Demand Estimation Sub Committee

Seasonal Normal Review 2020:

Review of Seasonal Normal Basis (SNCWV) – Part 2

9th December 2019

Objective

- At today's DESC meeting, members to consider recommendations for revised SNCWV values in order to seek approval for their use from 1st October 2020

- To support this, there are 2 presentations which cover the following:

  - Presentation 1:
    - Recap on modified CWV formula and Parameter optimisation
    - Summary of work carried out to derive new history of Actual CWVs
    - Review of 'CWV composition' in new history

  - Presentation 2:
    - Recap of approved methodology for deriving Seasonal Normal CWV
    - Overview of data used and Results
    - Conclusions and Next Steps

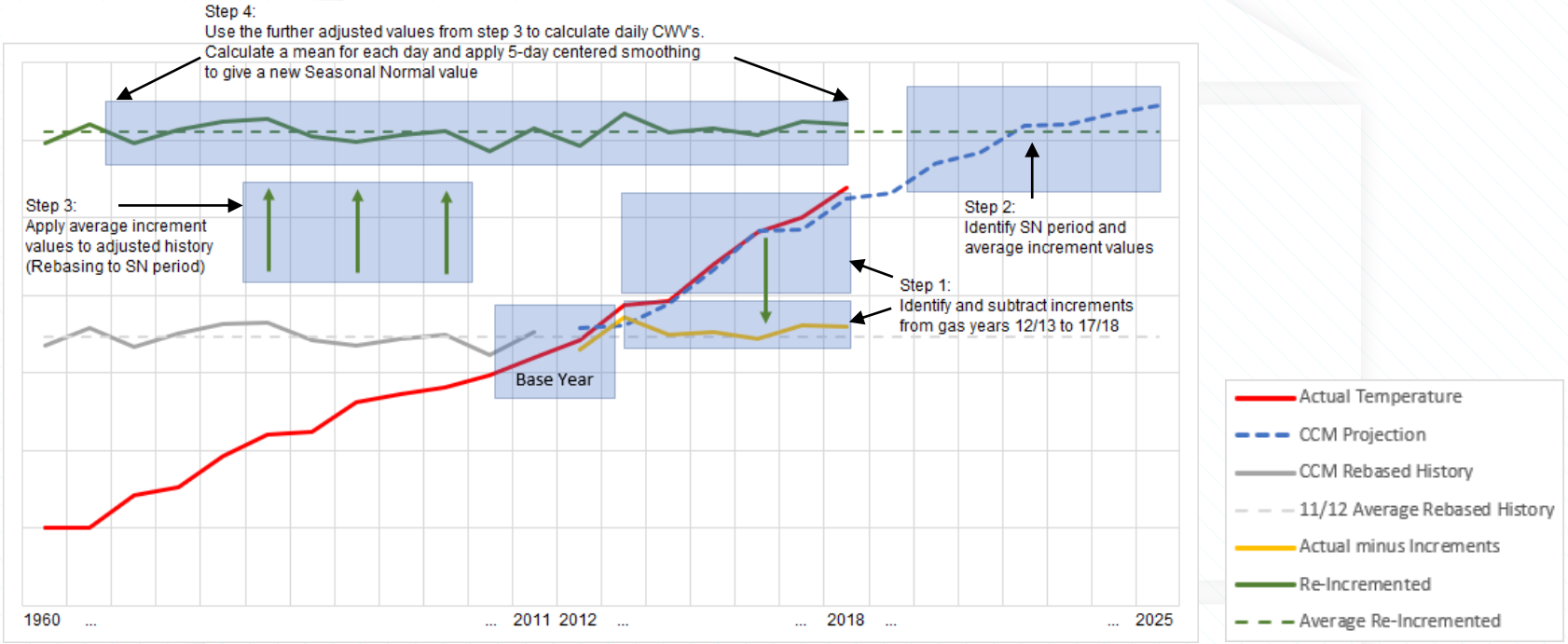
Seasonal Normal Review – Background

- A new Composite Weather Variable (CWV) formula and set of parameters have been produced and approved by DESC to be used in the calculation of the CWV as of 1st October 2020
- The new CWV formula and parameters include a Solar Radiation term, with a Precipitation term likely to follow pending further investigation
- Following the revision of the CWV formula and parameters, there is a need for a new Seasonal Normal basis to be used effective 1st October 2020
- Methodology used to calculate the Seasonal Normal basis was agreed by DESC via teleconference on 5th November 2019
- A reminder of the agreed methodology and results for individual LDZs follow

Seasonal Normal Review – Methodology

- The visual below displays the methodology for recalculating Seasonal Normal CWVs

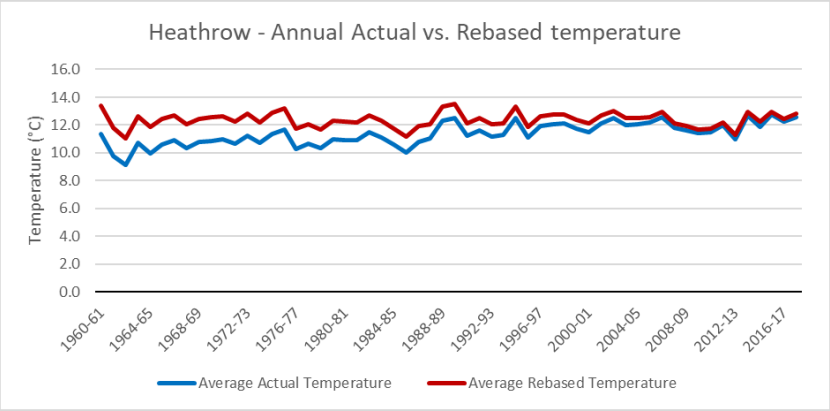
Fig 1. Not to scale, exaggerated values for illustration only

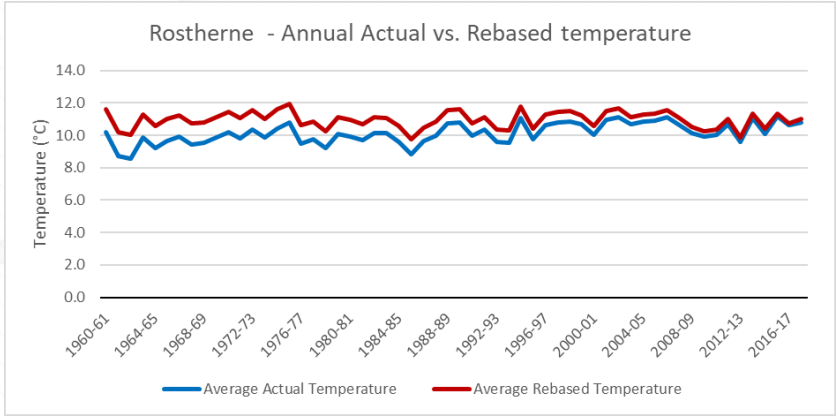


Seasonal Normal Review – Methodology

- As agreed by DESC, the calculation of the Seasonal Normal basis will broadly follow 4 steps, as below:
  - Step 1 – Rebase Gas Years 2012/13 to 2017/18 to a ‘2011/12 level’ by subtracting Climate Change Methodology (CCM) increments from Actual observed temperatures. Append to existing CCM history (1960/61 to 2011/12)
  - Step 2 – Calculate average hourly increments across period 01/10/2020 00:00 to 30/09/2025 23:00
  - Step 3 – Add the calculated hourly increments from Step 2 to the rebased temperature history obtained in Step 1
  - Step 4 – Recalculate CWV history, calculate a mean for each calendar day and smooth using a 5-day centred moving average

Seasonal Normal Review – Rebased Temperatures





- The cumulative effects of Steps 1 to 3 can be observed by comparing the average annual observed temperature (blue line) to the rebased temperature (red line), above are weather stations London Heathrow and Rostherne which cover 5 of 13 LDZ's
- Calculations to rebase Temperature histories for all Gas industry weather stations to a level which corresponds to the Seasonal Normal period (01/10/2020 to 30/09/2025) have been performed
- These rebased temperatures will form the basis of the CWV history recalculation in Step 4 of the seasonal normal methodology

Seasonal Normal Review – Explanation of Results

- To help explain some of the changes in the new Seasonal normal values, the calculation to produce SNCWVs has been performed twice; Once with the Old version of the formula and parameters, and once with the newly agreed formula and parameters

- The run of calculations using the old formula (Blue line on subsequent analysis) has been produced as an attempt to explain the differences seen in SNCWV value by breaking down the formula into its constituent elements and comparing across the two versions of the formula, using ‘like for like’ temperatures

- The run of calculation using the new formula and parameters (Red line on subsequent analysis) represents the actual values which form the new seasonal normal basis.

- By comparing these two datasets it is possible to observe the effects of changing the parameters of the CWV formula and remove any differences which would have been caused by rebasing of temperature histories.

Seasonal Normal Review – Degree Days

The results presented use “Degree Days” – an explanation is provided below:

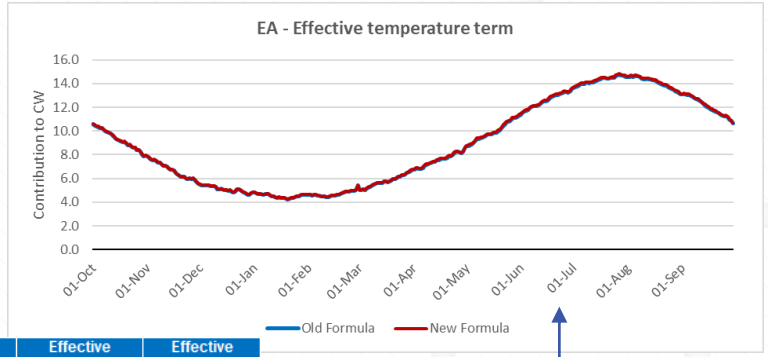
- For any gas day, in any LDZ the value of Degree Days is given by:
  Degree Days (on gas day t) = Threshold – CWV on gas day t
- Since CWV is defined in terms of their fit to aggregate NDM demand in each LDZ, the threshold value used is that applicable to aggregate NDM demand in each LDZ
- The choice of threshold ensures that degree day values are never negative
- The Degree Day thresholds applied are provided below

LDZ	EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
Degree Day Threhsold	18.7	16.8	17.0	15.9	19.5	16.9	16.8	17.7	18.0	16.6	17.0	17.5	17.0

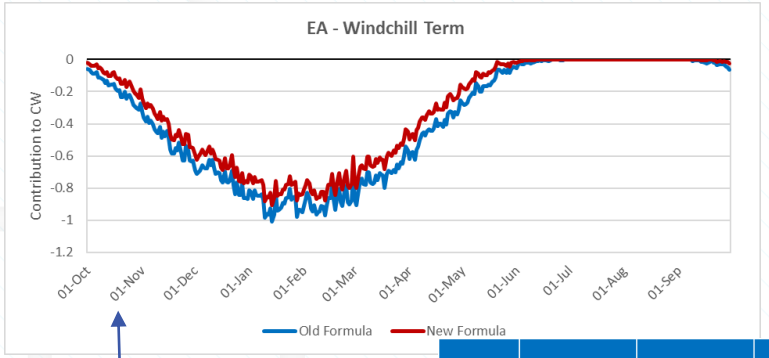
Seasonal Normal Review

Seasonal Normal Composite Weather Variable (SNCWV) for EA

Seasonal Normal Review – EA (1 of 4)

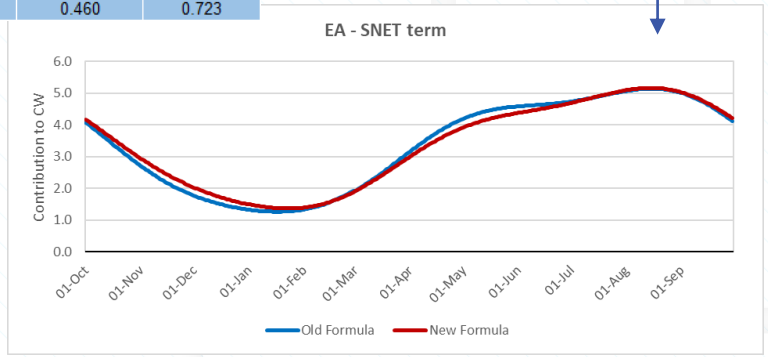


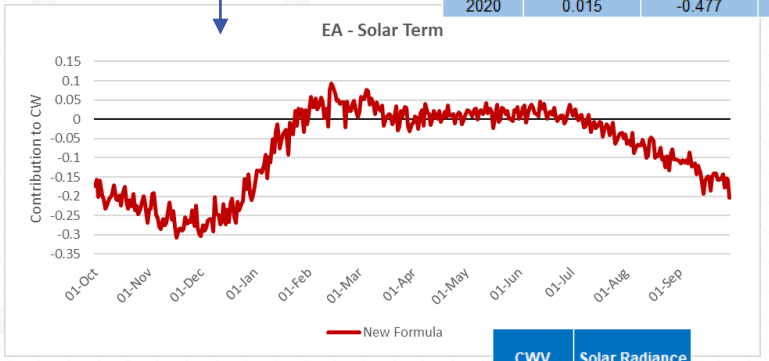
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.719
2020	0.460	0.723



CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0144	0	14
2020	0.015	-0.477	12.650

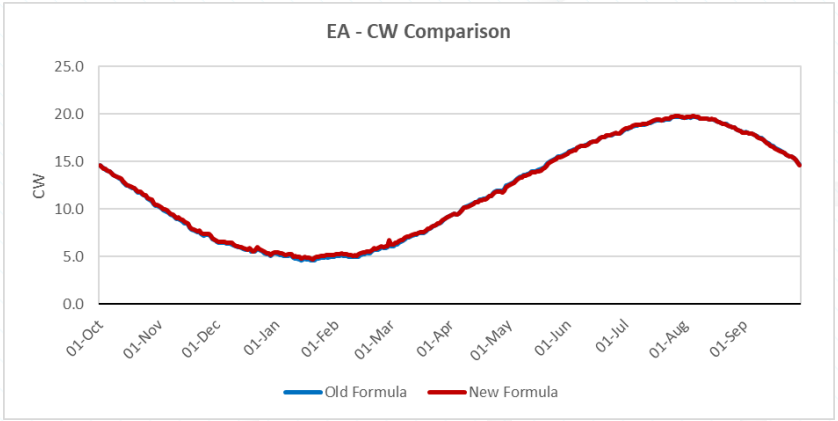
$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$

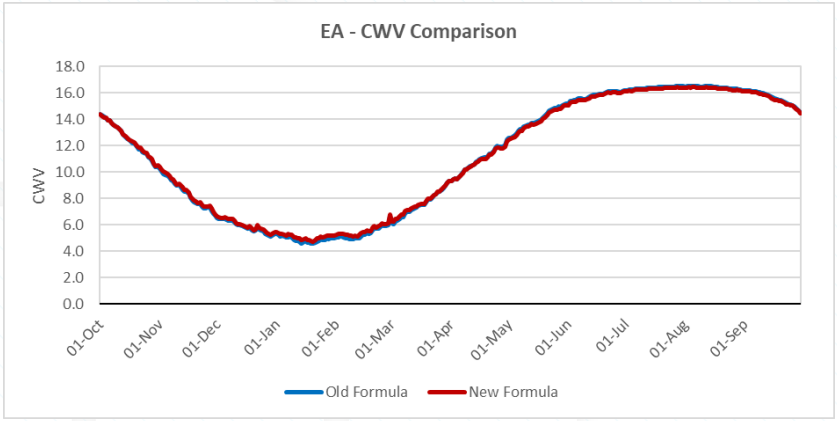




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.635

Seasonal Normal Review – EA (2 of 4)



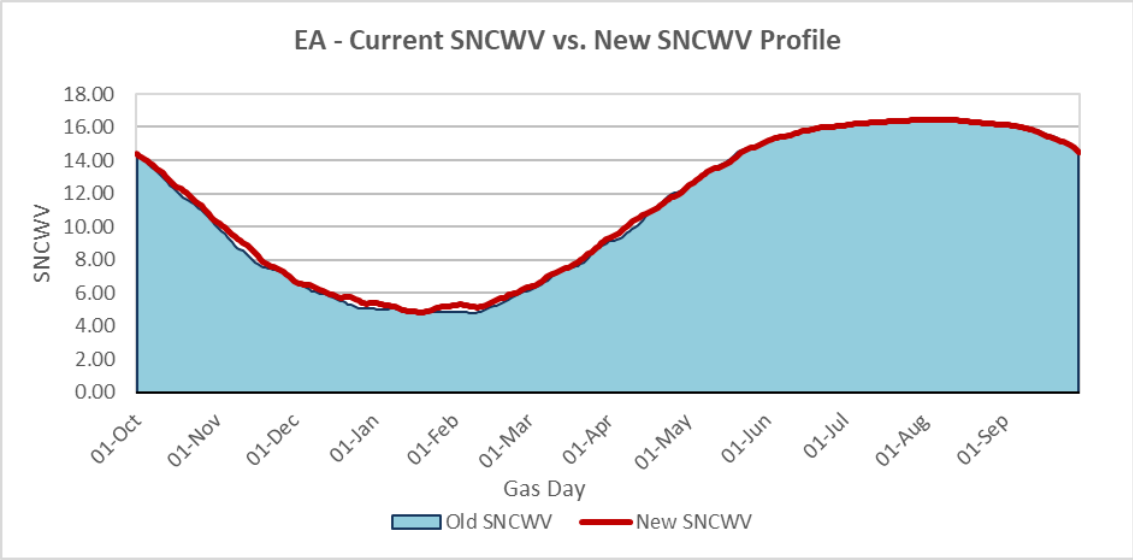


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.09	3	15.3	19.2	0.34
2020	0.109	-0.235	15.131	18.885	0.368

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	9.29%	11.40%
Transition	24.63%	22.96%
Normal	61.50%	65.21%
Cold weather upturn	4.58%	0.42%

- Following a reduction in the Warm weather cut-offs, V1 and V2, an additional 2.11% of gas days fall within the summer cut-off phase
- A reduction in the cold weather upturn threshold (V0) has lead to a reduction in the amount of days within this phase

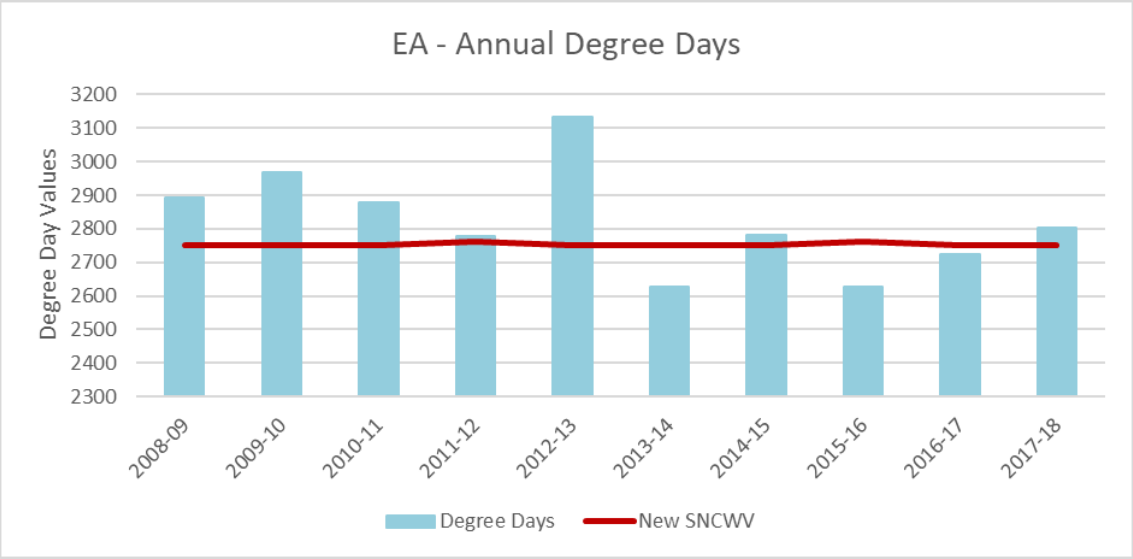
Seasonal Normal Review – EA (3 of 4)



Overall % Change from Current SNCWV		
Annual	1.05%	Increase
Dec to Feb	4.64%	Increase
Mar to May	0.71%	Increase
Jun to Aug	-0.17%	Decrease
Sep to Nov	1.45%	Increase

- The value of LDZ EA's SNCWV has shown a 1.05% increase from the old to the new basis.
- A slight decrease of 0.17% can be observed in the summer months (June to August), all other seasons show an increase.

Seasonal Normal Review – EA (4 of 4)



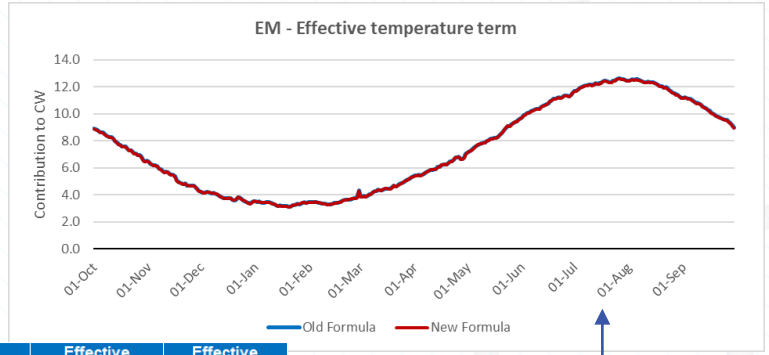
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 3 of the 10 most recent gas years were warmer than the new SNCWV basis.

Seasonal Normal Review

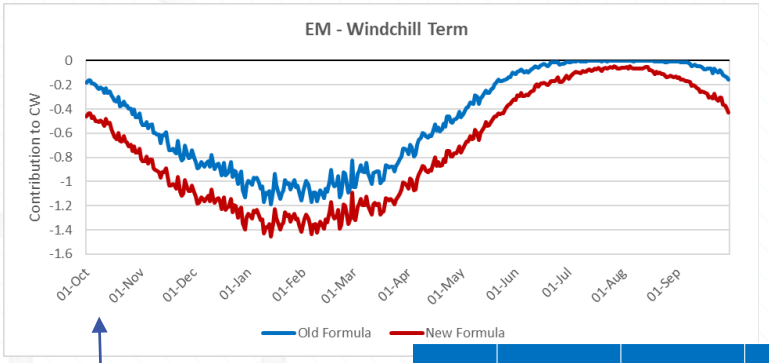
Seasonal Normal Composite Weather Variable (SNCWV) for EM

Seasonal Normal Review – EM (1 of 4)

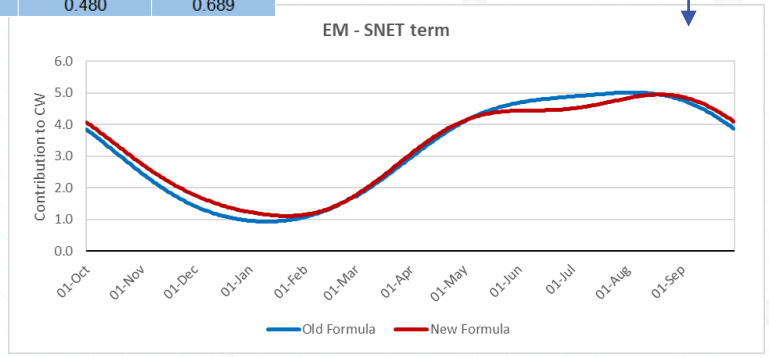


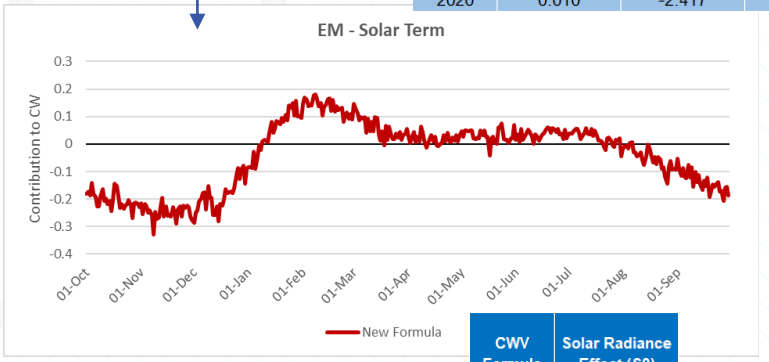
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.691
2020	0.480	0.689

$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$



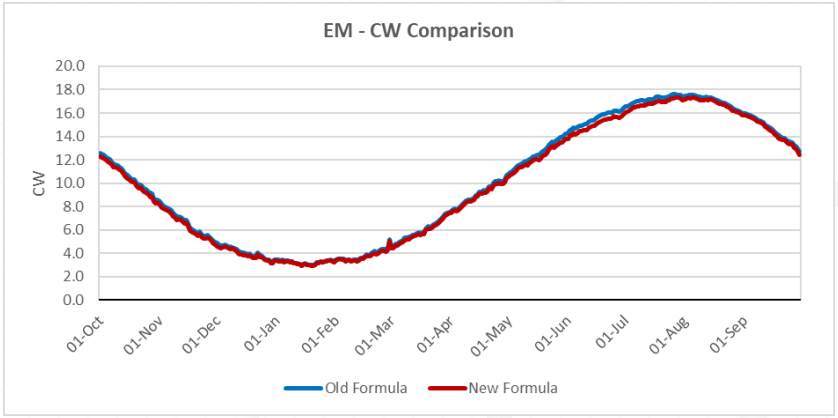
CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0144	0	14
2020	0.010	-2.417	17.377

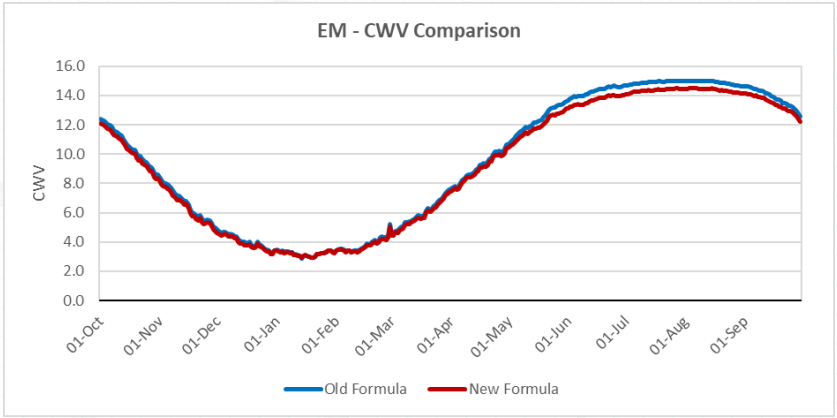




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.698

Seasonal Normal Review – EM (2 of 4)



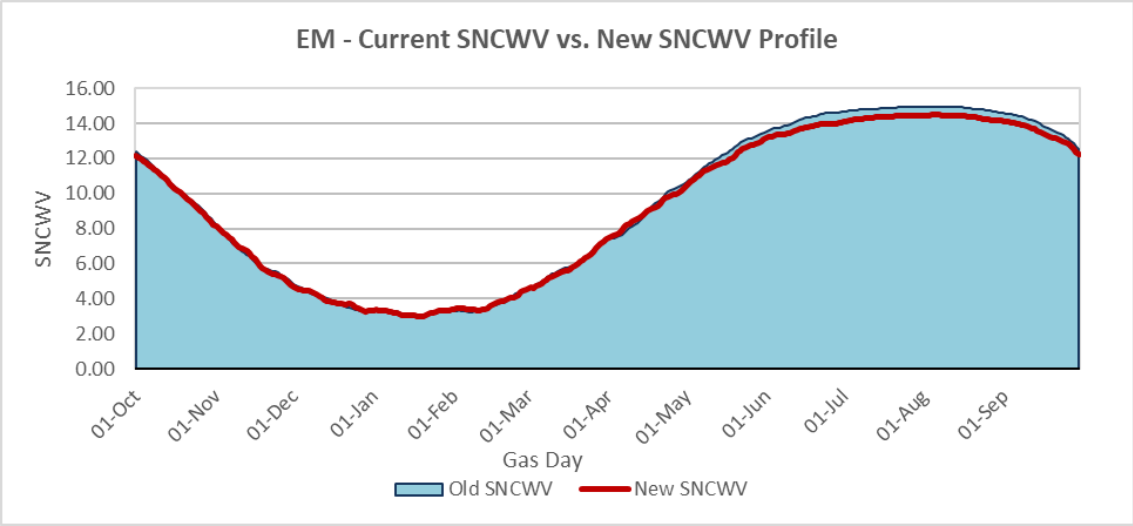


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.05	3	13.5	16.8	0.49
2020	0.138	-1.344	13.008	16.897	0.424

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	11.81%	9.88%
Transition	21.99%	24.49%
Normal	55.85%	65.11%
Cold weather upturn	10.35%	0.53%

- An increase in the Upper warm weather cut off (V2) has lead to fewer days falling within the Summer cut-off phase and reaching the max CWV value
- A reduction in the cold weather upturn threshold (V0) has lead to a reduction in the amount of days within this phase

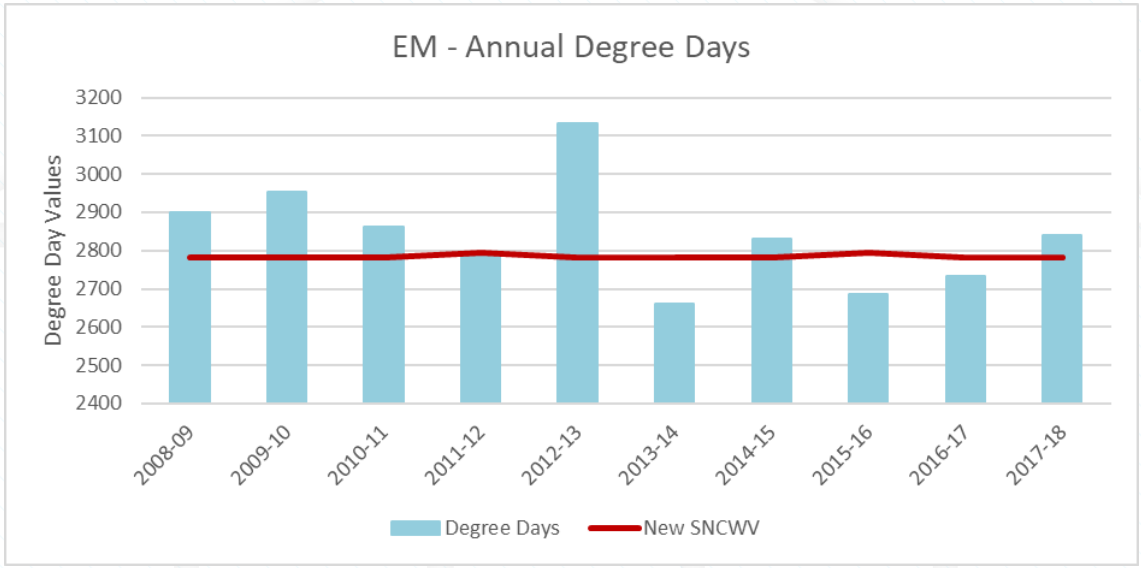
Seasonal Normal Review – EM (3 of 4)



Overall % Change from Current SNCWV		
Annual	-2.18%	Decrease
Dec to Feb	0.52%	Increase
Mar to May	-1.70%	Decrease
Jun to Aug	-3.40%	Decrease
Sep to Nov	-1.80%	Decrease

- The value of LDZ EM's SNCWV has shown a 2.18% decrease from the old to the new basis.
- A slight increase of 0.52% can be seen during the winter months (Dec to Feb), all other seasons show a decrease

Seasonal Normal Review – EM (4 of 4)



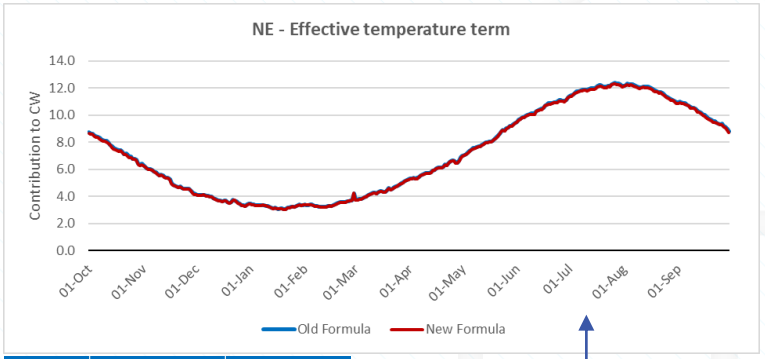
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 4 of the 10 most recent gas years were warmer than the new SNCWV basis.

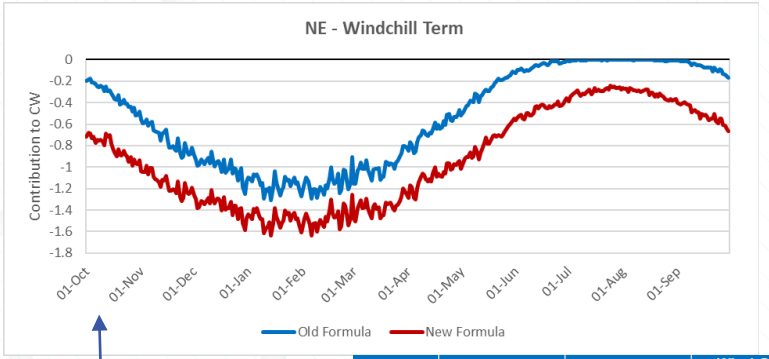
Seasonal Normal Review

Seasonal Normal Composite Weather Variable (SNCWV) for NE

Seasonal Normal Review – NE (1 of 4)

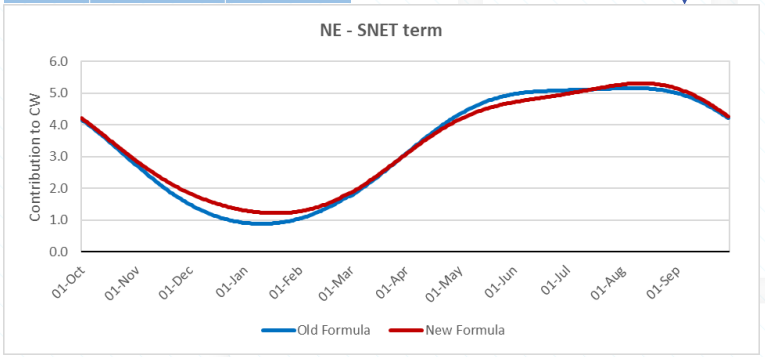


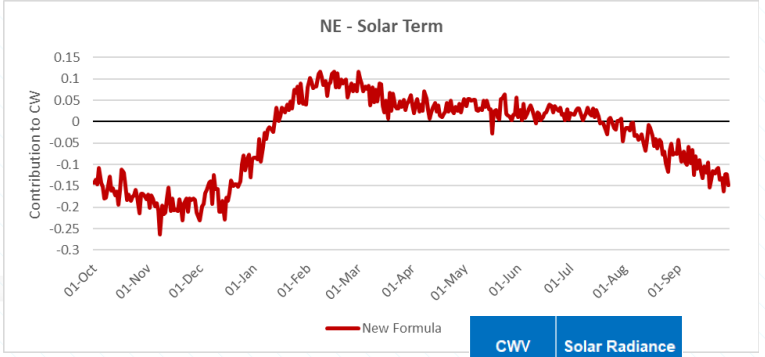
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.676
2020	0.459	0.672



CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0159	0	14
2020	0.009	-1.652	21.596

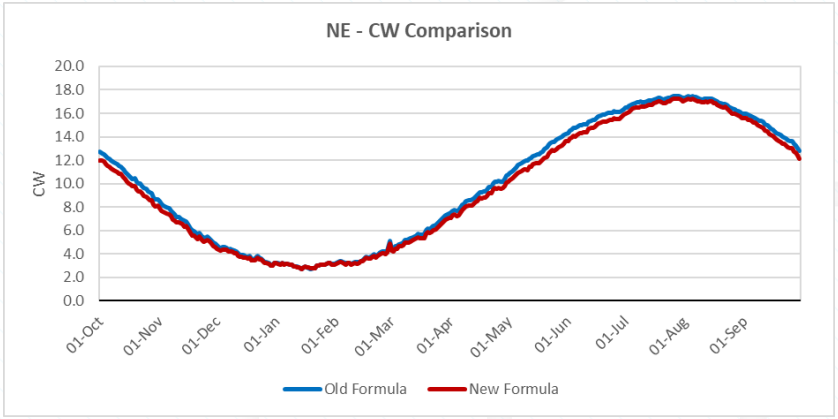
$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$

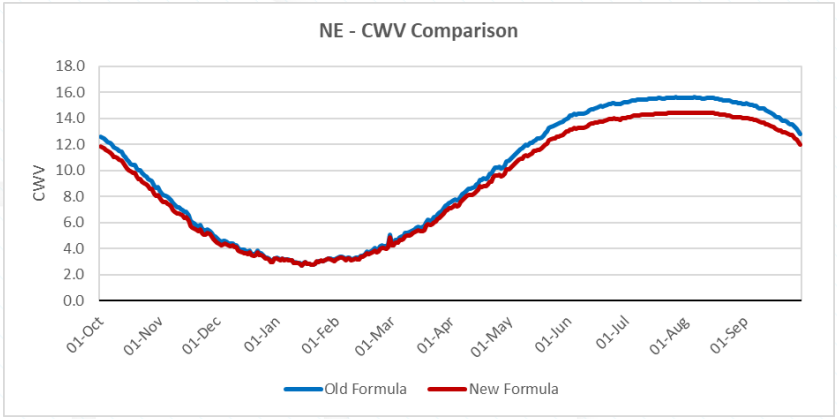




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.568

Seasonal Normal Review – NE (2 of 4)



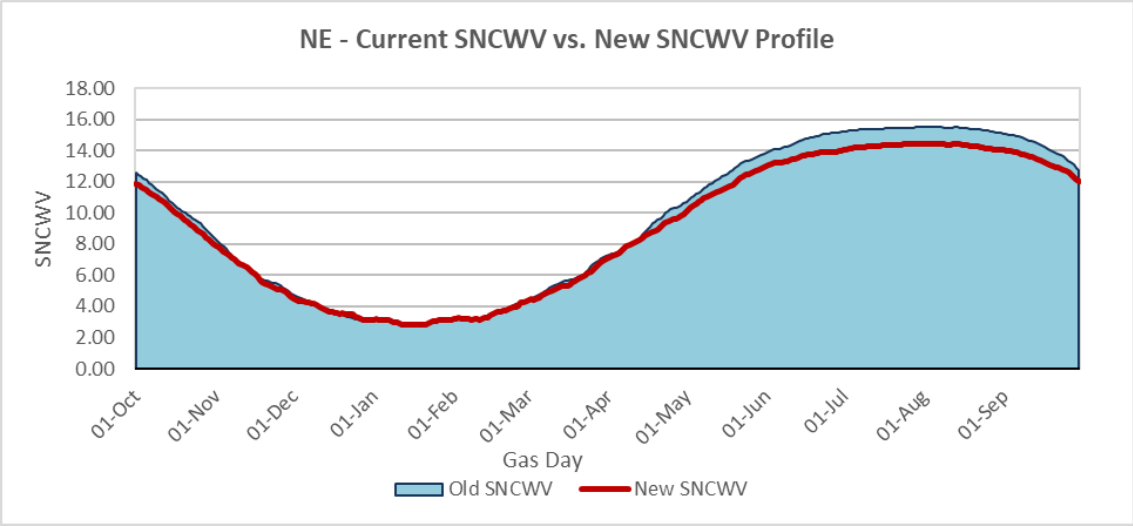


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0	0	14.7	17.9	0.38
2020	0.083	-1.261	12.924	16.679	0.446

Phase	Old Formula	New Formula
Summer cut-off	5.33%	9.99%
Transition	22.26%	23.16%
Normal	70.62%	66.22%
Cold weather upturn	1.80%	0.62%

- An increase in the Upper warm weather cut off (V2) has lead to fewer days falling within the Summer cut-off phase and reaching the max CWV value
- A reduction in the cold weather upturn threshold (V0) has lead to a reduction in the amount of days within this phase

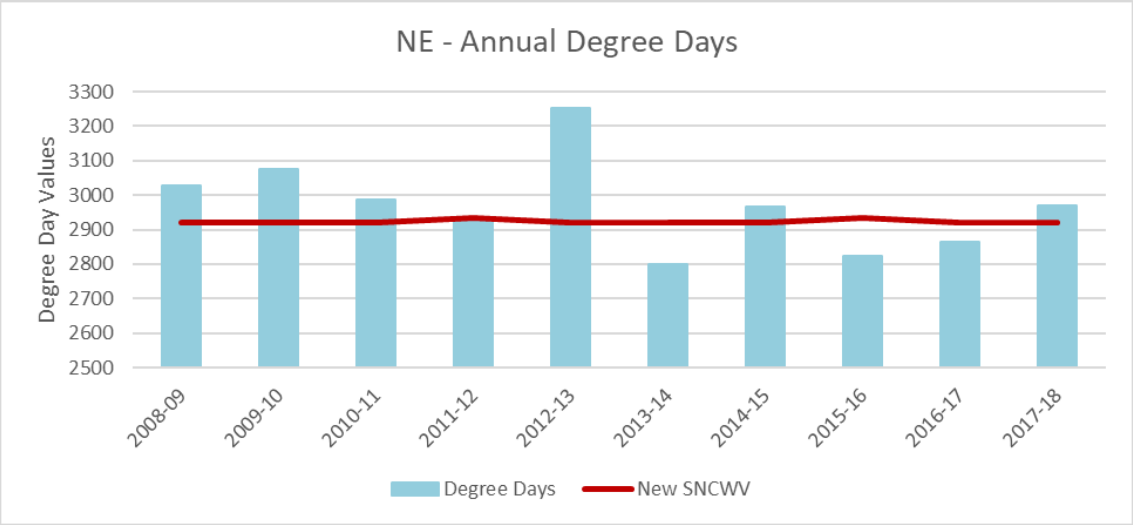
Seasonal Normal Review – NE (3 of 4)



Overall % Change from Current SNCWV		
Annual	-5.49%	Decrease
Dec to Feb	0.09%	Increase
Mar to May	-5.03%	Decrease
Jun to Aug	-7.12%	Decrease
Sep to Nov	-5.31%	Decrease

- The value of LDZ NE's SNCWV has shown a 5.49% decrease from the old to the new basis.
- The largest decrease can be observed during the summer months (June to August) which have decreased by a total of 7.12%

Seasonal Normal Review – NE (4 of 4)



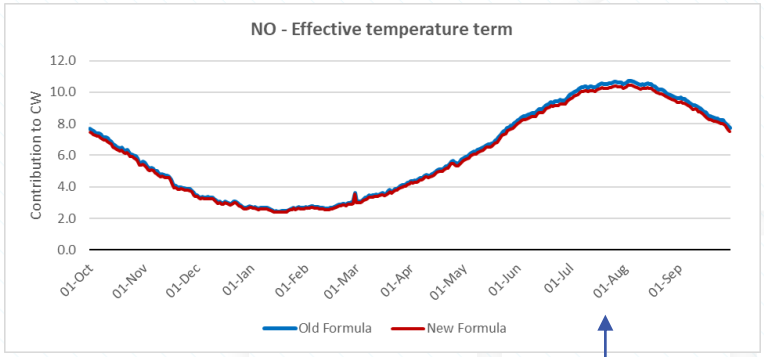
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 4 of the 10 most recent gas years were warmer than the new SNCWV basis.

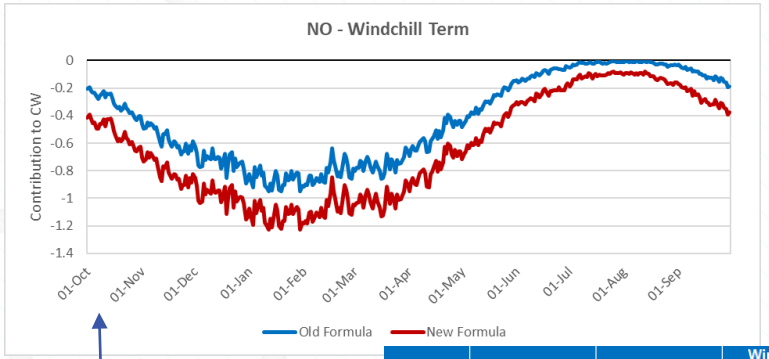
Seasonal Normal Review

Seasonal Normal Composite Weather Variable (SNCWV) for NO

Seasonal Normal Review – NO (1 of 4)

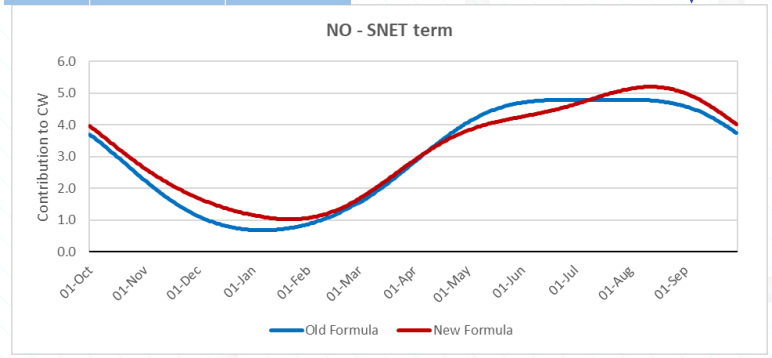


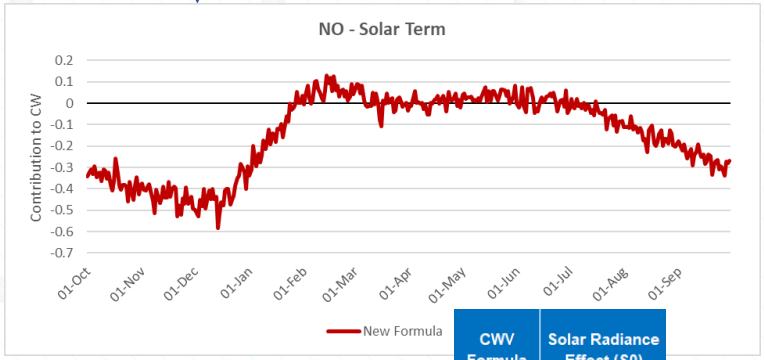
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.663
2020	0.492	0.646



CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0086	0	14
2020	0.008	-0.894	16.657

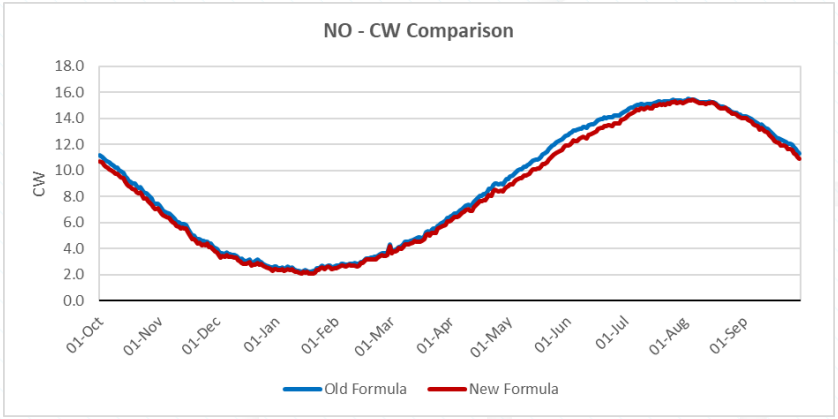
$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$

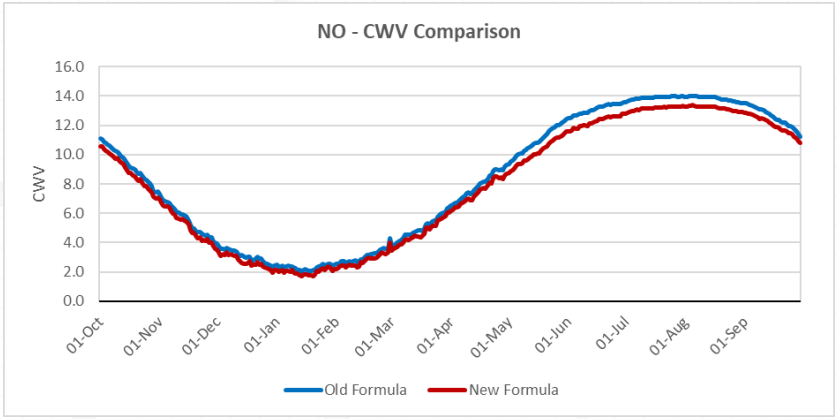




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.950

Seasonal Normal Review – NO (2 of 4)



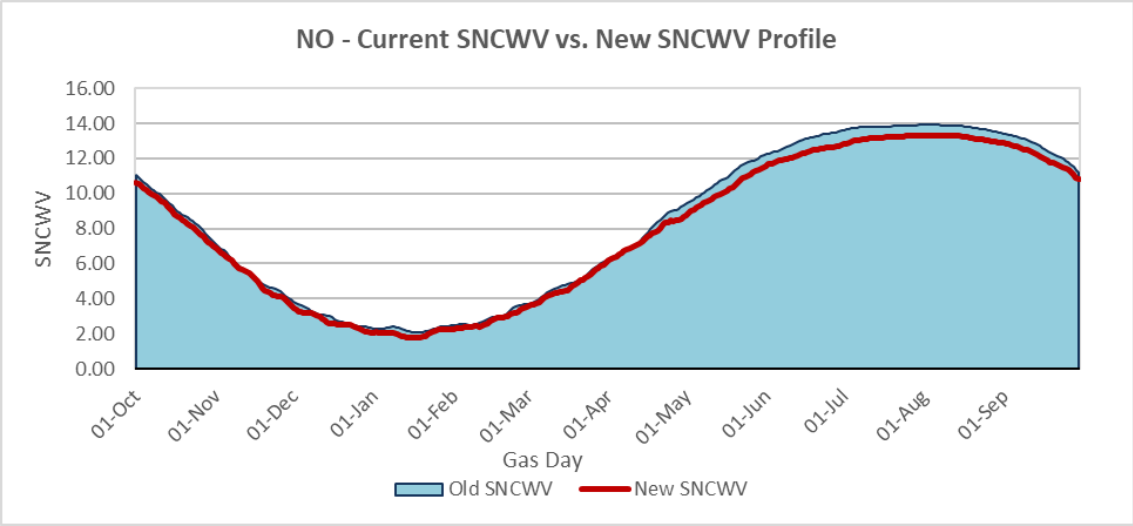


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.15	3	13	16	0.46
2020	0.126	5.000	12.005	15.779	0.438

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	4.58%	4.86%
Transition	22.80%	25.26%
Normal	57.94%	38.96%
Cold weather upturn	14.68%	30.92%

- A slight decrease in the Upper warm weather cut off (V2) has lead to a small increase in the number of days falling within the Summer cut-off phase and reaching the max CWV value
- An increase in the cold weather upturn threshold (V0) has lead to more than twice as many days falling within the cold weather upturn phase

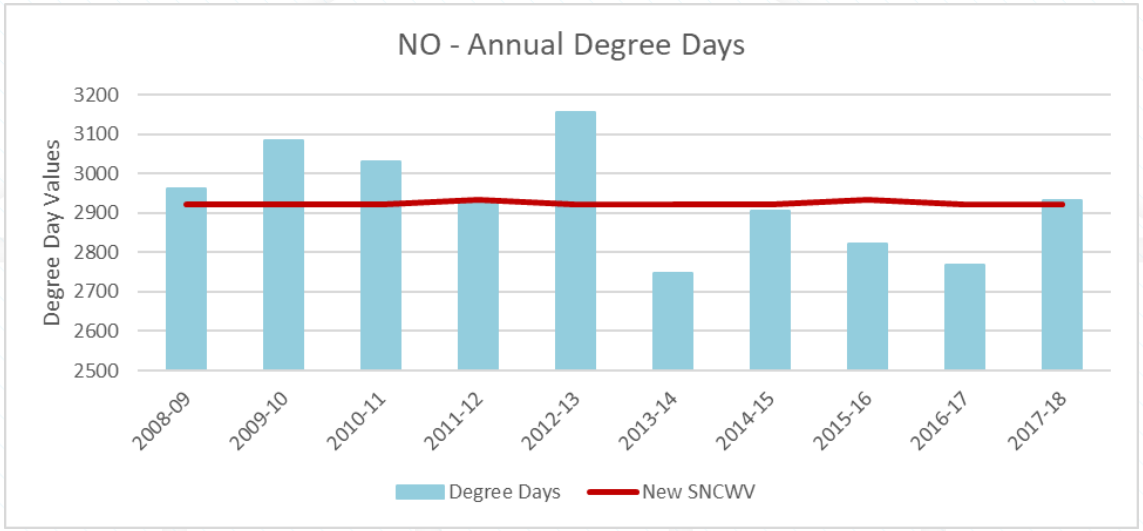
Seasonal Normal Review – NO (3 of 4)



Overall % Change from Current SNCWV		
Annual	-4.96%	Decrease
Dec to Feb	-8.39%	Decrease
Mar to May	-5.08%	Decrease
Jun to Aug	-4.91%	Decrease
Sep to Nov	-3.90%	Decrease

- The value of LDZ NO's SNCWV has shown a 4.96% decrease from the old to the new basis.
- Every season has shown a decrease under the new Seasonal Normal basis

Seasonal Normal Review – NO (4 of 4)



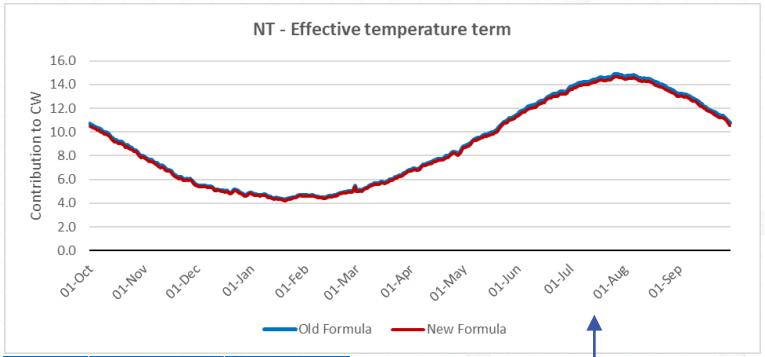
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 5 of the 10 most recent gas years were warmer than the new SNCWV basis.

Seasonal Normal Review

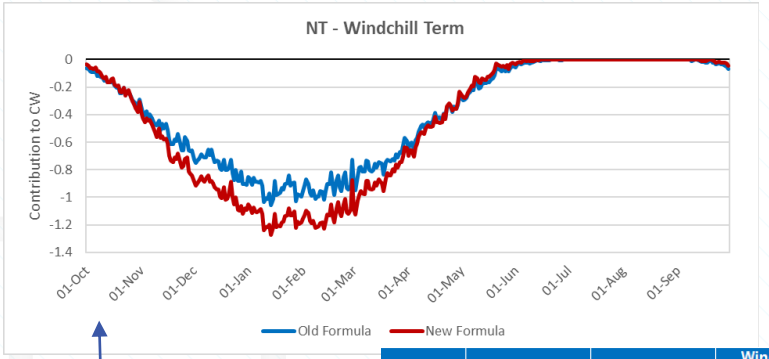
Seasonal Normal Composite Weather Variable (SNCWV) for NT

Seasonal Normal Review – NT (1 of 4)

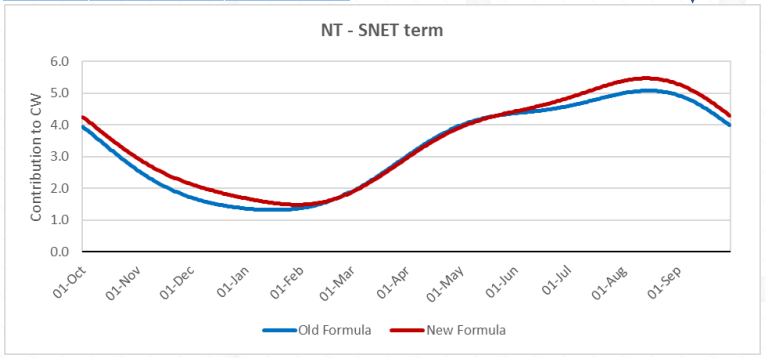


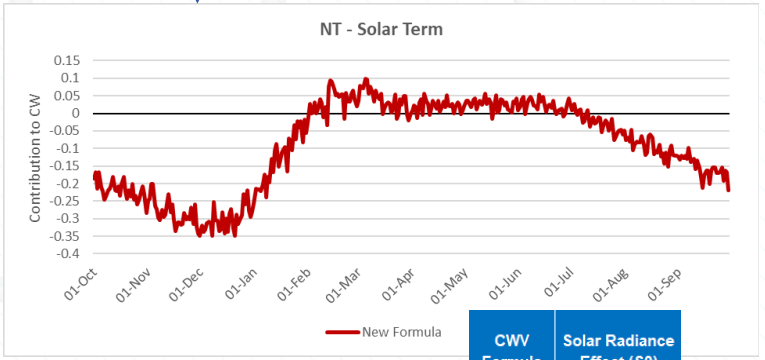
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.727
2020	0.473	0.715

$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$



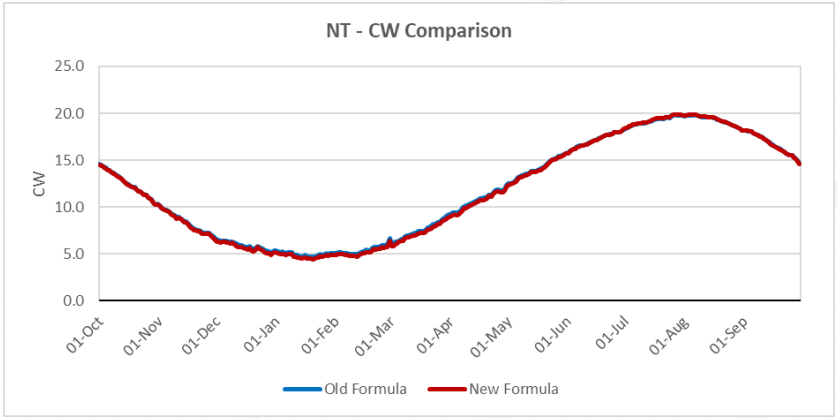
CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0151	0	14
2020	0.015	-3.811	12.833

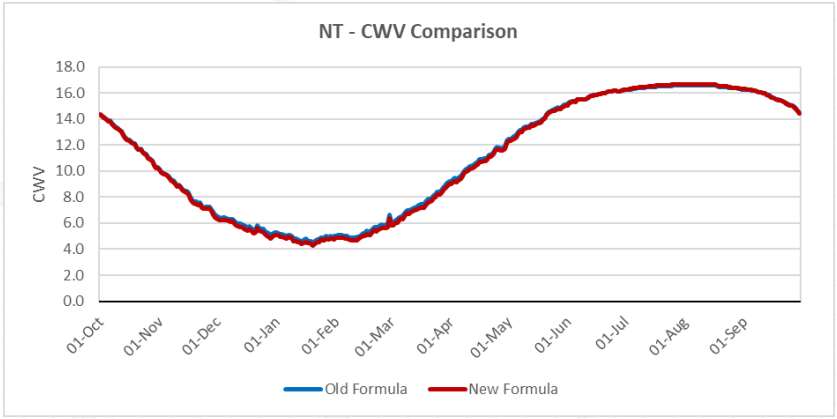




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.695

Seasonal Normal Review – NT (2 of 4)



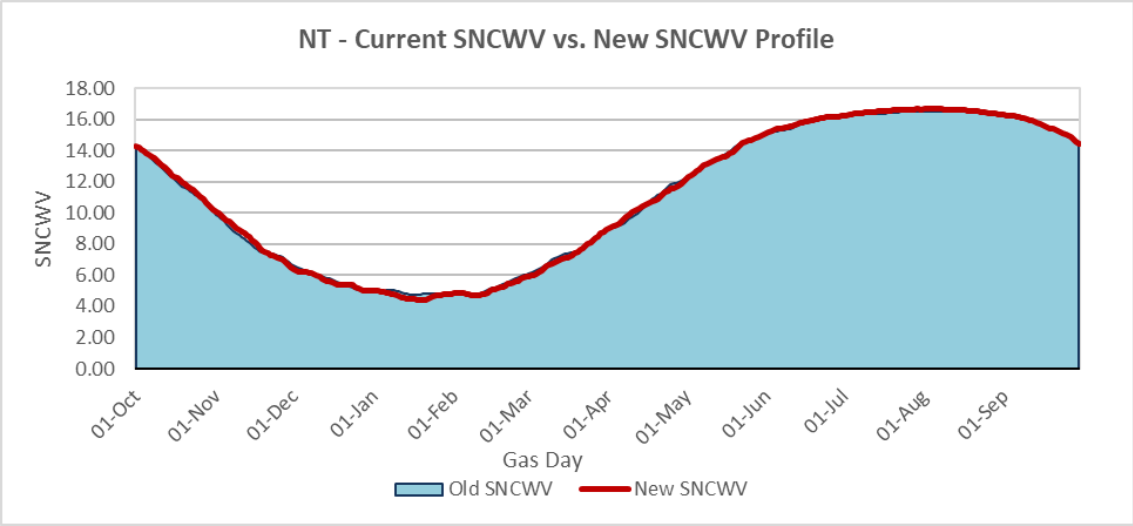


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.22	3	15.2	19.2	0.38
2020	0.066	4.898	15.029	19.184	0.429

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	9.67%	9.99%
Transition	24.47%	24.60%
Normal	61.25%	52.41%
Cold weather upturn	4.62%	13.00%

- A slight decrease in the Upper warm weather cut off (V2) has lead to an extra 0.32% of days falling within the Summer cut-off phase and reaching the max CWV value
- An increase in the cold weather upturn threshold (V0) has lead to 13% of days within this phase in the new seasonal normal basis

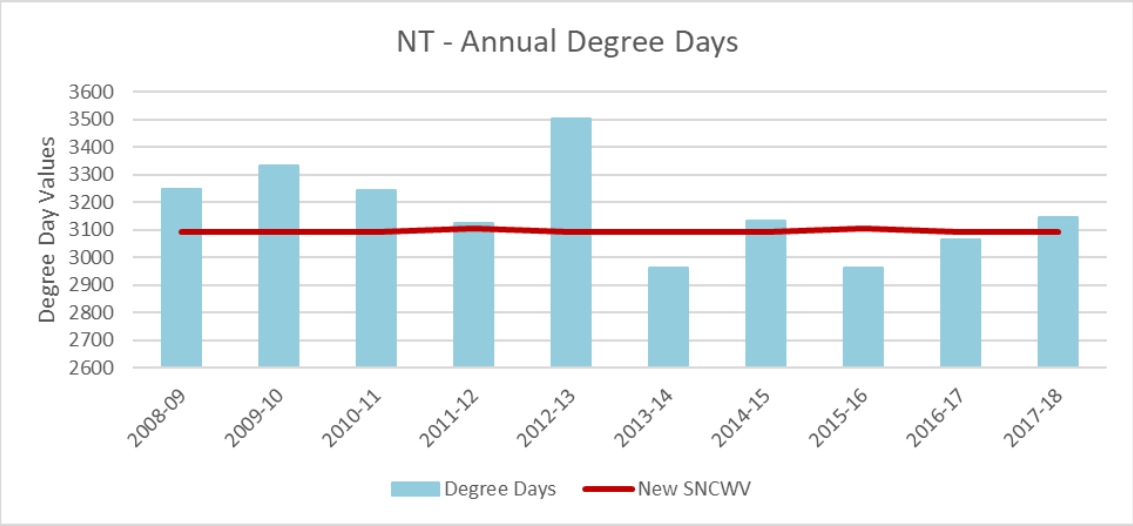
Seasonal Normal Review – NT (3 of 4)



Overall % Change from Current SNCWV		
Annual	0.00%	Increase
Dec to Feb	-2.37%	Decrease
Mar to May	-0.63%	Decrease
Jun to Aug	0.63%	Increase
Sep to Nov	0.75%	Increase

- The value of LDZ NT's SNCWV has shown a slight increase (<0.005%) from the old to the new basis.
- A decrease can be observed during the period December to May, however a slight increase can be observed during the period June to November

Seasonal Normal Review – NT (4 of 4)



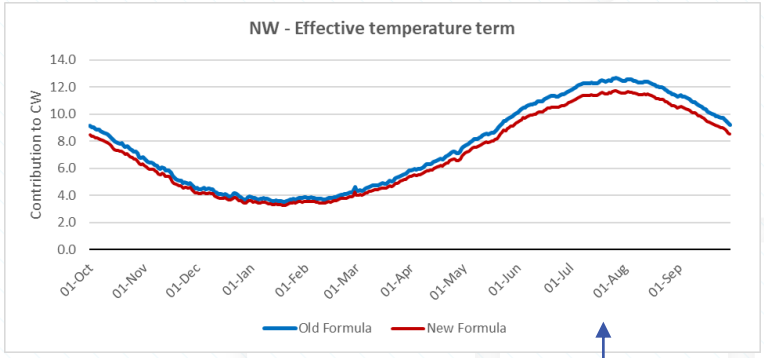
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 3 of the 10 most recent gas years were warmer than the new SNCWV basis.

Seasonal Normal Review

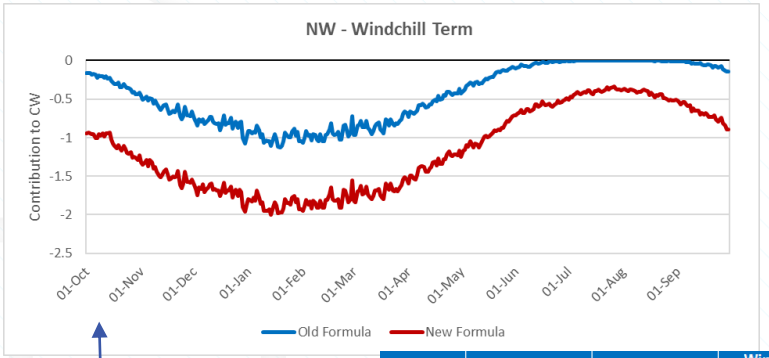
Seasonal Normal Composite Weather Variable (SNCWV) for NW

Seasonal Normal Review – NW (1 of 4)

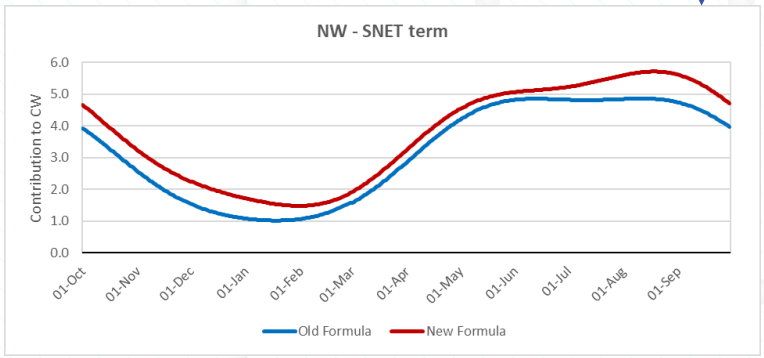


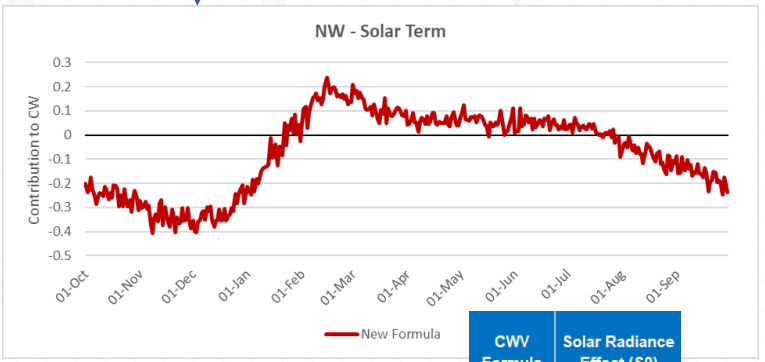
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.697
2020	0.498	0.646

$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$



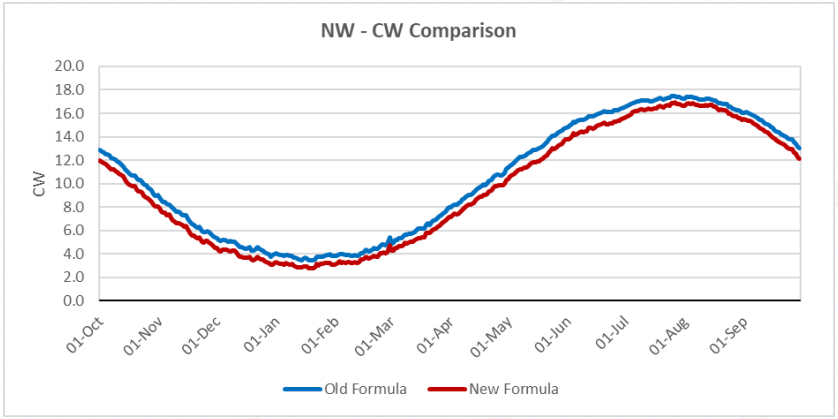
CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0149	0	14
2020	0.009	-5.000	21.312

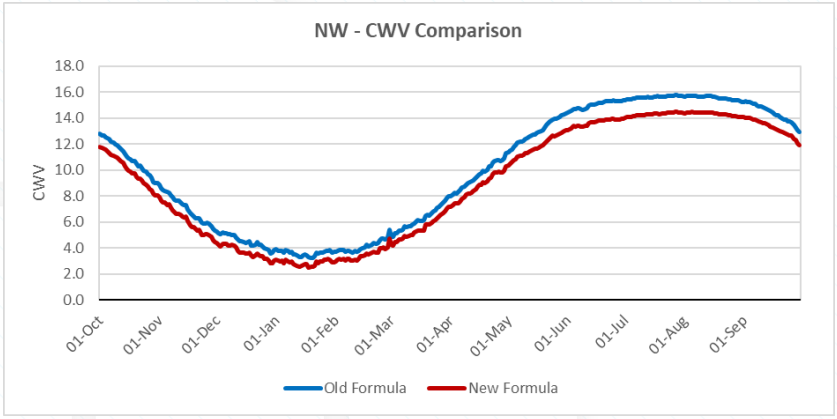




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.802

Seasonal Normal Review – NW (2 of 4)



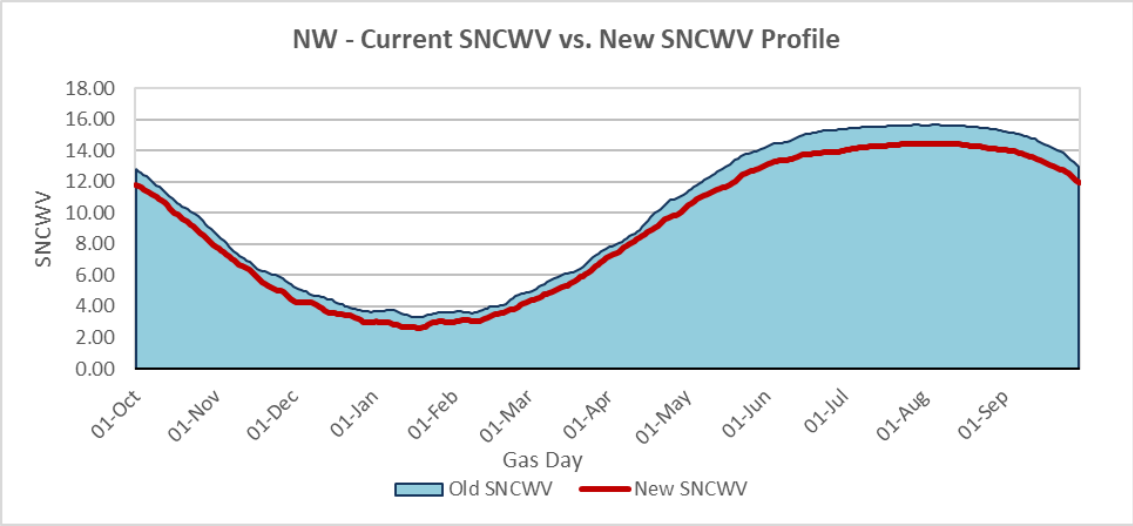


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.3	3	14.9	18	0.38
2020	0.315	2.694	12.775	16.466	0.513

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	5.30%	9.76%
Transition	22.46%	24.34%
Normal	64.27%	56.39%
Cold weather upturn	7.96%	9.51%

- A reduction in the warm weather cut-offs (V1 & V2) has lead to an increase in the number of days falling within the Summer cut-off phase and reaching the max CWV value
- Despite a reduction in the cold weather upturn threshold (V0), there has been an increase in the amount of days within the cold weather upturn phase. This may be explained by the reduction observed in the CW values

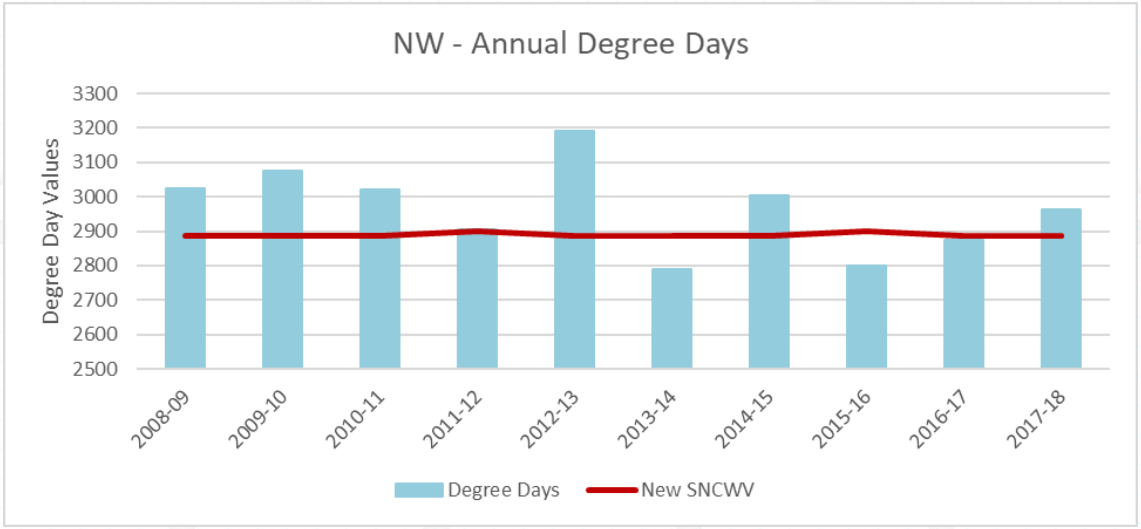
Seasonal Normal Review – NW (3 of 4)



Overall % Change from Current SNCWV		
Annual	-9.33%	Decrease
Dec to Feb	-16.72%	Decrease
Mar to May	-9.05%	Decrease
Jun to Aug	-8.19%	Decrease
Sep to Nov	-8.47%	Decrease

- Overall, the value of LDZ NW's SNCWV has shown a 9.33% decrease from the old to the new basis.
- Reductions in the SNCWV values can be observed throughout the year.

Seasonal Normal Review – NW (4 of 4)



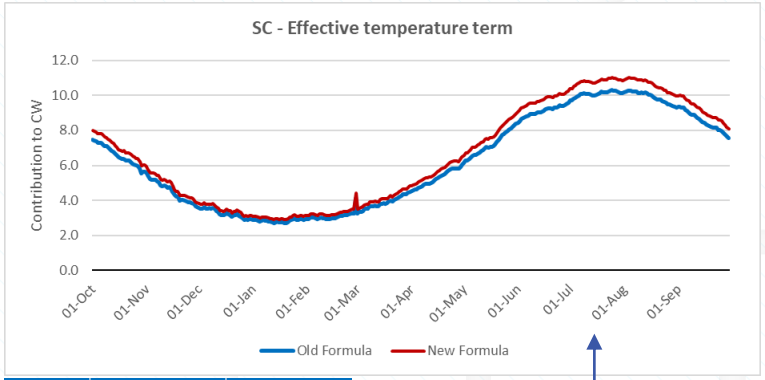
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 3 of the 10 most recent gas years were warmer than the new SNCWV basis.

Seasonal Normal Review

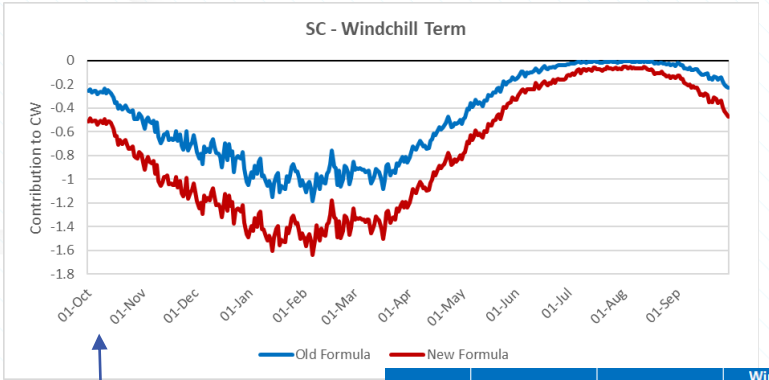
Seasonal Normal Composite Weather Variable (SNCWV) for SC

Seasonal Normal Review – SC (1 of 4)

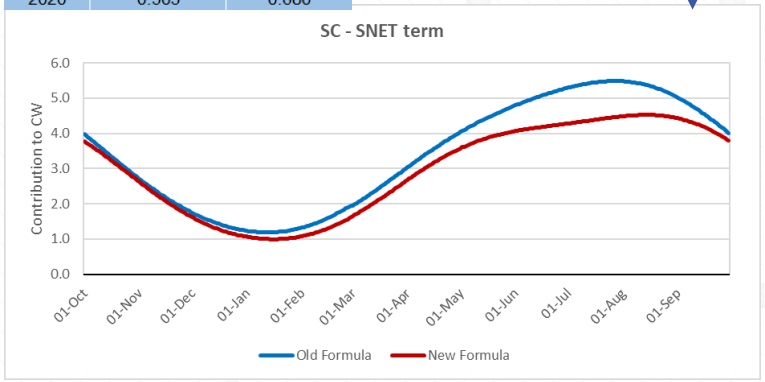


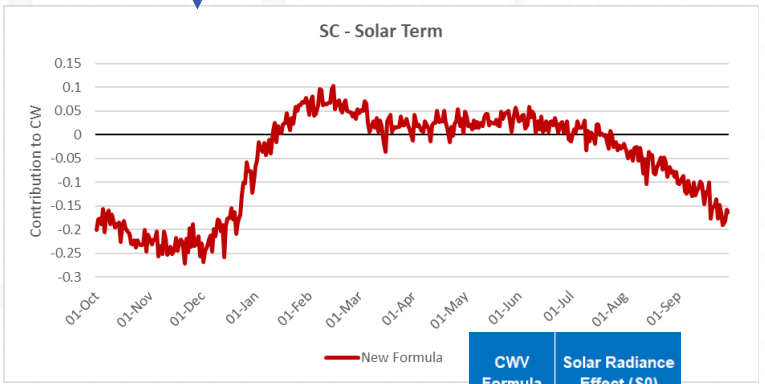
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.635
2020	0.505	0.680

$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$



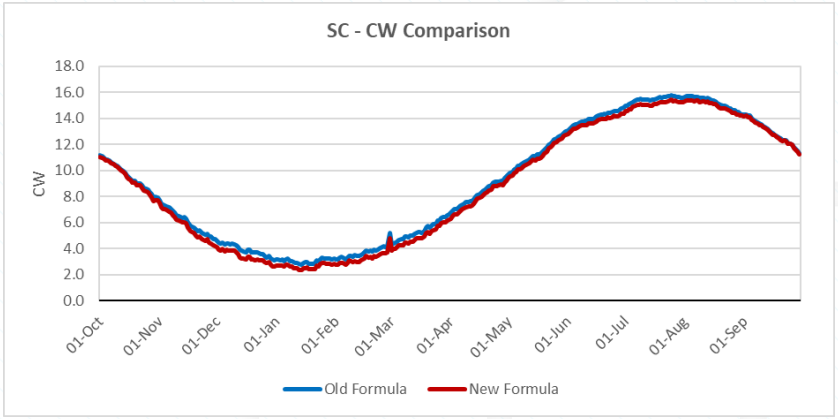
CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0119	0	14
2020	0.011	-2.992	15.476

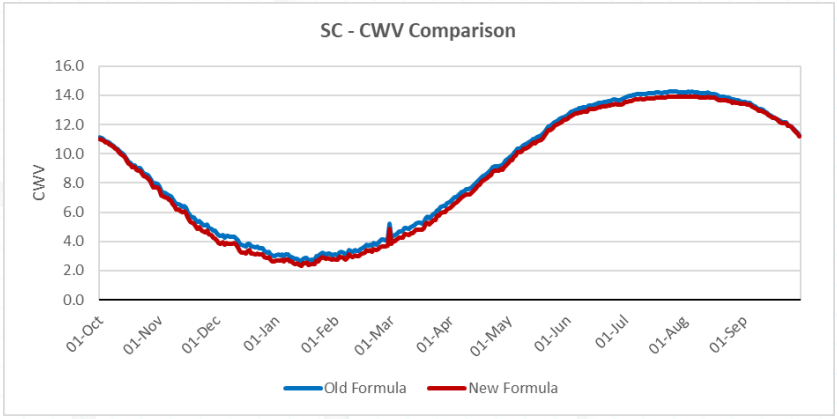




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.507

Seasonal Normal Review – SC (2 of 4)



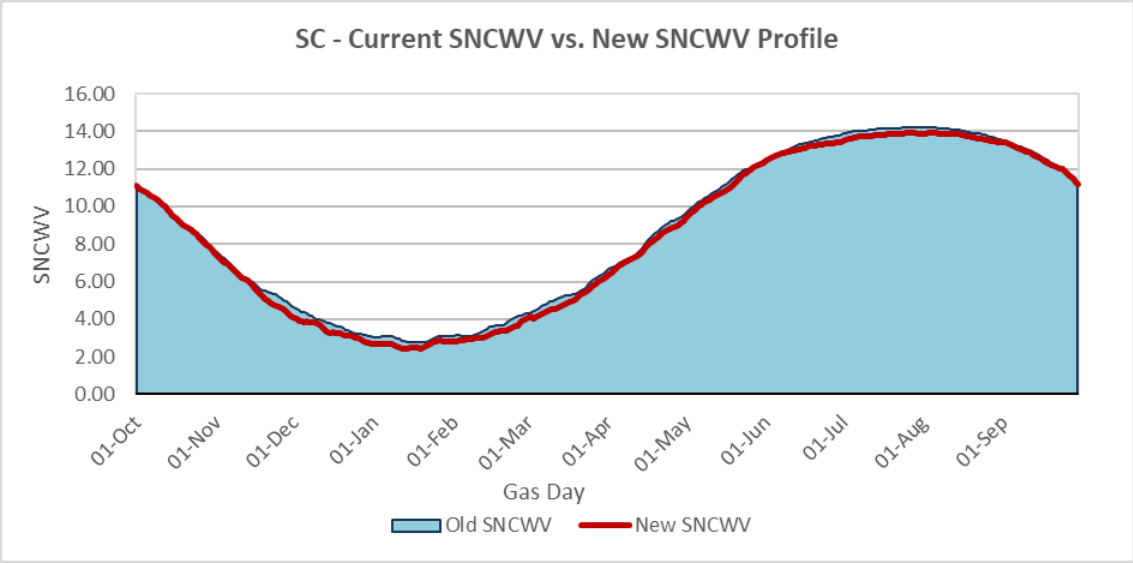


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.15	3	12.2	16	0.64
2020	0.000	1.053	12.590	16.402	0.509

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	5.18%	2.99%
Transition	28.46%	27.04%
Normal	55.83%	65.70%
Cold weather upturn	10.54%	4.27%

- An increase in the warm weather cut offs (V1 & V2) has lead to fewer days falling within the Summer cut-off phase and reaching the max CWV value
- A reduction in the cold weather upturn threshold (V0) has lead to less than half as many days falling within the cold weather upturn phase

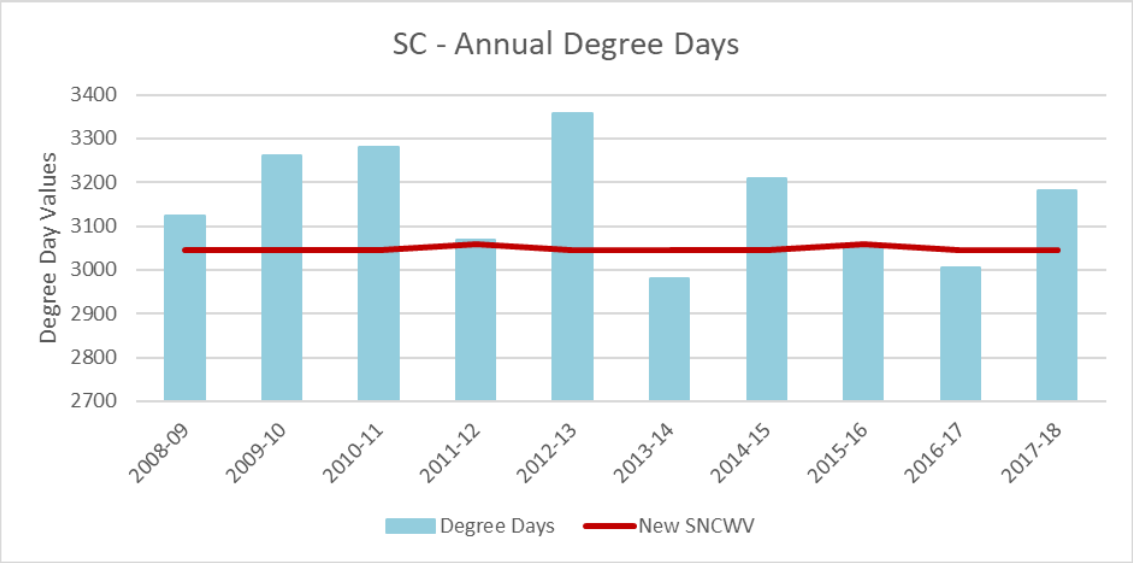
Seasonal Normal Review – SC (3 of 4)



Overall % Change from Current SNCWV		
Annual	-2.92%	Decrease
Dec to Feb	-9.90%	Decrease
Mar to May	-3.34%	Decrease
Jun to Aug	-1.87%	Decrease
Sep to Nov	-1.56%	Decrease

- The value of LDZ SC's SNCWV has shown a 2.92% decrease from the old to the new basis.
- Reductions in the SNCWV values can be observed throughout the year.

Seasonal Normal Review – SC (4 of 4)



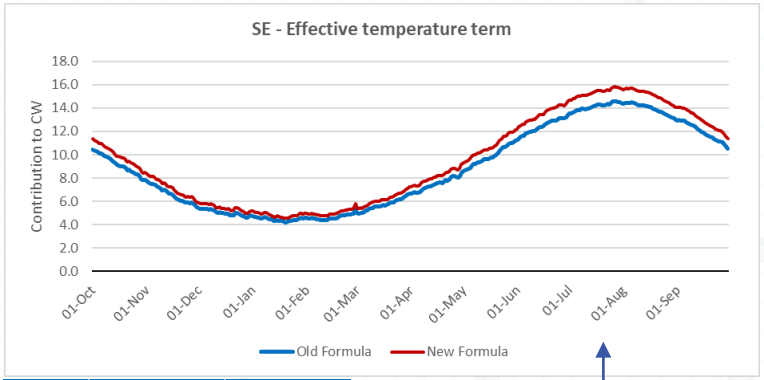
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 3 of the 10 most recent gas years were warmer than the new SNCWV basis.

Seasonal Normal Review

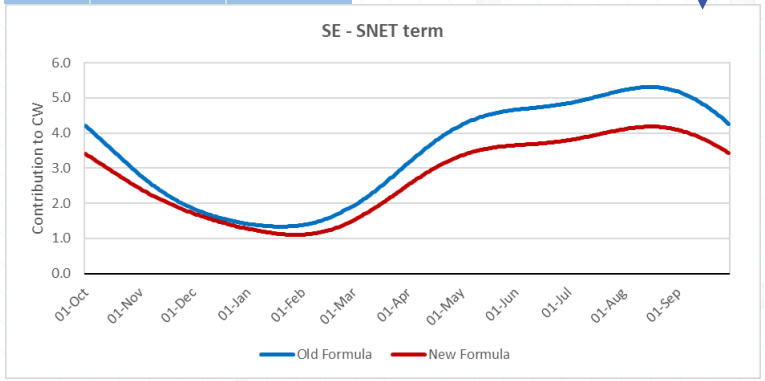
Seasonal Normal Composite Weather Variable (SNCWV) for SE

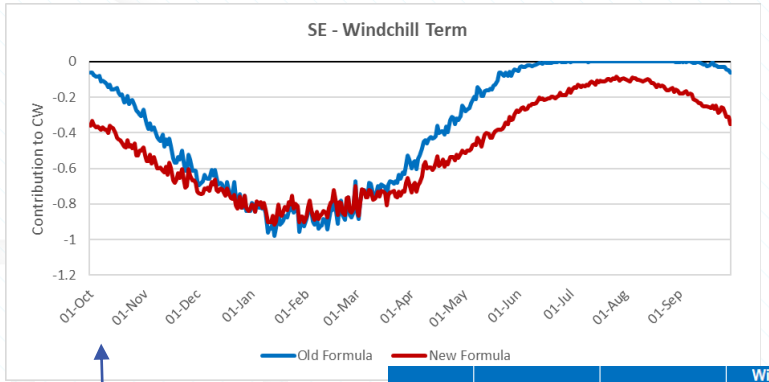
Seasonal Normal Review – SE (1 of 4)



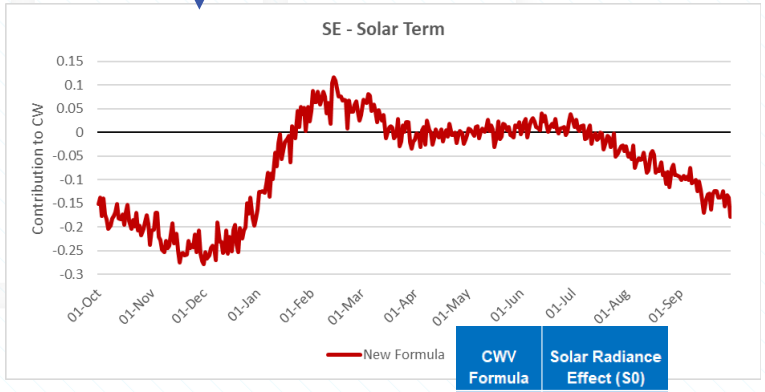
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.712
2020	0.484	0.772

$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$



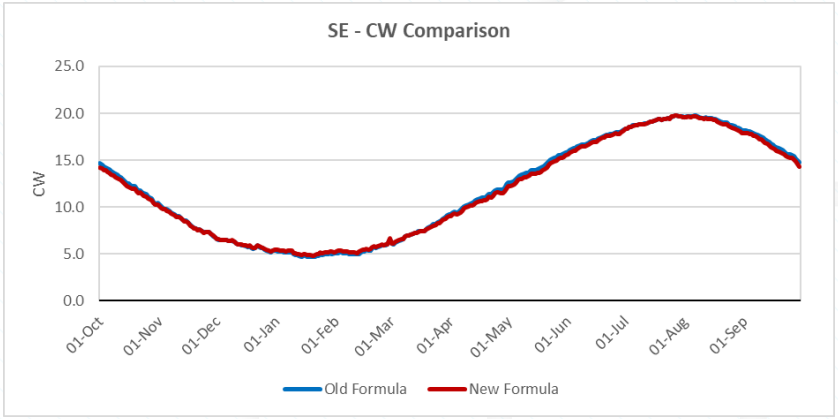


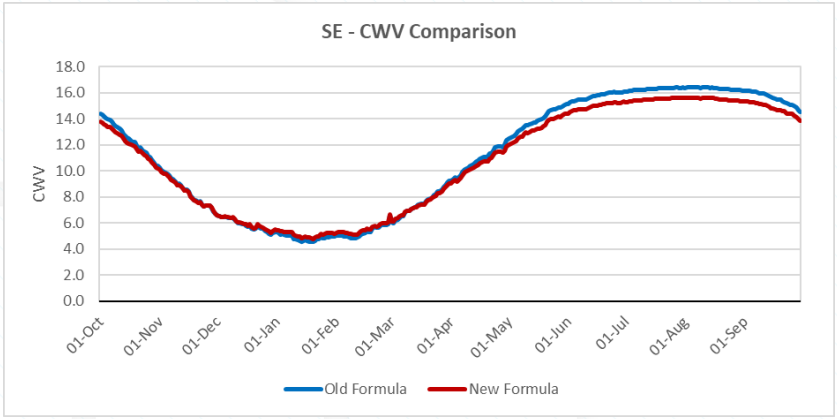
CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.014	0	14
2020	0.006	-0.721	21.613



CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.566

Seasonal Normal Review – SE (2 of 4)



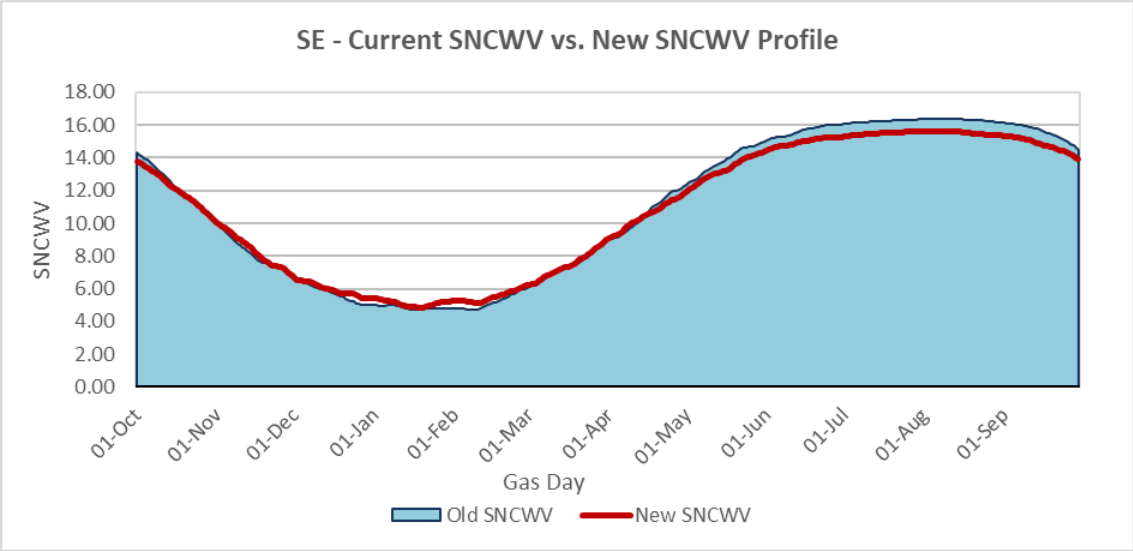


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.33	3	15.1	18.7	0.38
2020	0.266	1.335	13.996	18.523	0.375

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	12.52%	13.04%
Transition	22.36%	24.95%
Normal	60.72%	60.65%
Cold weather upturn	4.40%	1.36%

- A reduction in the warm weather cut-offs (V1 & V2) has lead to an increase in the number of days falling within the Summer cut-off phase and reaching the max CWV value
- A reduction in the cold weather upturn threshold (V0) has resulted in fewer days falling within the cold weather upturn phase

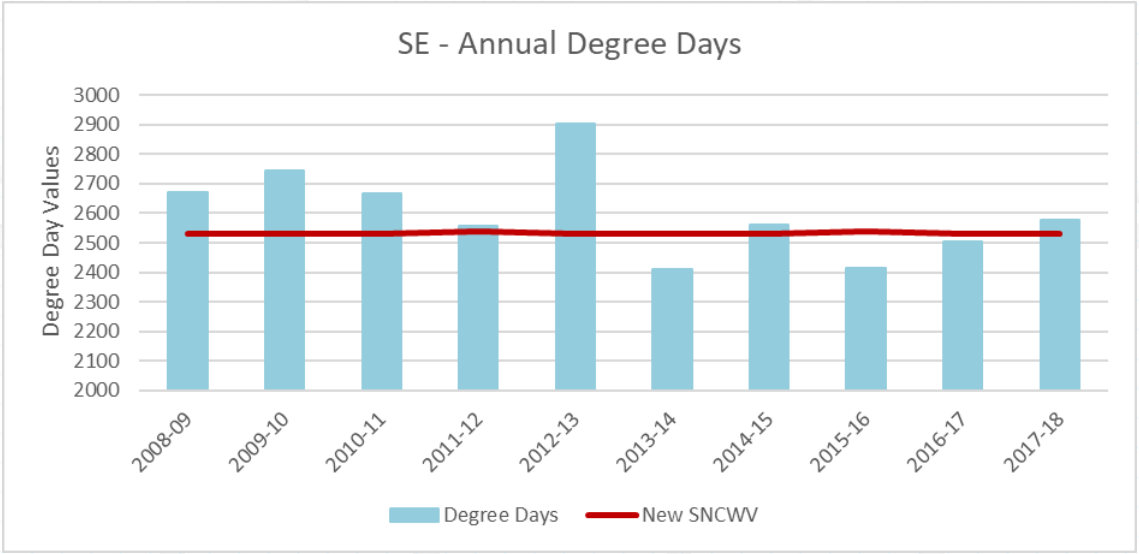
Seasonal Normal Review – SE (3 of 4)



Overall % Change from Current SNCWV		
Annual	-2.18%	Decrease
Dec to Feb	5.06%	Increase
Mar to May	-2.04%	Decrease
Jun to Aug	-4.61%	Decrease
Sep to Nov	-2.19%	Decrease

- The value of LDZ SE's SNCWV has shown a 2.18% decrease from the old to the new basis.
- An increase of 5.06% can be observed during the winter months (December to February), all other seasons show a reduction.

Seasonal Normal Review – SE (4 of 4)



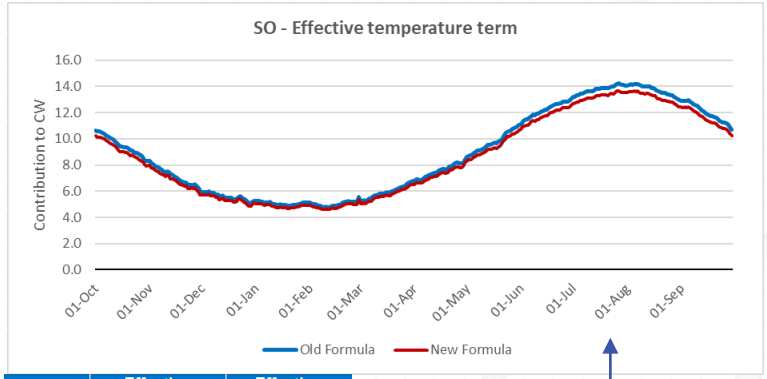
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 3 of the 10 most recent gas years were warmer than the new SNCWV basis.

Seasonal Normal Review

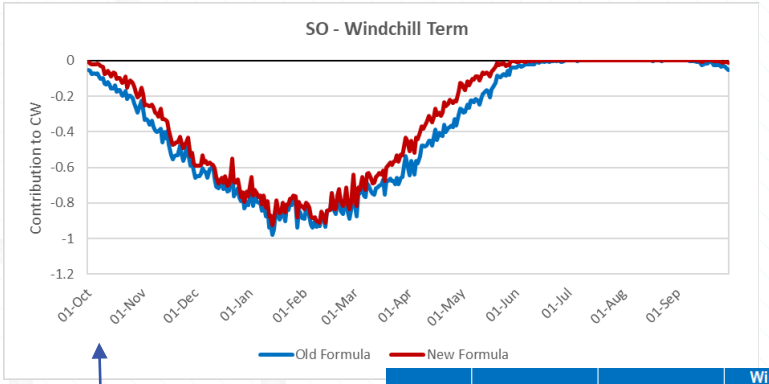
Seasonal Normal Composite Weather Variable (SNCWV) for SO

Seasonal Normal Review – SO (1 of 4)

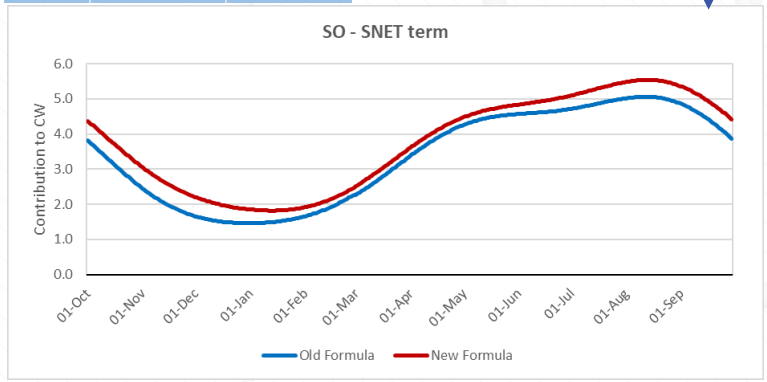


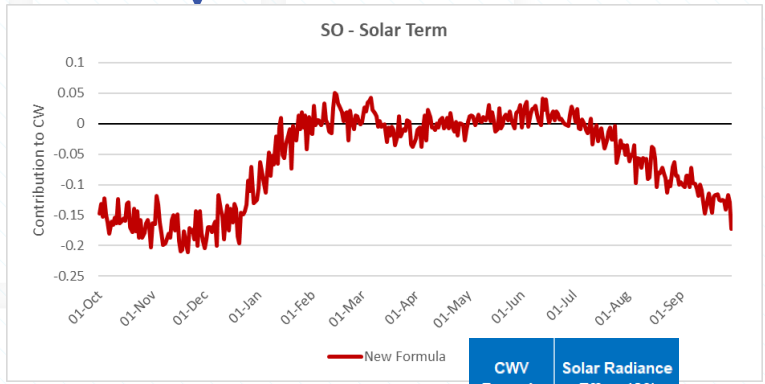
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.72
2020	0.438	0.692

$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$



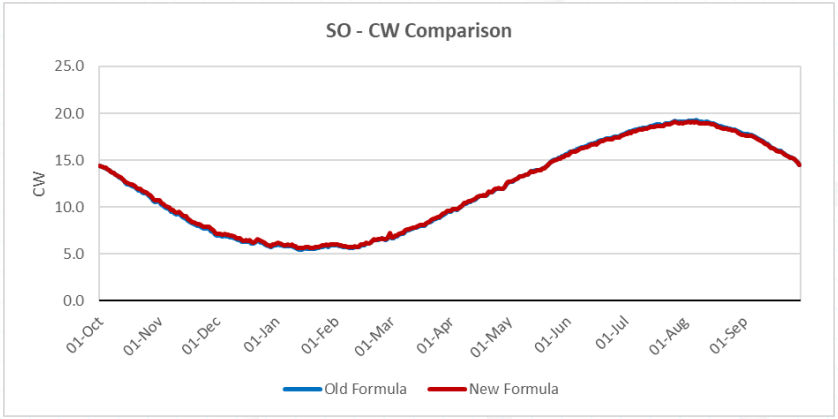
CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0134	0	14
2020	0.015	-2.076	11.978

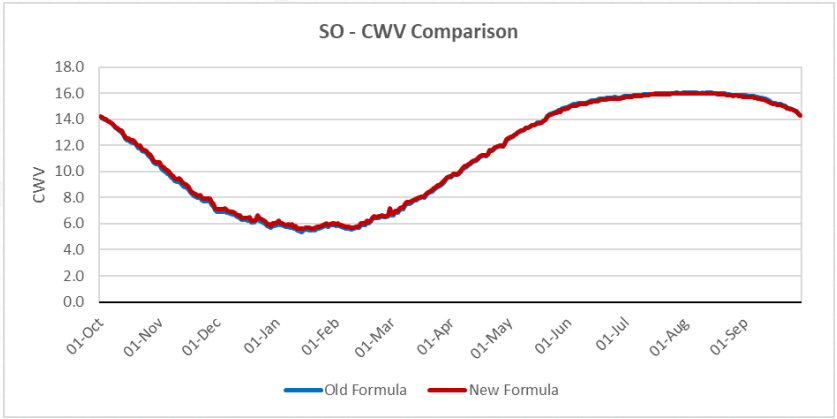




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.559

Seasonal Normal Review – SO (2 of 4)



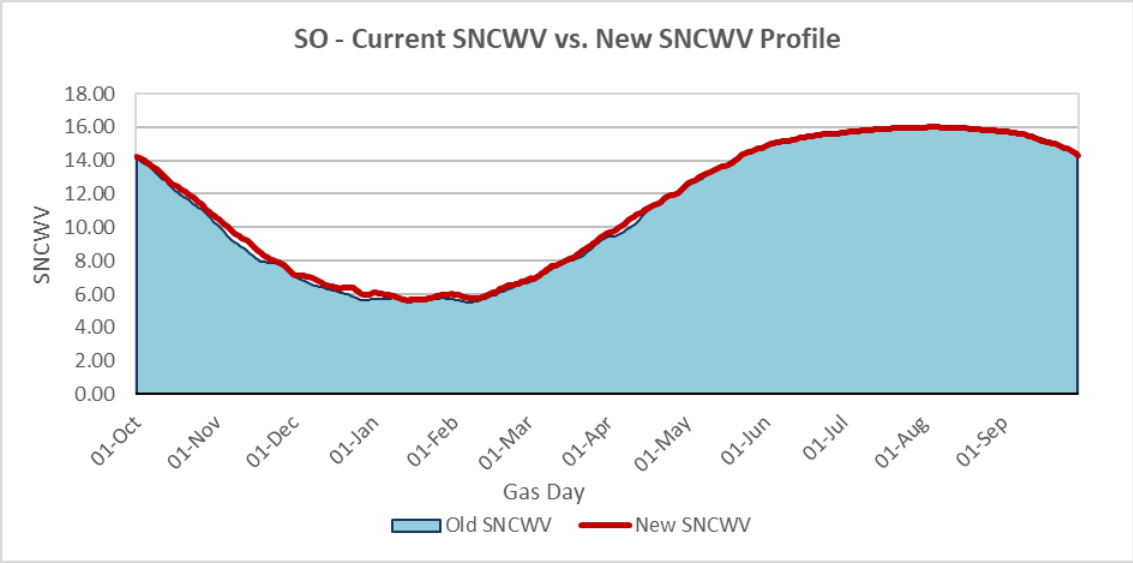


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.24	3	14.8	18.2	0.37
2020	0.405	0.141	14.745	18.715	0.345

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	13.08%	8.52%
Transition	22.53%	26.93%
Normal	61.51%	64.15%
Cold weather upturn	2.88%	0.40%

- An increase in the warm weather cut-offs (V2) has lead to a reduction in the number of days falling within the Summer cut-off phase and reaching the max CWV value
- A reduction in the cold weather upturn threshold (V0) from 3 to 0.141 has resulted in only 0.40% of days falling within the cold weather upturn phase

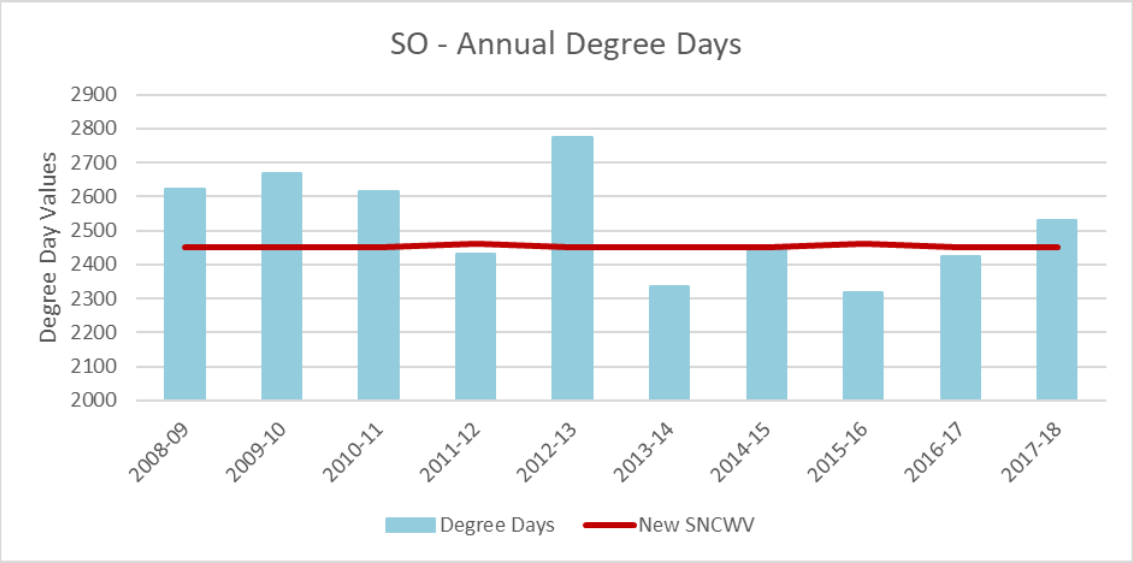
Seasonal Normal Review – SO (3 of 4)



Overall % Change from Current SNCWV		
Annual	1.18%	Increase
Dec to Feb	3.73%	Increase
Mar to May	1.13%	Increase
Jun to Aug	-0.13%	Decrease
Sep to Nov	1.69%	Increase

- The value of LDZ SO's SNCWV has shown a 1.18% increase from the old to the new basis.
- A slight decrease of 0.13% can be observed during the Summer months (June to August), all other seasons have increased.

Seasonal Normal Review – SO (4 of 4)



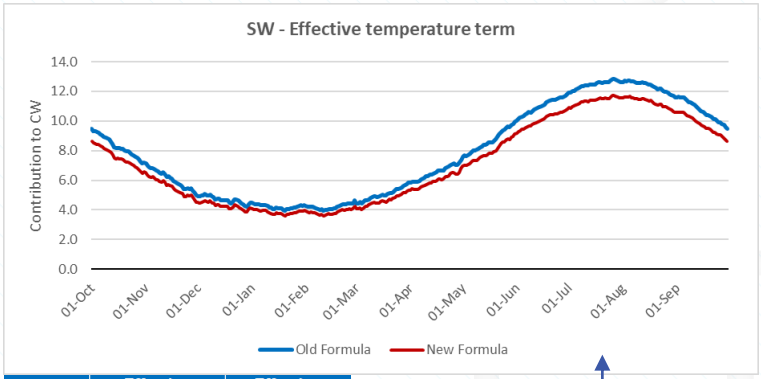
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 4 of the 10 most recent gas years were warmer than the new SNCWV basis.

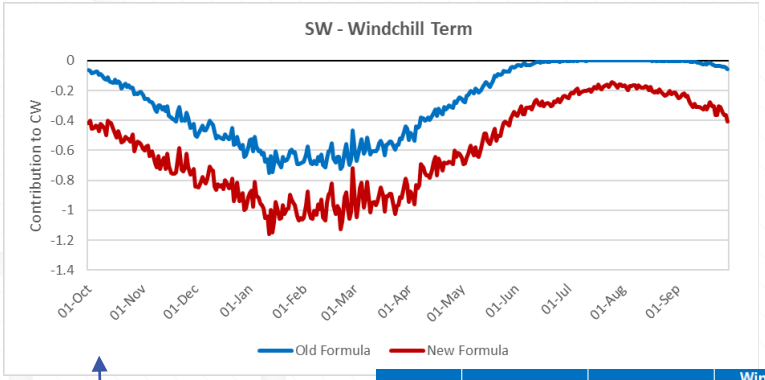
Seasonal Normal Review

Seasonal Normal Composite Weather Variable (SNCWV) for SW

Seasonal Normal Review – SW (1 of 4)

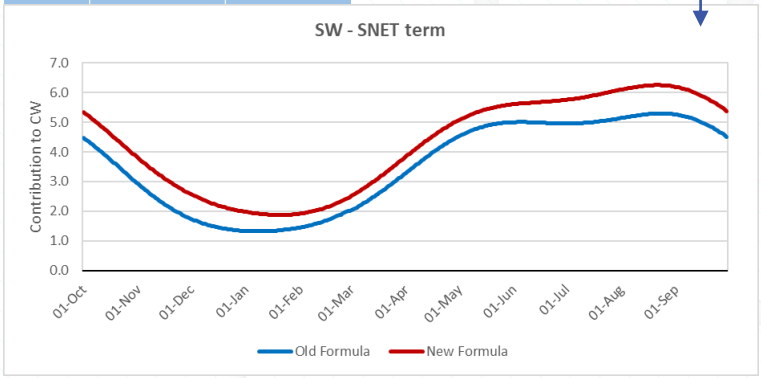


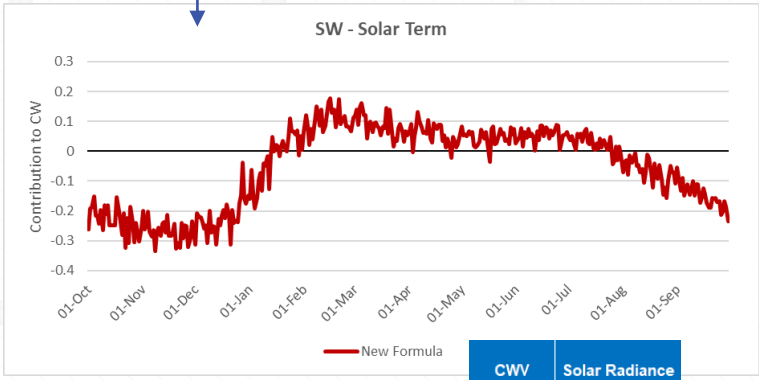
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.682
2020	0.448	0.623



CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.01	0	14
2020	0.008	0.705	21.707

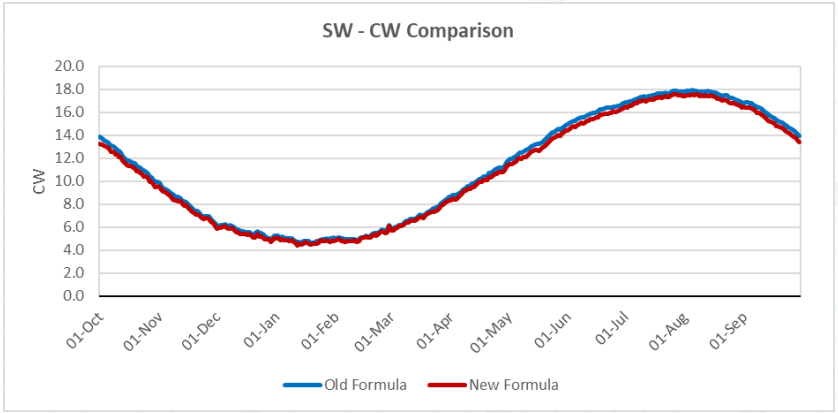
$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$

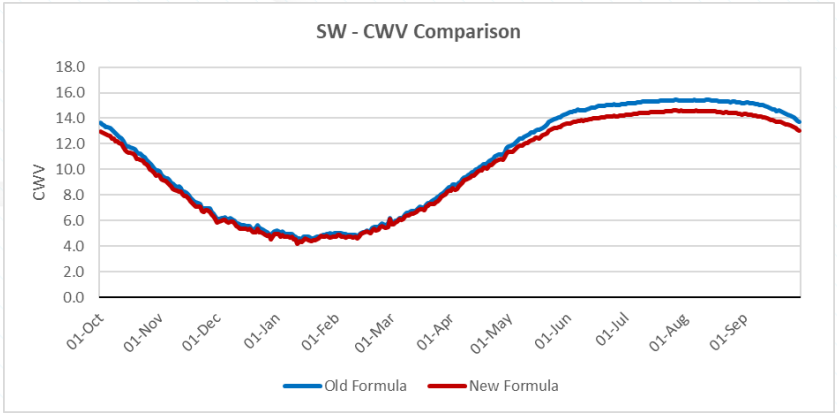




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.801

Seasonal Normal Review – SW (2 of 4)



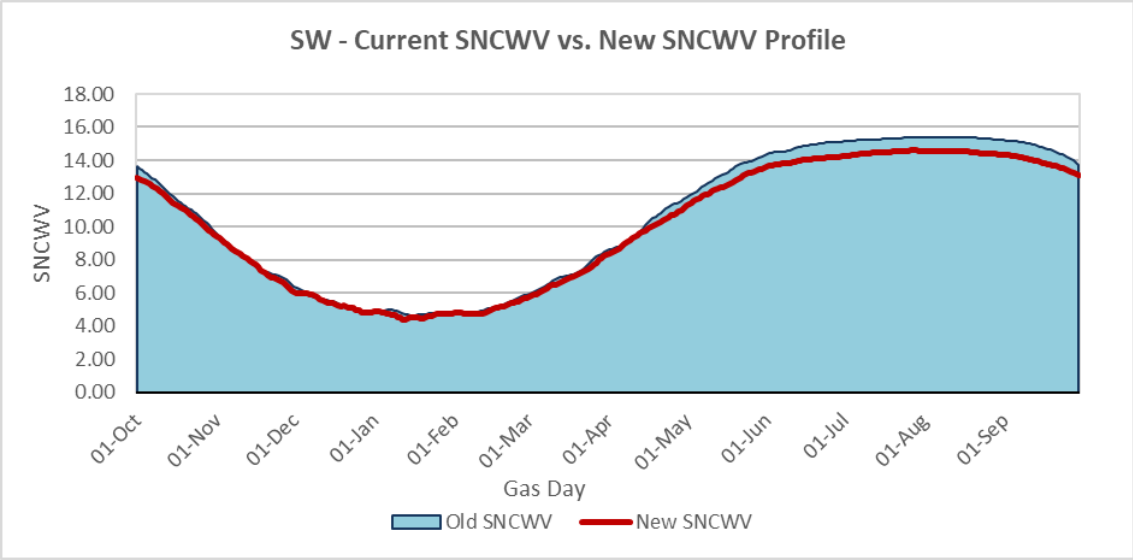


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.22	3	14.2	17.3	0.42
2020	0.258	3.476	13.254	17.898	0.337

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	11.55%	5.26%
Transition	23.37%	31.76%
Normal	60.34%	57.16%
Cold weather upturn	4.74%	5.82%

- The increase observed in LDZ SW's upper warm weather cut-off (V2) has lead to fewer days falling within the Summer cut-off phase and reaching the max CWV value
- An increase in the cold weather upturn threshold (V0) has resulted in an additional 1.08% of days falling within the cold weather upturn phase

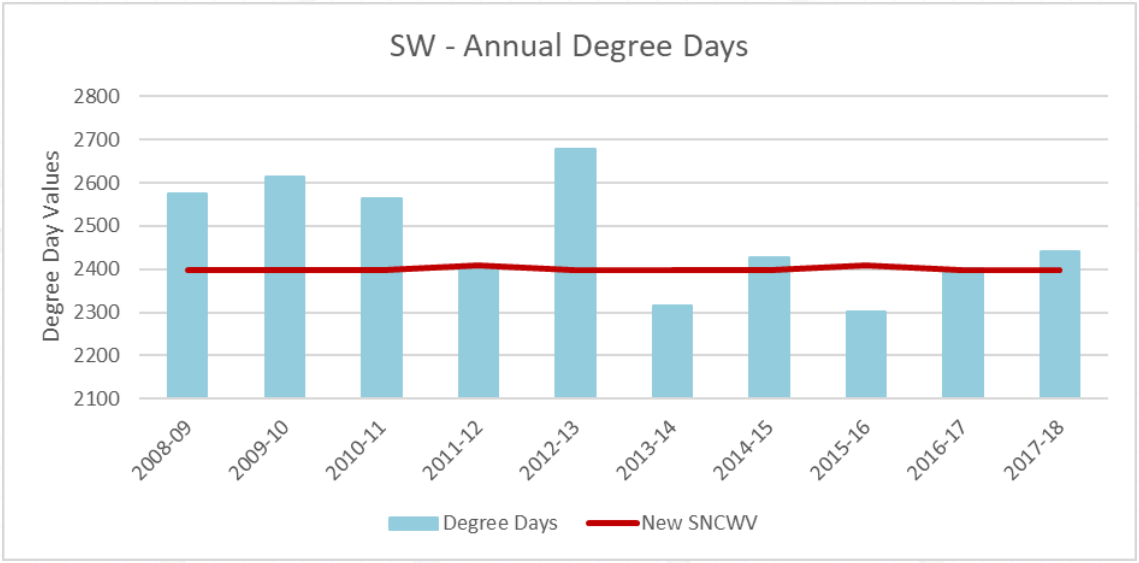
Seasonal Normal Review – SW (3 of 4)



Overall % Change from Current SNCWV		
Annual	-4.33%	Decrease
Dec to Feb	-2.29%	Decrease
Mar to May	-4.09%	Decrease
Jun to Aug	-5.50%	Decrease
Sep to Nov	-3.90%	Decrease

- The value of LDZ SW's SNCWV has shown a 4.33% decrease from the old to the new basis.
- Reductions in the SNCWV values can be observed throughout the year.

Seasonal Normal Review – SW (4 of 4)



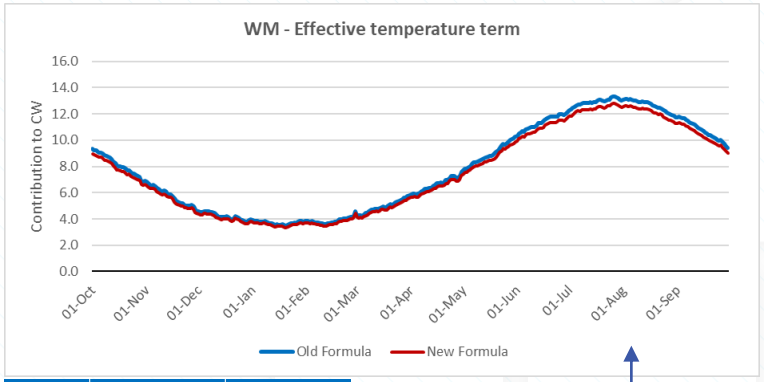
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 2 of the 10 most recent gas years were warmer than the new SNCWV basis.

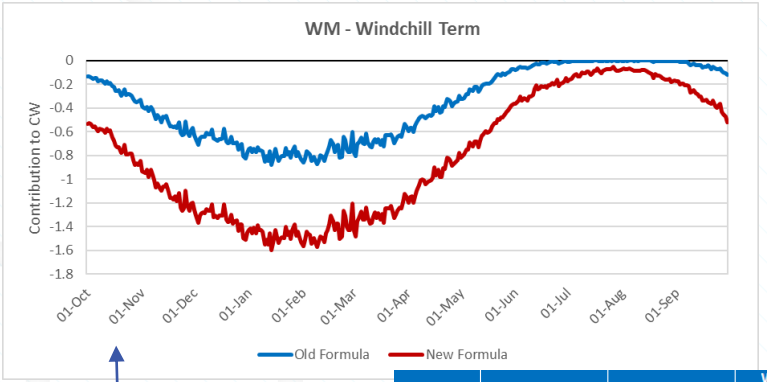
Seasonal Normal Review

Seasonal Normal Composite Weather Variable (SNCWV) for WM

Seasonal Normal Review – WM (1 of 4)

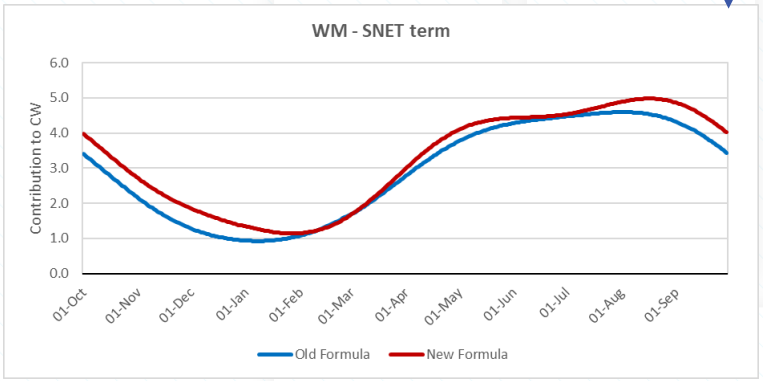


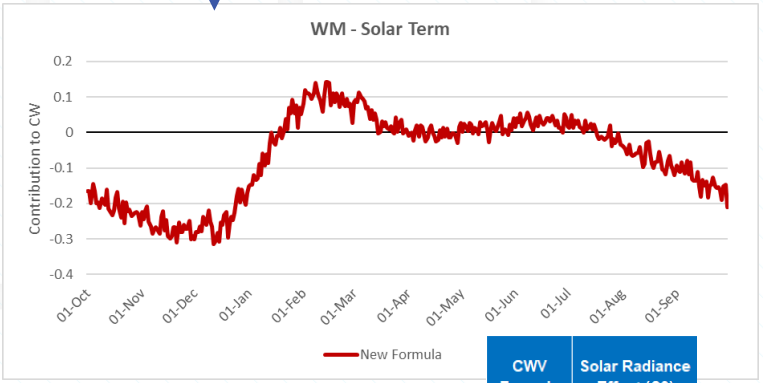
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.72
2020	0.471	0.692



$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$

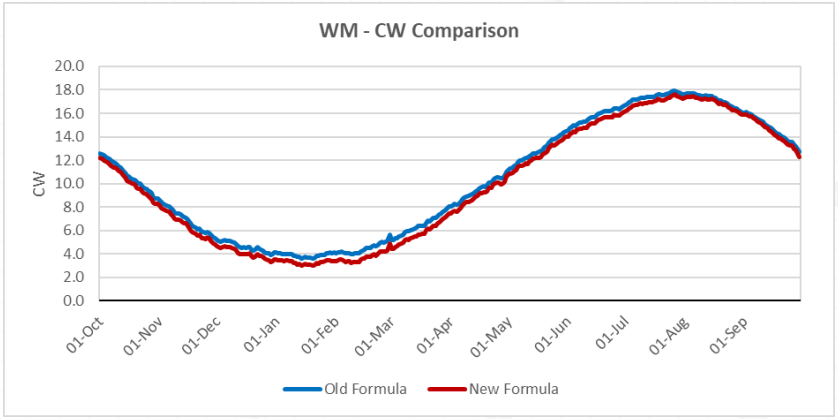
CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0111	0	14
2020	0.010	-3.619	17.569

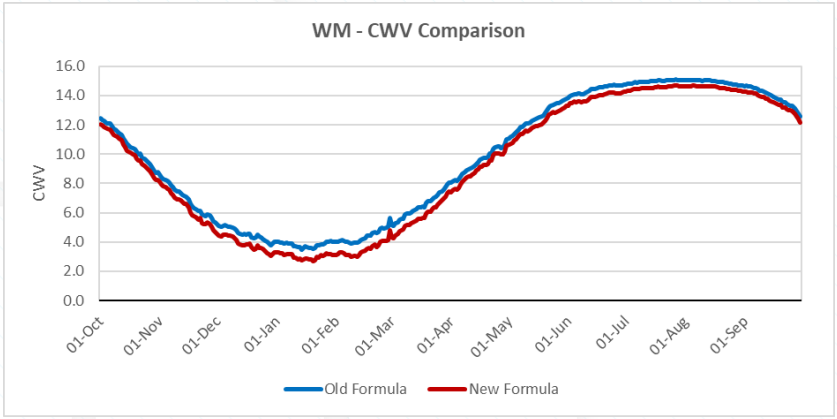




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.678

Seasonal Normal Review – WM (2 of 4)



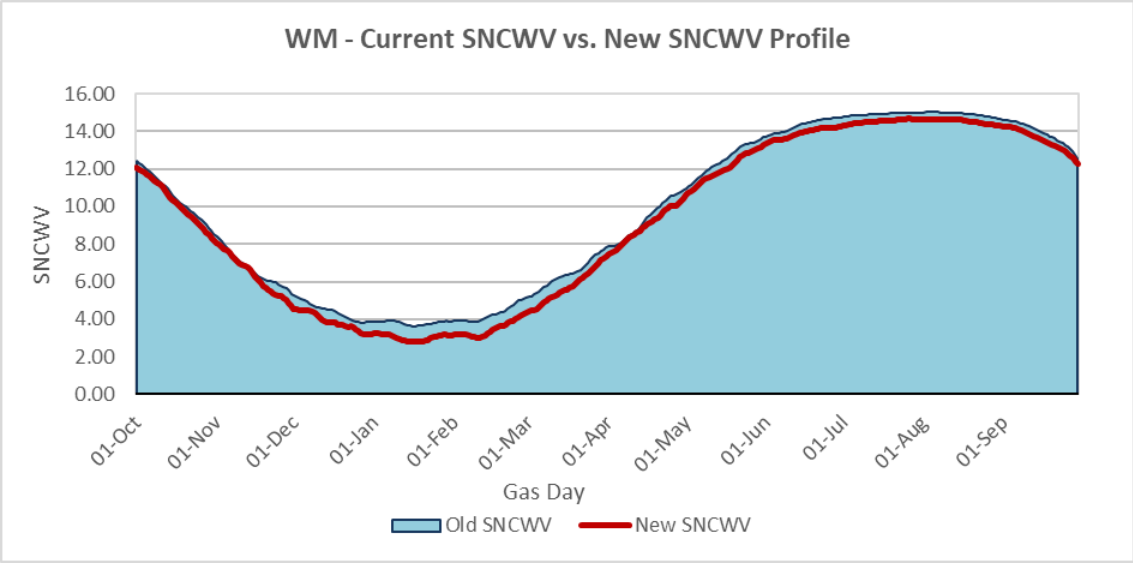


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.14	3	13.7	17.2	0.43
2020	0.163	4.385	13.392	17.480	0.368

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	10.29%	7.51%
Transition	23.18%	25.20%
Normal	58.81%	48.76%
Cold weather upturn	7.71%	18.53%

- A reduction in the warm weather cut-offs (V1 & V2) has lead to an increase in the number of days falling within the Summer cut-off phase and reaching the max CWV value
- Following an increase from 3 to 4.385 in LDZ WM's Cold weather upturn threshold (V0), 18.53% of days under the new seasonal normal basis now fall within the cold weather upturn phase.

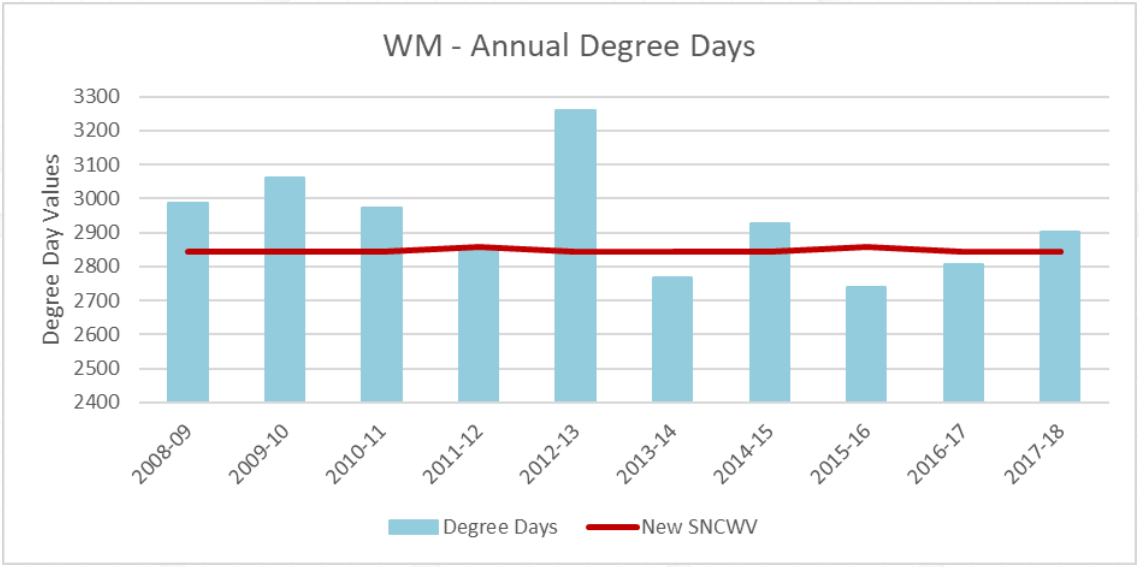
Seasonal Normal Review – WM (3 of 4)



Overall % Change from Current SNCWV		
Annual	-4.97%	Decrease
Dec to Feb	-16.87%	Decrease
Mar to May	-5.30%	Decrease
Jun to Aug	-2.71%	Decrease
Sep to Nov	-3.13%	Decrease

- The value of LDZ WM's SNCWV has shown a 4.97% decrease from the old to the new basis.
- Reductions in the SNCWV values can be observed throughout the year.

Seasonal Normal Review – WM (4 of 4)



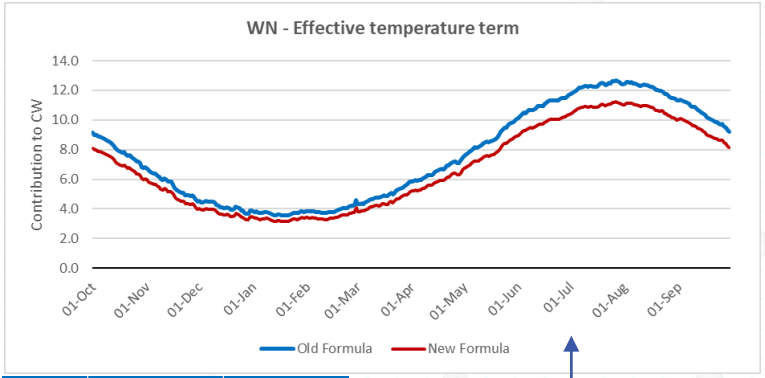
Low bars = Warmer weather; High bars = Colder weather

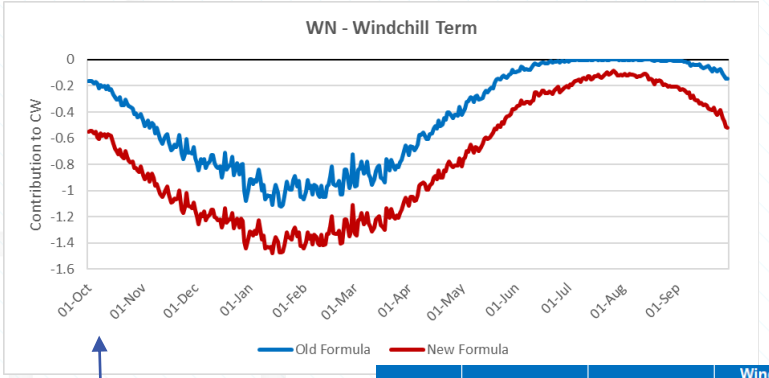
- A Degree Day calculation indicates that 4 of the 10 most recent gas years were warmer than the new SNCWV basis.

Seasonal Normal Review

Seasonal Normal Composite Weather Variable (SNCWV) for WN

Seasonal Normal Review – WN (1 of 4)

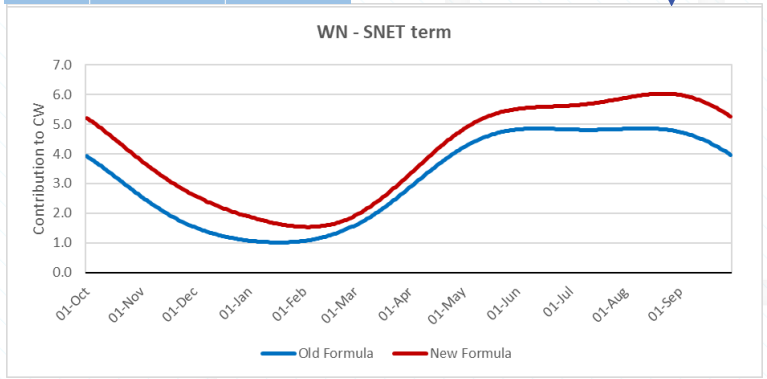


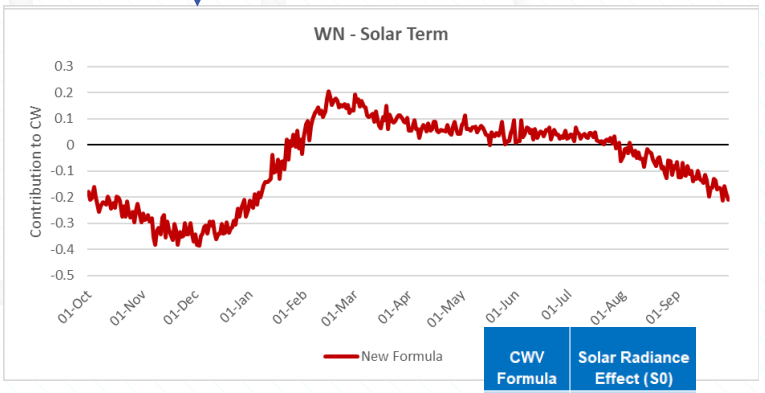


CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.697
2020	0.482	0.618

$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$

CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0149	0	14
2020	0.009	-3.926	18.249

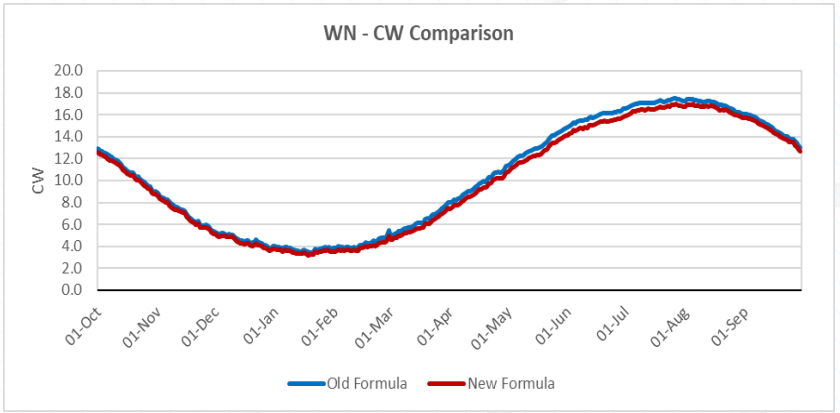


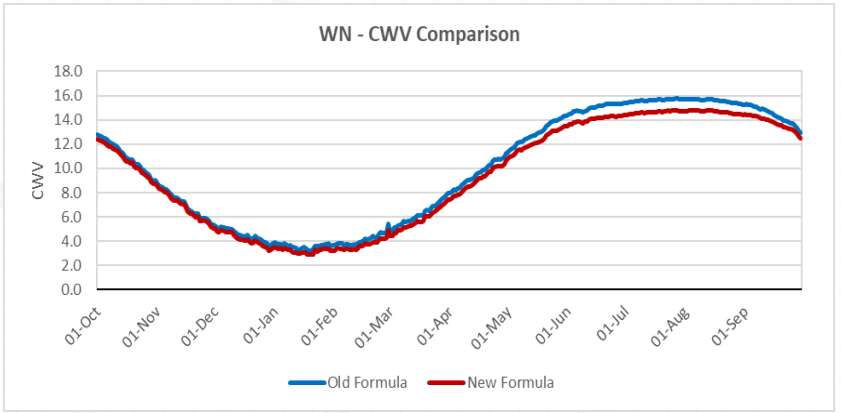


CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.679

Seasonal Normal Review – WN (2 of 4)

UPDATED SLIDE





CWV Formula	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)
2015	0.3	3	14.9	18	0.38
2020	0.324	3.773	13.477	16.987	0.445

*

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	5.30%	7.64%
Transition	22.46%	25.17%
Normal	64.27%	54.18%
Cold weather upturn	7.96%	13.01%

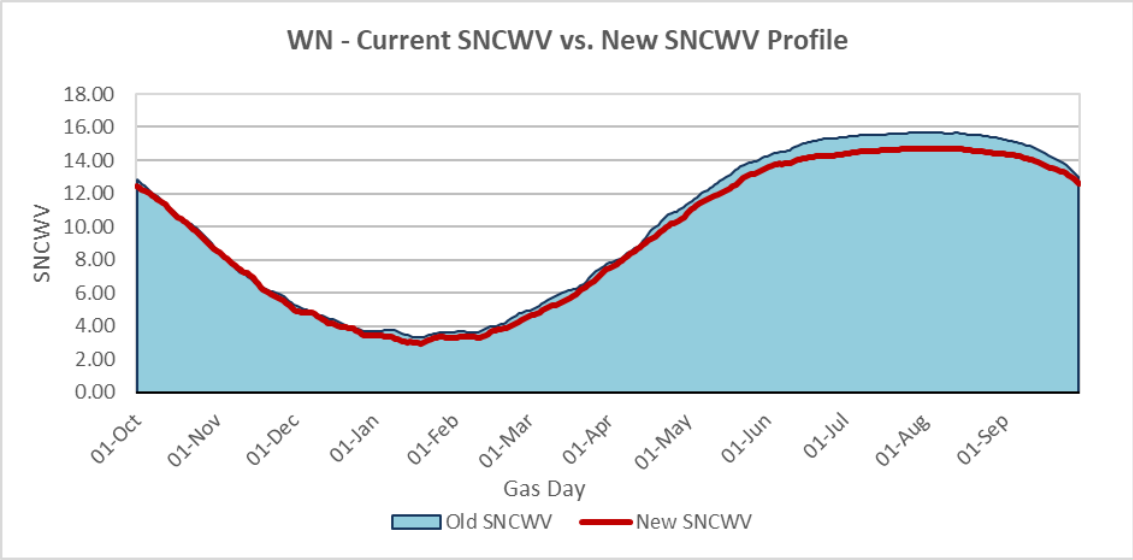
*

- Following a reduction in the upper warm weather cut-off value (V2), an additional 2.34% of days fall within the summer cut-off phase under the new seasonal normal basis
- An increase in the cold weather upturn threshold (V0) has resulted in 13.01% of days falling within the cold weather upturn phase, up from 7.96%

* Updated in version 2

Seasonal Normal Review – WN (3 of 4)

UPDATED SLIDE



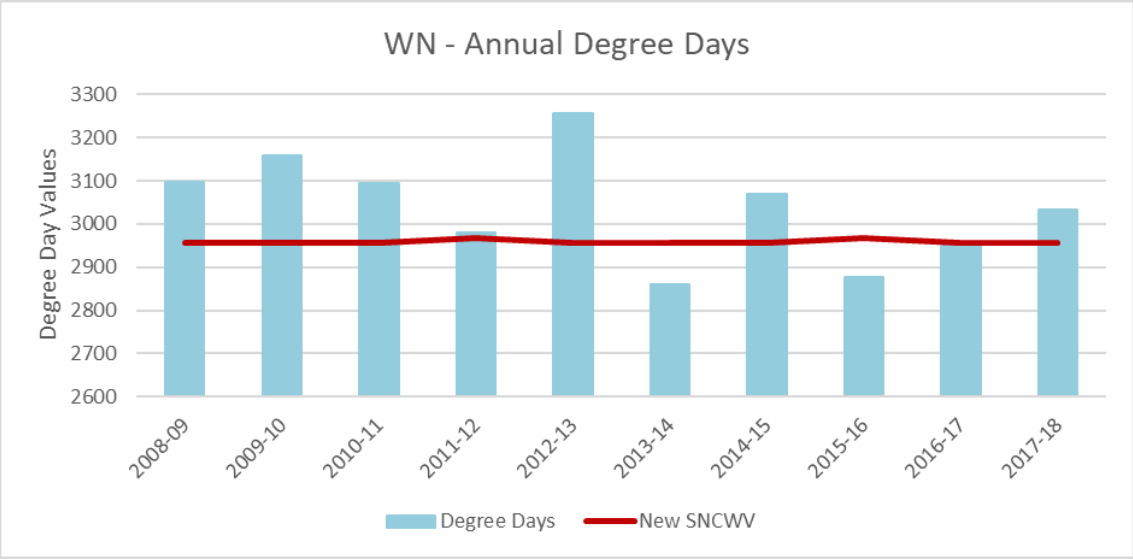
Overall % Change from Current SNCWV		
Annual	-5.04%	Decrease
Dec to Feb	-7.34%	Decrease
Mar to May	-5.34%	Decrease
Jun to Aug	-5.81%	Decrease
Sep to Nov	-2.79%	Decrease

*

- The value of LDZ WN's SNCWV has shown a 5.04% decrease from the old to the new basis.
- Reductions in the SNCWV values can be observed throughout the year.

* Updated in version 2

Seasonal Normal Review – WN (4 of 4)



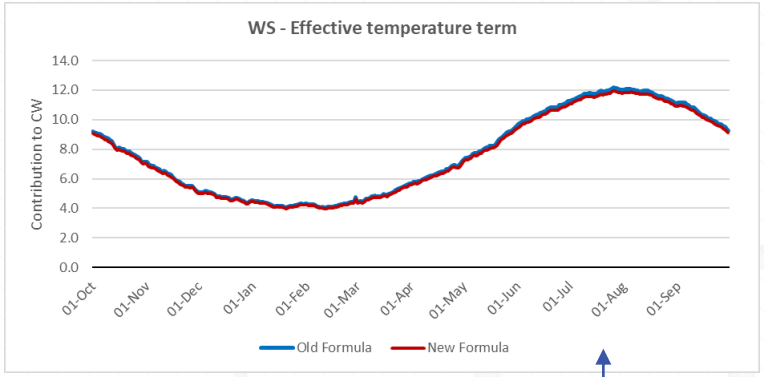
Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 3 of the 10 most recent gas years were warmer than the new SNCWV basis.

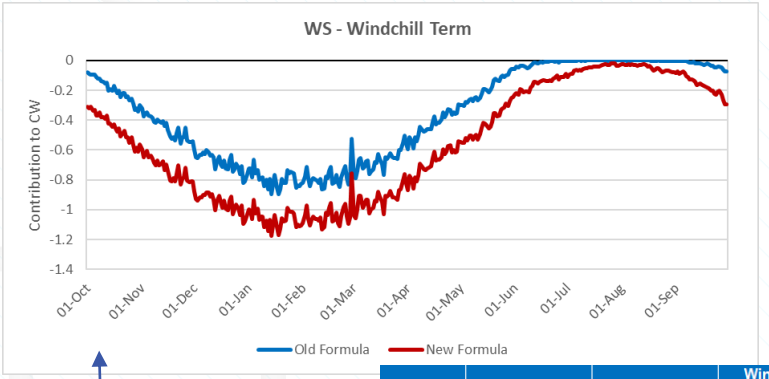
Seasonal Normal Review

Seasonal Normal Composite Weather Variable (SNCWV) for WS

Seasonal Normal Review – WS (1 of 4)

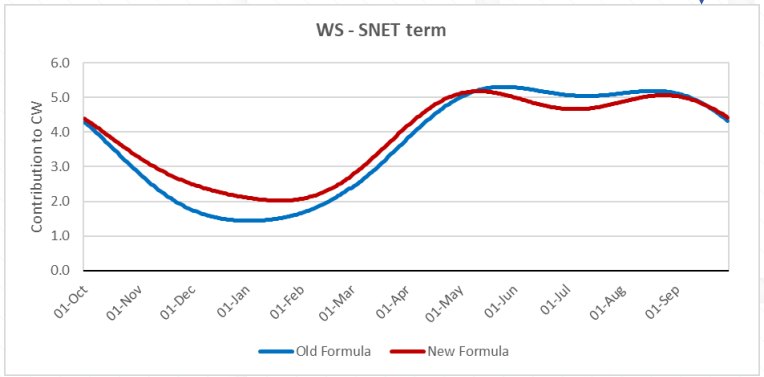


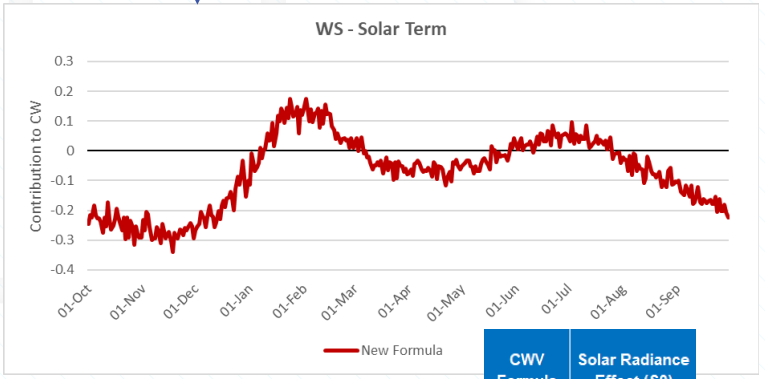
CWV Formula	Effective Temperature/AT Weight	Effective Temperature Weight (I1)
2015	0.5	0.669
2020	0.543	0.657



CWV Formula	Wind Chill Weight (I2)	Wind Chill Wind Cut-Off (W0)	Wind Chill Temperature Cut-Off (T0)
2015	0.0101	0	14
2020	0.008	-1.910	17.068

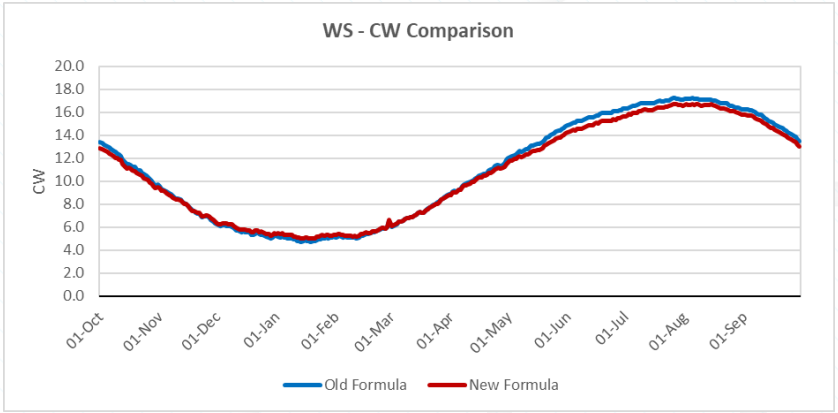
$$CW_t = I_1 * E_t + (1.0 - I_1) * S_t - I_2 * \max(0, W_t - W_0) * \max(0, T_0 - AT_t) + S_0 * SR_t + P_0 * P_t$$

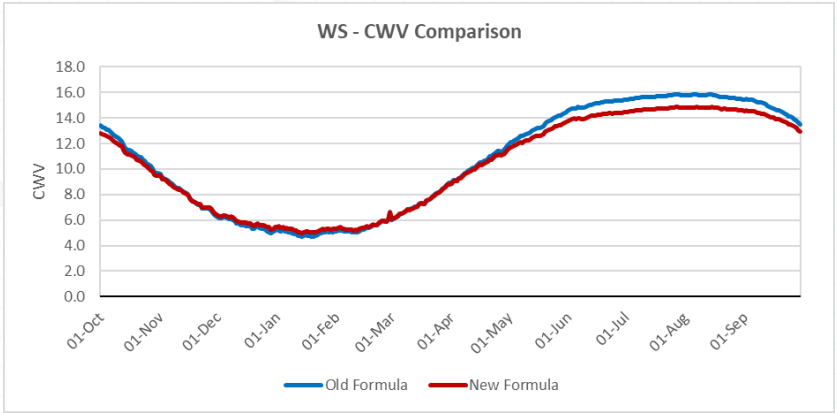




CWV Formula	Solar Radiance Effect (S0)
2015	n/a
2020	0.776

Seasonal Normal Review – WS (2 of 4)



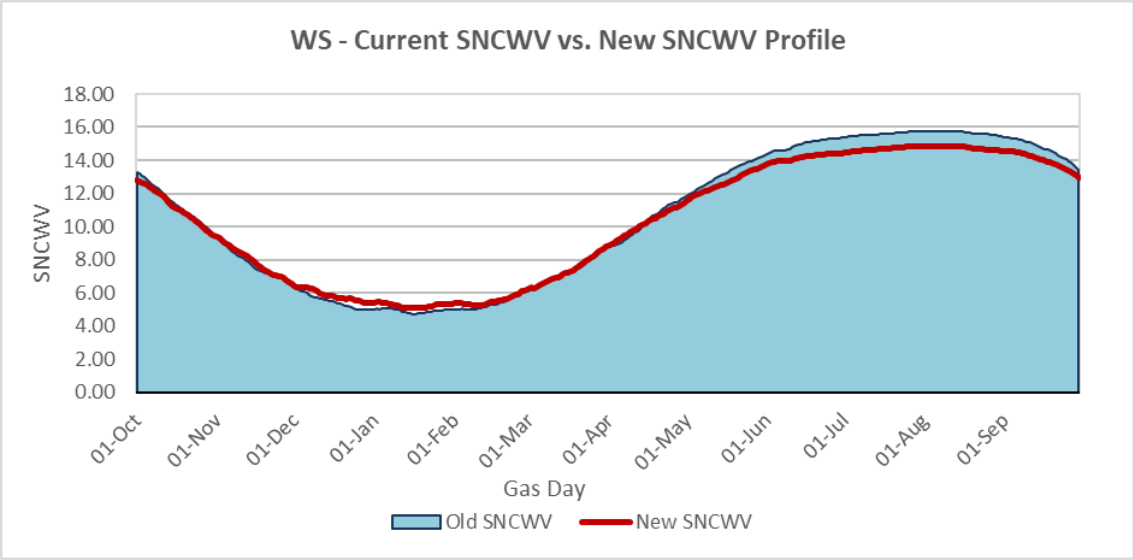


CWV Formula	Cold Weather Sensitivity (I3)	Cold Weather Upturn Threshold (V0)	Lower Warm Weather Cut-Off (V1)	Upper Warm Weather Cut-Off (V2)	Slope Relating to Warm Weather Cut-Off (q)
2015	0.11	3	14.8	17.9	0.46
2020	0.079	1.797	13.826	17.186	0.384

Phase	2015 CWV Formula	2020 CWV Formula
Summer cut-off	3.71%	4.58%
Transition	25.92%	27.57%
Normal	66.47%	66.49%
Cold weather upturn	3.90%	1.36%

- A reduction in the warm weather cut-offs (V1 & V2) has lead to an increase in the number of days falling within the Summer cut-off phase and reaching the max CWV value
- A reduction in the cold weather upturn threshold (V0) has resulted in fewer days falling within the cold weather upturn phase

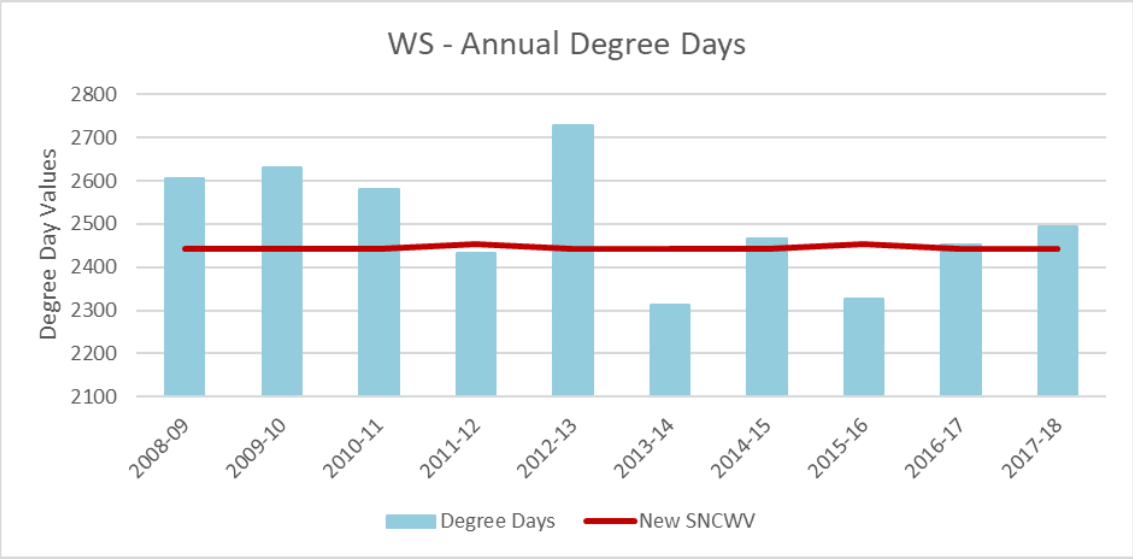
Seasonal Normal Review – WS (3 of 4)



Overall % Change from Current SNCWV		
Annual	-2.42%	Decrease
Dec to Feb	5.47%	Increase
Mar to May	-1.79%	Decrease
Jun to Aug	-5.65%	Decrease
Sep to Nov	-2.23%	Decrease

- The value of LDZ WS's SNCWV has shown a 2.42% decrease from the old to the new basis.
- An increase of 5.47% can be observed during the winter months (December to February), all other seasons show a decrease

Seasonal Normal Review – WS (4 of 4)



Low bars = Warmer weather; High bars = Colder weather

- A Degree Day calculation indicates that 3 of the 10 most recent gas years were warmer than the new SNCWV basis.

Seasonal Normal Review

Summary

Seasonal Normal Review – LDZ Summary

UPDATED SLIDE

LDZ	Dec to Feb	Mar to May	Jun to Aug	Sep to Nov	Annual
EA	4.64%	0.71%	-0.17%	1.45%	1.05%
EM	0.52%	-1.70%	-3.40%	-1.80%	-2.18%
NE	0.09%	-5.03%	-7.12%	-5.31%	-5.49%
NO	-8.39%	-5.08%	-4.91%	-3.90%	-4.96%
NT	-2.37%	-0.63%	0.63%	0.75%	0.00%
NW	-16.72%	-9.05%	-8.19%	-8.47%	-9.33%
SC	-9.90%	-3.34%	-1.87%	-1.56%	-2.92%
SE	5.06%	-2.04%	-4.61%	-2.19%	-2.18%
SO	3.73%	1.13%	-0.13%	1.69%	1.18%
SW	-2.29%	-4.09%	-5.50%	-3.90%	-4.33%
WM	-16.87%	-5.30%	-2.71%	-3.13%	-4.97%
WN	-7.34%	-5.34%	-5.81%	-2.79%	-5.04%
WS	5.47%	-1.79%	-5.65%	-2.23%	-2.42%

Increase
Decrease

*

- 10 of 13 LDZ's have seen a reduction in their overall SNCWV Values
- During the summer months (June to August), the SNCWV values for 12 of 13 LDZ's have decreased whilst NT has increased.
- 6 of 13 LDZ's have seen an increase to their SNCWV values during the winter months (December to February)

* Updated in version 2

Seasonal Normal Review – Conclusions

- Changes to both the ‘Shape’ and ‘Levels’ of SNCWV can be observed in most LDZ’s
- Majority of LDZ’s have seen a reduction in SNCWV values. As seen, this can be explained by the changing of the underlying parameters which have been successfully optimised against observed demand
- Coldest days of profiles for all LDZs under the new basis lie between 12th and 20th January and Warmest days of profiles for all LDZs under the new basis are between 25th July and 7th August
- Any questions on proposed SNCWV profiles that haven’t been covered during the presentation ?

- **Vote Required:**
- Are DESC Members happy to approve the revised SNCWV values effective from 1st October 2020 ?

Seasonal Normal Review – Next Steps

- Once DESC approval is gained….

- Short Term - By end of w/c 9th December 2019

  - Xoserve to publish the Seasonal Normal CWV Methodology document (for future reference), along with SNET, SNES, and SNCWV values.
  - These will be published on the Secure area of Xoserve's Website (UK Link docs) which all Users are able to access
  - Ensure all Comms to relevant Industry Forums is planned for in 2020

- Long Term - During 2020

  - In Q1 of 2020 perform 'back-runs' of individual years' EUC models using new CWVs and SNCWVs required for Spring 2020 NDM analysis
  - In Q2 of 2020 perform Spring 2020 Modelling using new CWVs and SNCWVs
  - In Q3 of 2020, produce revised WAALPs for all EUCs using new ALPs, DAFs, CWVs and SNCWVs to support AQ calculations in September 2020
  - In Q3 of 2020 produce 'Seasonal Normal Ratios' for each EUC which will be applied to those Supply Points which fail to calculate in the September 2020 AQ Calculation run

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