	8.44%	5.87%

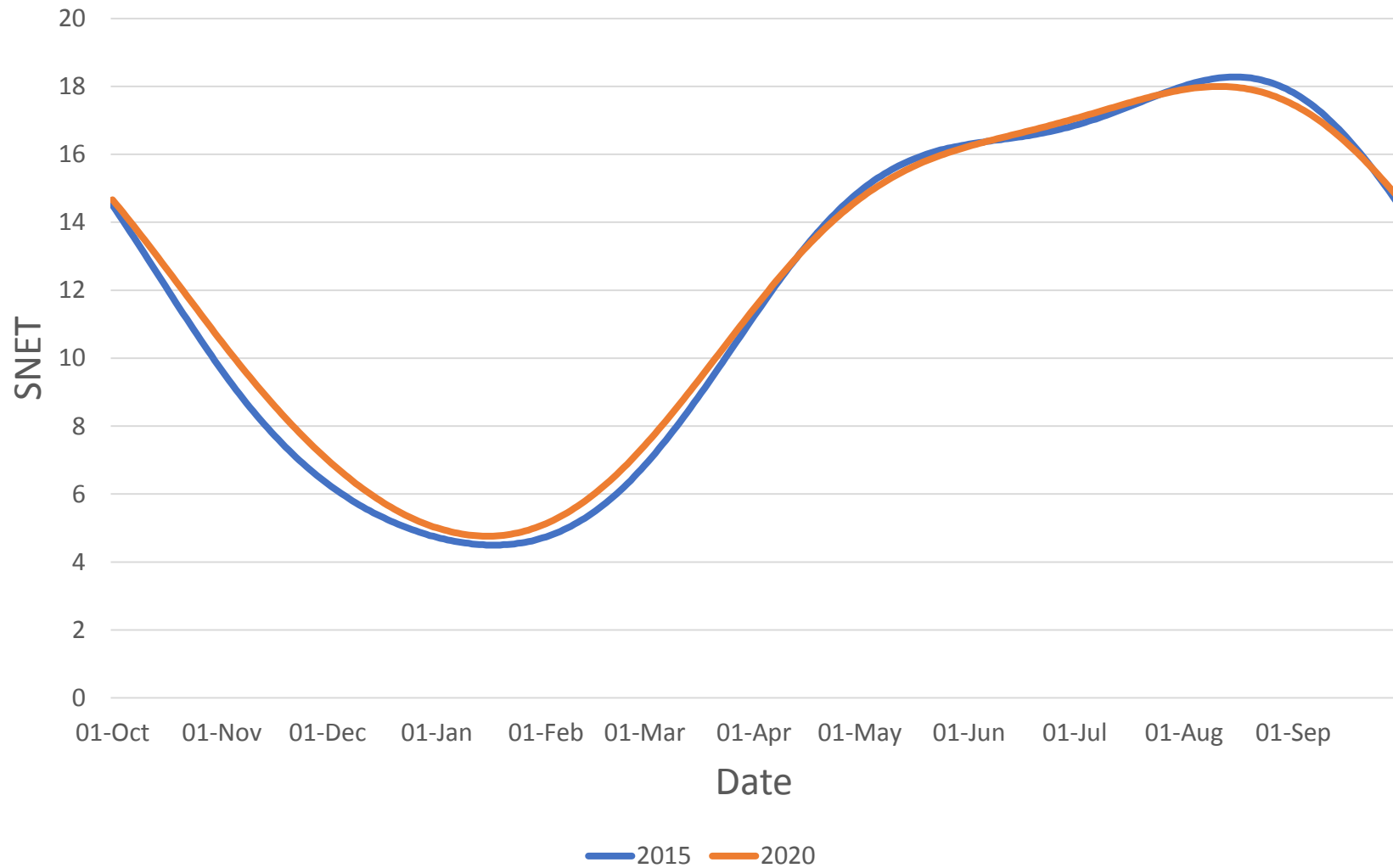


Month	2015	2020
Jan	8286	8103
Feb	7130	6867
Mar	8887	8692
Apr	8521	8385
May	7305	7204
Jun	4084	4383
Jul	2626	3527
Aug	2838	3779
Sep	3431	3840
Oct	6222	6445
Nov	7146	7044
Dec	8412	8353
All	6636	6662

RMSE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	8058	8263	3237	5864
2020	7896	8116	3907	5947



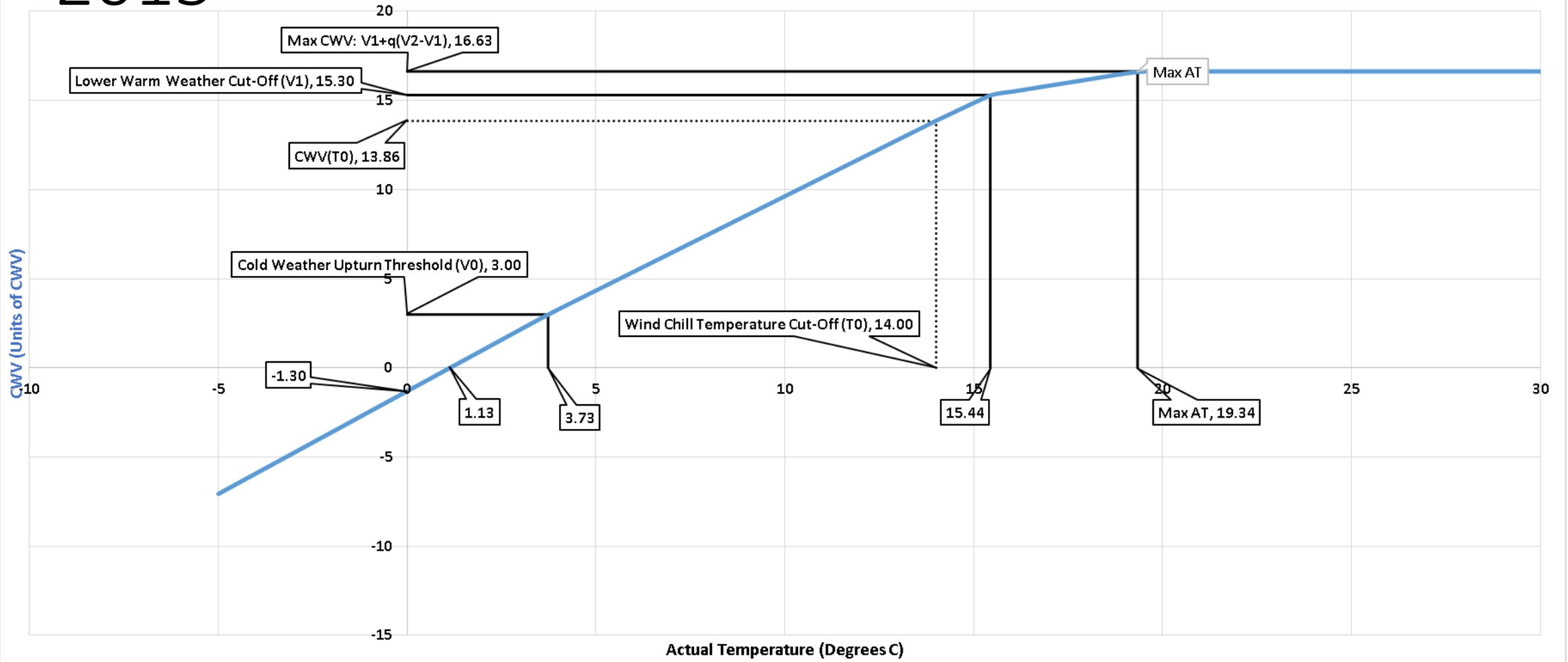
EA LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

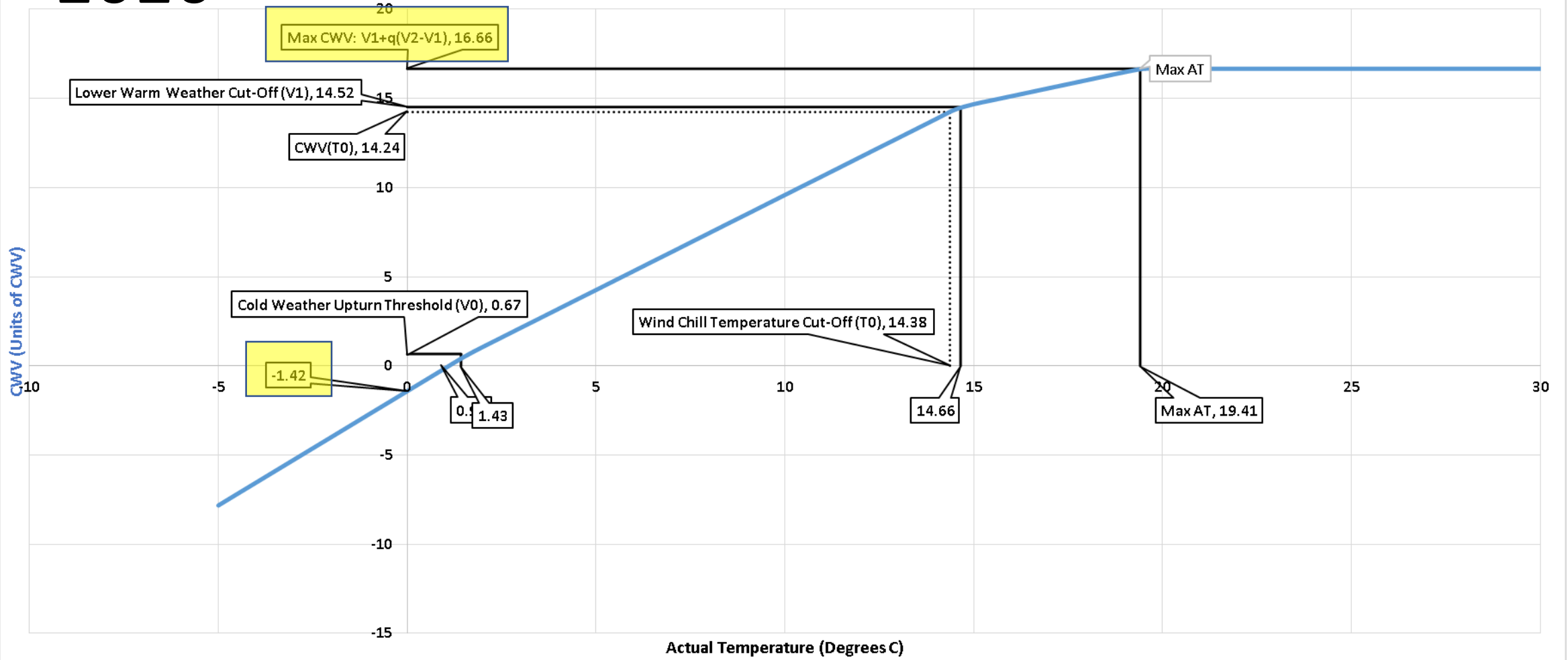
4.00



2020

Fixed Wind Speed

4.00



Results: LDZ EM

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.476	
Effective Temperature Weight (I1)	0.691	0.679	
Wind Chill Weight (I2)	0.0144	0.014	
Cold Weather Sensitivity (I3)	0.05	0.189	
Cold Weather Upturn Threshold (V0)	3	1.436	
Lower Warm Weather Cut-Off (V1)	13.5	13.136	
Upper Warm Weather Cut-Off (V2)	16.8	17.676	
Slope Relating to Warm Weather Cut-Off (q)	0.49	0.454	
Wind Chill Wind Cut-Off (W0)	0	1.538	
Wind Chill Temperature Cut-Off (T0)	14	14.516	
R2	0.9916	0.9915	

LDZ	Station
EM	Watnall (Nottingham)

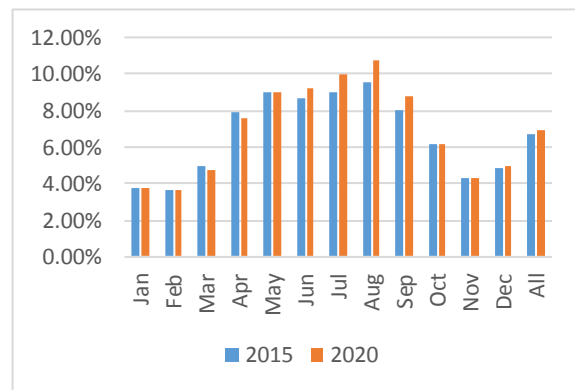
Gas Years	2010/11 to 2017/18
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Parameters	Avg. Mean Abs. %Error
2015	6.67%
2020	6.92%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9916	9060	
0.9915	9153	

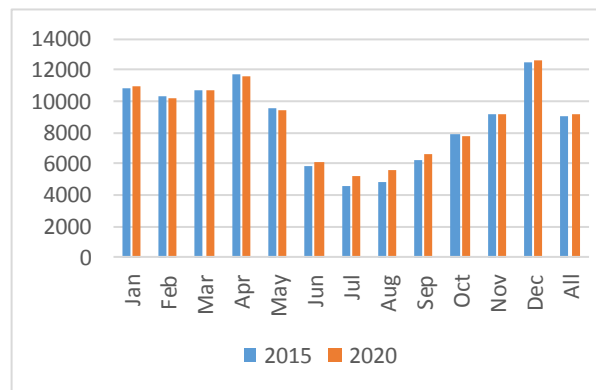
Month	2015	2020
Jan	3.78%	3.77%
Feb	3.61%	3.60%
Mar	4.93%	4.78%
Apr	7.91%	7.58%
May	8.98%	9.02%
Jun	8.66%	9.19%
Jul	9.06%	9.99%
Aug	9.57%	10.76%
Sep	8.04%	8.74%
Oct	6.11%	6.14%
Nov	4.33%	4.30%
Dec	4.83%	4.92%
All	6.67%	6.92%

MAPE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	4.09%	7.27%	9.10%	6.16%
2020	4.11%	7.12%	9.99%	6.39%

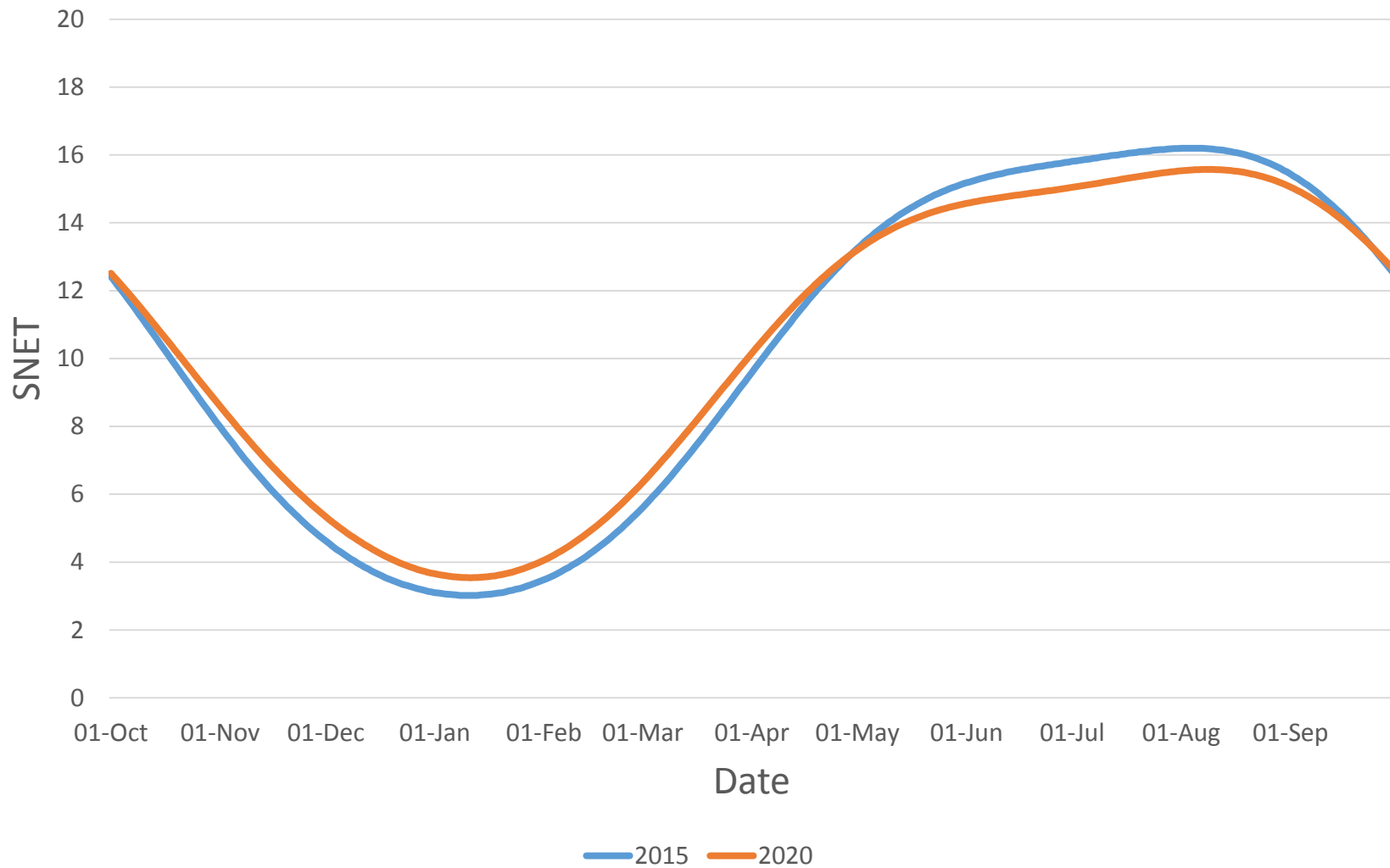


Month	2015	2020
Jan	10835	10968
Feb	10316	10233
Mar	10744	10738
Apr	11739	11549
May	9518	9473
Jun	5817	6050
Jul	4541	5140
Aug	4832	5633
Sep	6284	6592
Oct	7891	7799
Nov	9143	9177
Dec	12470	12629
All	9060	9153

RMSE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	11299	10694	5084	7842
2020	11394	10610	5615	7926



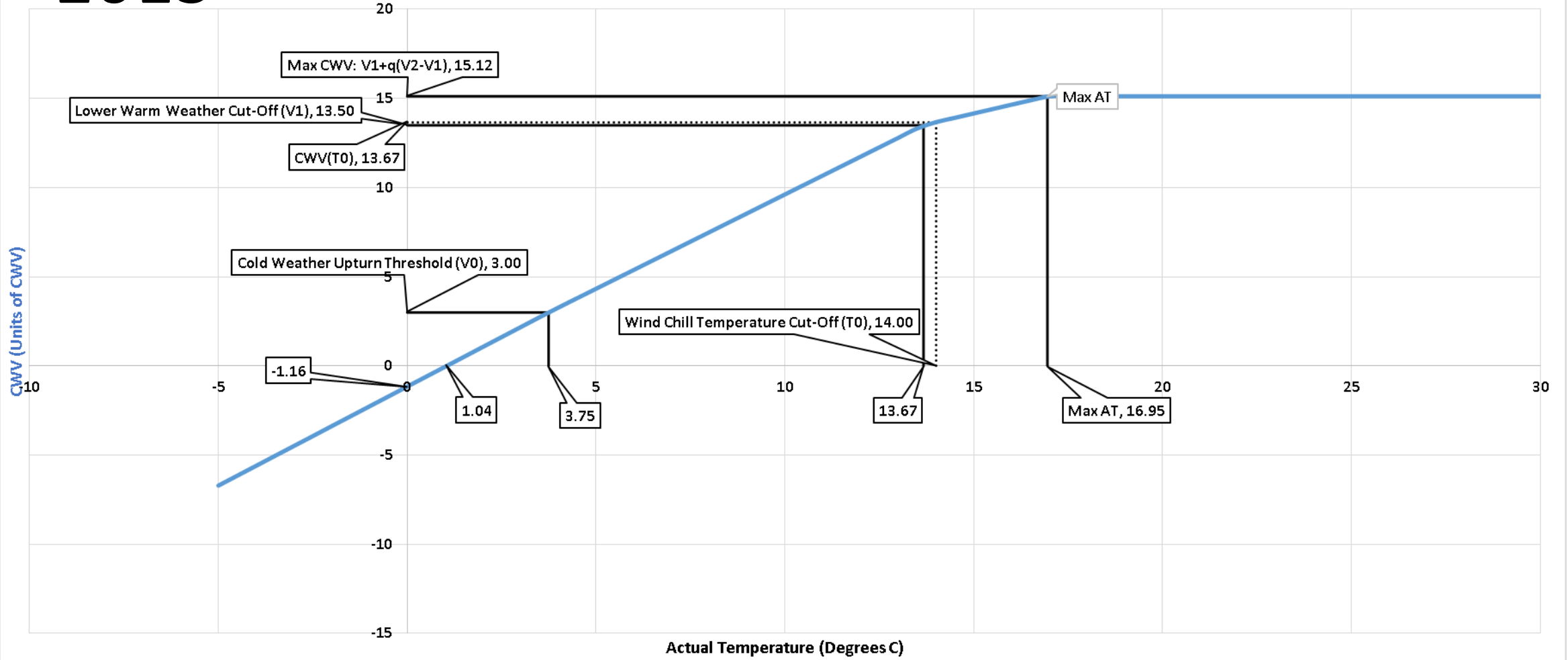
EM LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

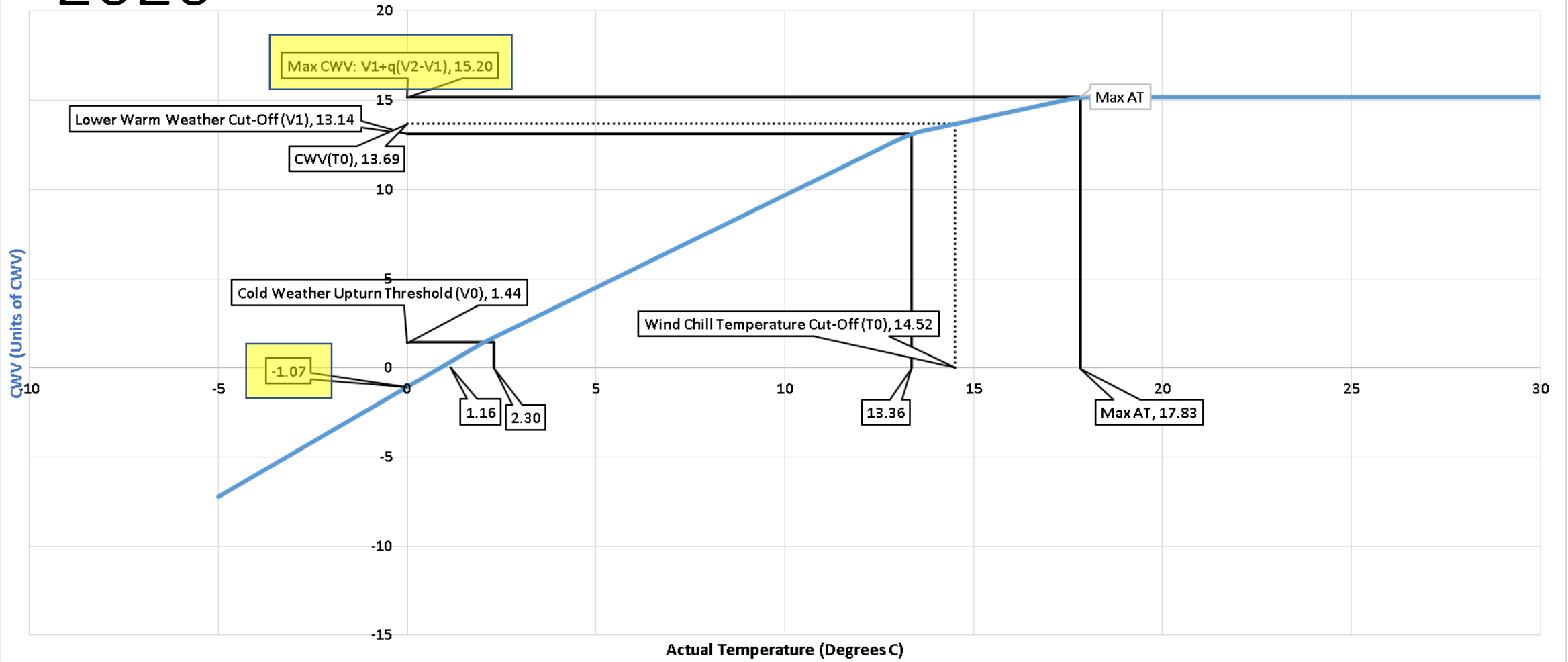
4.00



2020

Fixed Wind Speed

4.00



Results: LDZ NE

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.472	
Effective Temperature Weight (I1)	0.676	0.644	
Wind Chill Weight (I2)	0.0159	0.018	
Cold Weather Sensitivity (I3)	0	0.279	
Cold Weather Upturn Threshold (V0)	0	-0.635	
Lower Warm Weather Cut-Off (V1)	14.7	13.595	
Upper Warm Weather Cut-Off (V2)	17.9	17.990	
Slope Relating to Warm Weather Cut-Off (q)	0.38	0.488	
Wind Chill Wind Cut-Off (W0)	0	0.303	
Wind Chill Temperature Cut-Off (T0)	14	14.955	
R2	0.9862	0.9862	

LDZ	Station
NE	all (Nottingham)

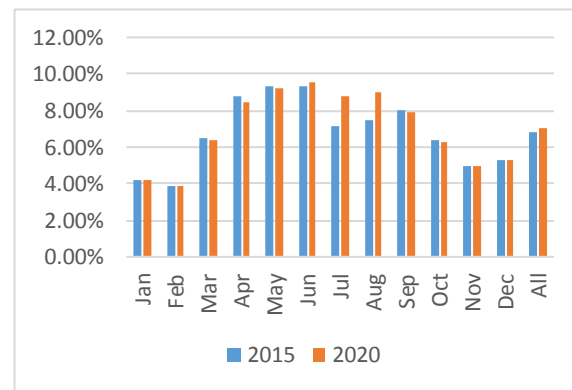
Gas Years	2010/11 to 2017/18
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Parameters	Avg. Mean Abs. %Error
2015	6.78%
2020	7.01%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9862	6301	
0.9862	6327	

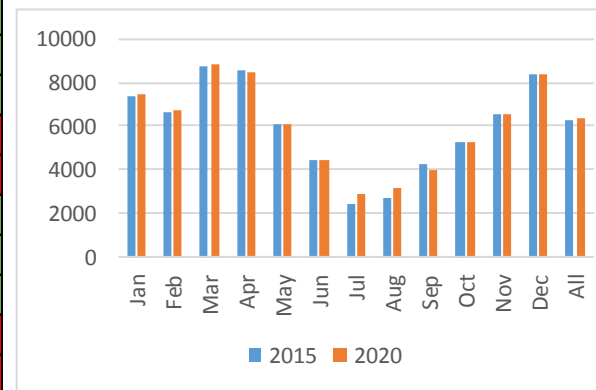
Month	2015	2020
Jan	4.22%	4.18%
Feb	3.81%	3.83%
Mar	6.46%	6.39%
Apr	8.74%	8.41%
May	9.35%	9.22%
Jun	9.31%	9.53%
Jul	7.20%	8.78%
Aug	7.43%	9.05%
Sep	8.04%	7.94%
Oct	6.34%	6.32%
Nov	4.98%	4.90%
Dec	5.29%	5.33%
All	6.78%	7.01%

MAPE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	4.46%	8.18%	7.96%	6.45%
2020	4.47%	8.01%	9.11%	6.39%

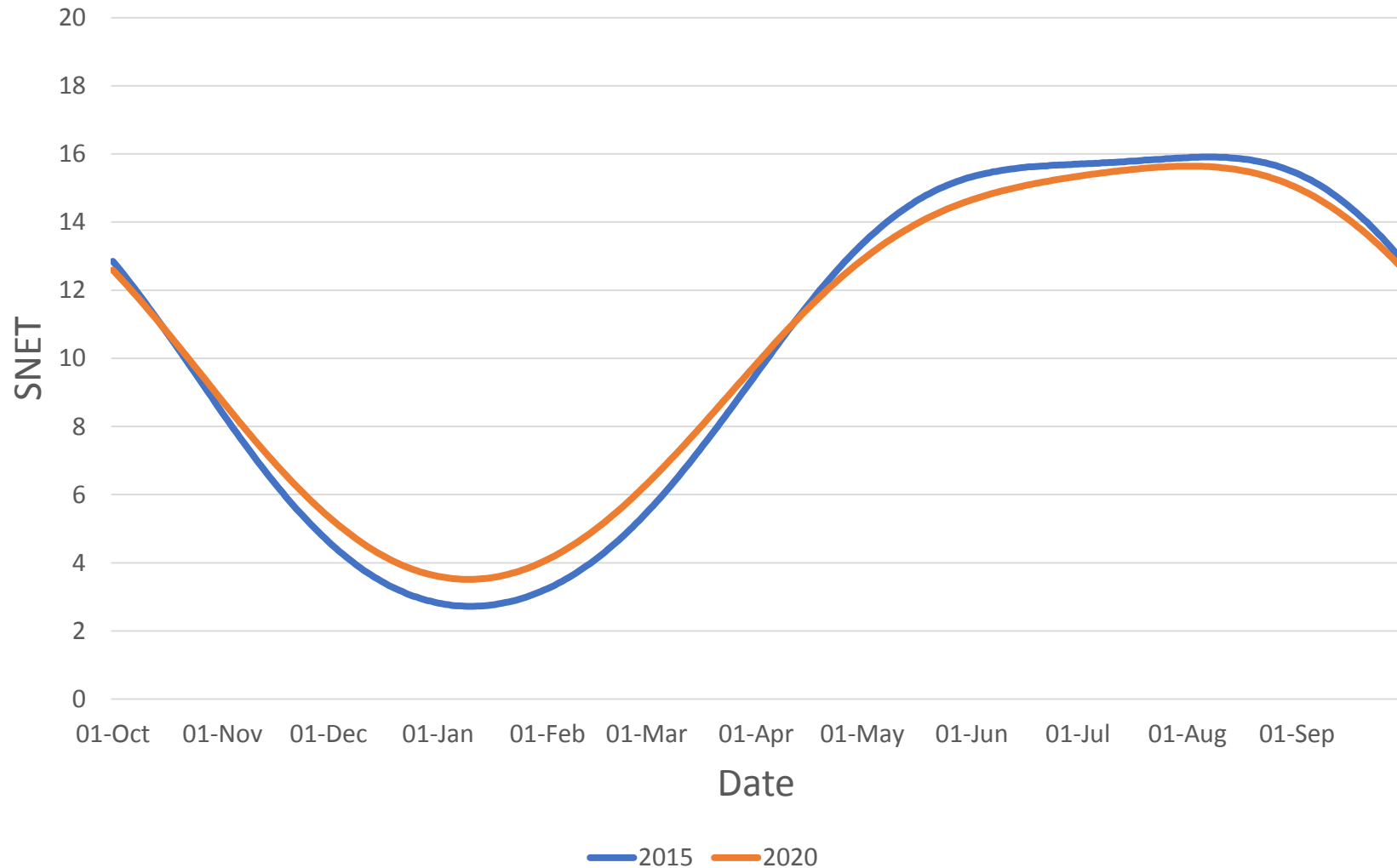


Month	2015	2020
Jan	7351	7422
Feb	6654	6751
Mar	8717	8798
Apr	8548	8449
May	6064	6046
Jun	4480	4453
Jul	2413	2872
Aug	2719	3127
Sep	4219	3973
Oct	5289	5262
Nov	6580	6531
Dec	8379	8400
All	6301	6327

RMSE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	7547	7863	3316	5419
2020	7635	7854	3541	5357



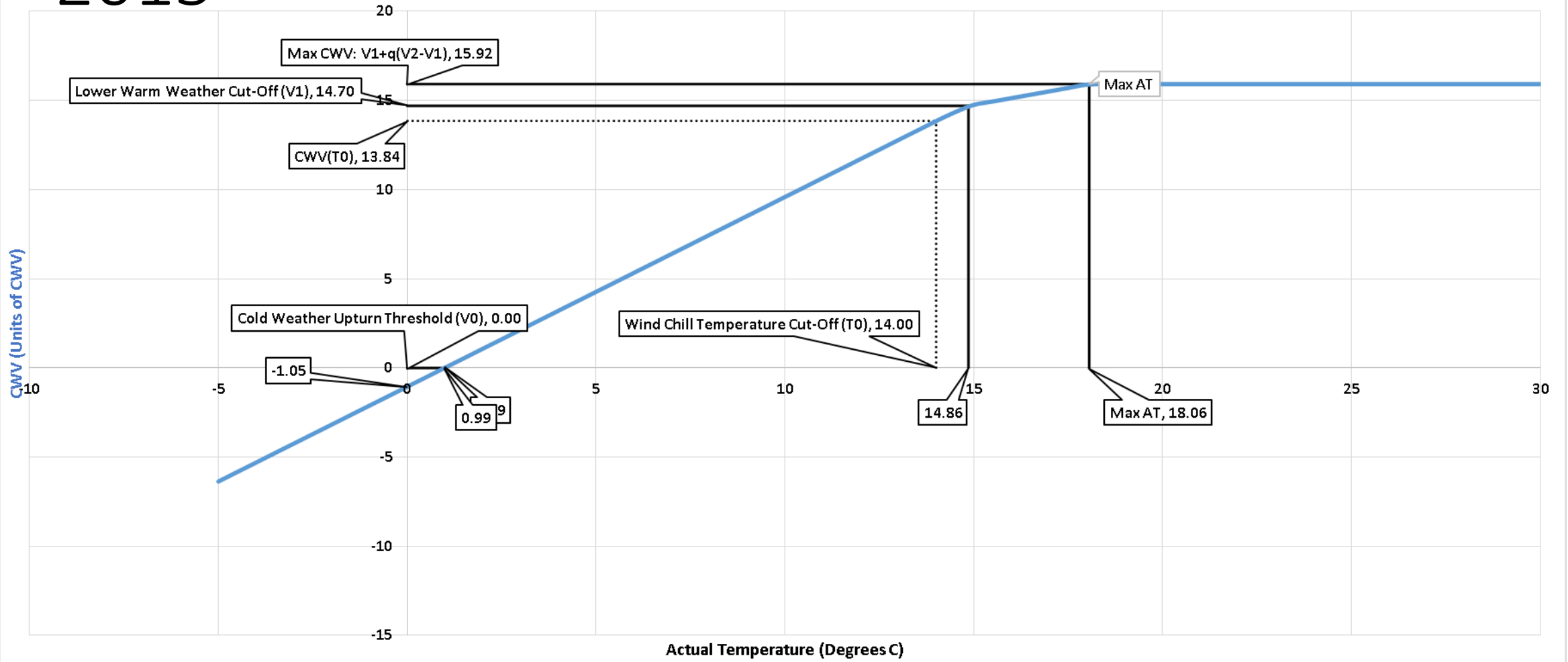
NE LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

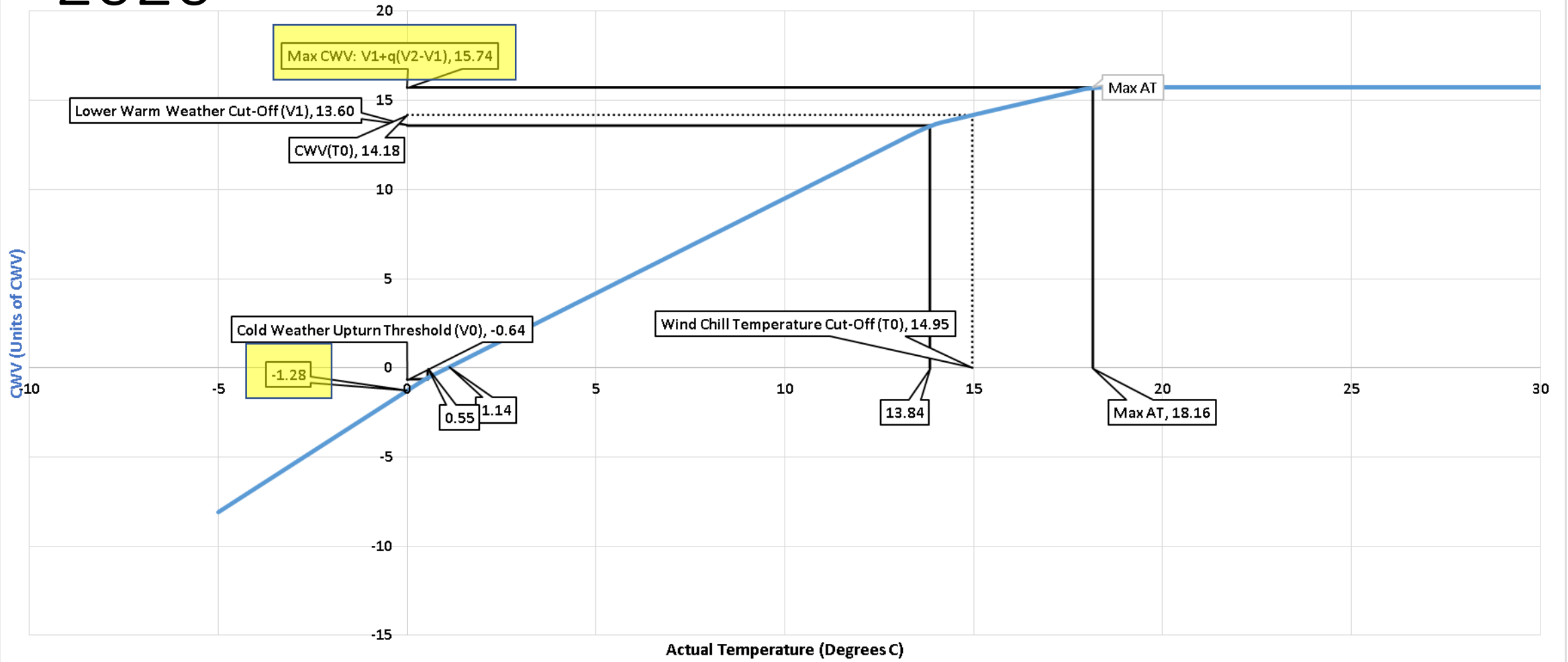
4.00



2020

Fixed Wind Speed

4.00



Results: LDZ NO

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.506	
Effective Temperature Weight (I1)	0.663	0.643	
Wind Chill Weight (I2)	0.0086	0.010	
Cold Weather Sensitivity (I3)	0.15	0.239	
Cold Weather Upturn Threshold (V0)	3	1.773	
Lower Warm Weather Cut-Off (V1)	13	12.299	
Upper Warm Weather Cut-Off (V2)	16	18.730	
Slope Relating to Warm Weather Cut-Off (q)	0.46	0.469	
Wind Chill Wind Cut-Off (W0)	0	0.807	
Wind Chill Temperature Cut-Off (T0)	14	14.511	
R2	0.9855	0.9844	

LDZ	Station
NO	Albemarle

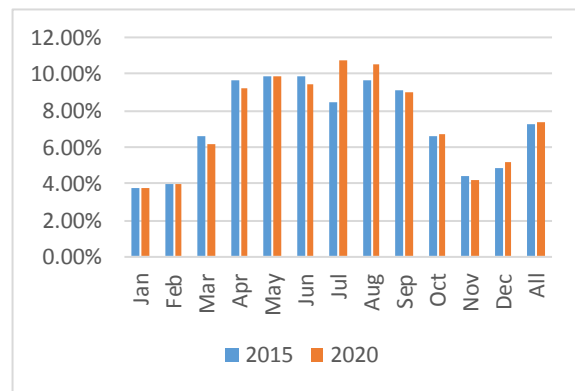
Gas Years	2010/11 to 2017/18
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Parameters	Avg. Mean Abs. %Error
2015	7.27%
2020	7.42%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9855	5257	
0.9854	5243	

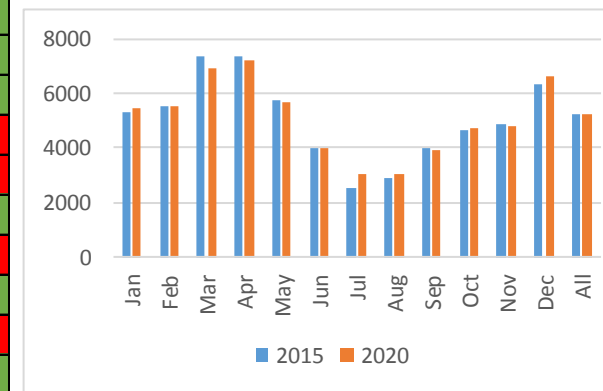
Month	2015	2020
Jan	3.77%	3.80%
Feb	3.94%	3.95%
Mar	6.56%	6.18%
Apr	9.66%	9.27%
May	9.91%	9.84%
Jun	9.92%	9.43%
Jul	8.48%	10.71%
Aug	9.67%	10.55%
Sep	9.14%	8.99%
Oct	6.61%	6.67%
Nov	4.43%	4.20%
Dec	4.89%	5.13%
All	7.27%	7.42%

MAPE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	4.21%	8.70%	9.35%	6.73%
2020	4.30%	8.42%	10.24%	6.62%

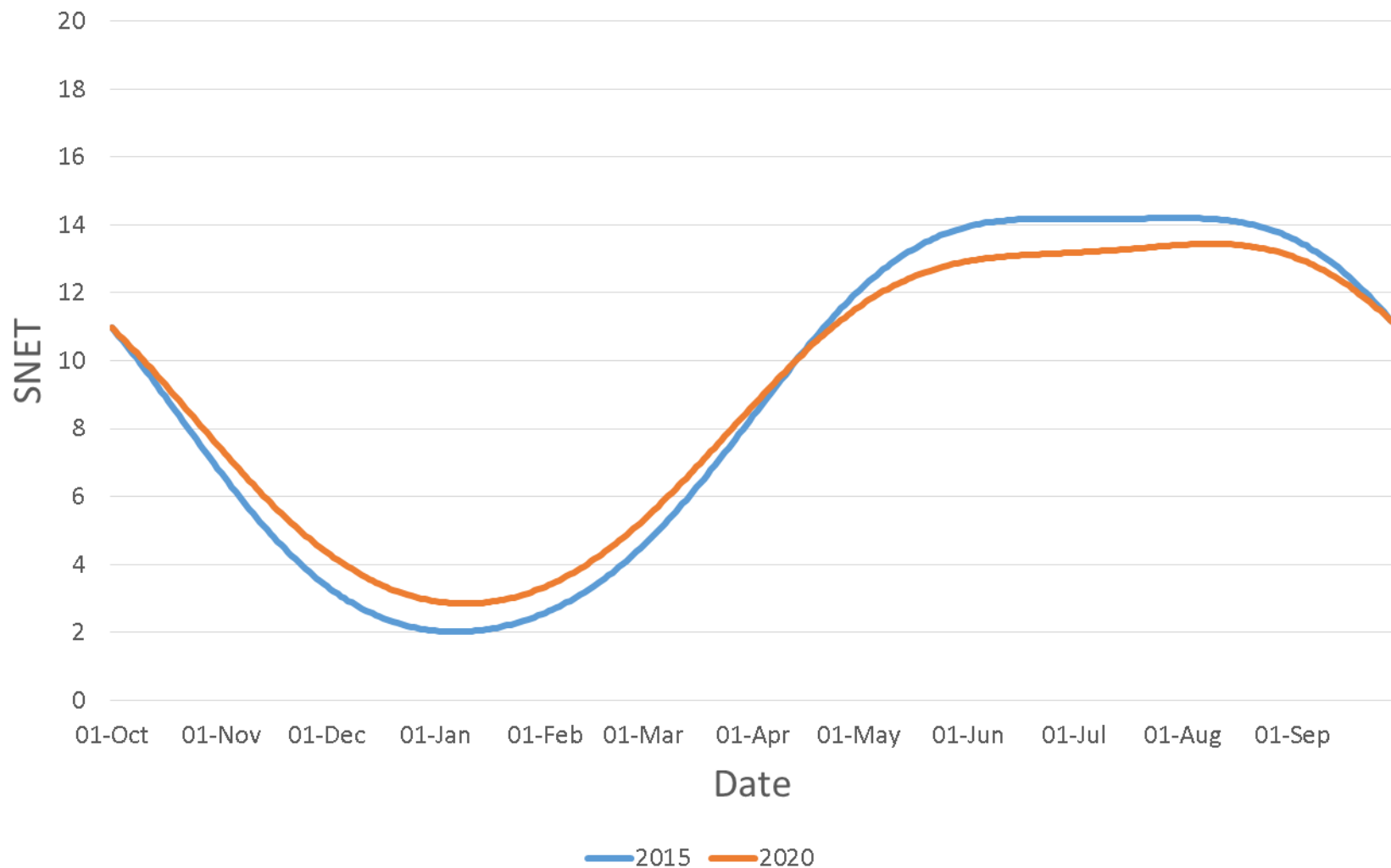


Month	2015	2020
Jan	5281	5418
Feb	5500	5518
Mar	7318	6899
Apr	7383	7194
May	5778	5657
Jun	4025	3959
Jul	2502	3043
Aug	2920	3043
Sep	3972	3913
Oct	4648	4728
Nov	4872	4779
Dec	6340	6647
All	5257	5243

RMSE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	5790	6861	3204	4511
2020	5930	6611	3369	4494



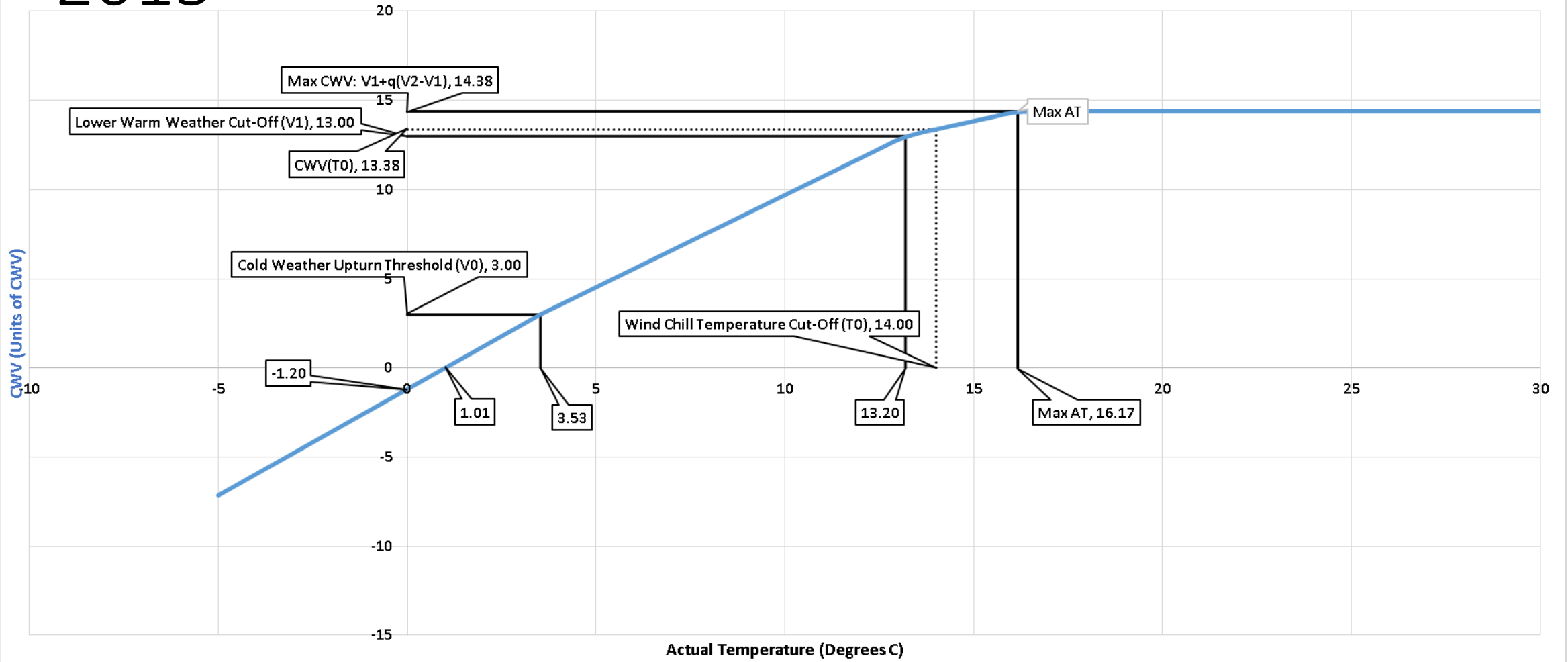
NO LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

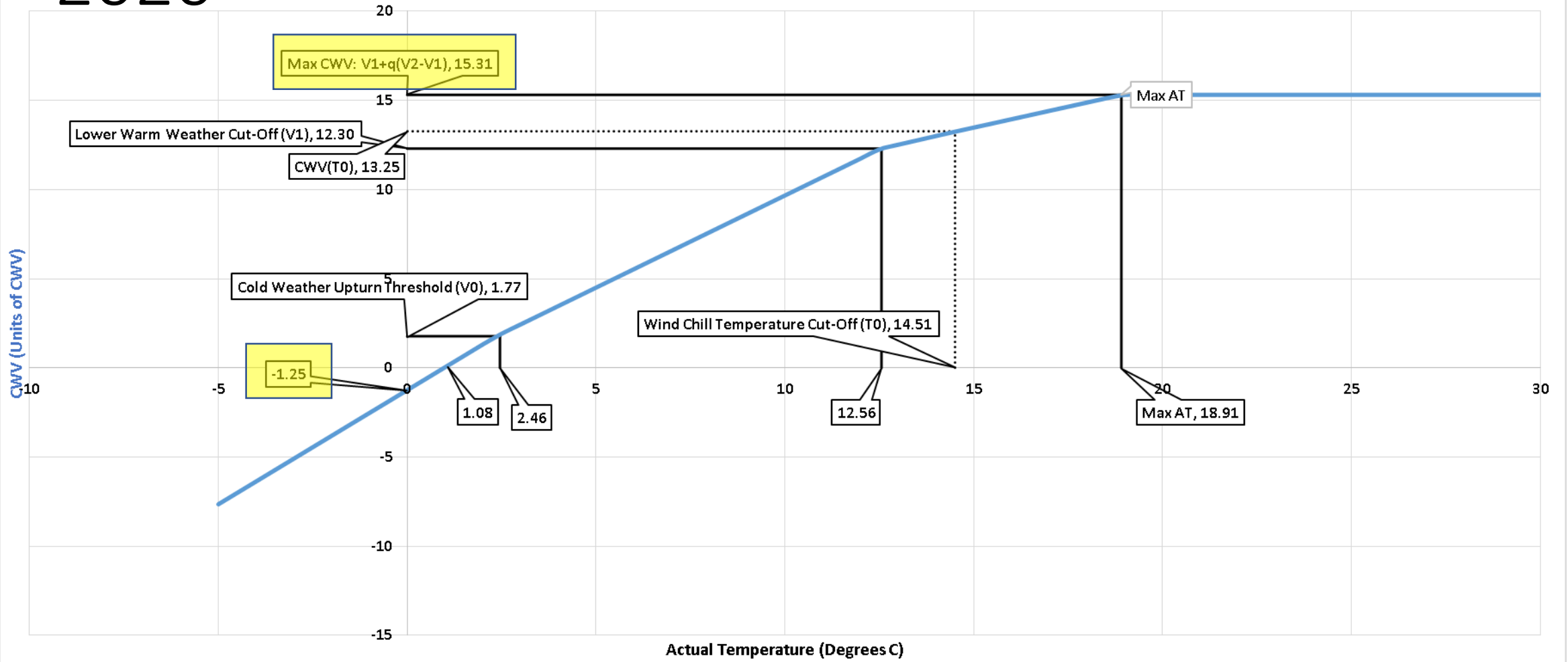
4.00



2020

Fixed Wind Speed

4.00



Results: LDZ NT

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.471	
Effective Temperature Weight (I1)	0.727	0.730	
Wind Chill Weight (I2)	0.0151	0.015	
Cold Weather Sensitivity (I3)	0.22	0.345	
Cold Weather Upturn Threshold (V0)	3	2.130	
Lower Warm Weather Cut-Off (V1)	15.2	14.719	
Upper Warm Weather Cut-Off (V2)	19.2	19.444	
Slope Relating to Warm Weather Cut-Off (q)	0.38	0.438	
Wind Chill Wind Cut-Off (W0)	0	-1.157	
Wind Chill Temperature Cut-Off (T0)	14	13.537	
R2	0.9928	0.9928	

LDZ	Station
NT	Heathrow

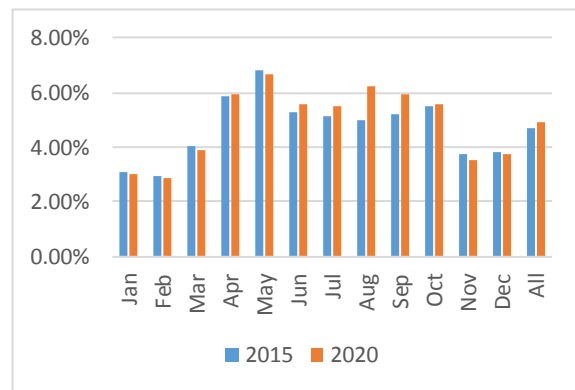
Gas Years	2010/11 to 2017/18
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Parameters	Avg. Mean Abs. %Error
2015	4.70%
2020	4.89%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9928	7748	
0.9928	7731	

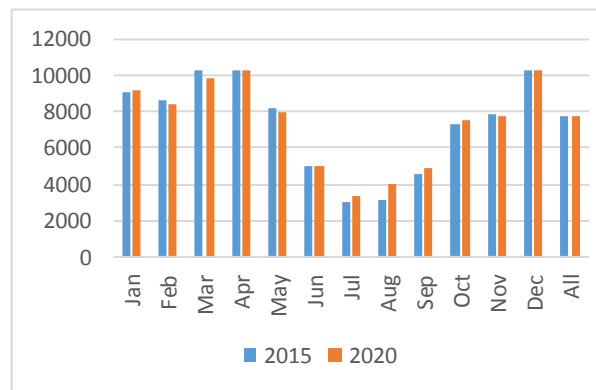
Month	2015	2020
Jan	3.07%	3.03%
Feb	2.92%	2.84%
Mar	4.04%	3.91%
Apr	5.87%	5.91%
May	6.79%	6.66%
Jun	5.26%	5.58%
Jul	5.11%	5.49%
Aug	4.99%	6.25%
Sep	5.17%	5.96%
Oct	5.52%	5.56%
Nov	3.76%	3.56%
Dec	3.82%	3.74%
All	4.70%	4.89%

MAPE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	3.28%	5.56%	5.12%	4.82%
2020	3.22%	5.49%	5.78%	5.03%

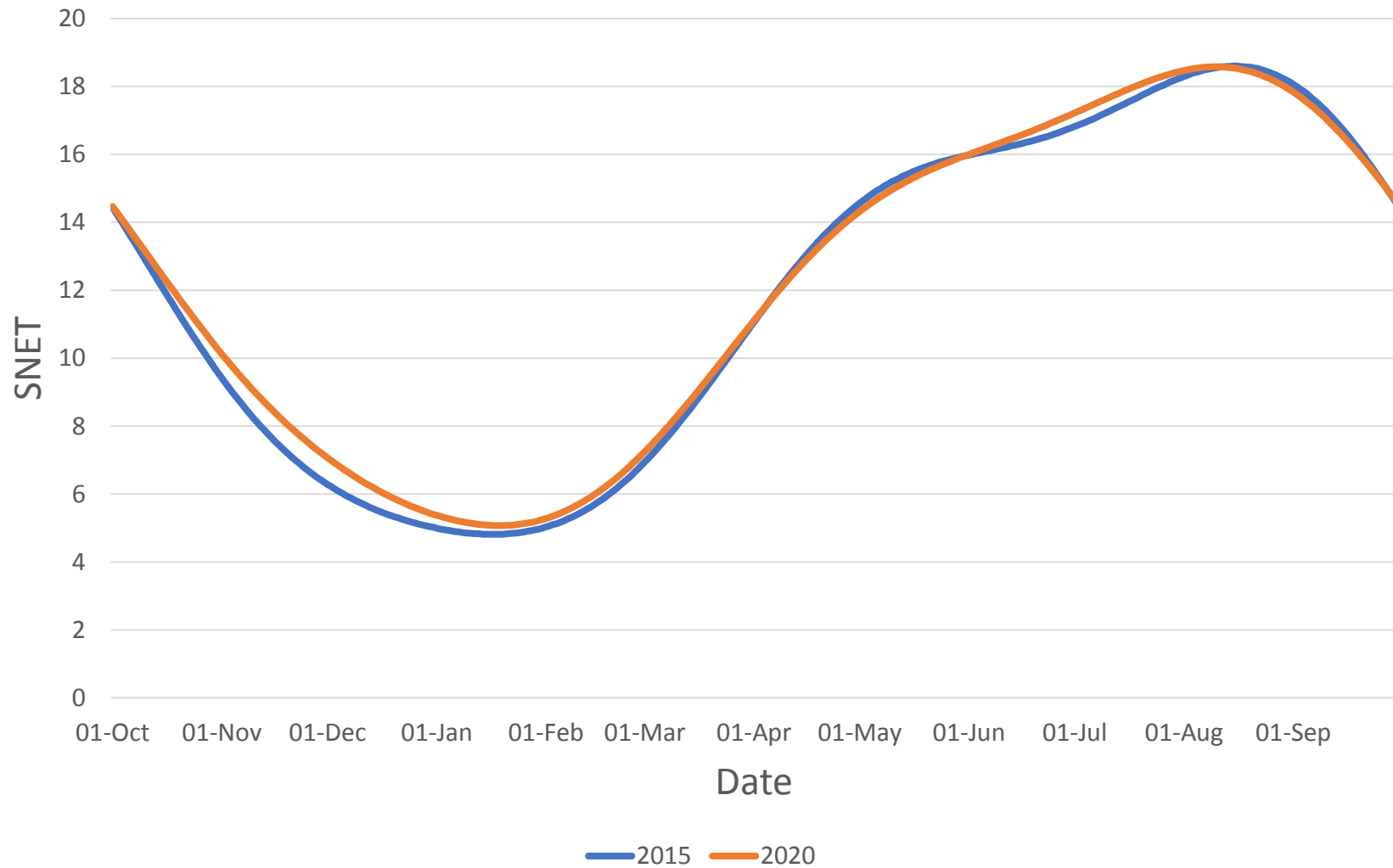


Month	2015	2020
Jan	9072	9182
Feb	8569	8396
Mar	10281	9862
Apr	10238	10230
May	8205	8013
Jun	4993	4965
Jul	3059	3358
Aug	3104	3992
Sep	4550	4915
Oct	7360	7478
Nov	7882	7742
Dec	10308	10228
All	7748	7731

RMSE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	9483	9616	3811	6755
2020	9471	9409	4148	6839



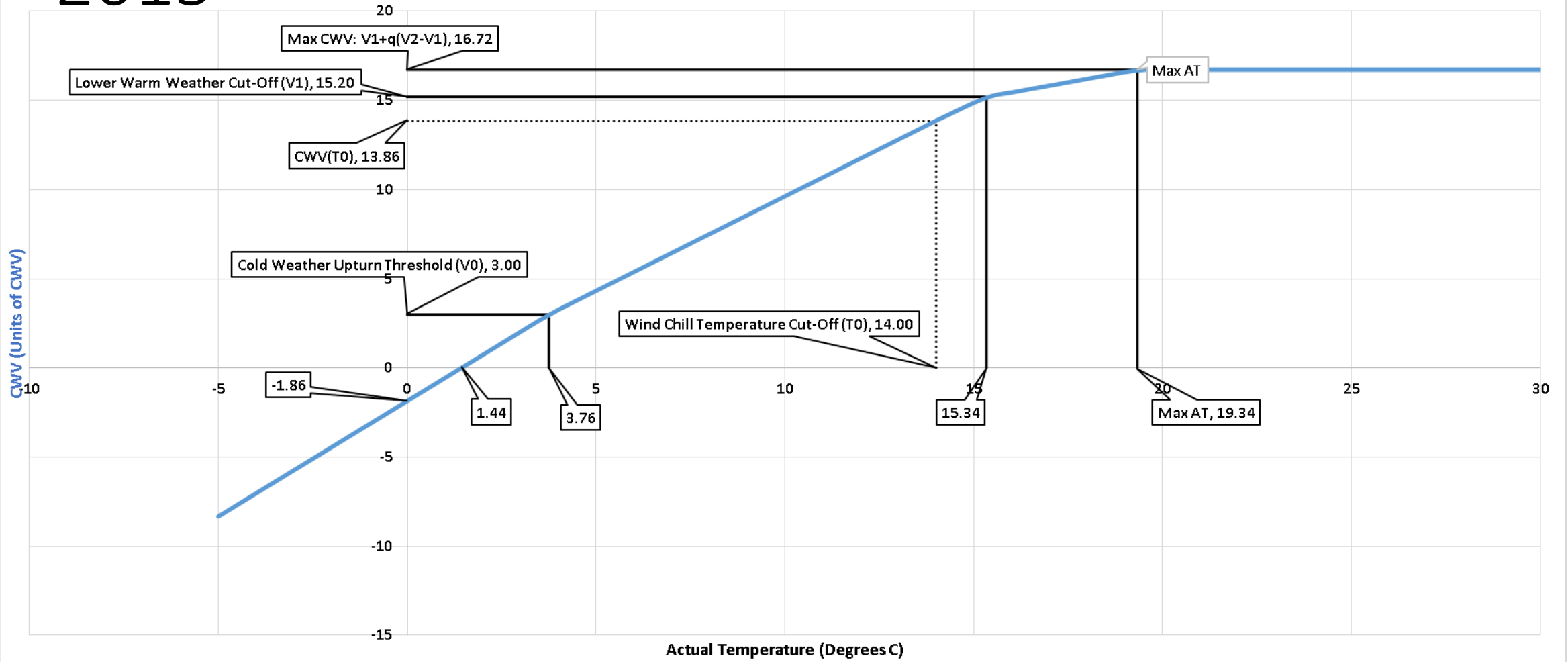
NT LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

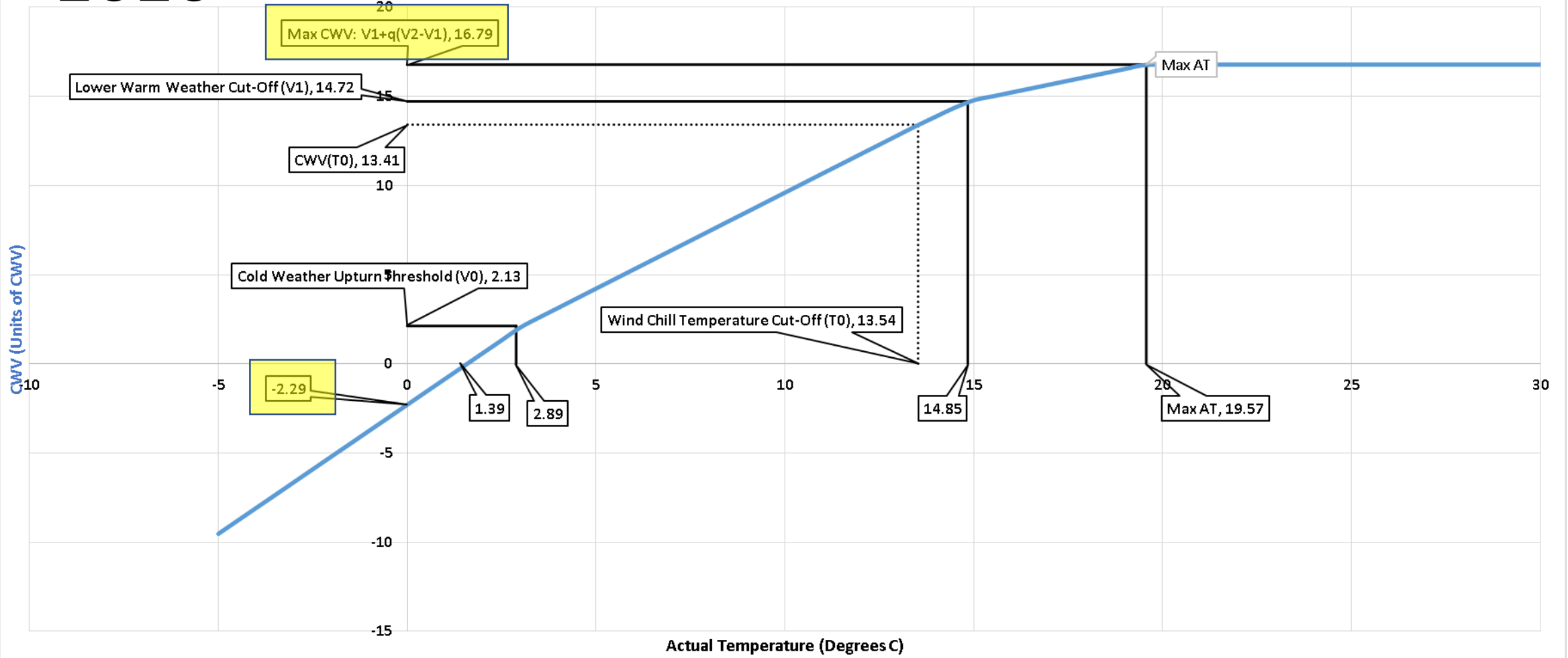
4.00



2020

Fixed Wind Speed

4.00



Results: LDZ NW

- Missing temperature and windspeed data for 01/10/2012 to 24/09/2013. Due 13th May 2019

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500		
Effective Temperature Weight (I1)	0.697		
Wind Chill Weight (I2)	0.0149		
Cold Weather Sensitivity (I3)	0.3		
Cold Weather Upturn Threshold (V0)	3		
Lower Warm Weather Cut-Off (V1)	14.9		
Upper Warm Weather Cut-Off (V2)	18		
Slope Relating to Warm Weather Cut-Off (q)	0.38		
Wind Chill Wind Cut-Off (W0)	0		
Wind Chill Temperature Cut-Off (T0)	14		
R2			

For results due 13th may

For results due 13th may

2015

For results due 13th may

2020



For results due 13th may



Results: LDZ SC

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.485	
Effective Temperature Weight (I1)	0.635	0.658	
Wind Chill Weight (I2)	0.0119	0.012	
Cold Weather Sensitivity (I3)	0.15	0.208	
Cold Weather Upturn Threshold (V0)	3	2.275	
Lower Warm Weather Cut-Off (V1)	12.2	12.653	
Upper Warm Weather Cut-Off (V2)	16	16.327	
Slope Relating to Warm Weather Cut-Off (q)	0.64	0.599	
Wind Chill Wind Cut-Off (W0)	0	1.345	
Wind Chill Temperature Cut-Off (T0)	14	15.411	
R2	0.9887	0.9886	

LDZ	Station
SC	Glasgow Bishopton

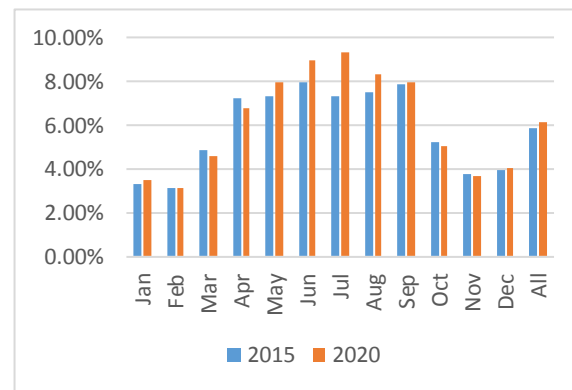
Gas Years	2010/11 to 2017/18
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Parameters	Avg. Mean Abs. %Error
2015	5.83%
2020	6.14%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9887	7624	
0.9886	7704	

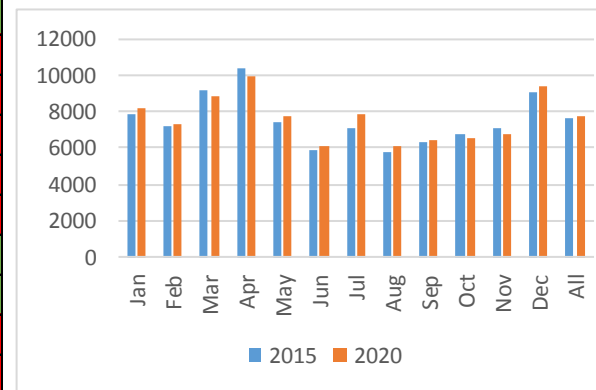
Month	2015	2020
Jan	3.33%	3.45%
Feb	3.13%	3.16%
Mar	4.83%	4.63%
Apr	7.20%	6.80%
May	7.36%	7.96%
Jun	8.01%	8.94%
Jul	7.37%	9.33%
Aug	7.52%	8.35%
Sep	7.91%	7.93%
Oct	5.22%	5.01%
Nov	3.80%	3.64%
Dec	3.97%	4.06%
All	5.83%	6.14%

MAPE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	3.49%	6.45%	7.70%	5.64%
2020	3.57%	6.46%	8.96%	5.53%

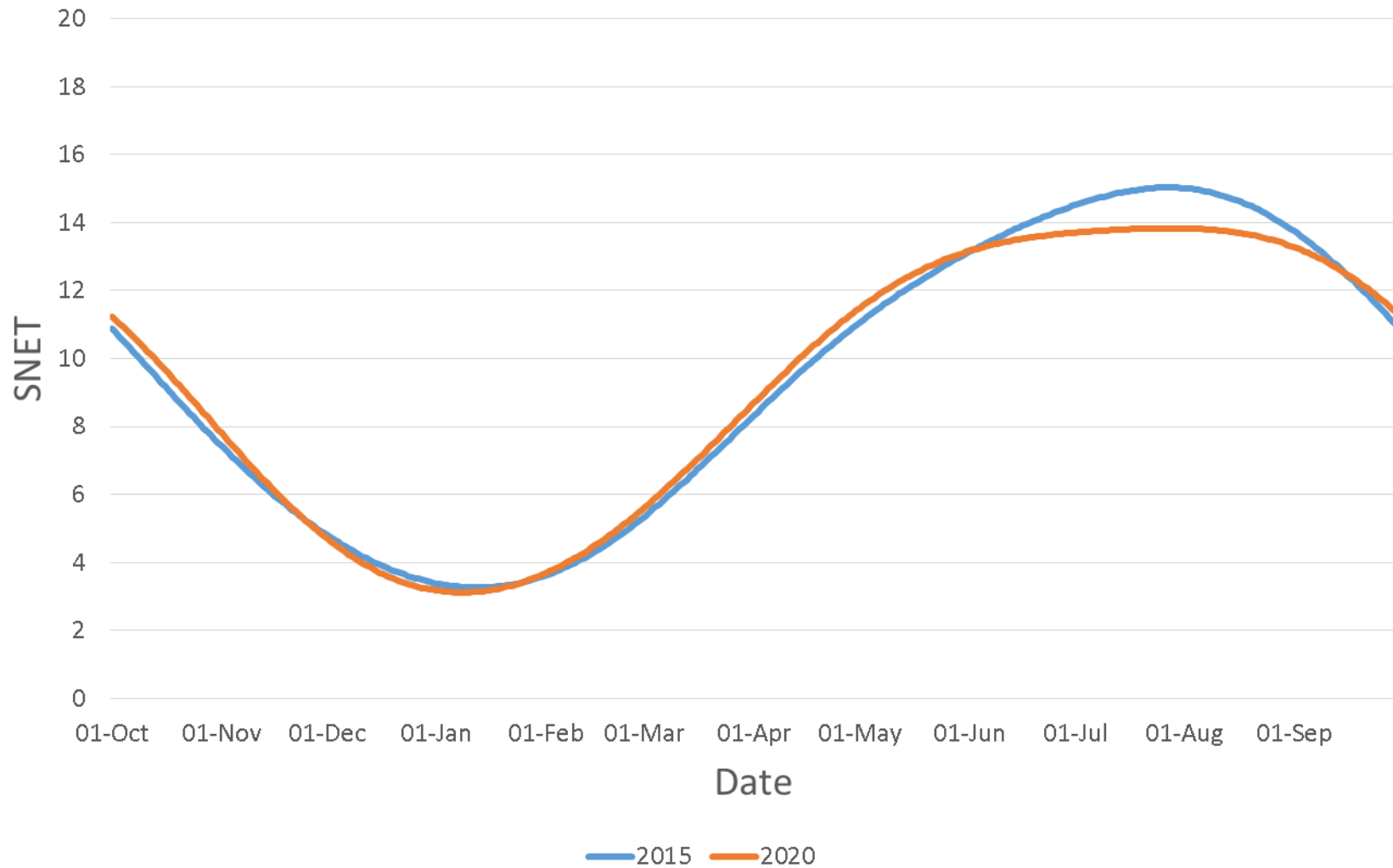


Month	2015	2020
Jan	7874	8148
Feb	7188	7305
Mar	9211	8891
Apr	10321	9914
May	7400	7709
Jun	5886	6151
Jul	7138	7886
Aug	5754	6110
Sep	6370	6403
Oct	6778	6545
Nov	7093	6803
Dec	9028	9333
All	7624	7704

RMSE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	8142	9043	6295	6574
2020	8391	8872	6773	6585



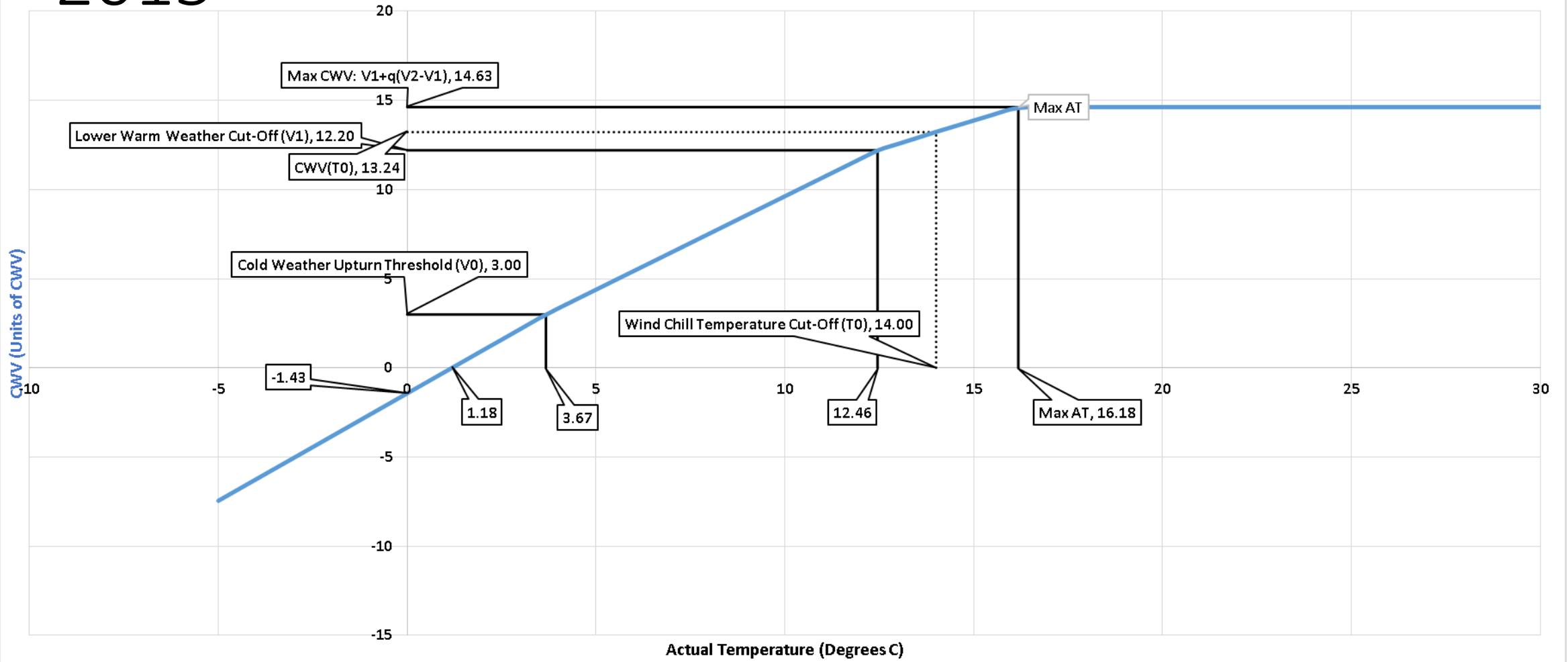
SC LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

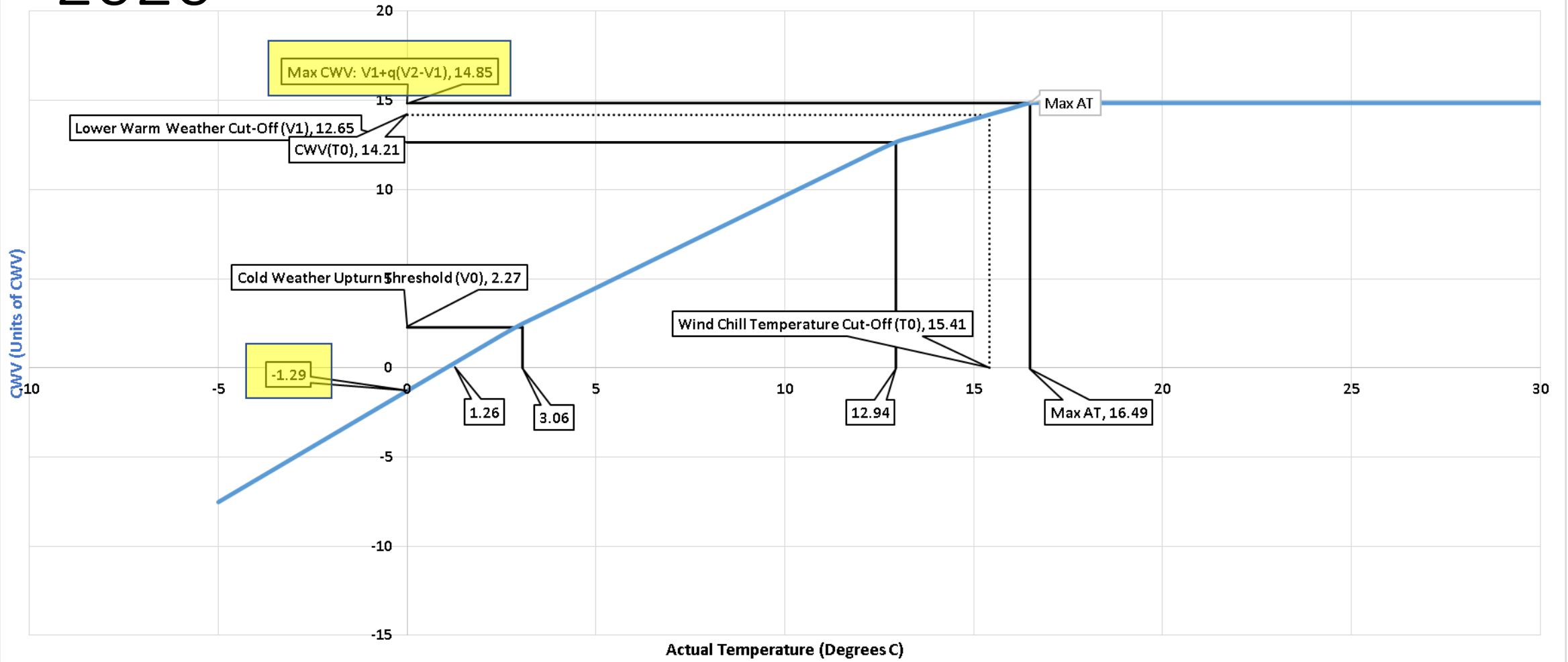
4.00



2020

Fixed Wind Speed

4.00



Results: LDZ SE

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.483	
Effective Temperature Weight (I1)	0.712	0.727	
Wind Chill Weight (I2)	0.014	0.014	
Cold Weather Sensitivity (I3)	0.33	0.325	
Cold Weather Upturn Threshold (V0)	3	2.541	
Lower Warm Weather Cut-Off (V1)	15.1	14.106	
Upper Warm Weather Cut-Off (V2)	18.7	18.675	
Slope Relating to Warm Weather Cut-Off (q)	0.38	0.448	
Wind Chill Wind Cut-Off (W0)	0	-0.511	
Wind Chill Temperature Cut-Off (T0)	14	13.985	
R2	0.9914	0.9915	

LDZ	Station
SE	Heathrow

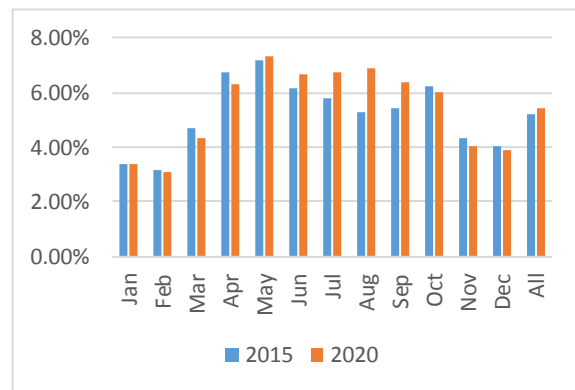
Gas Years	2010/11 to 2017/18
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Parameters	Avg. Mean Abs. %Error
2015	5.20%
2020	5.44%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9914	8184	
0.9915	8049	

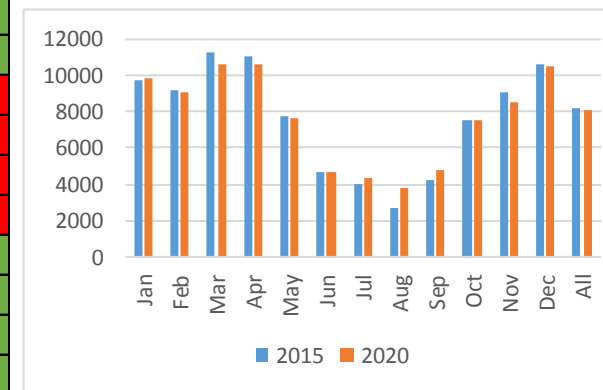
Month	2015	2020
Jan	3.39%	3.41%
Feb	3.17%	3.11%
Mar	4.66%	4.30%
Apr	6.71%	6.31%
May	7.16%	7.30%
Jun	6.18%	6.65%
Jul	5.76%	6.73%
Aug	5.24%	6.88%
Sep	5.43%	6.40%
Oct	6.19%	6.03%
Nov	4.34%	4.01%
Dec	4.02%	3.90%
All	5.20%	5.44%

MAPE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	3.54%	6.17%	5.73%	5.33%
2020	3.49%	5.97%	6.77%	5.48%

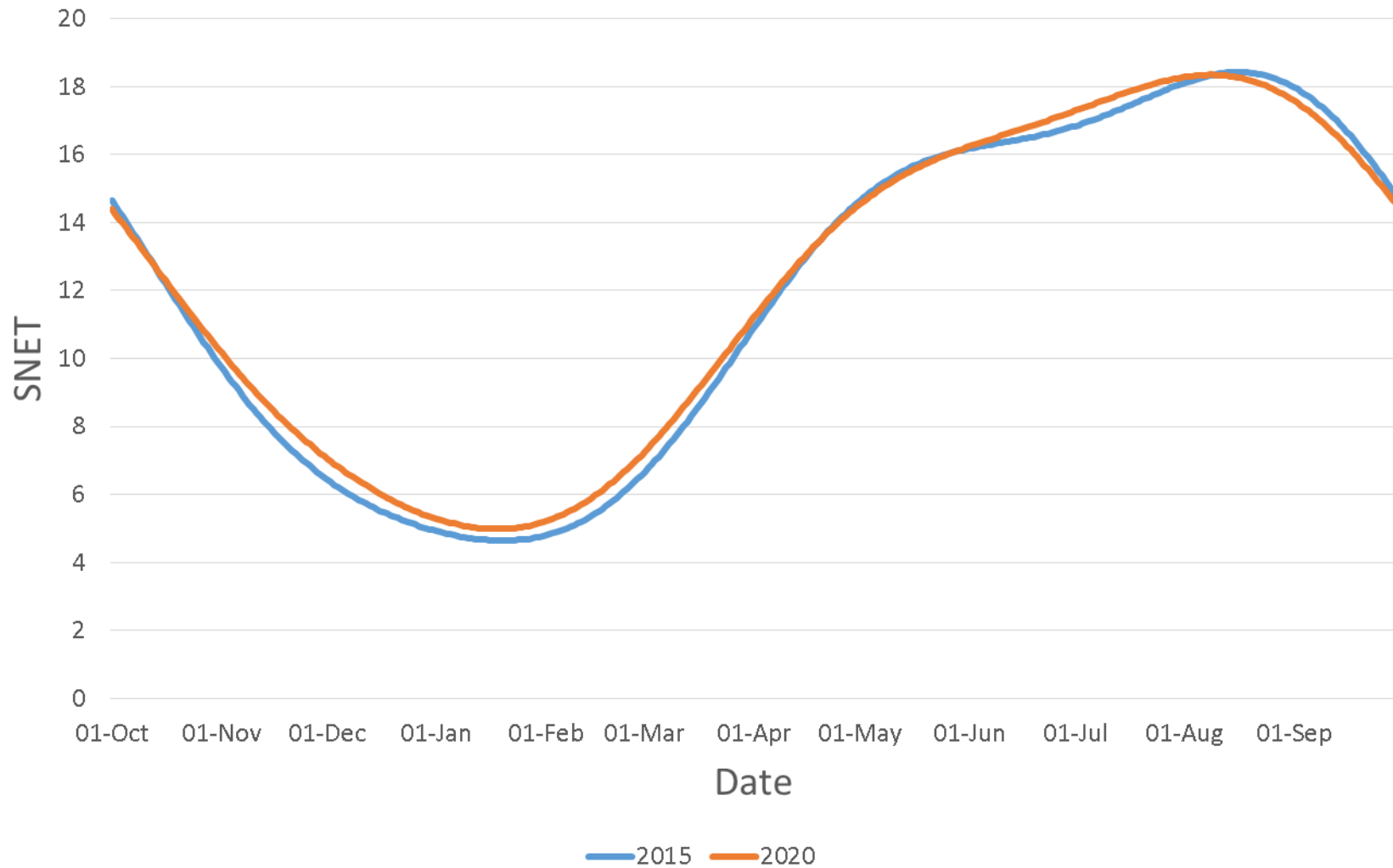


Month	2015	2020
Jan	9724	9798
Feb	9204	9092
Mar	11262	10565
Apr	11040	10574
May	7750	7676
Jun	4680	4714
Jul	4021	4369
Aug	2738	3747
Sep	4238	4750
Oct	7559	7511
Nov	9099	8546
Dec	10638	10481
All	8184	8049

RMSE				
Year	Season			
	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
2015	10034	10135	3888	7015
2020	9978	9691	4290	7123



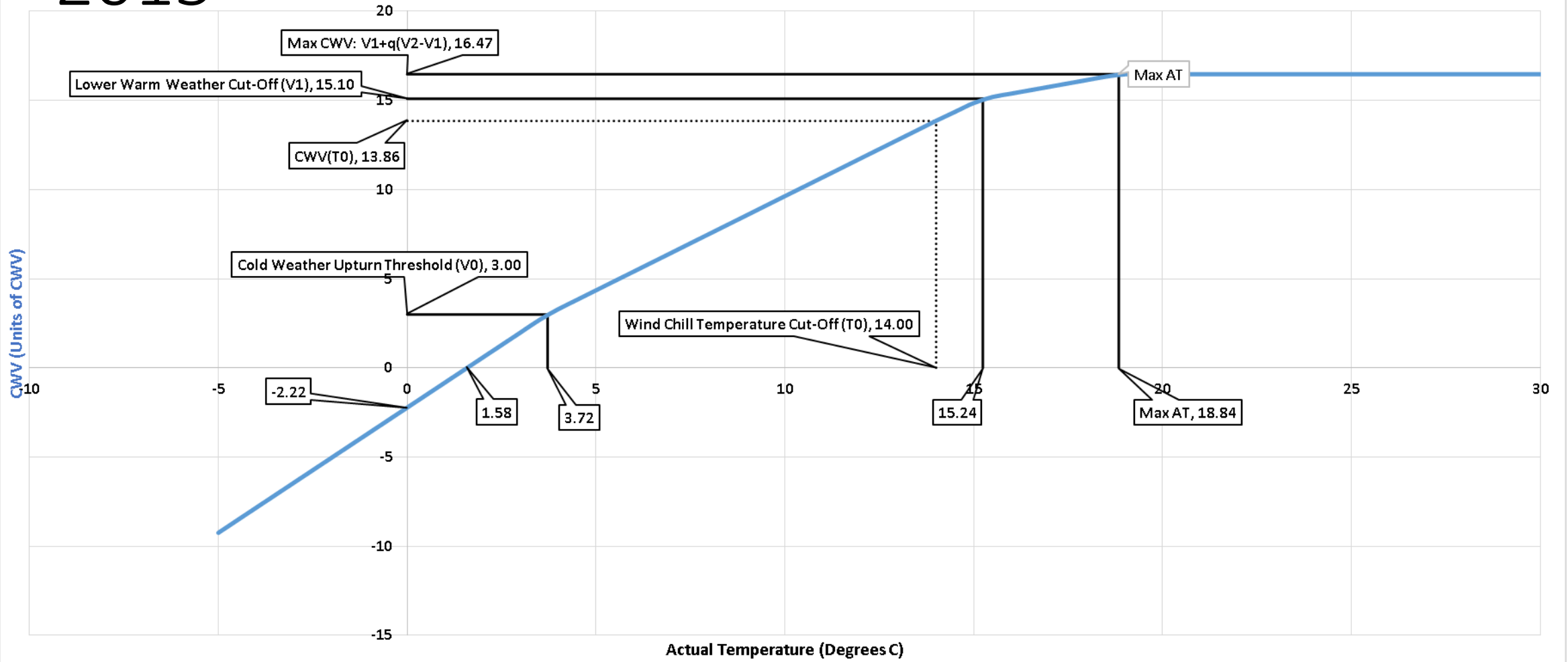
SE LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

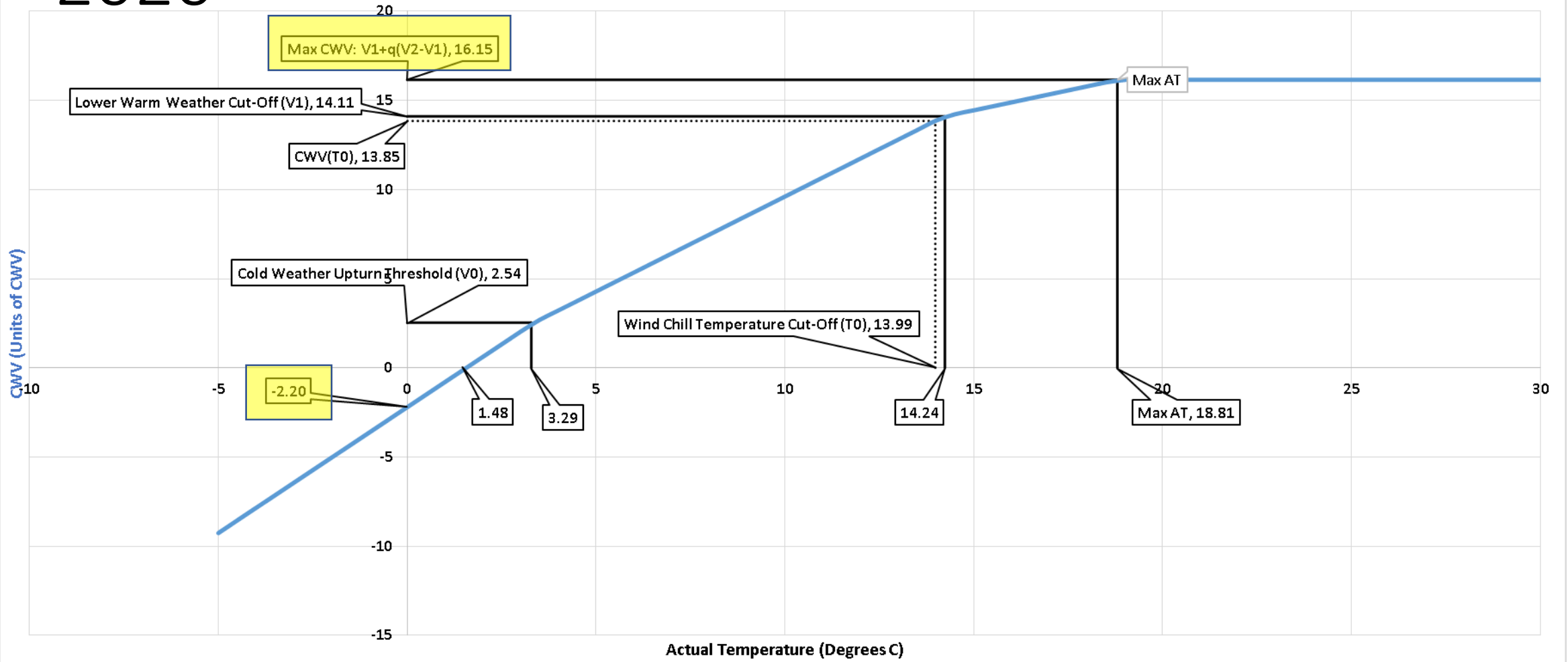
— 4.00



2020

Fixed Wind Speed

4.00



Results: LDZ SO

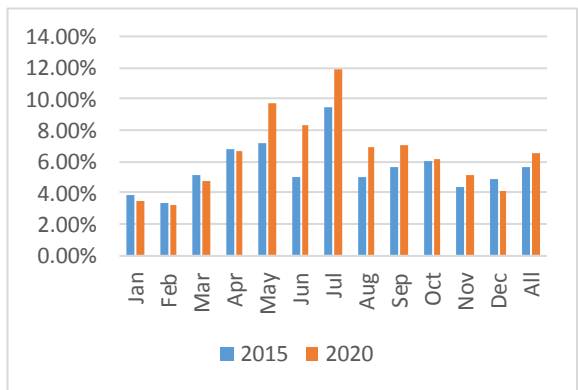
Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.430	
Effective Temperature Weight (I1)	0.72	0.728	
Wind Chill Weight (I2)	0.0134	0.013	
Cold Weather Sensitivity (I3)	0.24	0.241	
Cold Weather Upturn Threshold (V0)	3	2.853	
Lower Warm Weather Cut-Off (V1)	14.8	12.210	
Upper Warm Weather Cut-Off (V2)	18.2	17.600	
Slope Relating to Warm Weather Cut-Off (q)	0.37	0.603	
Wind Chill Wind Cut-Off (W0)	0	-1.309	
Wind Chill Temperature Cut-Off (T0)	14	14.696	
R2	0.9916	0.9908	

LDZ	Station	Gas Years	2010/11 to 2017/18
SO	Southampton Oceanographic Ce		

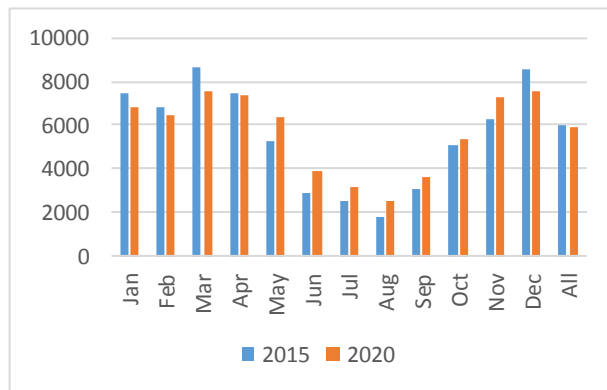
Parameters	Avg. Mean Abs. %Error
2015	5.60%
2020	6.51%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9916	5956	
0.9908	5939	

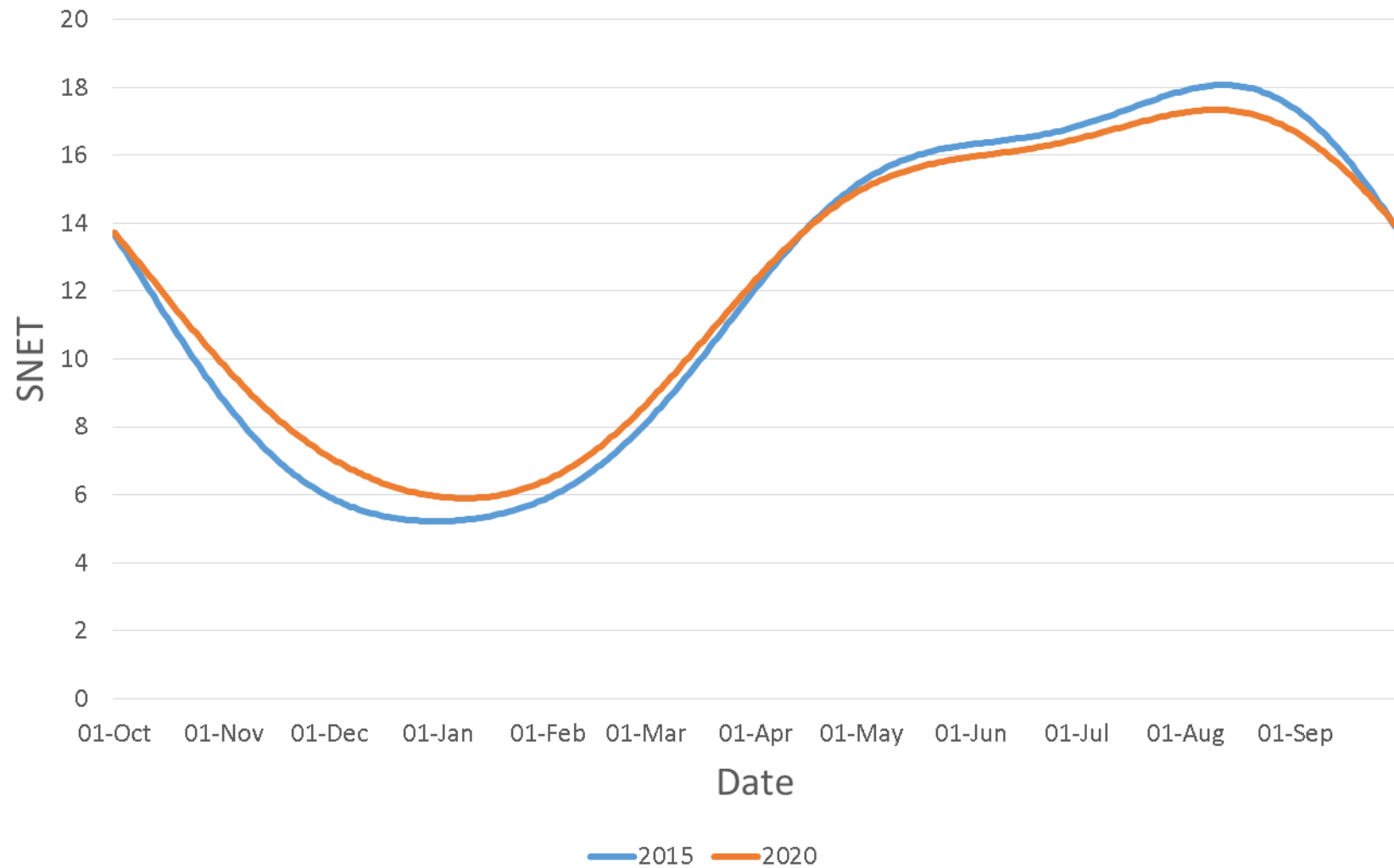
Month	2015	2020	MAPE				
			Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.83%	3.42%	2015	4.07%	6.40%	6.50%	5.37%
Feb	3.42%	3.26%	2020	3.63%	7.10%	9.09%	6.16%
Mar	5.20%	4.81%					
Apr	6.85%	6.72%					
May	7.17%	9.76%					
Jun	5.06%	8.39%					
Jul	9.44%	11.87%					
Aug	4.96%	6.97%					
Sep	5.60%	7.08%					
Oct	6.08%	6.19%					
Nov	4.41%	5.20%					
Dec	4.91%	4.17%					
All	5.60%	6.51%					



Month	2015	2020	RMSE				
			Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	7452	6847	2015	7733	7247	2436	5498
Feb	6858	6455	2020	7016	7110	3235	5614
Mar	8618	7528					
Apr	7482	7385					
May	5236	6368					
Jun	2864	3899					
Jul	2553	3148					
Aug	1777	2538					
Sep	3031	3619					
Oct	5087	5324					
Nov	6235	7296					
Dec	8587	7557					
All	5956	5939					



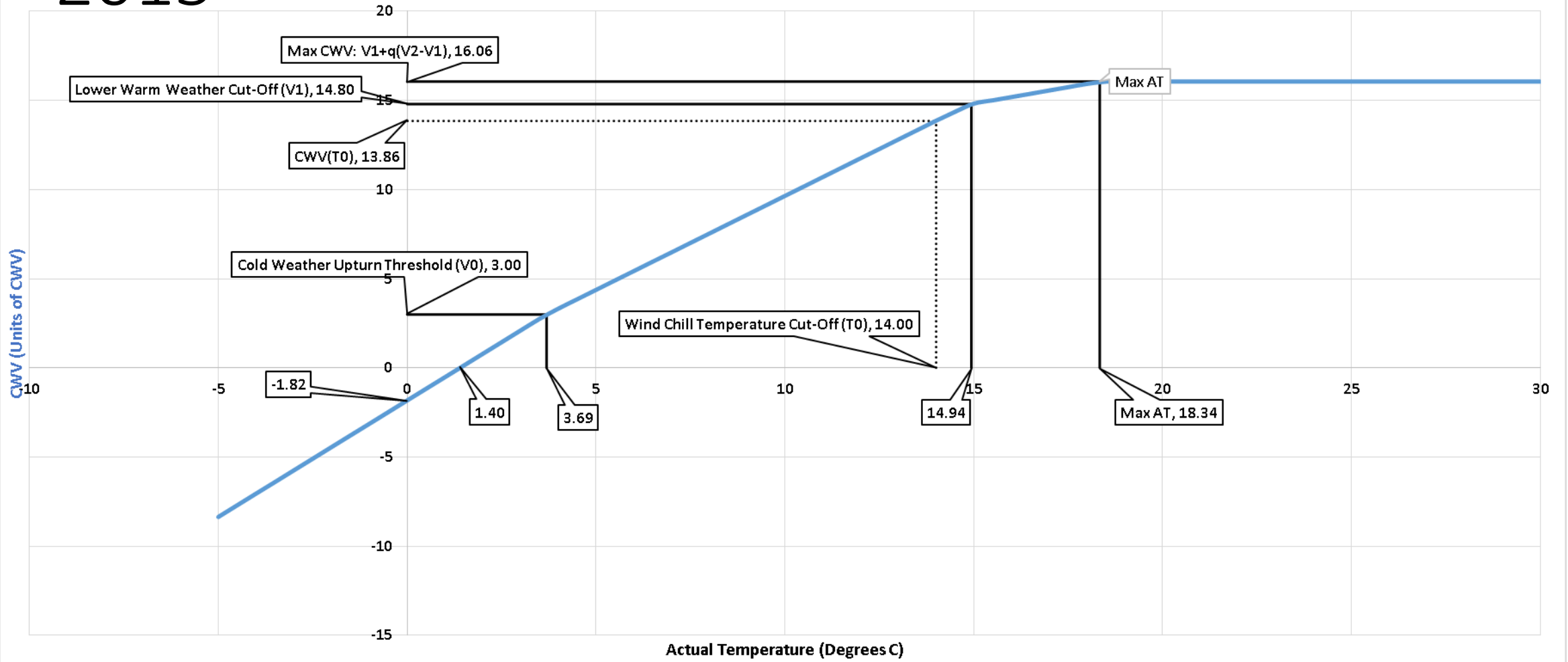
SO LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

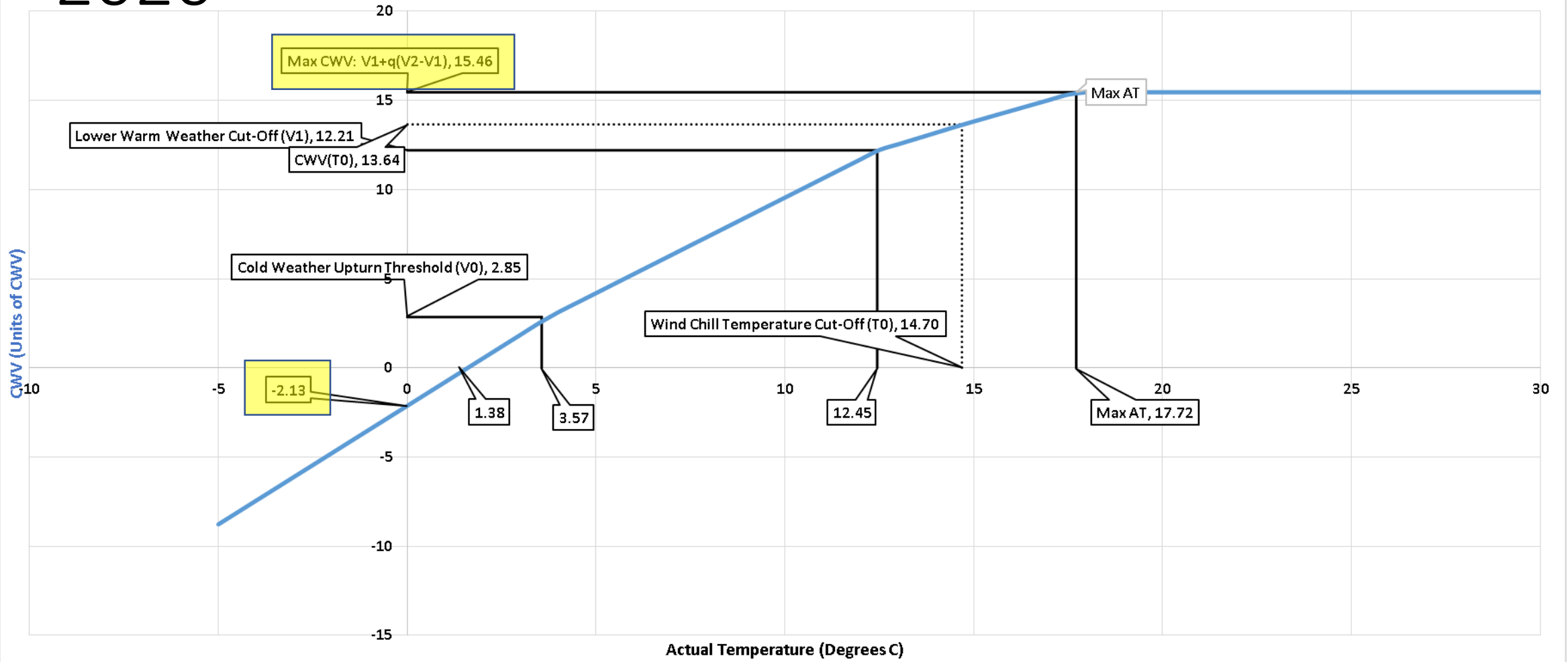
4.00



2020

Fixed Wind Speed

4.00



Results: LDZ SW – Due 13th May 2019 needs to be Yeovilton

Parameter	2015	2020	Comments
Effective Temperature/AT Weight			
Effective Temperature Weight (I1)			
Wind Chill Weight (I2)			
Cold Weather Sensitivity (I3)			
Cold Weather Upturn Threshold (V0)			
Lower Warm Weather Cut-Off (V1)			
Upper Warm Weather Cut-Off (V2)			
Slope Relating to Warm Weather Cut-Off (q)			
Wind Chill Wind Cut-Off (W0)			
Wind Chill Temperature Cut-Off (T0)			
R2			

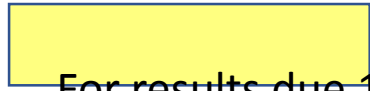
For results due 13th may

For results due 13th may

2015

For results due 13th may

2020



For results due 13th may



Results: LDZ WM

- MISSING WIND ALL YEARS

TEMPERATURE 01/10/2010 - 28/02/2011 & 18/10/2012 - 09/11/2012. Due 13th May 2019 – using Coleshill Windspeed.

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500		
Effective Temperature Weight (I1)	0.72		
Wind Chill Weight (I2)	0.0111		
Cold Weather Sensitivity (I3)	0.14		
Cold Weather Upturn Threshold (V0)	3		
Lower Warm Weather Cut-Off (V1)	13.7		
Upper Warm Weather Cut-Off (V2)	17.2		
Slope Relating to Warm Weather Cut-Off (q)	0.43		
Wind Chill Wind Cut-Off (W0)	0		
Wind Chill Temperature Cut-Off (T0)	14		
R2			

For results due 13th may

For results due 13th may

2015

For results due 13th may

2020



For results due 13th may



Results: LDZ WN

- Missing temperature and windspeed data for 01/10/2012 to 24/09/2013

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500		
Effective Temperature Weight (I1)	0.697		
Wind Chill Weight (I2)	0.0149		
Cold Weather Sensitivity (I3)	0.3		
Cold Weather Upturn Threshold (V0)	3		
Lower Warm Weather Cut-Off (V1)	14.9		
Upper Warm Weather Cut-Off (V2)	18		
Slope Relating to Warm Weather Cut-Off (q)	0.38		
Wind Chill Wind Cut-Off (W0)	0		
Wind Chill Temperature Cut-Off (T0)	14		
R2			

For results due 13th may

For results due 13th may

2015

For results due 13th may

2020



For results due 13th may



Results: LDZ WS

Parameter	2015	2020	Comments
Effective Temperature/AT Weight	0.500	0.528	
Effective Temperature Weight (I1)	0.669	0.627	
Wind Chill Weight (I2)	0.0101	0.011	
Cold Weather Sensitivity (I3)	0.11	0.182	
Cold Weather Upturn Threshold (V0)	3	0.843	
Lower Warm Weather Cut-Off (V1)	14.8	13.680	
Upper Warm Weather Cut-Off (V2)	17.9	18.525	
Slope Relating to Warm Weather Cut-Off (q)	0.46	0.518	
Wind Chill Wind Cut-Off (W0)	0	1.453	
Wind Chill Temperature Cut-Off (T0)	14	13.980	
R2	0.9825	0.9829	

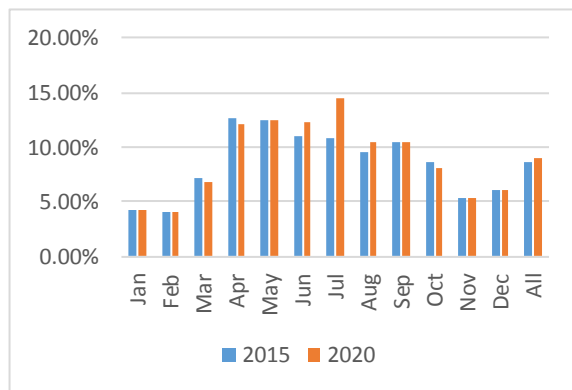
LDZ	Station
WS	St Athan

Gas Years	2010/11 to 2017/18
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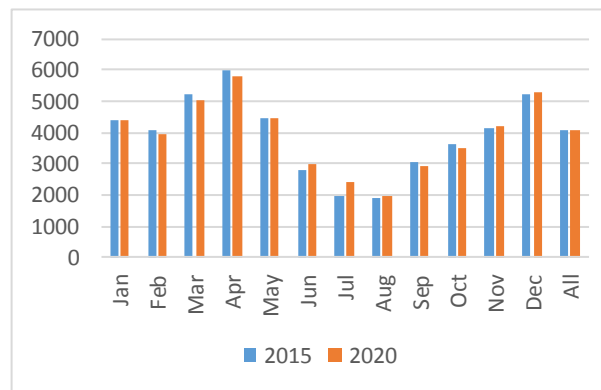
Parameters	Avg. Mean Abs. %Error
2015	8.56%
2020	8.92%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9825	4097	
0.9829	4064	

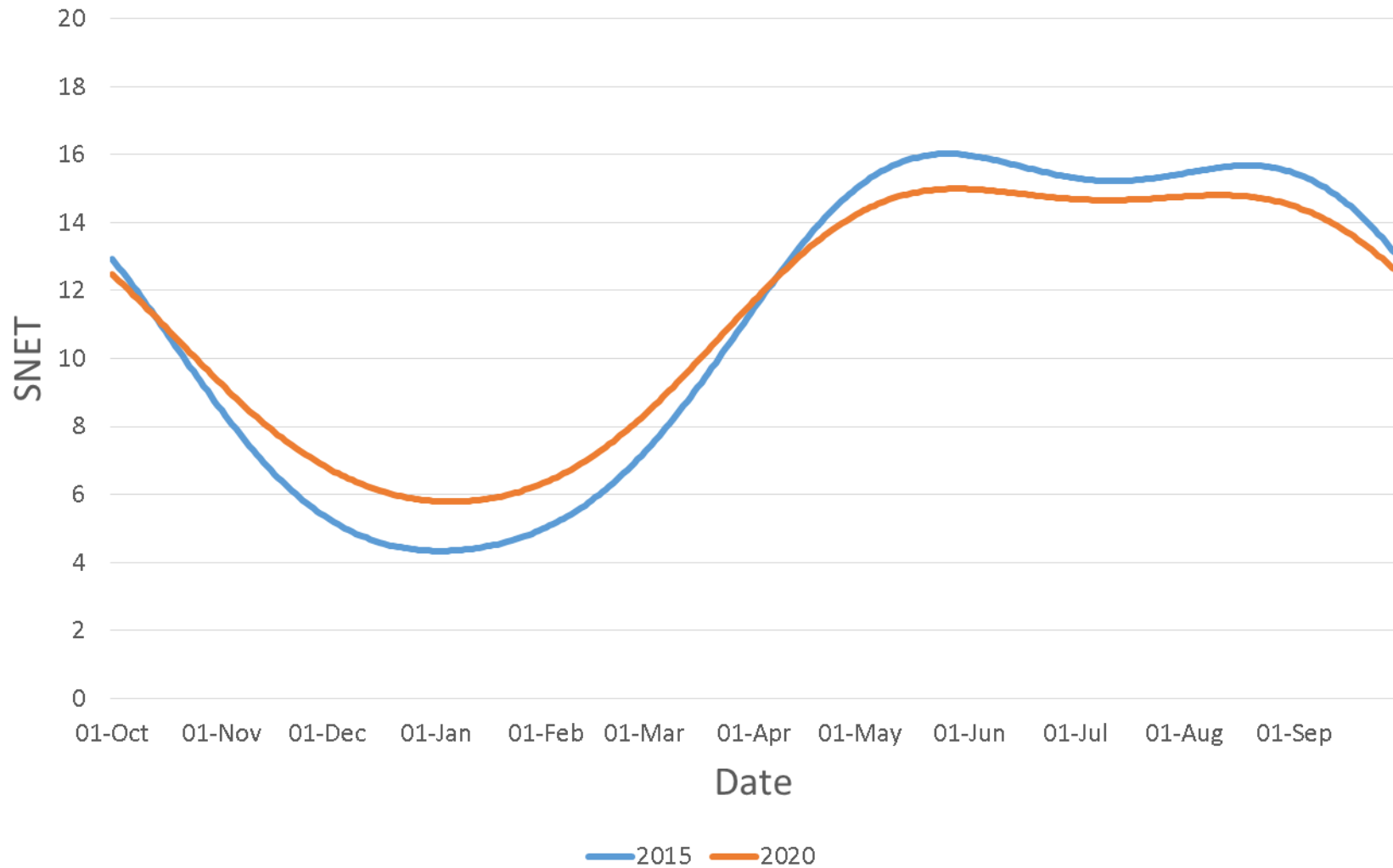
Month	2015	2020	MAPE				
			Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	4.27%	4.27%	2015	4.84%	10.74%	10.43%	8.15%
Feb	4.10%	4.08%	2020	4.82%	10.40%	12.38%	8.00%
Mar	7.11%	6.76%					
Apr	12.67%	12.05%					
May	12.50%	12.43%					
Jun	10.95%	12.33%					
Jul	10.77%	14.44%					
Aug	9.58%	10.36%					
Sep	10.39%	10.46%					
Oct	8.61%	8.17%					
Nov	5.42%	5.38%					
Dec	6.06%	6.05%					
All	8.56%	8.92%					



Month	2015	2020	RMSE				
			Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	4385	4372	2015	4681	5270	2252	3610
Feb	4050	3951	2020	4657	5112	2499	3577
Mar	5240	5045					
Apr	6005	5781					
May	4482	4444					
Jun	2816	3012					
Jul	1962	2438					
Aug	1880	1953					
Sep	3059	2938					
Oct	3628	3508					
Nov	4156	4179					
Dec	5210	5253					
All	4097	4064					



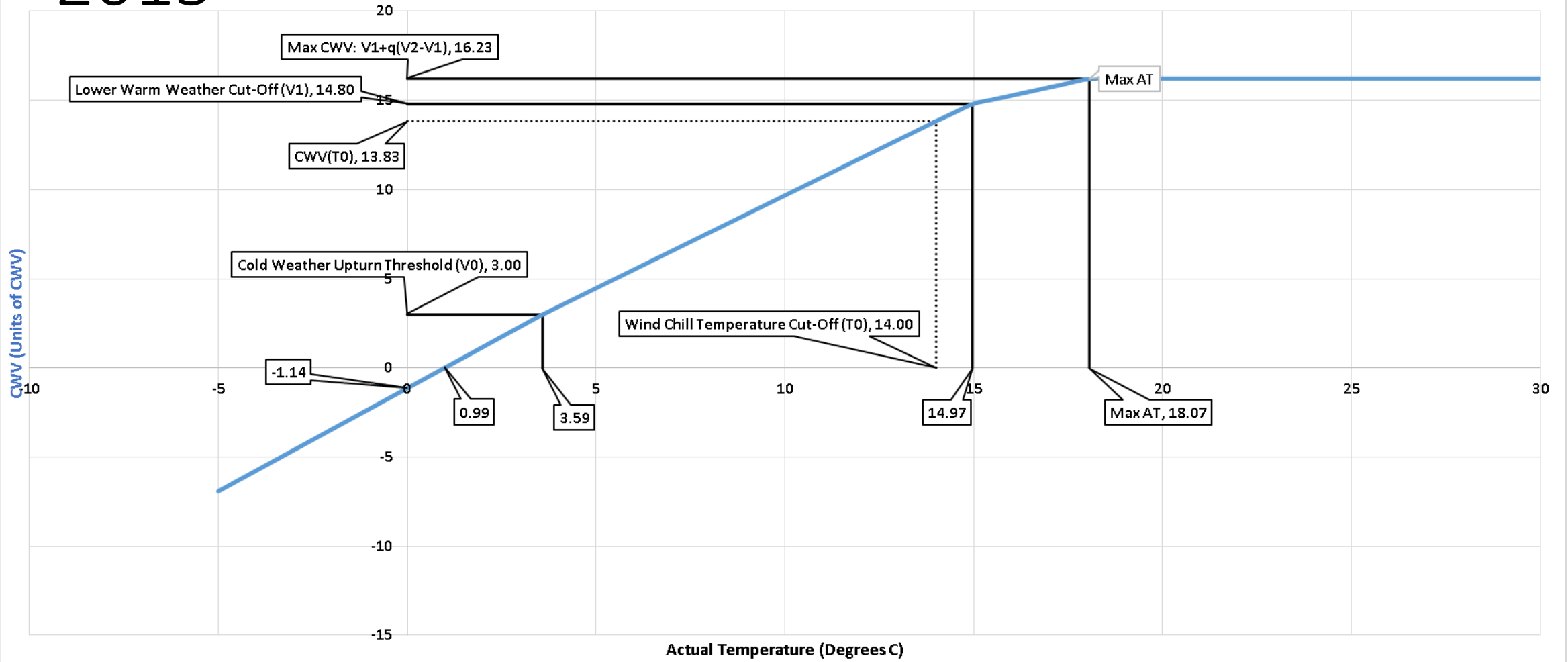
WS LDZ Pseudo SNET Profiles



2015

Fixed Wind Speed

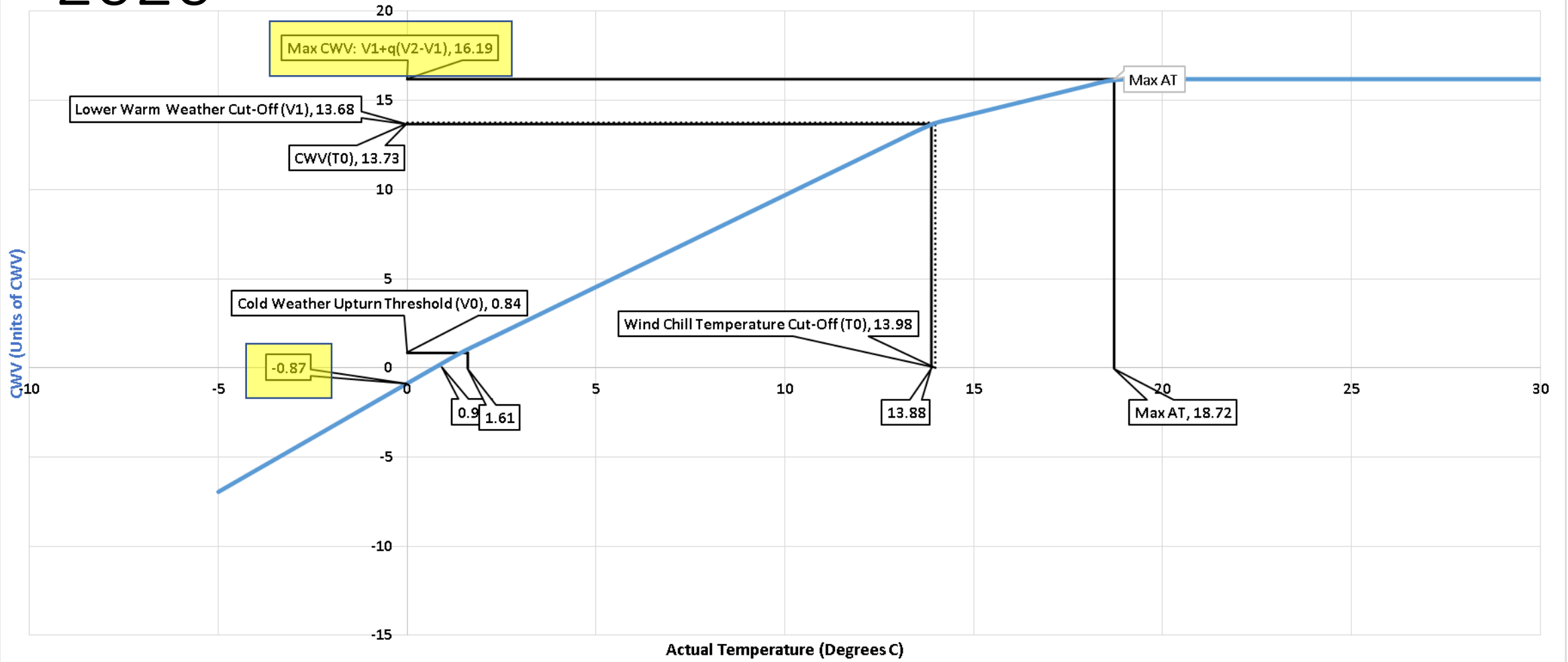
4.00



2020

Fixed Wind Speed

4.00



Parameter Interpretations

Parameter	Interpretations
Effective Temperature/AT Weight (ET calculation)	Determines the combination of AT/ET used in the SNET calculation and how much of yesterday ET is used for today's ET
Effective Temperature Weight (I1)	What proportion of <u>SNET</u> is included in SNET Term (≈ 0.3)
Wind Chill Weight (I2)	In combination with W0 & T0 calculates WCT – gives a colder CWV where AT is less than T0
Cold Weather Sensitivity (I3)	CWV Cold: Determines when cold weather upturn is applied.
Cold Weather Upturn Threshold (V0)	
Lower Warm Weather Cut-Off (V1)	CWV Transition : Attempts to model a lower demand response as temperature increase. These in combination determines Max CWV
Upper Warm Weather Cut-Off (V2)	
Slope Relating to Warm Weather Cut-Off (q)	
Wind Chill Wind Cut-Off (W0)	determines at what speed wind (DWS) produces a wind chill effect
Wind Chill Temperature Cut-Off (T0)	values of temperature (AT) when wind chill is applied

LDZ/Weather Stations

LDZ	Weather Station
EA	Heathrow
EM	Watnall (Nottingham)
NE	Watnall (Nottingham)
NO	Albemarle
NT	Heathrow
NW	Manchester Rostherne
SC	Glasgow Bishopton
SE	Heathrow
SO	Southampton Oceanographic Centre
SW	Yeolvilton (from Filton)
WM	Winterbourne/Coleshill (Birmingham)
WN	Manchester Rostherne
WS	St Athan

Weather data history was complete in most LDZs, requiring minimal cleaning/filling, except for:

WM – use of Coleshill temperatures for the period 01/10/2010-28/02/2011 due to missing Winterbourne station data