AUSTIN ENERGY'S 2022 BASE RATE REVIEW	§ § §	**BEFORE THE CITY OF AUSTIN** **IMPARTIAL HEARING EXAMINER**

AUSTIN ENERGY'S RESPONSE TO INDEPENDENT CONSUMER ADVOCATE'S FIRST REQUEST FOR INFORMATION

Austin Energy files this Response to the Independent Consumer Advocate's ("ICA") First Request for Information ("RFI") submitted on April 25, 2022.[1] Pursuant to the 2022 Austin Energy Base Rate Review Procedural Guidelines § F(2)(f)(1), this Response is timely filed.

Respectfully submitted,

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ATTORNEYS FOR THE CITY OF AUSTIN D/B/A AUSTIN ENERGY

[1] The ICA's First Request for Information was submitted to the Rate Review Administrator after 12:00 pm on April 22, 2022, so it is considered submitted the following business day, on April 25, 2022.

ICA 1-1 Please provide workpapers and documentation that shows the adjustment of each customer classes' annual base and pass-through revenues for the end of period number of customers. If this adjustment was not performed, please provide each customer classes' number of customers for each month of the test year and demand and energy base revenues by month (in Excel spreadsheet format).

ANSWER: Please refer to Attachments ICA RFI 1-1a and ICA RFI 1-1b.

Attachment ICA RFI 1-1a summarizes the data with respect to energy sales, as well as total Net Energy for Load (NEL). This attachment describes how energy sales are adjusted for year-end customer counts. The total energy sales (page 1, column E, row 14) and total NEL (page 2, column B, row 20) can be found on page 3.

Page 3 of Attachment ICA RFI 1-1a illustrates the calibration of customer class billing determinants to the forecast model.

Attachment ICA RFI 1-1a: Forecast Model Output Summary
Attachment ICA RFI 1-1b: Forecast Model Output Summary in Excel spreadsheet format

Prepared by: JL/ZD
Sponsored by: Brian Murphy and Grant Rabon

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Year	Month	SalesGWH	SalesGWH_WA	SalesGWH_CCA	ResGWH_WA	ResGWH_CCA	ResPremise	KWhPerResBill_WA	ComGWH_WA	ComGWH_CCA	ComBills	KWhPerComBill_WA	IndusGWH	IndGWH_CCA	IndBills	KWhPerIndBill
2	2020	10	**1,114.9**	1,108.9	1,129.7	**382.48**	392.22	**450,355**	849	**491.70**	496.31	**53,271**	9,230	**234.69**	241.21	**36**	6,519,089
3	2020	11	**969.7**	965.1	982.4	**310.74**	317.54	**451,937**	688	**436.15**	440.64	**53,223**	8,195	**218.20**	224.26	**36**	6,061,209
4	2020	12	**948.2**	942.3	957.1	**303.52**	309.55	**452,835**	670	**428.39**	431.30	**53,408**	8,021	**210.39**	216.23	**36**	5,844,133
5	2021	1	**1,073.2**	1,103.8	1,114.5	**393.29**	400.35	**453,686**	867	**476.58**	480.31	**53,353**	8,933	**233.88**	233.88	**37**	6,321,193
6	2021	2	**927.8**	938.1	954.9	**327.28**	332.73	**454,271**	720	**414.73**	420.65	**53,015**	7,823	**196.07**	201.52	**36**	5,446,484
7	2021	3	**924.3**	827.8	836.5	**259.44**	263.18	**455,252**	570	**412.56**	417.53	**53,132**	7,765	**155.78**	155.78	**37**	4,210,158
8	2021	4	**951.1**	960.4	966.1	**293.33**	296.73	**456,520**	643	**442.47**	444.78	**53,491**	8,272	**224.58**	224.58	**37**	6,069,803
9	2021	5	**987.2**	1,035.3	1,047.7	**345.84**	349.27	**457,283**	756	**472.48**	475.42	**53,439**	8,842	**217.02**	223.05	**36**	6,028,312
10	2021	6	**1,124.4**	1,174.5	1,178.8	**432.47**	435.70	**458,400**	943	**519.55**	520.63	**53,659**	9,682	**222.44**	222.44	**37**	6,011,979
11	2021	7	**1,341.7**	1,366.8	1,370.4	**532.33**	534.66	**459,812**	1,158	**579.67**	580.85	**53,662**	10,802	**254.84**	254.84	**37**	6,887,700
12	2021	8	**1,311.3**	1,373.5	1,381.3	**553.94**	555.30	**460,698**	1,202	**584.17**	584.07	**53,780**	10,862	**235.37**	241.91	**36**	6,538,021
13	2021	9	**1,428.7**	1,432.6	1,432.6	**573.61**	573.61	**461,827**	1,242	**610.56**	610.56	**53,771**	11,355	**248.45**	248.45	**37**	6,714,791
14	FY21		13,102.6	13,229.0	13,352.0	4,708.3	4,760.8			5,869.0	5,903.0			2,651.7	2,688.2		
15																	

16 Notes:

17 A. SalesGWH_WA = ResGWH_WA + ComGWH_WA + IndusGWH
18 B. SalesGHW_CCA = ResGWH_CCA + ComGWH_CCA + IndGWH_CCA
19 C. ResGWH_CCA = ResBills (Year 2021, Month 9) * kWhPerResBill_WA
20 D. kWhPerResBill_SA = ResGWH_WA / ResBills
21 E. ComGWH_WA = ComBills (Year 2021, Month 9) * kWhPerComBill_WA
22 F. kwhPerComBill_WA = ComGWH_WA / ComBills
23 G. IndGWH_CCA = IndBills (Year 2021, Month 9) * kWhPerIndBill
24 H. kWhPerIndBill = IndGWH / IndBills
25 I. Forecast model utilitzes premise counts for residential customers in place of bills
26 J. Forecast model utilitzes customer counts for residential customers in place of bills

	A	B	C	D
1	Calendar Month	EnergyMWh	PeakMW	
2	202010	1,131,797.0	2,229.0	
3	202011	963,577.0	1,758.0	
4	202012	1,058,130.0	1,936.0	
5	202101	1,080,216.0	2,085.0	
6	202102	964,727.0	2,551.0	
7	202103	926,404.0	1,614.0	
8	202104	1,031,283.0	2,136.0	
9	202105	1,178,087.0	2,374.0	
10	202106	1,381,166.0	2,706.0	
11	202107	1,441,508.0	2,686.0	
12	202108	1,500,245.0	2,712.0	
13	202109	1,325,574.0	2,666.0	
14				
15	Total	13,982,714		
16				
17	Add CDT	1225		9/30/20-23:59:59
18	Sub CST	-1603		9/30/21-23:59:59
19				
20	CDT Adj:	13,982,336		
21				
22	Notes:			
23	[1] Meter record data on CDT			
24	[2] Forecast is prepared on CST			

Class	Billing Cycle Sales kWh Adjusted for Weather and Year End Customers		Adjust Bill Cycle Data to Hourly Basis		Normalized for Weather and Year End Customers	Reference
Residential	4,760,843,159	+	123,691,009	=	4,884,534,169	WP H-5.1
Secondary Voltage < 10 kW	325,578,909	+	-23,692,590	=	301,886,319	WP H-5.2
Secondary Voltage ≥ 10 < 300 kW	2,708,283,359	+	12,313,453	=	2,720,596,811	WP H-5.3
Secondary Voltage ≥ 300 kW	2,334,516,983	+	-85,240,353	=	2,249,276,630	WP H-5.4
Primary Voltage < 3 MW	337,625,514	+	-2,276,889	=	335,348,624	WP H-5.5
Primary Voltage ≥ 3 < 20 MW	1,002,951,618	+	-4,592,954	=	998,358,663	WP H-5.6
Primary Voltage ≥ 20 MW		+	0	=		WP H-5.7
Primary Voltage ≥ 20 MW @ 85% aLF	1,567,568,315	+	-19,829,655	=	1,547,738,660	WP H-5.8
Transmission Voltage	26,421,075	+	614,282	=	27,035,357	WP H-5.10
Transmission Voltage ≥ 20 MW @ 85% aLF	232,558,916	+	-4,692,158	=	227,866,758	WP H-5.11
Service Area Street Lighting	39,370,462	+	3,090,026	=	42,460,488	WP H-5.12
City-Owned Private Outdoor Lighting	9,972,534	+	970,118	=	10,942,652	WP H-5.13
Customer-Owned Non-Metered Lighting	1,734,696	+	27,114	=	1,761,810	WP H-5.14
Customer-Owned Metered Lighting	4,623,605	+	283,428	=	4,907,033	WP H-5.15
Total Energy @ Meter	13,352,049,144				13,352,713,976	
GWh Sales	13,352.1				13,352.7	
Forecast Model	13,352.0					
Variance	0					
Add Line Loss (GWh)					629.6	WP F-6.1.2
Energy @ Generator					13,982.3	WP F-6.1
Forecast Model					13,982.3	
Variance					0	

Note: Billing cycles cross over months

Attachment ICA 1-1b

Provided separately in
Native Excel Format

ICA 1-2 Please provide all analyses and assessments regarding the impact of the COVID-19 pandemic on Austin Energy's revenues, customer usage, and customer class demand and energy allocation factors.

ANSWER: Please refer to Attachment ICA RFI 1-2: FY 2021 Monthly Energy Sales and Revenue.

In April 2020, in response to the COVID pandemic, Austin Energy made several modifications to its charges and practices. The sole base revenue impact was the elimination of the top two tiers from the residential rate schedule. All residential consumption above 1,000 kWh was billed at the inside city rate for tier 3. The estimated FY 2020 impact of this change was $4,126,536. This rate reduction was reversed on November 1, 2020.

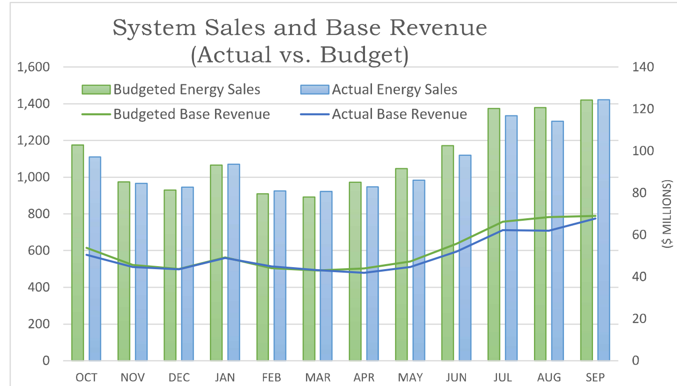
Attachment ICA RFI 1-2: FY 2021 Monthly Energy Sales and Revenue

Prepared by: ZD
Sponsored by: Brian Murphy

Austin Energy
Monthly Energy Sales and Revenue
(Fiscal Year 2021)

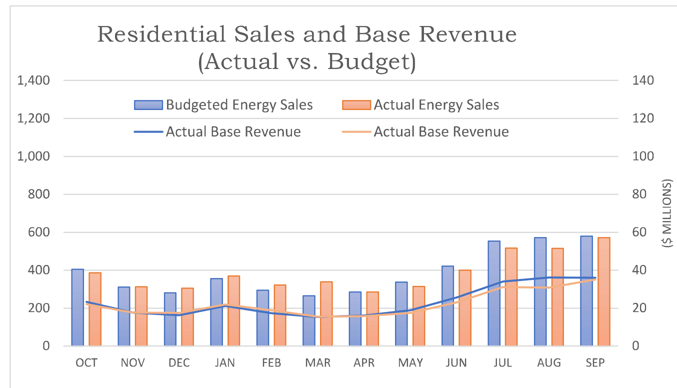
System Total Sales

Revenue Month	Energy Sales (GWh)				Base Revenue ($millions)			
	Budget	Actual	Forecast w/Actual Weather	COVID Impact	Budget	Actual	Forecast w/Actual Weather	COVID Impact
OCT	1,175.5	1,110.2	1,169.7	(59.6)	53.8	50.4	51.9	(1.5)
NOV	974.6	966.0	979.3	(13.3)	45.6	44.7	44.8	(0.1)
DEC	930.6	945.4	948.4	(3.0)	43.7	43.7	43.2	0.5
JAN	1,065.5	1,070.2	1,040.9	29.3	49.3	48.9	47.3	1.6
FEB	908.8	925.6	911.0	14.6	44.1	45.0	44.0	1.0
MAR	891.8	922.4	987.1	(64.7)	43.0	43.2	48.8	(5.5)
APR	973.2	948.0	958.6	(10.6)	44.0	41.9	41.9	(0.0)
MAY	1,046.5	983.7	997.6	(13.9)	47.3	44.6	44.7	(0.1)
JUN	1,171.6	1,119.6	1,144.5	(25.0)	55.8	52.0	52.7	(0.6)
JUL	1,374.0	1,335.0	1,351.6	(16.6)	66.2	62.3	63.5	(1.2)
AUG	1,378.9	1,304.3	1,327.4	(23.1)	68.6	62.0	63.4	(1.4)
SEP	1,420.3	1,421.6	1,428.6	(7.0)	69.1	67.8	68.5	(0.8)
FYTD	13,311.3	13,051.9	13,244.9	(192.9)	630.5	606.4	614.6	(8.1)



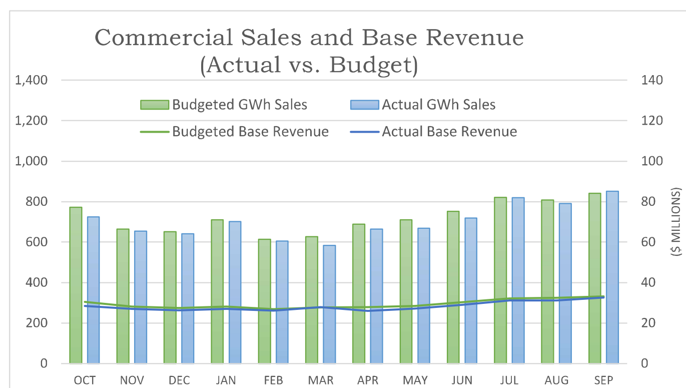
Residential Sector Sales

Revenue Month	Energy Sales (GWh)				Base Revenue ($millions)			
	Budget	Actual	Forecast w/Actual Weather	COVID Impact	Budget	Actual	Forecast w/Actual Weather	COVID Impact
OCT	403.7	386.3	400.7	(14.4)	23.2	22.0	22.9	(0.9)
NOV	310.4	312.4	312.5	(0.2)	17.6	17.6	17.6	0.1
DEC	279.6	304.1	290.1	13.9	16.2	17.4	16.7	0.7
JAN	355.1	369.2	336.8	32.4	21.2	21.9	20.3	1.6
FEB	294.5	320.8	298.7	22.1	17.3	18.8	17.7	1.1
MAR	264.5	339.0	343.7	(4.7)	15.3	15.4	20.0	(4.6)
APR	284.2	284.6	275.3	9.3	16.1	15.8	15.6	0.2
MAY	336.9	314.6	305.9	8.6	18.8	17.5	17.4	0.2
JUN	420.4	400.3	405.2	(4.9)	25.5	23.0	23.4	(0.4)
JUL	552.6	516.1	541.5	(25.4)	34.0	31.1	32.6	(1.5)
AUG	571.1	513.9	540.7	(26.8)	36.2	30.8	32.4	(1.5)
SEP	578.6	571.1	586.7	(15.6)	35.9	35.1	36.1	(1.0)
FYTD	4,651.7	4,632.2	4,637.9	(5.7)	277.3	266.4	272.6	(6.2)



Commercial & Industrial Sector Sales

Revenue Month	Energy Sales (GWh)				Base Revenue ($millions)			
	Budget	Actual	Forecast w/Actual Weather	COVID Impact	Budget	Actual	Forecast w/Actual Weather	COVID Impact
OCT	771.8	723.9	769.0	(45.2)	30.5	28.5	29.0	(0.6)
NOV	664.2	653.6	666.7	(13.1)	28.1	27.0	27.2	(0.1)
DEC	650.9	641.4	658.3	(17.0)	27.5	26.3	26.5	(0.2)
JAN	710.4	701.0	704.1	(3.1)	28.1	27.0	27.0	(0.0)
FEB	614.3	604.8	612.3	(7.5)	26.9	26.2	26.3	(0.1)
MAR	627.3	583.3	643.4	(60.0)	27.7	27.8	28.7	(0.9)
APR	689.0	663.4	683.3	(19.9)	27.9	26.0	26.2	(0.2)
MAY	709.7	669.1	691.7	(22.5)	28.5	27.1	27.4	(0.2)
JUN	751.1	719.3	739.3	(20.0)	30.2	29.0	29.3	(0.2)
JUL	821.4	818.9	810.1	8.8	32.2	31.2	30.9	0.2
AUG	807.8	790.4	786.8	3.6	32.4	31.1	31.0	0.1
SEP	841.7	850.6	841.9	8.6	33.2	32.7	32.4	0.2
FYTD	8,659.6	8,419.7	8,607.0	(187.2)	353.2	340.0	342.0	(1.9)



ICA 1-3 Please provide supporting documents and data for weather normalization adjustments applied to base revenues and energy and demand ratios.

ANSWER: The weather normalization of Energy Sales and Peak Demand is based on model simulation methodology.

Please see Attachment ICA RFI 1-3: Weather Normalization of Energy Sales and Peak Demand.

Prepared by: ZD
Sponsored by: Russell Maenius

4.11 Weather Normalization

The process of weather normalization adjusts actual revenue month sales to “normal” levels based on normal weather conditions. Basically, this allows us to compare current energy and demand usage from the previous year’s weather normalized usage and be able to assess positive/negative growth estimates by isolating (quantifying) the change in usage beyond normal weather patterns. The key assumptions in this process are as follows:

- Normal Weather calculation based on prior 20-year historical dry bulb updated every other year
- Cooling Degree-Day (CDD)/Heating Degree-Day (HDD) dry bulb temperature breakpoints pegged at 65/55 F
- Historical/Normal Revenue Month CDD/HDD used in the Residential and Commercial Sector Sales models are “Bill Cycle“ weighted
- Economic parameters utilized in the Residential, Commercial, and Industrial Sector Sales forecasts are based on latest Travis County Projections by Perryman Group and Woods & Poole Economics, Inc.
- DSM Peak Demand & Energy Savings are based on historical performance and future goals as provided by AE’s Customer Energy Solutions group.

Weather normalization is performed at the sector level but only on the Residential and Commercial sector sales. Industrial Sectors sales are deemed not significantly sensitive to weather patterns. Thus, AE’s weather normalized sales is expressed mathematically, as follows:

$$WN\_Sales_{y,m} = WN\_ResSales_{y,m} + WN\_ComSales_{y,m} + IndSectorSales_{y,m}$$

where:

WN_Sales $_{y,m}$ - AE’s Weather Normalized Revenue Month Sales in year y, month m

WN_ResSales $_{y,m}$ - Weather Normalized Residential Sector Revenue Month Sales in year y, month m estimated from the Residential Sector Model Normal Weather Simulation

WN_ComSales $_{y,m}$ - Weather Normalized Commercial Sector Revenue Month Sales in year y, month m, calculated utilizing the weather response estimates derived from the Non-Residential Sector Sales Model Normal Weather Simulation

IndSectorSales $_{y,m}$ - Actual Industrial Sector Sales Revenue Month Sales in year y, month m

Weather normalization estimation utilizes the same models as the revenue month sales SAE forecast models and thus leverage on the existing modeling and weather CDD/HDD calculation infrastructure. At a high level, the Residential and Commercial Weather Normalized Sales are calculated by applying a “weather adjustment” on the energy sales based on the revenue month’s prevailing weather conditions. On the Residential Sector Sales, the weather adjustment is calculated on an average customer consumption basis. However, on the Commercial Sector Sales, the weather adjustment is estimated at the sector level.

The weather adjustment is defined by calculating the difference (delta) in the model predicted revenue month energy usage estimates between historical (actual) weather CDD/HDD conditions and normal (average) weather scenario. Thus, other than gathering and loading previous month residential customer count and sales for each billing rates into MetrixND data tables, the more complex part of the process lies on the calculation of actual billing cycle weighted CDD/HDD values and the weather normal scenario simulation. However, these two processes are handled by the MetrixLT 4.x and MetrixND 4.x software environments.

The main module of the Weather Normalization Process is implemented in a separate MetrixND 4.x project file. The evaluation of AE's weather normalized sales is handled by SalesGWH_WN transform under MonthlyFcst_WN transform table object (See Figure 106). References to both Actual and Normal Billing Cycle Weighted CDD/HDD values are also included in this transform table.

The revenue month actual Billing Cycle Weighted CDD/HDD is arguably the most critical parameter in the weather normalizing Residential and Commercial Sector Sales. Since it is pre-requisite to recalibrating both Residential and Commercial SAE models, it is covered first in Section 4.11.1.

The high level implementation details of weather normalizing Residential Sector and Commercial Sector Sales are covered in Section 4.11.2 and Section 4.11.3, respectively. Nomalization of Austin Energy's System One-Hour Peak is handled in Section 4.11.4.

Transform Table: MonthlyFcst_WN

```
SalesGWH = MonthlyFcst_WN.ResGWH + MonthlyFcst_WN.ComIndGWH
CDD = RevenueMonthCddHdd.CDD65
HDD = RevenueMonthCddHdd.HDD55
Total_WA = MonthlyFcst_WN.ResGWH_WA+ MonthlyFcst_WN.ComIndGWH_WA
SalesGWH_WN = MonthlyFcst_WN.ResGWH_WN + MonthlyFcst_WN.ComIndGWH_WN
BillDays = UtilityData.BillingDays
NormalCDD = WeatherTrans.NCDD65
NormalHDD = WeatherTrans.NHDD55
ResCustomers = UtilityData.ResCustomers
SalesPerHH_NetPV = EconTrans.SalesPerHH
SalesPerHH_WA = AveResSalesNormal.Diff
ResGWH = (MonthlyFcst_WN.SalesPerHH_NetPV * UtilityData.ResCustomers / 1000000.0) + (UtilityData.SolarPV_KWH / 1000000.0)
ResSolarPV_GWH = UtilityData.SolarPV_KWH / 1000000.0
ResGWH_WN = (MonthlyFcst_WN.SalesPerHH_NetPV_WN * MonthlyFcst_WN.ResCustomers / 1000000) + (UtilityData.SolarPV_KWH / 1000000.0)
ResGWH_WA = MonthlyFcst_WN.ResGWH - MonthlyFcst_WN.ResGWH_WN
SalesPerHH = (MonthlyFcst_WN.ResGWH / MonthlyFcst_WN.ResCustomers ) * 1000000
SalesPerHH_Check = MonthlyFcst.SalesPerHHIncPV
SalesPerHH_WN = MonthlyFcst_WN.SalesPerHH - MonthlyFcst_WN.SalesPerHH_WA
ResGWH_WN_Check = (MonthlyFcst_WN.SalesPerHH * MonthlyFcst_WN.ResCustomers / 1000000) - MonthlyFcst_WN.ResGWH_WN
ComPVSalesAdj = IF (  YEAR  >= 2018 ) THEN
                      UtilityDataCom.SolarPV_KWH
                    ELSE
                      0
                ENDIF
ComIndGWH = MonthlyFcst_WN.ComIndGWH_NetPV + MonthlyFcst_WN.ComPVSalesAdj / 1000000
Variance_CandI_CovidGWH = MonthlyFcst_WN.ComIndGWH - MonthlyFcst_WN.ComIndGWH_FCST
Variance_CandI_Covid = (MonthlyFcst_WN.ComIndGWH - MonthlyFcst_WN.ComIndGWH_FCST) / MonthlyFcst_WN.ComIndGWH
ComIndGWH_FCST = Non_Residential.Predicted + MonthlyFcst_WN.ComPVSalesAdj / 1000000
ComIndGWH_WA = Non_ResidentialSalesNormal.Diff
ComIndGWH_NetPV_WN = MonthlyFcst_WN.ComIndGWH_NetPV - MonthlyFcst_WN.ComIndGWH_WA
ComIndGWH_WN = MonthlyFcst_WN.ComIndGWH - MonthlyFcst_WN.ComIndGWH_WA
NTSGWH = NTS_MonthlyLoadStat.EnergyGWH
NTSGWH_WN = NTS_MonthlyLoadStat.EnergyGWH - NTSGWH_Normal.Diff
NTS_WA = NTSGWH_Normal.Diff
PeakMW = NTS_MonthlyLoadStat.PeakMW
WA_HDD = MonthlyFcst_WN.HDD - MonthlyFcst_WN.NormalHDD
WA_CDD = MonthlyFcst_WN.CDD - MonthlyFcst_WN.NormalCDD
```

Figure 106a – MetrixND 4.x MonthlyFcst_WN Transform Table Object – Design View Panel

Transform Table: MonthlyFcst_WN

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Year	Month	SalesGWH	CDD	HDD	Total_WA	SalesGWH_WN	BillDays	NormalCDD	NormalHDD	ResCustomers	SalesPerHH_NetPV	SalesPerHH_WA	ResGWH
113	2018	4	945.203	123	7	12.44	932.761	31.55	95	21	423,541	629.403	14.273	271.311
114	2018	5	986.514	220	4	-32.33	1,018.847	29.75	261	3	424,250	690.391	-47.434	298.102
115	2018	6	1,341.836	576	0	114.10	1,227.736	31.8	435	0	424,941	1,163.499	168.882	500.658
116	2018	7	1,327.594	614	0	23.12	1,304.478	29.8	585	0	425,800	1,205.971	34.183	519.388
117	2018	8	1,441.317	710	0	60.20	1,381.121	31.2	636	0	426,330	1,347.299	88.962	580.560
118	2018	9	1,399.133	629	0	-2.37	1,401.500	31.3	632	0	427,330	1,247.872	-3.494	538.923
119	2018	10	1,075.389	341	6	-1.60	1,076.991	28.5	348	0	428,480	826.903	-0.661	358.767
120	2018	11	1,001.359	110	44	-36.19	1,037.552	31.5	165	33	428,891	688.236	-49.950	299.414
121	2018	12	929.449	12	110	4.39	925.062	29.7	28	86	429,911	666.044	13.645	289.755
122	2019	1	1,023.782	2	152	-27.96	1,051.738	31.45	12	179	431,355	768.805	-49.187	334.662
123	2019	2	983.477	16	134	-23.21	1,006.682	30.4	17	164	431,819	712.471	-42.998	311.169
124	2019	3	931.924	27	127	33.66	898.259	29.15	35	72	432,680	665.352	65.762	290.988
125	2019	4	927.950	89	25	-2.10	930.052	30.25	95	21	433,775	598.912	-1.763	265.074
126	2019	5	1,000.053	212	1	-41.68	1,041.735	30.65	261	3	434,062	681.924	-61.203	301.802
127	2019	6	1,210.606	451	0	13.43	1,197.171	30.8	435	0	435,102	955.805	19.473	422.834
128	2019	7	1,303.800	563	0	-17.76	1,321.560	30.75	585	0	436,444	1,119.680	-25.769	495.243
129	2019	8	1,426.401	691	0	45.38	1,381.021	30.6	636	0	437,493	1,282.675	65.741	568.040
130	2019	9	1,466.968	719	0	71.61	1,395.357	30.75	632	0	439,200	1,316.944	103.495	584.727
131	2019	10	1,276.974	549	0	165.45	1,111.520	30	348	0	440,041	1,055.745	238.740	470.475
132	2019	11	1,005.685	133	67	-0.60	1,006.280	29.55	165	33	440,722	682.217	9.353	305.516
133	2019	12	984.357	42	76	3.99	980.370	30.9	28	86	441,529	663.156	2.729	297.126
134	2020	1	993.386	13	80	-72.76	1,066.146	31.95	12	179	442,531	694.824	-134.205	312.100
135	2020	2	963.239	14	80	-65.30	1,028.543	29.85	17	164	443,340	637.676	-118.703	287.056
136	2020	3	934.347	52	66	9.20	925.145	29.65	35	72	444,613	628.126	11.292	283.966
137	2020	4	937.482	152	9	38.02	899.463	30.5	95	21	445,509	664.063	50.858	300.988
138	2020	5	981.184	278	2	13.42	967.762	29.9	261	3	446,403	761.937	18.983	347.573
139	2020	6	1,159.450	453	0	15.11	1,144.344	30.4	435	0	447,330	979.295	21.488	445.991
140	2020	7	1,386.687	648	0	52.52	1,334.170	31.9	585	0	447,566	1,248.550	74.871	567.142
141	2020	8	1,367.943	687	0	42.16	1,325.780	30.05	636	0	448,767	1,271.909	60.009	578.971
142	2020	9	1,331.087	627	0	-3.53	1,334.614	30.3	632	0	449,591	1,191.320	-5.013	542.960
143	2020	10	1,114.857	355	0	6.01	1,108.846	30.75	348	0	450,355	842.810	8.538	386.320
144	2020	11	969.725	179	23	4.61	965.112	29.15	165	33	451,937	677.933	3.624	312.379
145	2020	12	948.247	57	62	5.89	942.355	30.35	28	86	452,835	659.647	1.227	304.079
146	2021	1	1,073.220	4	147	-30.71	1,103.927	33.2	12	179	453,686	800.810	-53.025	369.231
147	2021	2	927.766	4	165	-10.35	938.114	28.2	17	164	454,271	695.202	-14.219	320.822
148	2021	3	924.276	36	200	97.13	827.149	29.1	35	72	455,252	732.942	174.863	339.041
149	2021	4	951.064	102	1	-9.39	960.457	31.55	95	21	456,520	605.583	-19.098	284.607
150	2021	5	987.236	206	0	-48.24	1,035.473	30.35	261	3	457,283	672.617	-68.359	314.578
151	2021	6	1,124.447	375	0	-50.14	1,174.591	30.2	435	0	458,400	857.382	-70.194	400.293
152	2021	7	1,341.727	555	0	-25.18	1,366.912	31.1	585	0	459,812	1,103.420	-35.159	516.162
153	2021	8	1,311.324	562	0	-62.32	1,373.643	29.75	636	0	460,698	1,096.434	-86.894	513.910
154	2021	9	1,428.709	627	0	-3.91	1,432.621	31.65	632	0	461,827	1,215.717	-5.446	571.092
155	2021	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Figure 106b – MetrixND 4.x MonthlyFcst_WN Transform Table Object – Data View Panel

4.11.1 Actual Billing Cycle Weighted CDD/HDD Calculation

The calculation of *Actual Billing Cycle Weighted CDD/HDD* calculation is implemented in the MetrixLT 4.x software environment utilizing the same modeling infrastructure employed in the *Historical and Normal Billing Cycle Weighted CDD/HDD* calculation (See Section 3.5). The actual daily temperature profiles for the previous month (taken at Camp Mabry station) are loaded in AEDailyWeather data table (See Figure 107). Daily average dry bulb, MaxTemp, MinTemp, CDD65, HDD55 are calculated in a separate MetrixND 4.x transform object.

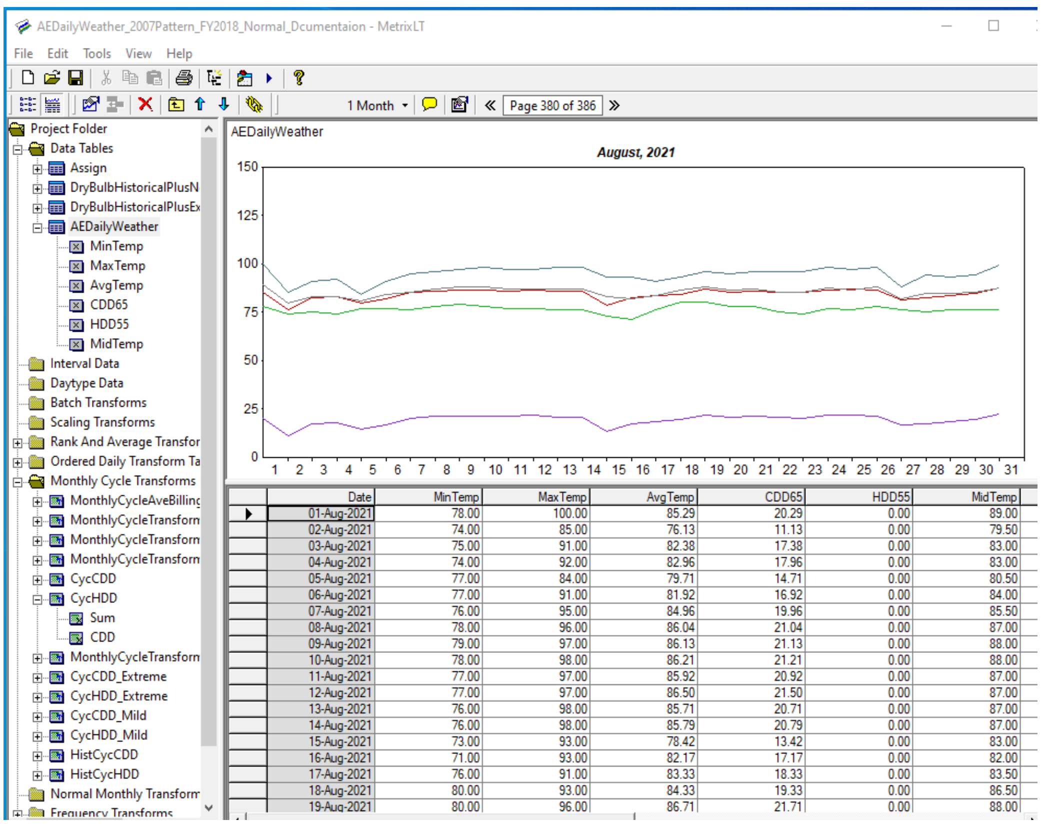


Figure 107 – MetrixLT 4.x AEDailyWeather Data Table Object – Data View Panel

The calculation of Bill Cycle Weighted CDD/HDD for the prior revenue month is handled in MetrixLT 4.x CycCDD (Figure 108a) and CycHDD (Figure 108b) Monthly Cycle transforms. *Billing Cycle Weighted CDD/HDD* derived from both transforms are then used to update the RevenueMonthCddHdd Data Table object (See Figure 109) which is then referenced by both the Residential and Commercial Sector SAE Models.

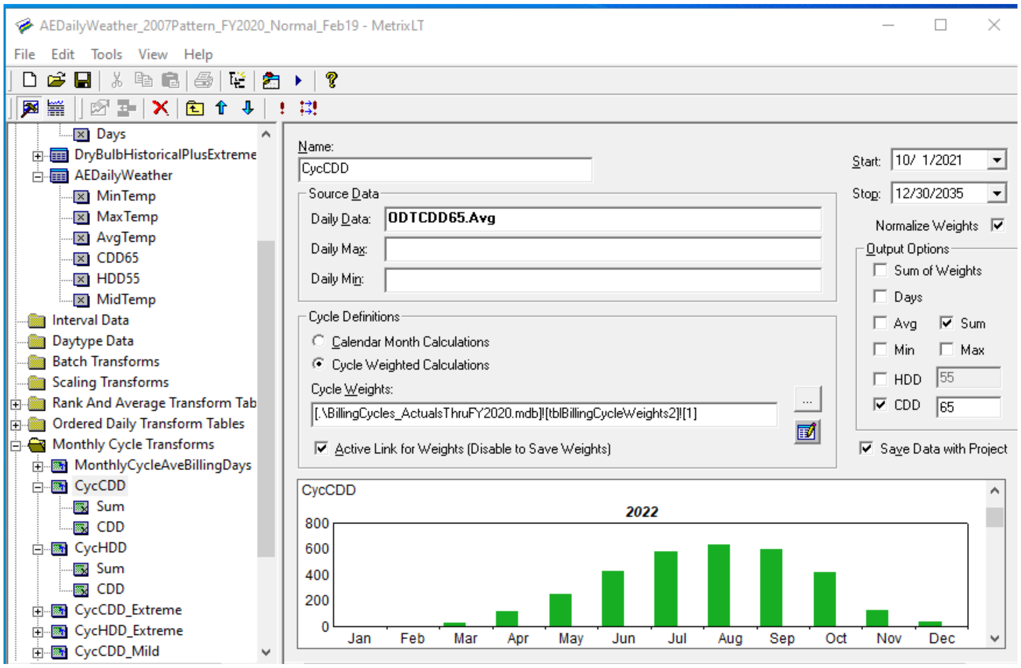


Figure 108a – MetrixLT 4.x CycCDD Monthly Cycle Transform Object – Data View Panel

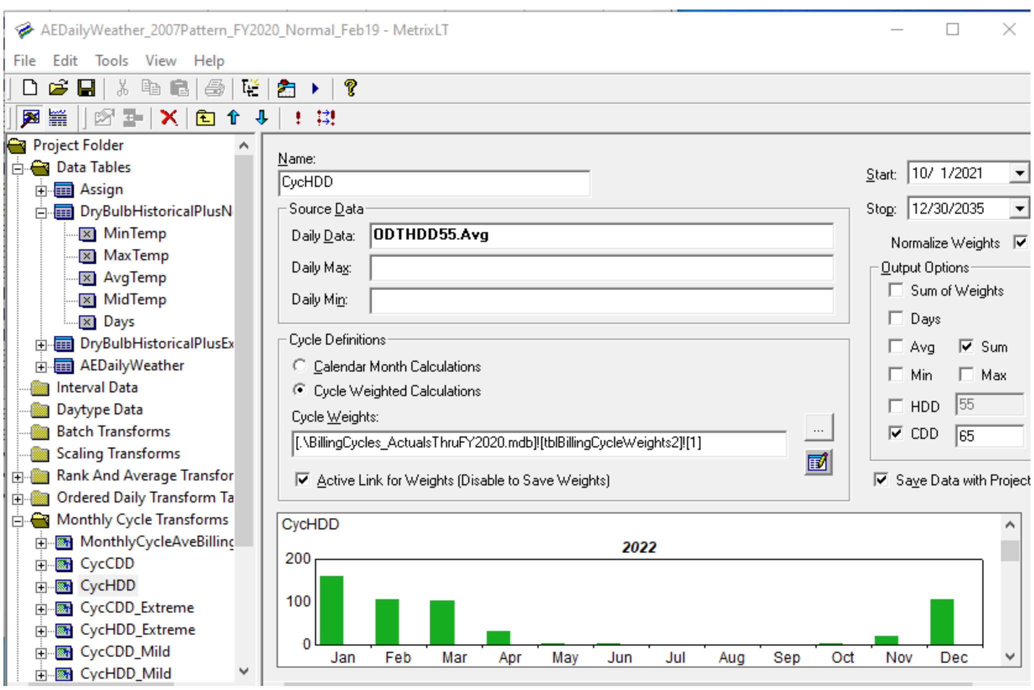
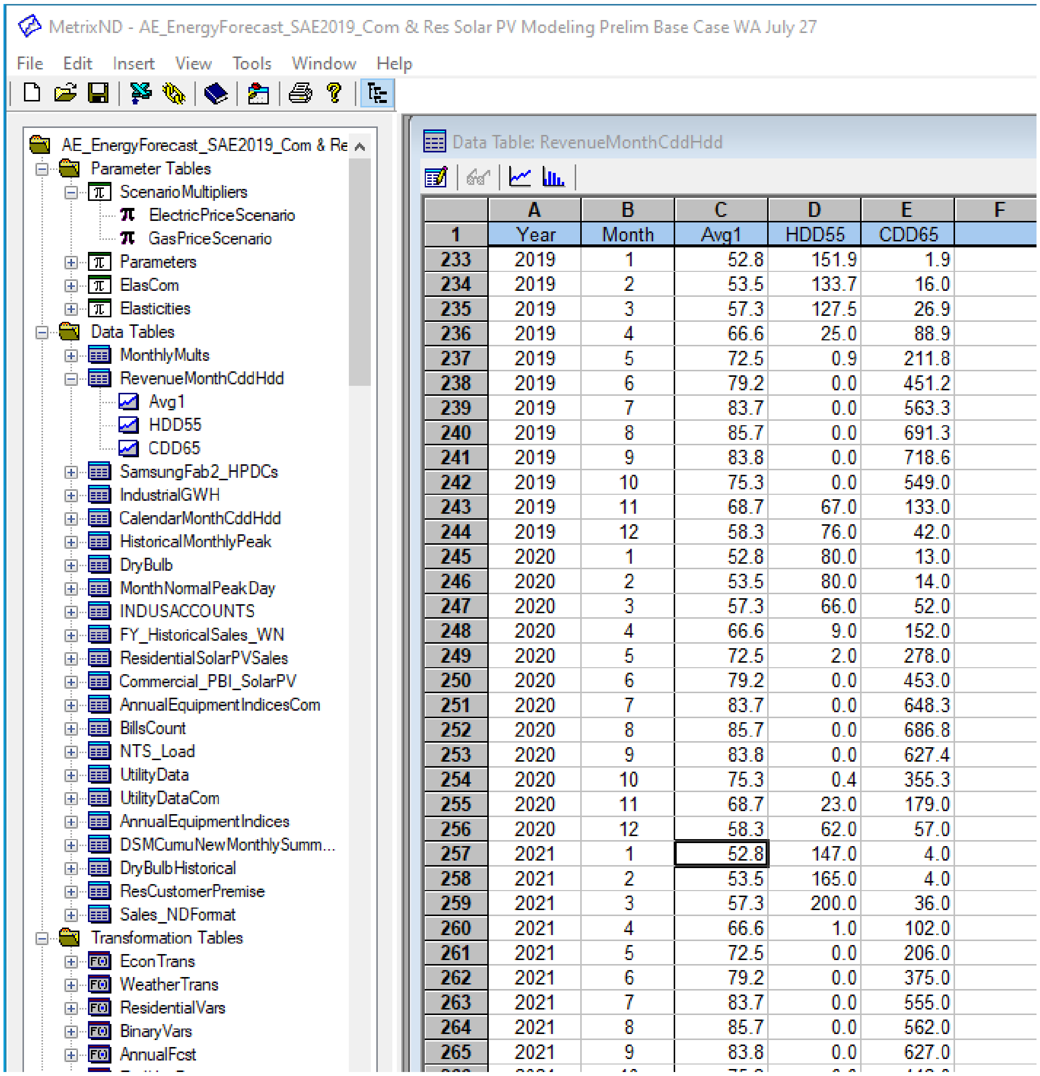


Figure 108b – MetrixLT 4.x CycHDD Monthly Cycle Transform Object – Data View Panel



	A	B	C	D	E	F
1	Year	Month	Avg1	HDD55	CDD65	
233	2019	1	52.8	151.9	1.9	
234	2019	2	53.5	133.7	16.0	
235	2019	3	57.3	127.5	26.9	
236	2019	4	66.6	25.0	88.9	
237	2019	5	72.5	0.9	211.8	
238	2019	6	79.2	0.0	451.2	
239	2019	7	83.7	0.0	563.3	
240	2019	8	85.7	0.0	691.3	
241	2019	9	83.8	0.0	718.6	
242	2019	10	75.3	0.0	549.0	
243	2019	11	68.7	67.0	133.0	
244	2019	12	58.3	76.0	42.0	
245	2020	1	52.8	80.0	13.0	
246	2020	2	53.5	80.0	14.0	
247	2020	3	57.3	66.0	52.0	
248	2020	4	66.6	9.0	152.0	
249	2020	5	72.5	2.0	278.0	
250	2020	6	79.2	0.0	453.0	
251	2020	7	83.7	0.0	648.3	
252	2020	8	85.7	0.0	686.8	
253	2020	9	83.8	0.0	627.4	
254	2020	10	75.3	0.4	355.3	
255	2020	11	68.7	23.0	179.0	
256	2020	12	58.3	62.0	57.0	
257	2021	1	52.8	147.0	4.0	
258	2021	2	53.5	165.0	4.0	
259	2021	3	57.3	200.0	36.0	
260	2021	4	66.6	1.0	102.0	
261	2021	5	72.5	0.0	206.0	
262	2021	6	79.2	0.0	375.0	
263	2021	7	83.7	0.0	555.0	
264	2021	8	85.7	0.0	562.0	
265	2021	9	83.8	0.0	627.0	

Figure 109 – MetrixND 4.x RevenueMonthCddHdd Data Table Object – Data View Panel

4.11.2 Residential Sector Sales Normalization

To reiterate, the monthly forecast of Residential Sector Energy Sales is calculated by multiplying the average residential consumption (modeled by the Residential SAE Model) by the number of forecasted customer accounts. Thus, the weather normalized Residential Sector Energy Sales in year y and month m may be expressed as follows:

$$WN\_ResSales_{y,m} = Customer\ Count_{y,m} \times WN\_AveResSales_{y,m}$$

where:

WN_ResSales $_{y,m}$ - Weather Normalized Residential Sector Sales in year y, month m

Customer Count $_{y,m}$ - Actual Residential Customer Count in year y, month m represented by the number of residential premises.

WN_AveResSales $_{y,m}$ - Weather Normalized Average Residential Customer Consumption in forecast year y, month m derived from the Residential SAE Model

The Weather Normalized Average Residential Customer Consumption is calculated by adding a weather adjustment to the Average Residential Customer Consumption. In equation form,

$$WN\_AveResSales_{y,m} = AveCustomerSales_{y,m} - WeatherAdjusment_{y,m}$$

where:

AveCustomerSales $_{y,m}$ - Average Residential Customer Consumption in year y, month m derived by dividing Actual Residential Sector Sales by the residential customers count

WeatherAdjustment $_{y,m}$ - Weather Adjustment in Average Residential Customer in year y, month m due to deviation from normal weather pattern.

The Weather Adjustment is derived from the Residential SAE Model (See Figure 110) by evaluating the difference in model predicted values between using Actual CDD/HDD and Normal CDD/HDD independent variables. Obviously, the Weather Adjustment is a negative value if actual revenue month weather patterns fall below normal and effectively added to the average customer sales. On the other hand, the Weather Adjustment is a positive value if weather patterns fall above normal.

At a high level, the average residential customer weather adjustment calculation is a two step process:

- Update the Residential SAE Model Utility Data with the most current Sales, Customer Count, and CDD/HDD variables
- Perform Normal Weather Simulation

The update of the Residential SAE Model Utility Data (Figure 111) starts by editing the Residential SAE Model UtilityData worksheet with the most recent actual data on residential sector energy sales and residential customer count. Model updates are then brought into the MetrixND environment by reloading UtilityData Data Table object. New Residential SAE Model estimates which predict average residential customer consumption using the most recent actual data are automatically triggered.

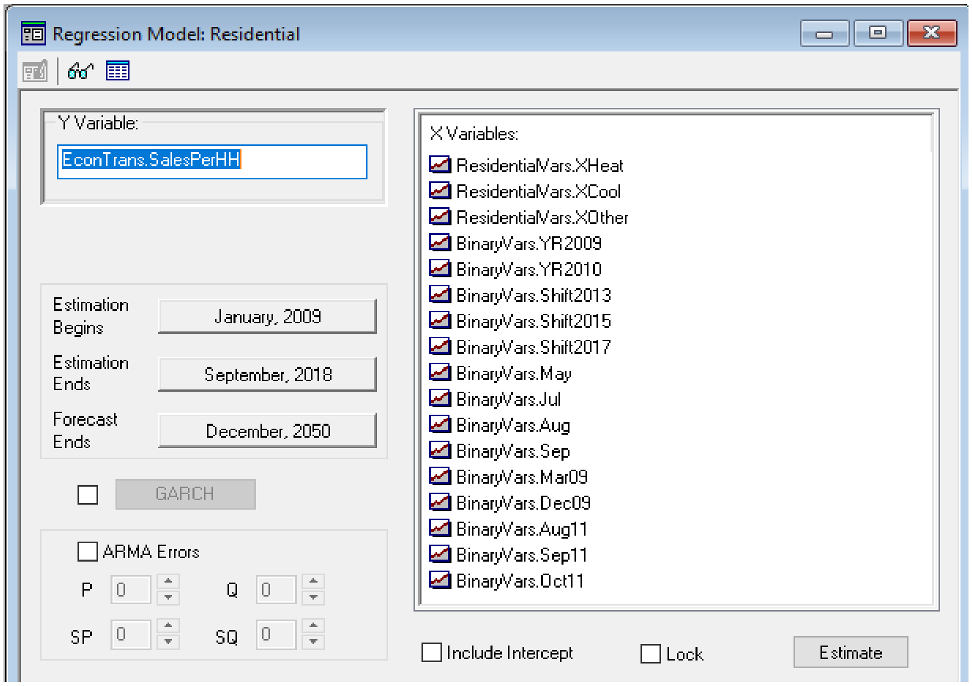
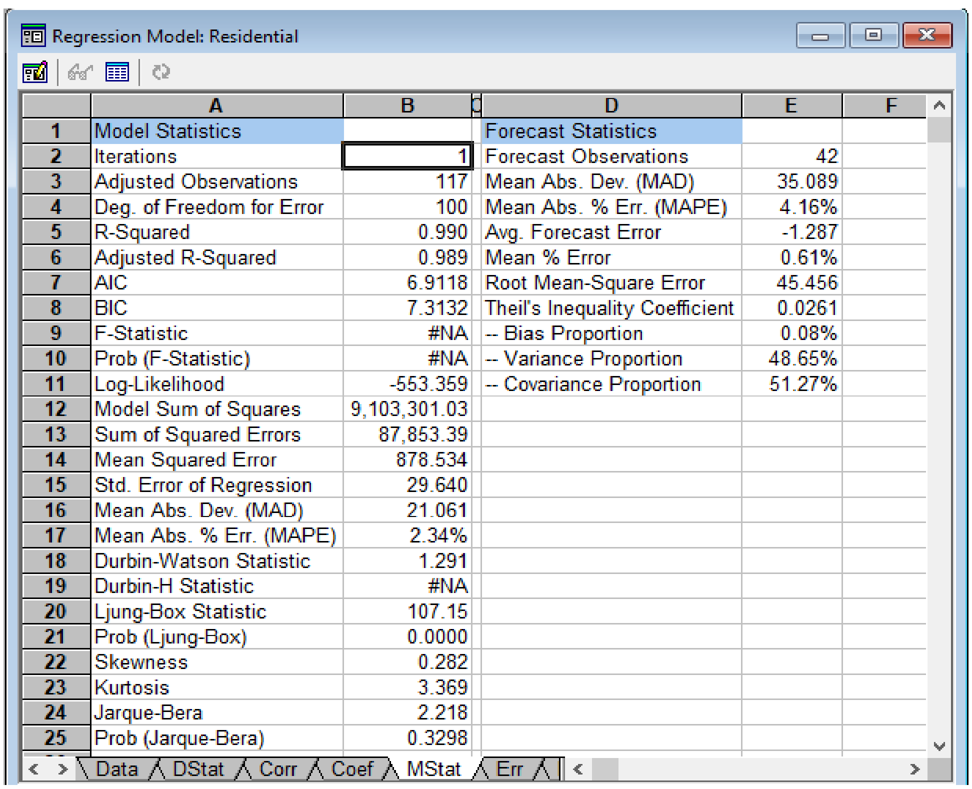


Figure 110a – MetrixND 4.x Residential Regression Model Object – Data View Panel



	A	B	D	E	F
1	Model Statistics		Forecast Statistics		
2	Iterations	1	Forecast Observations	42	
3	Adjusted Observations	117	Mean Abs. Dev. (MAD)	35.089	
4	Deg. of Freedom for Error	100	Mean Abs. % Err. (MAPE)	4.16%	
5	R-Squared	0.990	Avg. Forecast Error	-1.287	
6	Adjusted R-Squared	0.989	Mean % Error	0.61%	
7	AIC	6.9118	Root Mean-Square Error	45.456	
8	BIC	7.3132	Theil's Inequality Coefficient	0.0261	
9	F-Statistic	#NA	-- Bias Proportion	0.08%	
10	Prob (F-Statistic)	#NA	-- Variance Proportion	48.65%	
11	Log-Likelihood	-553.359	-- Covariance Proportion	51.27%	
12	Model Sum of Squares	9,103,301.03			
13	Sum of Squared Errors	87,853.39			
14	Mean Squared Error	878.534			
15	Std. Error of Regression	29.640			
16	Mean Abs. Dev. (MAD)	21.061			
17	Mean Abs. % Err. (MAPE)	2.34%			
18	Durbin-Watson Statistic	1.291			
19	Durbin-H Statistic	#NA			
20	Ljung-Box Statistic	107.15			
21	Prob (Ljung-Box)	0.0000			
22	Skewness	0.282			
23	Kurtosis	3.369			
24	Jarque-Bera	2.218			
25	Prob (Jarque-Bera)	0.3298			

Figure 110b – MetrixND 4.x Residential Regression Model Object – Data View Panel

Data Table: UtilityData

	A	B	C	D	E	F	G	H	I	J
1	Year	Month	Sales	ElecPrice	BillingDays	Households	HHSize	IncomePersonal	ResCustomers	SolarPV_KWH
290	2019	1	331.628	15.47	31.45	490.623	2.53	154,086	431,355	3,034,408
291	2019	2	307.658	15.47	30.40	490.623	2.53	154,086	431,819	3,510,086
292	2019	3	287.885	15.47	29.15	490.623	2.53	154,086	432,680	3,103,451
293	2019	4	259.793	15.47	30.25	490.623	2.53	154,086	433,775	5,280,348
294	2019	5	295.997	15.47	30.65	490.623	2.53	154,086	434,062	5,804,915
295	2019	6	415.873	15.47	30.80	490.623	2.53	154,086	435,102	6,961,697
296	2019	7	488.678	15.47	30.75	490.623	2.53	154,086	436,444	6,565,649
297	2019	8	561.161	15.47	30.60	490.623	2.53	154,086	437,493	6,878,583
298	2019	9	578.402	15.47	30.75	490.623	2.53	154,086	439,200	6,325,093
299	2019	10	464.571	15.47	30.00	490.623	2.53	154,086	440,041	5,903,629
300	2019	11	300.668	15.47	29.55	490.623	2.53	154,086	440,722	4,848,055
301	2019	12	292.803	15.47	30.90	490.623	2.53	154,086	441,529	4,323,746
302	2020	1	307.481	15.97	31.95	500.145	2.52	156,145	442,531	4,619,205
303	2020	2	282.707	15.97	29.85	500.145	2.52	156,145	443,340	4,348,998
304	2020	3	279.273	15.97	29.65	500.145	2.52	156,145	444,613	4,692,993
305	2020	4	295.846	15.97	30.50	500.145	2.52	156,145	445,509	5,141,737
306	2020	5	340.131	15.97	29.90	500.145	2.52	156,145	446,403	7,442,024
307	2020	6	438.068	15.97	30.40	500.145	2.52	156,145	447,330	7,922,929
308	2020	7	558.808	15.97	31.90	500.145	2.52	156,145	447,566	8,334,055
309	2020	8	570.791	15.97	30.05	500.145	2.52	156,145	448,767	8,180,509
310	2020	9	535.607	15.97	30.30	500.145	2.52	156,145	449,591	7,353,304
311	2020	10	379.564	15.97	30.75	500.145	2.52	156,145	450,355	6,756,456
312	2020	11	306.383	15.97	29.15	500.145	2.52	156,145	451,937	5,996,499
313	2020	12	298.711	15.97	30.35	500.145	2.52	156,145	452,835	5,367,728
314	2021	1	363.316	16.55	33.20	509.071	2.51	158,277	453,686	5,914,487
315	2021	2	315.810	16.55	28.20	509.071	2.51	158,277	454,271	5,012,190
316	2021	3	333.674	16.55	29.10	509.071	2.51	158,277	455,252	5,367,642
317	2021	4	276.461	16.55	31.55	509.071	2.51	158,277	456,520	8,145,694
318	2021	5	307.576	16.55	30.35	509.071	2.51	158,277	457,283	7,001,115
319	2021	6	393.024	16.55	30.20	509.071	2.51	158,277	458,400	7,269,097
320	2021	7	507.366	16.55	31.10	509.071	2.51	158,277	459,812	8,796,386
321	2021	8	505.125	16.55	29.75	509.071	2.51	158,277	460,698	8,784,946
322	2021	9	561.451	16.55	31.65	509.071	2.51	158,277	461,827	9,641,158

Data / DStat / Corr

Figure 111 – MetrixND 4.x UtilityData Data Table – Residential SAE Utility Data

A Normal Weather Simulation is automatically performed by the ResidentialNormal Simulation Object (See Figure 112a) during any update of the Residential SAE Model. A quick graph comparison of Actual Weather (Predicted) and Normal Weather (Simulated) Average Residential KWhConsumption is conveniently generated by this object as shown in Figure 112b.

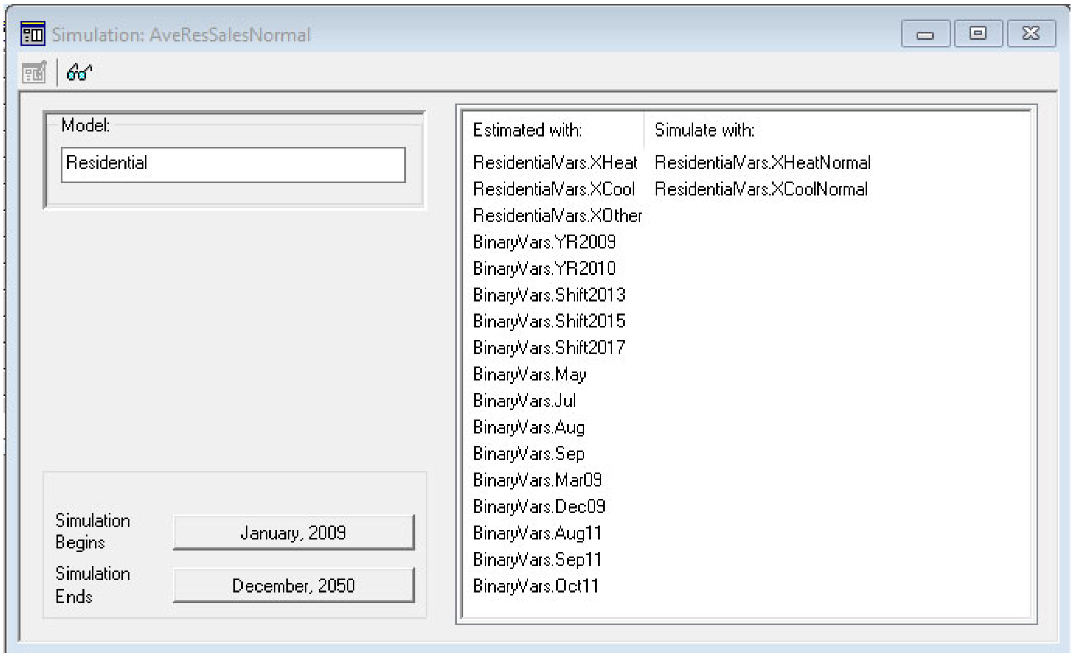


Figure 112a – MetrixND 4.x ResidentialNormal Simulation Object – Design View Panel

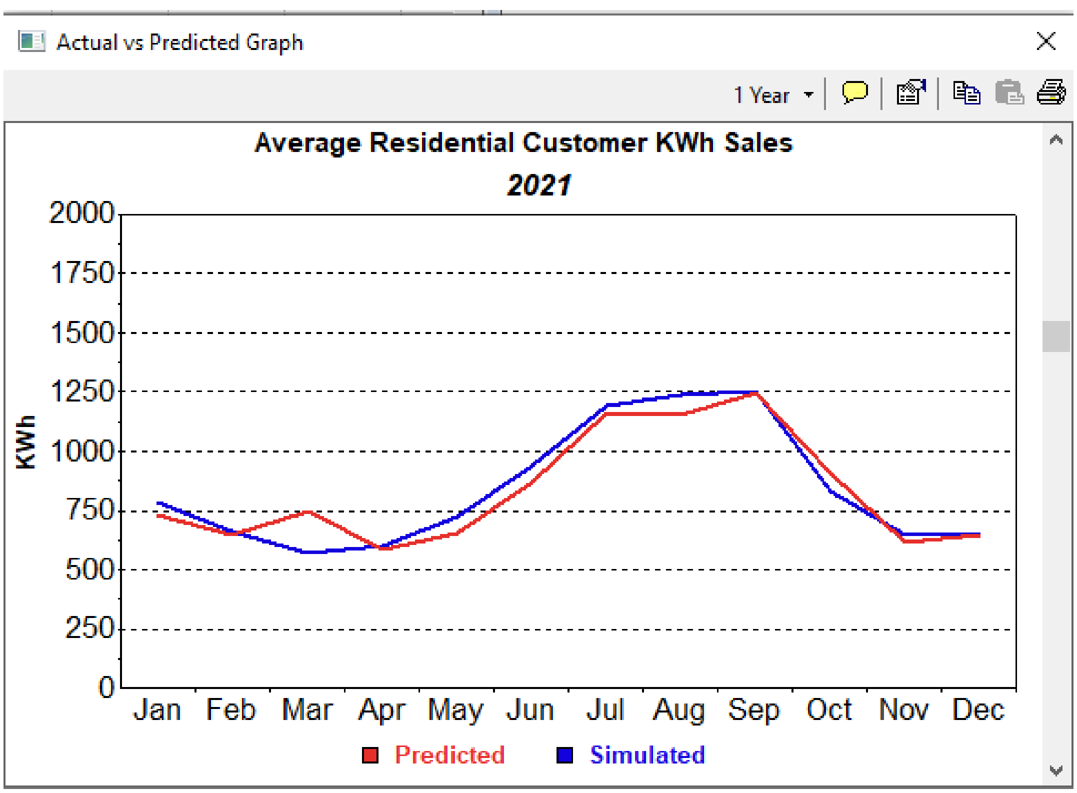


Figure 112b – MetrixND 4.x ResidentialNormal Simulation Object – Quick Graph View Panel

The calculation of **WeatherAdjustment** $_{y,m}$ is conveniently handled in ResidentialNormal Simulation Object by its “Diff” data member. In the MonthlyFcst_WN transform table object (See Figure 106), the weather adjustment is evaluated by **SalesPerHH_WA** transform which references **ResidentialNormal.Diff**.

Finally, the evaluation of Residential Sector normalized sales is handled by ResGWH_WN transform.

4.11.3 Commercial Sector Sales Normalization

The Weather Normalized Commercial Sector Sales is estimated by adding a weather adjustment to the Actual Commercial Sector Energy Sales. In equation form,

$$\textbf{WN\_ComSales}_{y,m} = \textbf{ActualComSales}_{y,m} - \textbf{WeatherAdjusment}_{y,m}$$

where:

WN_ComSales $_{y,m}$ - Weather Normalized Commercial Sector Sales in year y, month m

ActualComSales $_{y,m}$ - Actual Commercial Sector Sales in year y, month m

WeatherAdjustment $_{y,m}$ - Weather Adjustment to Commercial Sector Sales in year y, month m due to deviation from normal weather pattern.

The Weather Adjustment is derived from the Non-Residential (combined Commercial and Industrial Sector Sales) monthly energy sales model utilizing the Commercial SAE Model platform (See Figure 113). It is estimated by evaluating the difference in model predicted values between Actual and Normal bill cycle weighted CDD/HDD independent variables. The Weather Adjustment is a negative value if actual revenue month weather patterns fall below normal and a positive value if weather patterns fall above normal.

At a high level, the commercial sector weather adjustment calculation is a two step process:

- Update the Commercial SAE Model Utility Data with the latest Non-Residential Sales, and CDD/HDD variables
- Perform Normal Weather Simulation

The update of the Commercial Sector Model Utility Data (See Figure 114) starts by editing the Commercial SAE Model utility data worksheet with the most recent actual data on Non-Residential (combined commercial and industrial sector energy) sales. Model updates are then brought into the MetrixND environment by reloading UtilityDataCom Data Table object. New SAE Model estimates on Non-Residential Sector Sales based on the most recent actual CDD/HDD data are automatically triggered.

The Normal Weather Simulation is automatically invoked by the CommercialNormal Simulation Object (See Figure 115a) triggered by any update of the Commercial SAE Model. A quick graph comparison of Actual Weather (Predicted) and Normal Weather (Simulated) Commercial Sector Sales is conveniently generated by this object as shown in Figure 115b.

The calculation of the commericial sector **WeatherAdjustment** $_{y,m}$ is conveniently handled in CommercialNormal Simulation Object by its “Diff” data member. In the MonthlyFcst_WN transform table object (See Figure 106), the weather adjustment is evaluated by **ComGWH_WA** transform which references **Non_ResidentialSalesNormal.Diff** data member.

Finally, the evaluation of Commercial Sector normalized sales is handled by **ComGWH_WN** transform. The estimation of Commercial Sector normalized sales is handled by **ComGWH_WN** transform under **MonthlyFcst_WN** transform table object (See Figure 106).

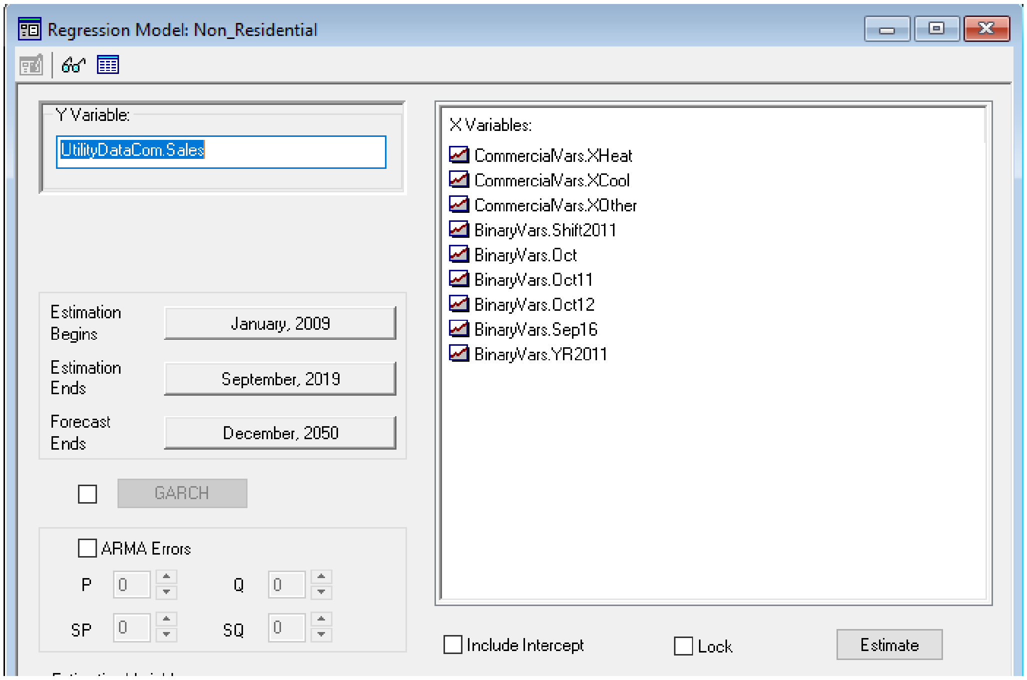


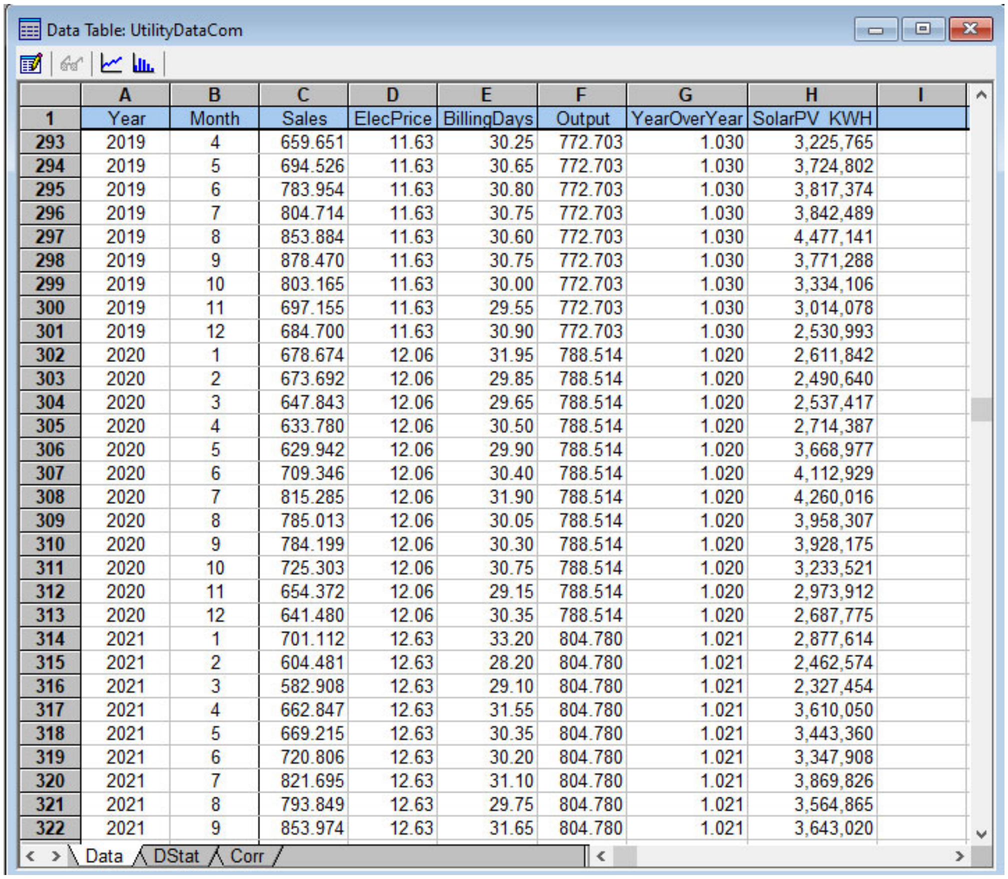
Figure 113a – MetrixND 4.x Non-Residential Regression Model Object – Design View Panel

Regression Model: Non_Residential

	A	B	D	E
1	Model Statistics		Forecast Statistics	
2	Iterations	1	Forecast Observations	30
3	Adjusted Observations	129	Mean Abs. Dev. (MAD)	25.499
4	Deg. of Freedom for Error	120	Mean Abs. % Err. (MAPE)	3.70%
5	R-Squared	0.966	Avg. Forecast Error	-6.743
6	Adjusted R-Squared	0.963	Mean % Error	-1.02%
7	AIC	5.5418	Root Mean-Square Error	32.674
8	BIC	5.7413	Theil's Inequality Coefficient	0.0230
9	F-Statistic	#NA	-- Bias Proportion	4.26%
10	Prob (F-Statistic)	#NA	-- Variance Proportion	1.70%
11	Log-Likelihood	-531.488	-- Covariance Proportion	94.04%
12	Model Sum of Squares	806,208.78		
13	Sum of Squared Errors	28,625.64		
14	Mean Squared Error	238.547		
15	Std. Error of Regression	15.445		
16	Mean Abs. Dev. (MAD)	11.433		
17	Mean Abs. % Err. (MAPE)	1.66%		
18	Durbin-Watson Statistic	1.835		
19	Durbin-H Statistic	#NA		
20	Ljung-Box Statistic	34.38		
21	Prob (Ljung-Box)	0.0782		
22	Skewness	-0.259		
23	Kurtosis	3.407		
24	Jarque-Bera	2.331		
25	Prob (Jarque-Bera)	0.3118		

Data / DStat / Corr / Coef / MStat / Err / Elas

Figure 113b – MetrixND 4.x Non-Residential Regression Model Object – Model Statistics



Data Table: UtilityDataCom

	A	B	C	D	E	F	G	H	I
1	Year	Month	Sales	ElecPrice	BillingDays	Output	YearOverYear	SolarPV_KWH	
293	2019	4	659.651	11.63	30.25	772.703	1.030	3,225,765	
294	2019	5	694.526	11.63	30.65	772.703	1.030	3,724,802	
295	2019	6	783.954	11.63	30.80	772.703	1.030	3,817,374	
296	2019	7	804.714	11.63	30.75	772.703	1.030	3,842,489	
297	2019	8	853.884	11.63	30.60	772.703	1.030	4,477,141	
298	2019	9	878.470	11.63	30.75	772.703	1.030	3,771,288	
299	2019	10	803.165	11.63	30.00	772.703	1.030	3,334,106	
300	2019	11	697.155	11.63	29.55	772.703	1.030	3,014,078	
301	2019	12	684.700	11.63	30.90	772.703	1.030	2,530,993	
302	2020	1	678.674	12.06	31.95	788.514	1.020	2,611,842	
303	2020	2	673.692	12.06	29.85	788.514	1.020	2,490,640	
304	2020	3	647.843	12.06	29.65	788.514	1.020	2,537,417	
305	2020	4	633.780	12.06	30.50	788.514	1.020	2,714,387	
306	2020	5	629.942	12.06	29.90	788.514	1.020	3,668,977	
307	2020	6	709.346	12.06	30.40	788.514	1.020	4,112,929	
308	2020	7	815.285	12.06	31.90	788.514	1.020	4,260,016	
309	2020	8	785.013	12.06	30.05	788.514	1.020	3,958,307	
310	2020	9	784.199	12.06	30.30	788.514	1.020	3,928,175	
311	2020	10	725.303	12.06	30.75	788.514	1.020	3,233,521	
312	2020	11	654.372	12.06	29.15	788.514	1.020	2,973,912	
313	2020	12	641.480	12.06	30.35	788.514	1.020	2,687,775	
314	2021	1	701.112	12.63	33.20	804.780	1.021	2,877,614	
315	2021	2	604.481	12.63	28.20	804.780	1.021	2,462,574	
316	2021	3	582.908	12.63	29.10	804.780	1.021	2,327,454	
317	2021	4	662.847	12.63	31.55	804.780	1.021	3,610,050	
318	2021	5	669.215	12.63	30.35	804.780	1.021	3,443,360	
319	2021	6	720.806	12.63	30.20	804.780	1.021	3,347,908	
320	2021	7	821.695	12.63	31.10	804.780	1.021	3,869,826	
321	2021	8	793.849	12.63	29.75	804.780	1.021	3,564,865	
322	2021	9	853.974	12.63	31.65	804.780	1.021	3,643,020	

Data / DStat / Corr

Figure 114 – MetrixND 4.x UtilityDataCom Data Table - Commercial SAE Model Utility Data

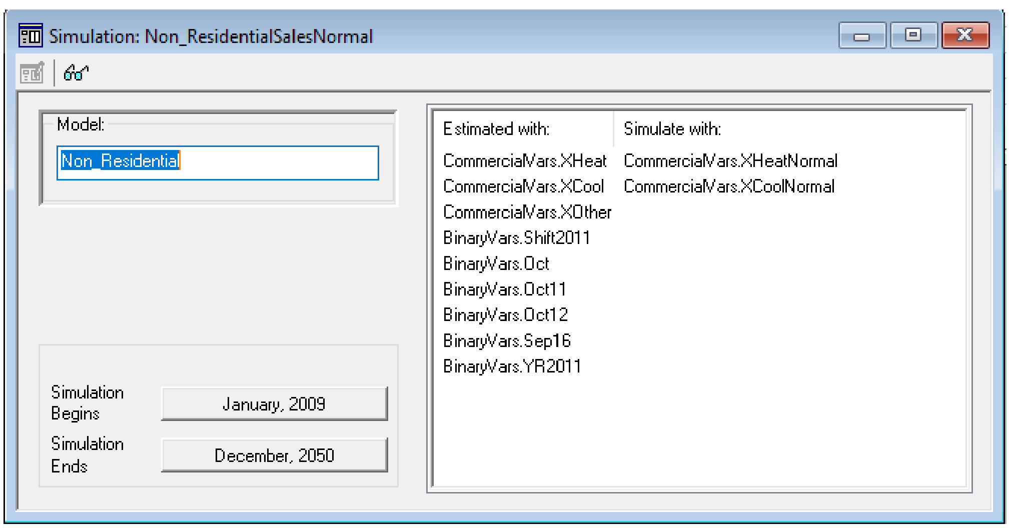


Figure 115a – MetrixND 4.x Non-Residential Model Simulation Object – Design View Panel

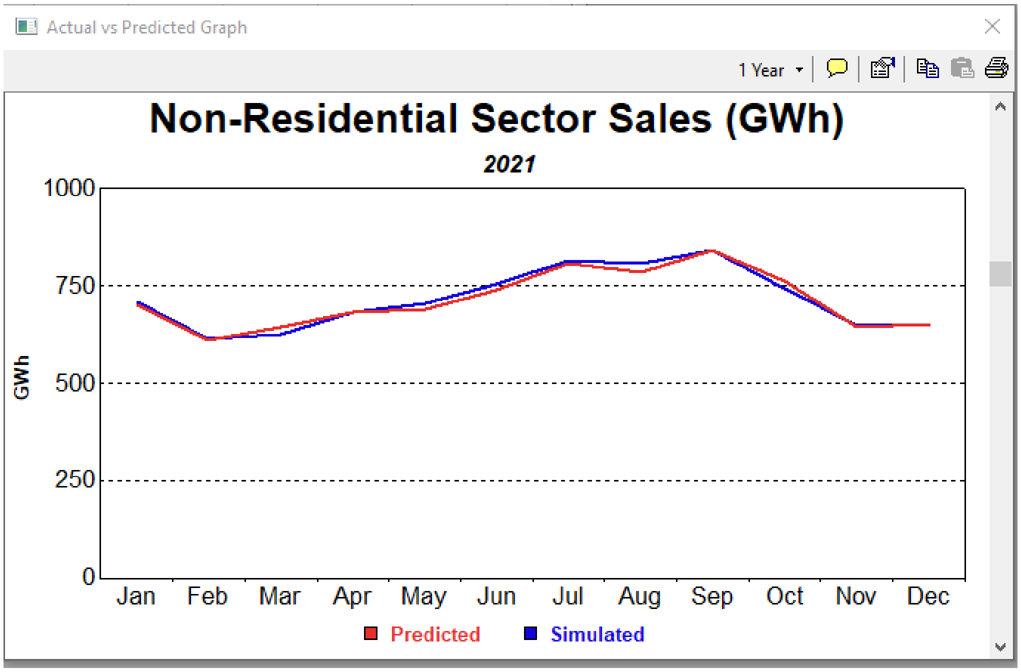


Figure 115b – MetrixND 4.x Non-Residential Model Simulation Object – Quick Graph View Panel

4.11.4 Peak Demand Weather Normalization

The Weather Normalized Peak Demand is estimated by adding a weather adjustment to the Actual Monthly One-Hour Peak Demand. In equation form,

$$\textbf{WN\_PeakMW}_{y,m} = \textbf{ActualPeak\_MW}_{y,m} - \textbf{PeakMW\_Adjusment}_{y,m}$$

where:

WN_PeakMW $_{y,m}$ - Weather Normalized Monthly One-Hour Peak in year y, month m

ActualPeakMW $_{y,m}$ - Actual Monthly One-Hour Peak in year y, month m

PeakMW_Adjustment $_{y,m}$ - PeakMW Adjustment to Actual One-Hour Peak in year y, month m due to deviation from monthly Net Energy for Load and normal weather pattern.

The PeakMW_Adjustment is derived from the monthly PeakMW regression model whose functional specification is expressed as follows:

$$\textbf{PeakMW}_{y,m} = f\,(\textbf{ExtremeDayTemp}_{y,m}\ ,\ \textbf{NTS}_{y,m})$$

where:

PeakMW $_{y,m}$ - Peak One Hour MW Demand in forecast year y, month m

ExtremeDayTemp $_{y,m}$ - Peak Day Extreme Max/Min Temperature in forecast year y, month m

NTS $_{y,m}$ - AE's **Net-Energy for Load** Generation Requirements in forecast year y, month m

In regression model form, the Peak Demand model is specified by the following equation.

$$\textbf{PeakMW}_{y,m} = a + b_1 NTS_{y,m} + b_2 NovHDD_{y,m} + b_3 DecHDD_{y,m} + b_4 JanHDD_{y,m} + b_5 FebHDD_{y,m} + b_6 MarHDD_{y,m} + b_7 FebCDD_{y,m} + b_8 MarCDD_{y,m} + b_9 AprCDD_{y,m} + b_{10} MayCDD_{y,m} + b_{11} JunCDD_{y,m} + b_{12} JulCDD_{y,m} + b_{13} AugCDD_{y,m} + b_{14} SepCDD_{y,m} + b_{15} OctCDD_{y,m} + b_{16} NovCDD_{y,m}$$

where:

$\textbf{NovHDD}_{y,m}$, $\textbf{DecHDD}_{y,m}$, $\textbf{JanHDD}_{y,m}$, $\textbf{FebHDD}_{y,m}$, $\textbf{MarHDD}_{y,m}$ - Peak Day Min. Dry Bulb Temperature Heating Degree-Days for the months of November, December, January, February, and March in year y, month m, based on 55 F heating breakpoint temperature.

$\textbf{FebCDD}_{y,m}$, $\textbf{MarCDD}_{y,m}$, $\textbf{AprCDD}_{y,m}$, …, $\textbf{OctCDD}_{y,m}$ - Peak Day Max. Dry Bulb Temperature Cooling Degree-Days from the months of February till October in year y, month m, based on 65 F cooling breakpoint temperature.

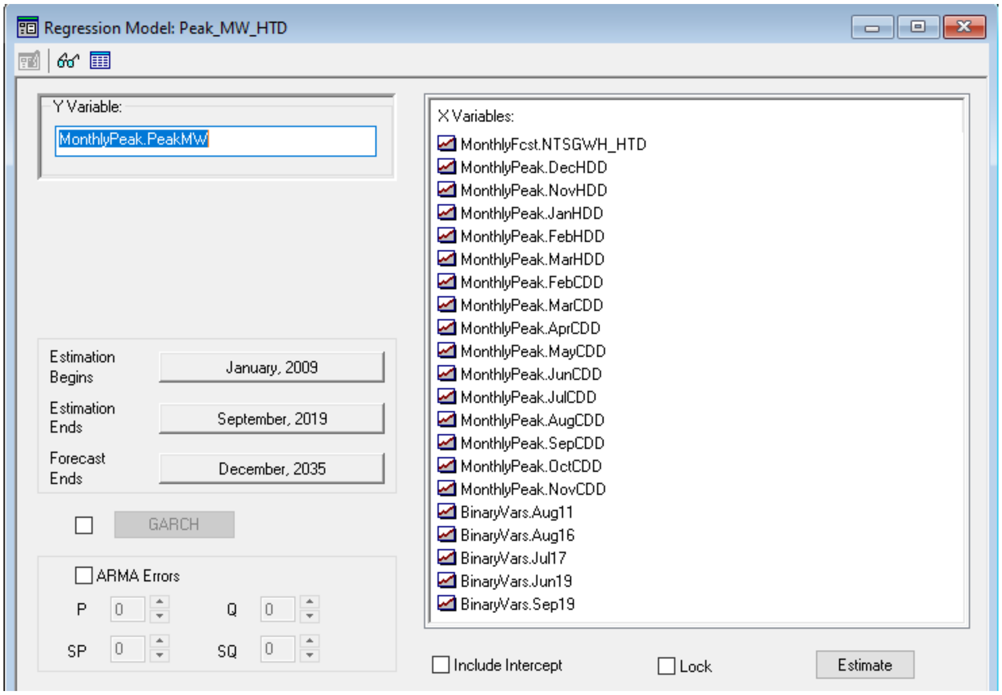
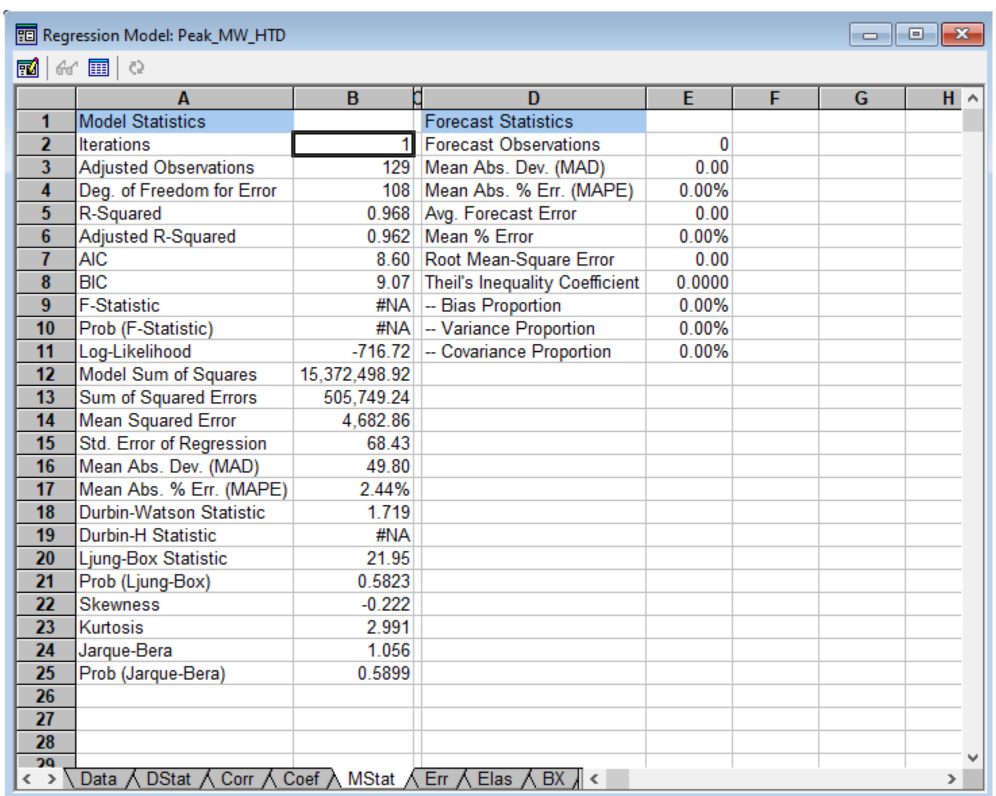


Figure 116a – MetrixND 4.x Peak Demand Regression Model Object – Design View Panel


Regression Model: Peak_MW_HTD

	A	B	D	E
1	Model Statistics		Forecast Statistics	
2	Iterations	1	Forecast Observations	0
3	Adjusted Observations	129	Mean Abs. Dev. (MAD)	0.00
4	Deg. of Freedom for Error	108	Mean Abs. % Err. (MAPE)	0.00%
5	R-Squared	0.968	Avg. Forecast Error	0.00
6	Adjusted R-Squared	0.962	Mean % Error	0.00%
7	AIC	8.60	Root Mean-Square Error	0.00
8	BIC	9.07	Theil's Inequality Coefficient	0.0000
9	F-Statistic	#NA	-- Bias Proportion	0.00%
10	Prob (F-Statistic)	#NA	-- Variance Proportion	0.00%
11	Log-Likelihood	-716.72	-- Covariance Proportion	0.00%
12	Model Sum of Squares	15,372,498.92		
13	Sum of Squared Errors	505,749.24		
14	Mean Squared Error	4,682.86		
15	Std. Error of Regression	68.43		
16	Mean Abs. Dev. (MAD)	49.80		
17	Mean Abs. % Err. (MAPE)	2.44%		
18	Durbin-Watson Statistic	1.719		
19	Durbin-H Statistic	#NA		
20	Ljung-Box Statistic	21.95		
21	Prob (Ljung-Box)	0.5823		
22	Skewness	-0.222		
23	Kurtosis	2.991		
24	Jarque-Bera	1.056		
25	Prob (Jarque-Bera)	0.5899		

Figure 116b – MetrixND 4.x Peak Demand Regression Model Object – Model Statistics

The Weather Adjustment to Austin Energy On-Hour Peak demand is derived from the Peak Demand regression model utilizing regression model simulation (See Figure 117). It is estimated by evaluating the difference in model predicted values between Actual and Normal CDD/HDDs, Net Energy for Load independent variables. The Weather Adjustment is a negative value if actual prior two months weather patterns fall below normal and a positive value if weather patterns fall above normal.

At a high level, the Peak MW weather normalized adjustment calculation is a two step process:

- Calculate the weather normalized monthly Net Energy for Load, and peak day CDD/HDD variables
- Perform Normal Weather Peak MW Simulation

The Normal Weather Simulation is estimated by the PeakMW_Normal Simulation Object and updates is automatically triggered by any updates of the month peak, Net Energy for Load, and energy sales models. A quick graph comparison of Actual Weather (Predicted) and Normal Weather (Simulated) System Peak MW is conveniently generated by this object as shown in Figure 117b.

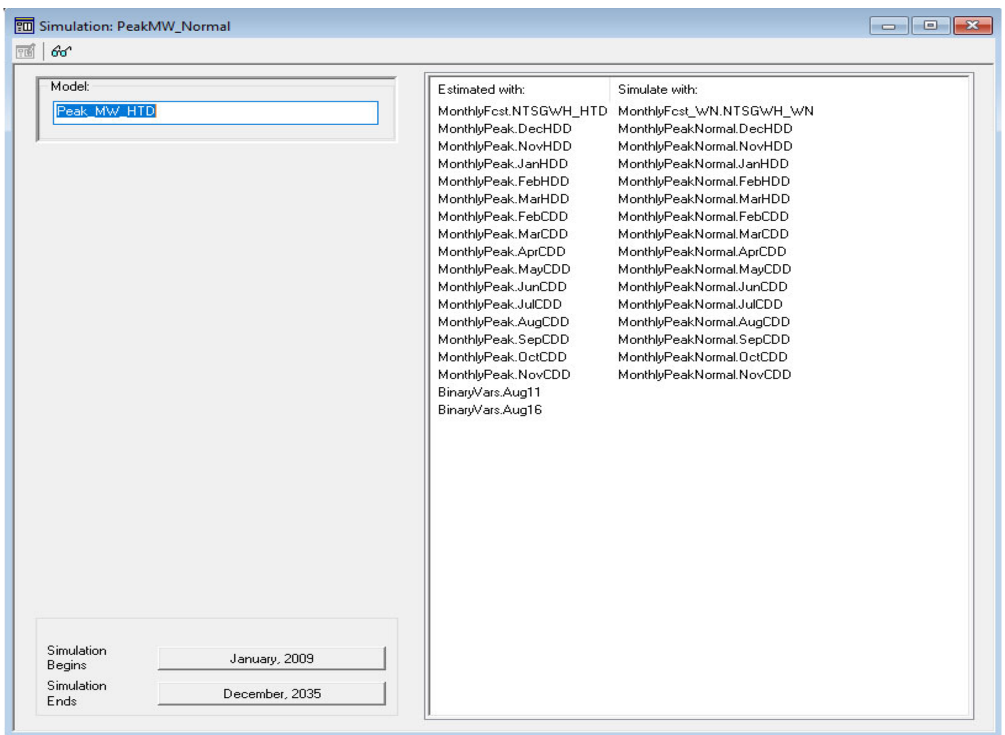


Figure 117a – MetrixND 4.x Peak Demand Model Simulation Object – Design View Panel

The calculation of **PeakMW_Adjustment** $_{y,m}$ is conveniently handled in PeakMW_Normal Simulation Object by its “Diff” data member. Finally, the estimation of weather adjusted peak is handled by **PeakMW_WN** transform under **MonthlyFcst_WN** transform table object (See Figure 106).

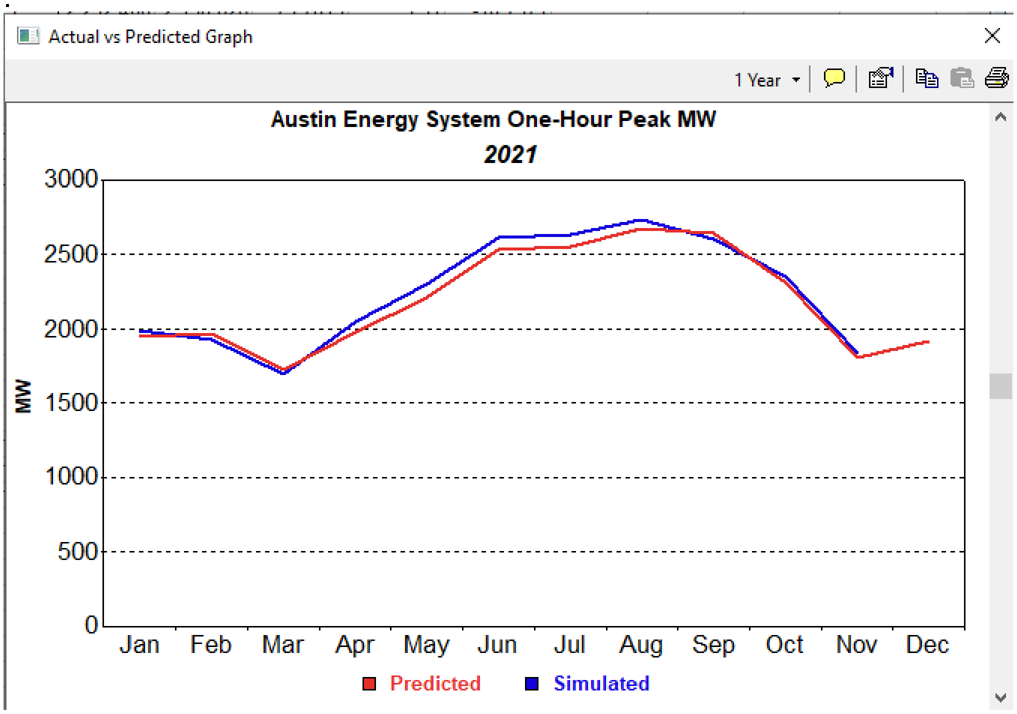


Figure 117b – MetrixND 4.x Peak Demand Model Simulation Object – Quick Graph View Panel

ICA 1-4 Please provide demand and energy class allocation factors for each of the three years prior to the test year. Include the underlying billing determinants that support the allocation factors.

ANSWER: The requested information does not exist. Demand and energy class allocation factors are developed for use in a Cost of Service Study. The last full Cost of Service Study was completed in 2016 using FY 2014 as the test year. The 2016 Cost of Service Study was published on April 18, 2022, and is available on the following website https://www.austintexas.gov/content/ae2016ratereview.

Prepared by: JL
Sponsored by: Russell Maenius

ICA 1-5 With respect to the impact of customer power outages due to Winter Storm Uri, please quantify the resulting loss of revenues by customer class, and the billing months which are affected.

ANSWER: Austin Energy has not developed a specific estimate of the revenue impact from load losses during Winter Storm Uri, which occurred in the billing months of February and March 2021.

Austin Energy provided all residential rate customers with a $10 credit following Winter Storm Uri. The revenue impact was $4,511,590.

Prepared by: JO
Sponsored by: Russell Maenius

ICA 1-6 For the residential class, S1 class, and S2 class, provide the estimated installed cost for mechanical meters vs. the smart meters currently used by Austin Energy. Please show the costs in comparable (same year) dollars.

ANSWER: Please see WP F-6.3 of the Cost of Service Study for the meter counts and meter costs for residential and small commercial customers. All RES/S1/S2 meters are smart meters, with the exception of 434 meters in the residential class. The installation cost for a residential smart meter is $54 and the installation cost for a residential mechanical meter is $75. The installed cost for a typical small commercial meter is $246.

		Meter Count		Meter Cost		Installation Cost	
Class	**Meter Models**	**Manual**	**AMI**	**Manual**	**AMI**	**Manual**	**AMI Meter**
Residential	Various		477,613		$160		$54
	Various	434		$30		$75	
Small/Medium Commercial	Various		52,392		$260		$246

Notes:

[1] Costs are based on meter contract and labor estimates from March 2020.
[2] The installation cost for manual meters on residential manual meters is based on the fee schedule for customers opting out of using a smart meter.
[3] Meter counts and costs are shown on WP F-6.3 of the Cost of Service Study.

Prepared by: JL & PG
Sponsored by: Grant Rabon

ICA 1-7 For each nuclear O&M expense account, provide the proportion which is composed of labor expense.

ANSWER: The table below shows the labor component of each nuclear O&M expense account:

Description	FERC Acct	AE Payroll	Allocated STP Payroll	FERC Acct Total Labor Expense	FERC Acct Total O&M Expense	Labor Expense Proportion
Operation						
Supervision & Engineering	517	$96,140	$6,611,079	$6,707,219	$9,201,529	73%
Coolants & Water	519		$736,771	$736,771	$1,301,968	57%
Steam Expenses	520		$867,557	$867,557	$1,974,458	44%
Electric Expenses	523		$5,620,068	$5,620,068	$6,545,685	86%
Misc Nucl Power Expenses	524		$1,043,621	$1,043,621	$24,644,174	4%
Maintenance						
Supervision & Engineering	528		$1,824,123	$1,824,123	$3,219,272	57%
Structures	529		$881,540	$881,540	$3,240,106	27%
Reactor Plant Equipment	530		$1,896,365	$1,896,365	$5,806,978	33%
Electric Plant	531		$849,955	$849,955	$3,895,954	22%
Misc Nuclear Plant	532		$848,396	$848,396	$1,561,804	54%
Total Nuclear O&M Payroll		$96,140	$21,179,476	$21,275,616	$61,391,928	35%

Prepared by: GJ/MG
Sponsored by: Grant Rabon

ICA 1-8 For each plant held for future use item on WP-B-6.1, please provide evidence that Austin Energy has a specific and definite plan to use the property, including the specific in-service date and the preparatory activities undertaken for installing the project.

ANSWER: Below is a description of the four items contained on WP B-6.1, Plant Held for Future Use, and the plans for utilizing these assets in the future:

Project Description	Balance as of FY2021	Planned Use
WSTRN COAL GENERATING PLAN	$18,854,861	This site is located in Travis County, Texas, and is expected to host future solar power generation facilities for Austin Energy per the Austin Energy Resource, Generation, and Climate Plan to 2030. The plan, approved by Austin City Council in March 2020, calls for an expansion of supply side renewables, including solar. A portion of this site already hosts a 30 MW solar facility. Austin Energy expects to develop this site within the 10 year planning window.
CT 3125, LYTTON SP-TRADING	$ 2,999,314	The plant held for future use associated with Circuit 3125 is a collection of easements intended to complete a 345 kV loop on the western side of our electric system. Based on potential generator shut downs inside/near our load zone as well as other system needs on the western part of our service territory, Austin Energy expects to use these easements for needed transmission buildout in the 10 year planning horizon.
TOYAH LAND	$ 520,455	This site is located in Reeves County, Texas and is also expected to host future solar power generation facilities for Austin Energy per the Austin Energy Resource, Generation and Climate Plan to 2030. The plan, approved by Austin City Council in March 2020, calls for an expansion of supply side renewables, including solar. The western & south western portion of Texas is conducive to solar with several projects underway in this region. Austin Energy expects to develop this site for solar generation purposes within the 10 year planning window. As of FY20, There are challenges with the Toyah Land in Reeves County. Connections of solar to the Texas electric grid are challenging since nearby Bulk transmission has been slow to materialize in the ERCOT market and is not foreseen in the near future. Mineral rights were previously sold on the land which might hamper the installation of solar or other electric facilities. Various options are currently being explored including a possible future sale of this land. The value of 520,454.52 for these several large parcels of land is still accurate, to the best of our knowledge. This property sold in FY2022.
SEAHOLM LAND	$ 740,392	The referenced Seaholm item has the existing electrical infrastructure and may have chilled water infrastructure in the future. As such, the utility intends to maintain this property.

Prepared by: MG
Sponsored by: Russell Maenius