Exhibit GMP-DCS-2

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Green Mountain Power
2019 Budget Forecast Report

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Green Mountain Power

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2019 FISCAL YEAR BUDGET FORECAST: SUMMARY

Itron, Inc. recently completed the Green Mountain Power (GMP) 2019 fiscal-year sales and revenue forecast. The forecast includes sales, customers, and revenue projections through 2028. The forecast is based on billed sales and customer data through December 2017. Forecast inputs include:

- Moody Analytics January 2018 Vermont economic forecast
- AEO 2017 end-use efficiency estimates for the New England Census Division
- VEIC most current energy efficiency savings projections and Tier 3 cold climate heat pump forecast
- Energy Futures Group 2017 electric vehicle forecast (Project for GMP)
- GMP's updated solar capacity forecast
- GMP adjustments for commercial Tier 3 electrification activity, and other large load adjustments that would not be reflected in the historical billing data
- Updated normal HDD and CDD (1998 to 2017)

Sales forecasts are generated at the customer class level and include residential, commercial, industrial, and street lighting. Class level sales forecasts are then allocated to rate schedules and billing determinants for the purpose of estimating revenues.

The sales and customer forecasts are based on linear regression models that relate monthly customer-class sales (average use in the residential sector) to monthly weather conditions, population growth, economic activity, prices, and end-use efficiency improvements. The sales forecast is adjusted for factors not reflected in historical data including expected changes in energy requirements for the largest commercial and industrial customers, solar load penetration, cold climate heat pumps, and electric vehicles. Impact of future efficiency programs are incorporated into the end-use intensity projections that drive the class sales forecasts.

Over the next 10 years, total sales are expected to continue to decline at a slow rate. Residential sales will see the strongest decline averaging 0.9% through 2020 and 0.8% over the longer ten-year period. With Tier 3 electrification activities and adjusted for expected load additions Small C&I sales average 0.3% increase over the next three years and 0.2% over the next ten years. Industrial sales average 0.1% annual growth over the next three years and are flat (0.0% annual growth) over the long-term. Table 1 shows the customer class sales forecast.

Table 1: Customer Class Billed Sales Forecast (MWh)

Year	Residential	Chg	Commercial	Chg	Industrial	Chg	Other	Chg	Total	Chg
2008	1,559,231		1,584,987		1,063,320		10,710		4,218,248	
2009	1,544,874	-0.9%	1,530,564	-3.4%	973,631	-8.4%	10,780	0.7%	4,059,848	-3.8%
2010	1,558,457	0.9%	1,534,895	0.3%	1,013,453	4.1%	10,918	1.3%	4,117,722	1.4%
2011	1,552,270	-0.4%	1,527,244	-0.5%	1,073,557	5.9%	11,414	4.5%	4,164,485	1.1%
2012	1,520,840	-2.0%	1,538,905	0.8%	1,169,331	8.9%	10,645	-6.7%	4,239,721	1.8%
2013	1,562,370	2.7%	1,550,572	0.8%	1,178,595	0.8%	8,443	-20.7%	4,299,981	1.4%
2014	1,568,689	0.4%	1,559,491	0.6%	1,177,033	-0.1%	6,887	-18.4%	4,312,099	0.3%
2015	1,539,045	-1.9%	1,531,148	-1.8%	1,168,796	-0.7%	5,274	-23.4%	4,244,263	-1.6%
2016	1,483,553	-3.6%	1,530,603	0.0%	1,188,527	1.7%	4,852	-8.0%	4,207,536	-0.9%
2017	1,465,612	-1.2%	1,516,541	-0.9%	1,170,493	-1.5%	4,453	-8.2%	4,157,098	-1.2%
2018	1,467,655	0.1%	1,518,210	0.1%	1,175,494	0.4%	4,760	6.9%	4,166,119	0.2%
2019	1,440,878	-1.8%	1,521,410	0.2%	1,179,223	0.3%	4,760	0.0%	4,146,271	-0.5%
2020	1,425,189	-1.1%	1,528,236	0.4%	1,173,906	-0.5%	4,760	0.0%	4,132,091	-0.3%
2021	1,404,761	-1.4%	1,528,060	0.0%	1,175,862	0.2%	4,760	0.0%	4,113,442	-0.5%
2022	1,390,565	-1.0%	1,529,039	0.1%	1,178,369	0.2%	4,760	0.0%	4,102,733	-0.3%
2023	1,378,673	-0.9%	1,529,121	0.0%	1,178,659	0.0%	4,760	0.0%	4,091,212	-0.3%
2024	1,370,041	-0.6%	1,530,529	0.1%	1,178,567	0.0%	4,760	0.0%	4,083,897	-0.2%
2025	1,359,059	-0.8%	1,532,087	0.1%	1,177,505	-0.1%	4,760	0.0%	4,073,410	-0.3%
2026	1,350,439	-0.6%	1,534,800	0.2%	1,175,797	-0.1%	4,760	0.0%	4,065,796	-0.2%
2027	1,345,652	-0.4%	1,538,443	0.2%	1,174,086	-0.1%	4,760	0.0%	4,062,941	-0.1%
2028	1,344,158	-0.1%	1,542,812	0.3%	1,173,789	0.0%	4,760	0.0%	4,065,519	0.1%
2008 - 17		-0.7%		-0.5%		1.2%		-8.8%		-0.1%
2017 - 20		**-0.9%**		**0.3%**		**0.1%**		**2.3%**		**-0.2%**
2017 - 28		-0.8%		0.2%		0.0%		0.6%		-0.2%

1. Class Sales Forecast

Monthly customer class sales and customer forecasts are based on regression models that relate monthly sales to household projections, economic activity as measured by real GDP, employment, household income, expected weather, price, and changes in end-use energy intensities resulting from new standards, natural occurring appliance stock replacement, and state energy efficiency programs. Models are estimated with monthly billed sales and customer counts from January 2008 to December 2017.

The forecast incorporates Moody's Analytics January 2018 state economic forecast and the Energy Information Administration (EIA) 2017 end-use energy intensity projections for New England. End-use intensity projections are adjusted to reflect end-use saturations for Vermont and VEIC's energy efficiency (EE) program savings projections.

Estimated forecast models incorporating household growth, economic activity, price, efficiency, and weather trends are used to generate the *Baseline* forecast.

The baseline forecast reflects both economic and end-use efficiency impacts. The forecast is then adjusted to include:

- New solar capacity projections
- Expected Tier 3 electrification impacts
- Electric Vehicle sales
- Spot load adjustments for expected large load additions (and losses)

1. Residential

Since 2008, residential weather normalized sales have declined 0.7% on an annual basis. Sales decline has even been stronger over the last three years (averaging 2.2% annual decline); strong solar capacity growth and the new lighting standards have been major contributors.

Sales growth can be disaggregated into customer and average use growth. Since 2008, normalized average use has declined 1.0% per year with the number of residential customers averaging a 0.3% increase. Weather normalized average use has declined from 7,226 kWh in 1008 to 6,620 kWh in 2017.

The residential baseline forecast is derived by combining average use forecast with customer forecast. The forecast is then adjusted for expected solar load growth, Tier 3 electrification impacts, and electric vehicle sales. Table 2 shows the forecast results.

Table 2: Residential Sales Forecast

Year	Average Use (kWh)	Chg	Customers	Chg	Sales (MWh)	Chg
2018	6,610		222,034		1,467,655	
2019	6,472	-2.1%	222,642	0.3%	1,440,878	-1.8%
2020	6,382	-1.4%	223,316	0.3%	1,425,189	-1.1%
2021	6,273	-1.7%	223,948	0.3%	1,404,761	-1.4%
2022	6,190	-1.3%	224,633	0.3%	1,390,565	-1.0%
2023	6,116	-1.2%	225,413	0.3%	1,378,673	-0.9%
2024	6,055	-1.0%	226,263	0.4%	1,370,041	-0.6%
2025	5,983	-1.2%	227,170	0.4%	1,359,059	-0.8%
2026	5,920	-1.0%	228,098	0.4%	1,350,439	-0.6%
2027	5,876	-0.7%	228,996	0.4%	1,345,652	-0.4%
2028	5,849	-0.5%	229,822	0.4%	1,344,158	-0.1%
18-28		-1.2%		0.3%		-0.9%

Table 3 shows the forecast adjustments and isolates efficiency impacts. The efficiency embedded in the baseline forecast is disaggregated by holding the model end-use intensities constant through the forecast period. Efficiency reflects the impact of new standards, natural occurring efficiency, and state efficiency programs.

Table 3: Residential Sales Forecast Disaggregation

Year	No EE (1)	Efficiency (2)	Solar (3)	Heat Pumps (4)	Electric Vehicles (5)	Total Adj	Forecast
2018	1,484,658	-15,262	-6,143	3,356	1,047	-17,003	1,467,655
2019	1,485,966	-35,024	-19,058	6,690	2,303	-45,088	1,440,878
2020	1,494,878	-55,202	-28,318	10,021	3,811	-69,688	1,425,189
2021	1,502,098	-78,881	-37,459	13,384	5,620	-97,337	1,404,761
2022	1,510,205	-96,417	-47,785	16,771	7,791	-119,640	1,390,565
2023	1,517,144	-112,089	-56,986	20,208	10,396	-138,471	1,378,673
2024	1,523,832	-124,648	-66,335	23,670	13,522	-153,791	1,370,041
2025	1,530,359	-140,310	-75,388	27,125	17,273	-171,300	1,359,059
2026	1,536,718	-154,037	-84,589	30,573	21,775	-186,278	1,350,439
2027	1,542,833	-164,813	-93,790	34,029	27,393	-197,181	1,345,652
2028	1,549,251	-173,755	-103,225	37,481	34,405	-205,093	1,344,158

1. No EE reflects sales growth due to household and economic activty
2. Efficiency includes impacts of new standards, naturally-occuring, and program-based efficiency improvements.
3. Solar - Derived from GMP solar capacity forecast, residential 36%, commercial 52%, and industrial 12% of capacity.
4. Heat Pumps - assume 2,200 units installed per year, based on VEIC state forecast (3,000 units per year).
5. Electric vehicles - EFG's 2017 Scenario 1 forecast (approx 9.3% of vehicle sales by 2026).

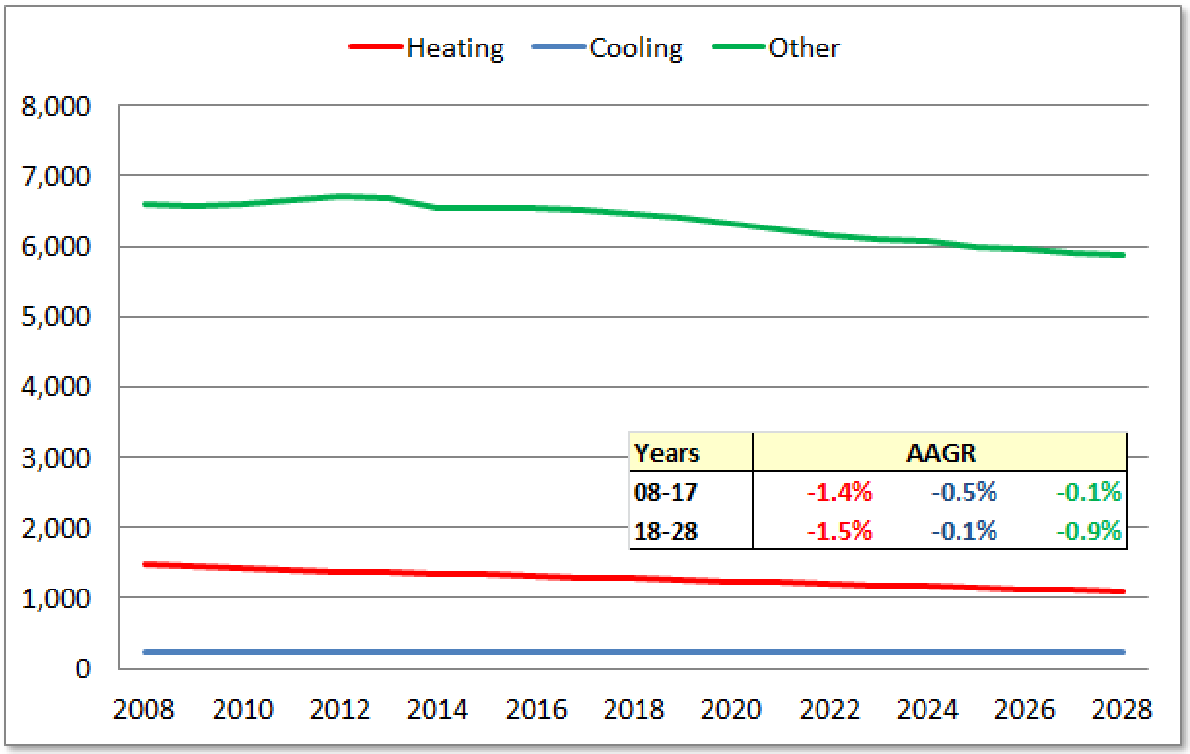
Forecast Drivers. The baseline forecast incorporates both household and income growth and the impacts of efficiency improvements through estimated end-use intensity projections. Moody Analytics' projects relatively slow household and income growth. Vermont has seen some of the slowest population growth in the U.S. This trend is expected through the forecast period; slow population growth translates into low household formation and low real income growth. Table 4 shows the residential economic drivers.

Table 4: Residential Economic Drivers

Year	Population (Thou)	Chg	Households (Thou)	Chg	RPI (Mil $)	Chg
2008	624.2		255.8		25,395	
2009	624.8	0.1%	256.2	0.2%	25,150	-1.0%
2010	625.8	0.2%	256.8	0.2%	25,249	0.4%
2011	626.2	0.1%	258.7	0.8%	26,038	3.1%
2012	625.6	-0.1%	260.2	0.6%	26,451	1.6%
2013	626.0	0.1%	262.2	0.7%	26,612	0.6%
2014	625.7	-0.1%	263.7	0.6%	27,045	1.6%
2015	624.5	-0.2%	264.2	0.2%	27,914	3.2%
2016	623.4	-0.2%	264.7	0.2%	28,202	1.0%
2017	623.7	0.0%	265.3	0.2%	28,228	0.1%
2018	623.7	0.0%	266.4	0.4%	28,499	1.0%
2019	624.5	0.1%	267.4	0.4%	28,603	0.4%
2020	625.2	0.1%	268.6	0.4%	28,558	-0.2%
2021	625.9	0.1%	269.8	0.4%	28,935	1.3%
2022	627.0	0.2%	271.0	0.5%	29,353	1.4%
2023	628.3	0.2%	272.4	0.5%	29,695	1.2%
2024	629.6	0.2%	273.9	0.6%	30,036	1.1%
2025	631.0	0.2%	275.5	0.6%	30,332	1.0%
2026	632.4	0.2%	277.1	0.6%	30,608	0.9%
2027	633.7	0.2%	278.7	0.6%	30,874	0.9%
2028	635.0	0.2%	280.2	0.5%	31,206	1.1%
08-17		0.0%		0.5%		1.1%
18-28		0.2%		0.4%		1.0%

Energy efficiency gains will continue to outweigh sales gains from customer and economic growth translating into lower residential sales. Efficiency gains are captured in end-use energy intensities. End-use intensities are derived for ten residential end-uses and are based on EIA 2017 Annual Energy Outlook for New England. End-use intensities are calibrated to Vermont and are adjusted to reflect state projected EE program savings. Figure 1 shows end-use intensities aggregated into heating, cooling, and other end-uses.

Figure 1: Residential End-Use Indices (Annual kWh per Household) Update



Overall, total residential intensity is expected to decline 1.0% annually over the next ten years with the heating and non-weather sensitive end-uses seeing the largest improvement in efficiency, averaging respectively 1.5% and 0.9% decline through 2028. The strong decline in other use is largely the outcome of statewide EE programs promoting LED lighting, along with future end-use appliance standards.

2. Small C&I Sales

Sales for the Small C&I revenue class are projected to increase on average 0.2% per year. Baseline commercial sales forecast is derived using a total commercial sales model. Baseline forecast is then adjusted for solar own-use (excess generation is treated as power purchase cost), Tier 3 electrification projects, and large load additions (and losses) that are not reflected in the baseline forecast model. Table 5 shows the commercial sales forecast.

Table 5: Commercial Customer Usage Forecast

Year	Average Use (kWh)	Chg	Customers	Chg	Sales (MWh)	Chg
2018	35,665		42,568		1,518,210	
2019	35,422	-0.7%	42,951	0.9%	1,521,410	0.2%
2020	35,484	0.2%	43,069	0.3%	1,528,236	0.4%
2021	35,226	-0.7%	43,378	0.7%	1,528,060	0.0%
2022	34,852	-1.1%	43,872	1.1%	1,529,039	0.1%
2023	34,553	-0.9%	44,254	0.9%	1,529,121	0.0%
2024	34,323	-0.7%	44,592	0.8%	1,530,529	0.1%
2025	34,141	-0.5%	44,875	0.6%	1,532,087	0.1%
2026	34,026	-0.3%	45,107	0.5%	1,534,800	0.2%
2027	33,945	-0.2%	45,322	0.5%	1,538,443	0.2%
2028	33,854	-0.3%	45,572	0.6%	1,542,812	0.3%
18-28		-0.5%		0.7%		0.2%

Table 6 shows the forecast disaggregation. Efficiency impacts are derived by holding the model end-use energy intensity inputs constant through the forecast period; efficiency impacts reflect new standards, natural occurring efficiency gains, as well state-level efficiency program activity.

Table 6: Commercial Sales Forecast Disaggregation

Year	No EE (1)	Efficiency (2)	Solar (3)	Electrification (4)	Spot Loads (5)	Total Adj	Forecast
2018	1,520,988	-5,460	-344	1,329	1,697	-2,778	1,518,210
2019	1,520,166	-11,006	-568	6,549	6,269	1,244	1,521,410
2020	1,522,860	-15,667	-778	12,478	9,343	5,376	1,528,236
2021	1,527,686	-20,445	-1,001	12,478	9,343	374	1,528,060
2022	1,534,305	-25,835	-1,252	12,478	9,343	-5,266	1,529,039
2023	1,539,991	-31,222	-1,468	12,478	9,343	-10,870	1,529,121
2024	1,545,692	-35,313	-1,670	12,478	9,343	-15,162	1,530,529
2025	1,550,685	-38,517	-1,902	12,478	9,343	-18,598	1,532,087
2026	1,555,352	-40,254	-2,119	12,478	9,343	-20,552	1,534,800
2027	1,559,841	-40,883	-2,335	12,478	9,343	-21,398	1,538,443
2028	1,565,257	-41,738	-2,528	12,478	9,343	-22,445	1,542,812

1. No EE reflects sales growth to due to household and economic activty
2. Efficiency incorporates both impacts of end-use standards and state efficiency programs
3. Solar is based on GMP Behind the Meter Solar Capacity Forecast and Historical "Own-Use" share of system generation.
4. Electrification is based on expected gains from specific Tier 3 electrification projects
5. Spot Loads are based on expected net new loads from large customer expansion/contraction activity not captured in the model

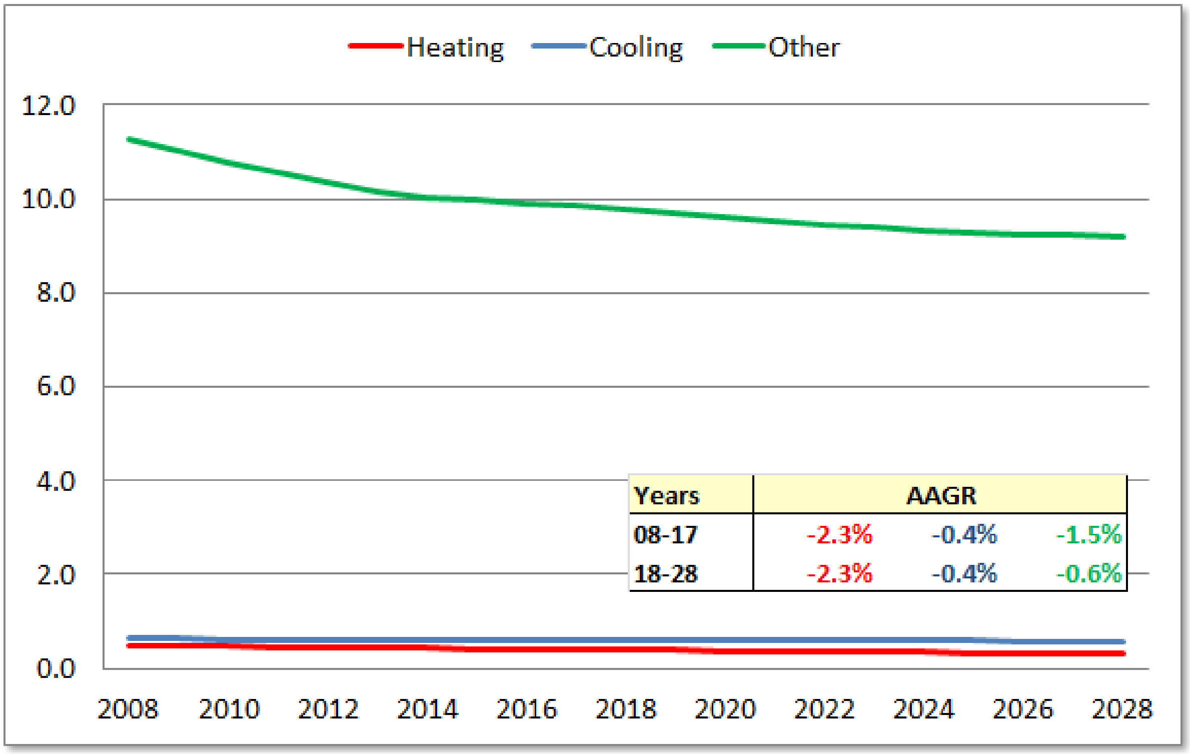
We expect to see moderate baseline commercial sales growth with increase in economic activity slightly out weighting commercial efficiency improvements. Table 7 shows Moody's January 2018 GDP and employment projections. GDP averages 1.1% annual growth over the next ten years with annual employment growth of 0.6%.

Table 7: State GDP and Employment Forecast

Year	GDP (Mil $)	Chg	Emp (Thou)	Chg	ManEmp (Thou)	Chg	NManEmp (Thou)	Chg
2008	25,980		306.8		34.9		271.8	
2009	25,595	-1.5%	298.2	-2.8%	31.5	-9.7%	266.7	-1.9%
2010	26,338	2.9%	297.8	-0.1%	30.6	-2.9%	267.2	0.2%
2011	26,968	2.4%	300.8	1.0%	31.1	1.5%	269.7	0.9%
2012	27,067	0.4%	304.3	1.2%	31.8	2.3%	272.5	1.0%
2013	26,830	-0.9%	306.5	0.7%	31.8	-0.2%	274.8	0.8%
2014	27,014	0.7%	309.5	1.0%	31.2	-1.7%	278.3	1.3%
2015	27,329	1.2%	311.9	0.8%	30.8	-1.3%	281.1	1.0%
2016	27,463	0.5%	313.2	0.4%	29.9	-3.0%	283.3	0.8%
2017	27,704	0.9%	316.0	0.9%	28.9	-3.4%	287.1	1.3%
2018	28,062	1.3%	319.6	1.1%	28.8	-0.3%	290.8	1.3%
2019	28,190	0.5%	321.6	0.6%	28.6	-0.7%	293.0	0.8%
2020	28,134	-0.2%	321.7	0.0%	28.2	-1.5%	293.5	0.2%
2021	28,598	1.6%	323.1	0.4%	27.8	-1.3%	295.3	0.6%
2022	29,115	1.8%	326.0	0.9%	27.6	-0.8%	298.4	1.0%
2023	29,539	1.5%	328.1	0.6%	27.3	-1.2%	300.8	0.8%
2024	29,962	1.4%	329.8	0.5%	26.9	-1.2%	302.9	0.7%
2025	30,332	1.2%	331.2	0.4%	26.6	-1.3%	304.7	0.6%
2026	30,677	1.1%	332.3	0.3%	26.2	-1.5%	306.1	0.5%
2027	31,011	1.1%	333.2	0.3%	25.8	-1.4%	307.4	0.4%
2028	31,427	1.3%	334.5	0.4%	25.5	-1.2%	309.0	0.5%
08-17		0.7%		0.2%		-1.8%		0.4%
18-28		1.1%		0.6%		-1.4%		0.8%

Figure 2 shows projected commercial heating, cooling, and other use intensity trends. Intensities are expressed on a kWh per square foot basis. Commercial heating and cooling intensities are relatively small in New England. Other use is composed of 8 end-uses where the largest end-uses include ventilation, lighting, refrigeration, and miscellaneous use. Indices are adjusted to reflect impact of statewide commercial EE program activity.

Figure 2: Commercial End-Use Intensities (kWh/sqft)



3. Large C&I and Other Sales

The Large C&I class includes GMP's largest customers. While this class is dominated by industrial load, it also includes some of GMP's largest commercial customers.

The baseline Large C&I sales forecast excluding Global Foundries and OMYA is derived using a generalized econometric model that relates monthly billed sales to state-level GDP and manufacturing employment. The baseline forecast is effectively flat as a result of slow GDP growth and declining manufacturing employment; table shows the GDP and employment projections. The baseline forecast is adjusted for process savings as a result of VEIC energy efficiency activity and new loads from expected customer expansions. The solar adjustment is actually positive as the solar load reduction is accounted for on the other side of the ledger as a power purchase cost.

Other use primarily consists of street lighting sales, but also includes public authority sales. Total sales are expected to be flat as continued efficiency gains outweigh new street-lighting fixture growth.

Table 8 summarizes industrial and other use sales forecasts.

Table 8: Industrial Sales Forecast

Year	Industrial (MWh)	Chg	Other (MWh)	Chg
2018	1,175,494		4,760	
2019	1,179,223	0.3%	4,760	0.0%
2020	1,173,906	-0.5%	4,760	0.0%
2021	1,175,862	0.2%	4,760	0.0%
2022	1,178,369	0.2%	4,760	0.0%
2023	1,178,659	0.0%	4,760	0.0%
2024	1,178,567	0.0%	4,760	0.0%
2025	1,177,505	-0.1%	4,760	0.0%
2026	1,175,797	-0.1%	4,760	0.0%
2027	1,174,086	-0.1%	4,760	0.0%
2028	1,173,789	0.0%	4,760	0.0%
18-28		0.0%		0.0%

Table 9 shows the disaggregated industrial sales forecast

Table 9: Disaggregated Industrial Sales Forecast

Year	No EE (1)	Efficiency (2)	Solar (3)	Spot Loads (4)	Total Adj	Forecast	Adj to Baseline
2018	1,178,685	-2,219	685	-1,658	-3,192	1,175,494	-0.3%
2019	1,173,728	-4,419	2,221	7,693	5,495	1,179,223	0.5%
2020	1,168,362	-6,626	3,308	8,861	5,544	1,173,906	0.5%
2021	1,169,709	-8,733	4,388	10,497	6,152	1,175,862	0.5%
2022	1,173,073	-10,811	5,610	10,497	5,296	1,178,369	0.5%
2023	1,174,148	-12,680	6,693	10,497	4,510	1,178,659	0.4%
2024	1,174,825	-14,541	7,786	10,497	3,742	1,178,567	0.3%
2025	1,174,574	-16,426	8,860	10,497	2,931	1,177,505	0.2%
2026	1,173,707	-18,350	9,944	10,497	2,090	1,175,797	0.2%
2027	1,172,862	-20,300	11,027	10,497	1,224	1,174,086	0.1%
2028	1,173,284	-22,117	12,124	10,497	504	1,173,789	0.0%

1. No EE reflects sales growth to due to economic activty
2. VEIC industrial process EE savings
3. Solar is additive as it's treated as part of power purchase costs
4. Spot Loads are based on expected net new loads from large customer expansion/contraction activity not accounted for in the model

2. Forecast Adjustments

The forecast begins by developing baseline forecasts for each revenue class. The baseline forecast is then adjusted for expected growth in solar capacity, Tier 3 electrification activity, electric vehicle sales, and large C&I load additions. Table 10 shows the breakdown of total billed sales forecast.

Table 10: Forecast Breakdown

Year	No EE (1)	Efficiency (2)	Solar (3)	Electrification (4)	Electric Vehicles (5)	Spot Loads (6)	Total Adj	Forecast
2018	4,189,091	-22,941	-5,802	4,684	1,047	39	-22,972	4,166,119
2019	4,184,620	-50,449	-17,404	13,239	2,303	13,962	-38,349	4,146,271
2020	4,190,859	-77,494	-25,788	22,499	3,811	18,204	-58,768	4,132,091
2021	4,204,252	-108,059	-34,072	25,861	5,620	19,840	-90,811	4,113,442
2022	4,222,343	-133,062	-43,427	29,249	7,791	19,840	-119,610	4,102,733
2023	4,236,043	-155,990	-51,761	32,686	10,396	19,840	-144,831	4,091,212
2024	4,249,108	-174,502	-60,219	36,148	13,522	19,840	-165,211	4,083,897
2025	4,260,378	-195,253	-68,430	39,602	17,273	19,840	-186,967	4,073,410
2026	4,270,536	-212,642	-76,764	43,051	21,775	19,840	-204,740	4,065,796
2027	4,280,296	-225,996	-85,098	46,507	27,393	19,840	-217,355	4,062,941
2028	4,292,553	-237,609	-93,628	49,959	34,405	19,840	-227,033	4,065,519

1. No EE reflects sales growth to due to household and economic activty
2. Efficiency incorporates both impacts of end-use standards and state efficiency programs
3. Solar is based on GMP Behind the Meter Solar Capacity Forecast and Historical "Own-Use" share of system generation.
4. Electrification is based on expected gains from cold-climate heat pump sales and specific commercial electrification projects
5. Electric vehicle sales are based on Energy Future's Group 2017 EV forecast for GMP (low case ?)
6. Spot Loads are based on expected net new loads from large customer expansion/contraction activity that are not be captured in the baseline model

1. Energy Efficiency

Energy efficiency impacts are embedded in the baseline forecast as end-use intensities are explicitly incorporated in the residential and commercial forecast models. Energy efficiency impacts can be isolated by first executing the forecast models where end-use intensities are held constant; this is called the constant efficiency forecast. The baseline forecast is then subtracted from the constant efficiency forecast giving us efficiency impact estimates (column 2 in the table above.) Adding the efficiency savings to the baseline forecast results in column 1 the No efficiency forecast.

Efficiency impacts are captured in the end-use intensity projections. For all but miscellaneous, end-use intensities are declining or are flat as improvements in efficiency outweigh additional gains in end-use saturation. Appliance stock efficiency continues to improve as existing equipment is replaced with more efficient equipment. Factors driving change in stock efficiency include new end-use standards, state efficiency programs that either subsidize the cost of more efficient end-use options or provide new end-use measures such as lighting and weatherization as part of home and business audits, and just natural turnover of existing equipment with more efficient equipment.

Historical end-use intensities for New England are adjusted to reflect Vermont end-use saturations and calibrated into Vermont residential, and commercial customer usage. End-use intensities are further adjusted to account for expected savings from state energy efficiency (EE) program activity that is not already captured in the intensity estimates. The current set of end-use intensity estimates were developed as part of the Vermont Electric Power Company (VELCO) 2018 long-term forecast. Itron worked with *Vermont Energy Investment Corporation (VEIC)* and other members of the *Vermont System Planning Forecast Subcommittee* to develop a set of end-use intensity projections that reflect both Federal efficiency standards and the impact of future EE program savings. The end-use intensities were updated in the June 2017 forecast to reflect changes in VEIC's EE program savings projections.

As the state has been aggressively pursuing efficiency programs for the last twelve years, there is significant efficiency improvements already embedded in the baseline forecast. To avoid "double counting" future EE savings; future EE program savings are adjusted to account for EE savings already embedded in the baseline forecast.

In the residential sector, end-use intensities that are adjusted for future EE program impacts include heating, water heating, cooling, refrigeration, lighting, kitchen/laundry, and miscellaneous use. In the commercial sector, program efficiency adjustments are made to heating, lighting, refrigeration, cooling, ventilation, water heating, and miscellaneous use.

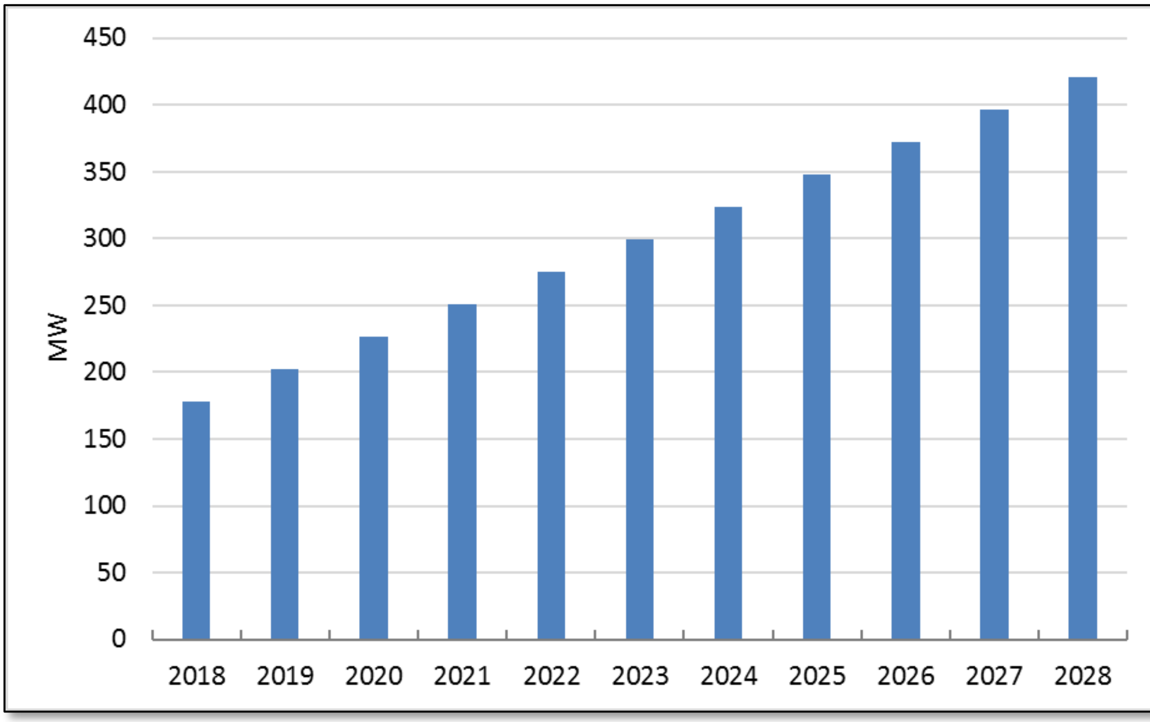
2. Solar Load Forecast

Solar Capacity Forecast

As of December 2017, installed solar capacity is 137 MW. This is a combination of traditional, customer owned or leased roof-top systems, and larger community/group based systems. GMP projects 40.7 MW of solar capacity is will be installed in 2018, and 24.3 MW of additional solar capacity each subsequent year.

Figure 3 shows the year-end capacity forecast.

Figure 3: Year-End Solar Capacity Forecast



The forecast is adjusted for new solar installations beginning in January 2018; existing solar load is embedded in the historical sales data.

Allocation of Capacity to Classes

The capacity forecast is allocated to the residential, commercial, and industrial classes based on the previous 12 months of billed solar generation data. Table 11 shows the allocation factors.

Table 11: Capacity Allocation Factors

Class	Previous 12 Mnth Generation (MWh)	% of total
Residental	52,619	36%
Commercial	75,343	52%
Industrial	17,920	12%
Total	145,882	

Capacity to Generation

Monthly generation is derived by applying monthly solar load factors to the capacity forecast. Table 12 shows the solar generation load factors.

Table 12: Solar Load Factors

Month	Load Factor
Jan	7.7%
Feb	10.8%
Mar	14.1%
Apr	18.8%
May	19.5%
Jun	20.6%
Jul	20.3%
Aug	19.5%
Sep	15.7%
Oct	12.5%
Nov	8.4%
Dec	5.7%

The monthly load factors are derived from engineering-based solar hourly load profile for 1 MW solar system load. The load shape is a weighted profile, which assumes 33% of systems are roof-mounted, 57% are fixed-tilt, and 10% 2 are axis trackers. The system hourly load profile was estimated by GMP.

The solar generation forecast (MWh) is derived by applying the load factors to solar capacity projections. The following equation shows an example of how 100 MW of capacity is translated into June generation.

$$100MW_{june} \times 0.206LdFct_{june} \times 720hrs_{june} = 14{,}832\ MWh_{june}$$

Estimation of Solar "Own-Use"

Solar generation is either consumed by the solar customer (*own-use*) or returned to the connected power-grid (*excess*); own-use reduces billed revenues, while excess is treated as power purchase cost. Historical solar billing data is used to determine the month share that is own-use and excess. The split between own-use and excess varies by revenue class and month; own-use share is typically smaller in the summer months with a larger percentage of the generation sent to the grid. Table 13 shows the forecasted generation based on the incremental new capacity, by own-use and excess use.

Table 13: Solar Generation

	Year End	Total			Residential			Commercial			Industrial		
	Capacity	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh
Year	(MW)	Generation	Excess	Own Use	Generation	Excess	Own Use	Generation	Excess	Own Use	Generation	Excess	Own Use
2018	40.7	20,660	14,858	5,802	7,452	1,309	6,143	10,670	10,326	344	2,538	3,223	-685
2019	65.0	63,966	46,562	17,404	23,073	4,015	19,058	33,036	32,469	568	7,857	10,079	-2,221
2020	89.3	95,009	69,221	25,788	34,270	5,951	28,318	49,069	48,290	778	11,671	14,979	-3,308
2021	113.6	125,703	91,630	34,072	45,341	7,881	37,459	64,921	63,920	1,001	15,441	19,829	-4,388
2022	138.0	160,465	117,038	43,427	57,879	10,094	47,785	82,875	81,623	1,252	19,711	25,321	-5,610
2023	162.3	191,333	139,572	51,761	69,014	12,027	56,986	98,817	97,348	1,468	23,503	30,196	-6,693
2024	186.6	222,634	162,415	60,219	80,304	13,969	66,335	114,983	113,313	1,670	27,348	35,133	-7,786
2025	210.9	253,069	184,640	68,430	91,282	15,894	75,388	130,701	128,800	1,902	31,086	39,947	-8,860
2026	235.2	283,937	207,174	76,764	102,416	17,827	84,589	146,644	144,525	2,119	34,878	44,822	-9,944
2027	259.6	314,806	229,708	85,098	113,550	19,760	93,790	162,586	160,251	2,335	38,670	49,697	-11,027
2028	283.9	346,359	252,731	93,628	124,931	21,707	103,225	178,882	176,355	2,528	42,546	54,670	-12,124

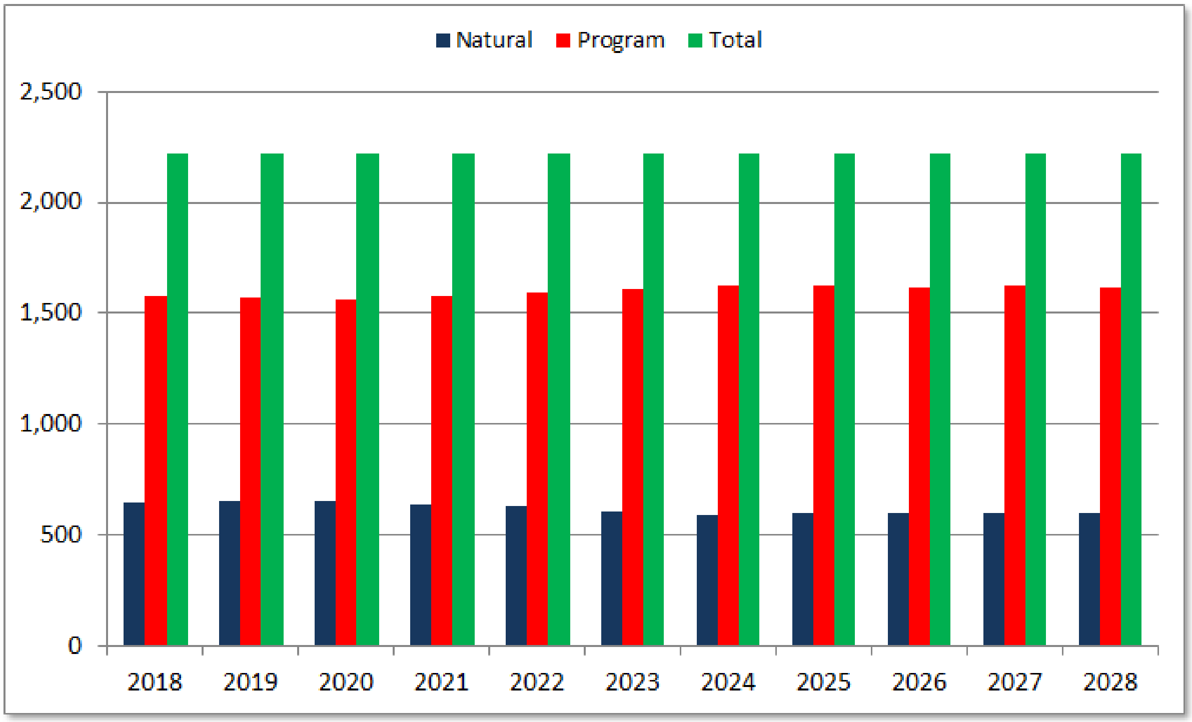
The sales forecast is adjusted for solar load impacts by subtracting cumulative new solar own-use generation from the appropriate class sales forecasts. By 2028, solar generation reduces residential sales by 93,628 MWh, which represents reduction of 340 kWh per customer. Industrial own-use is negative, meaning that solar is additive. This is due to an accounting practice within GMP's billing system in which generation from community/group systems is metered and booked under one rate class but excess can be credited to another. As such industrial excess is greater than generation, creating negative own-use.

3. Tier 3 Electrification Impacts

To meet Tier 3 obligations, VEIC and GMP are promoting technologies that displace fossil fuel. The largest program is an incentive program promoting adoption of cold-climate heat pumps. VEIC expects state households to take incentives associated with 3,000 new heat pumps per year. The estimates were provided as part of the development of the VELCO long-term demand forecast. Based on GMP's size, we expect that 74 percent of the heat pumps (2,220 heat pumps per year) will be sold in GMP service area.

Given the operating cost-effectiveness, EIA projects heat pump market penetration in New England even without incentives; we would expect some GMP households to take the incentives even if it is not influencing their purchase decision. Program related heat pump sales are reduced to reflect the "natural occurring" adoption reflected in EIA's heat pump saturation forecast. Figure 4 shows the breakdown of cold-climate heat pump adoption by market driven (*Natural*) and program induced (*Program*).

Figure 4: Cold-Climate Heat Pump Adoption (units)

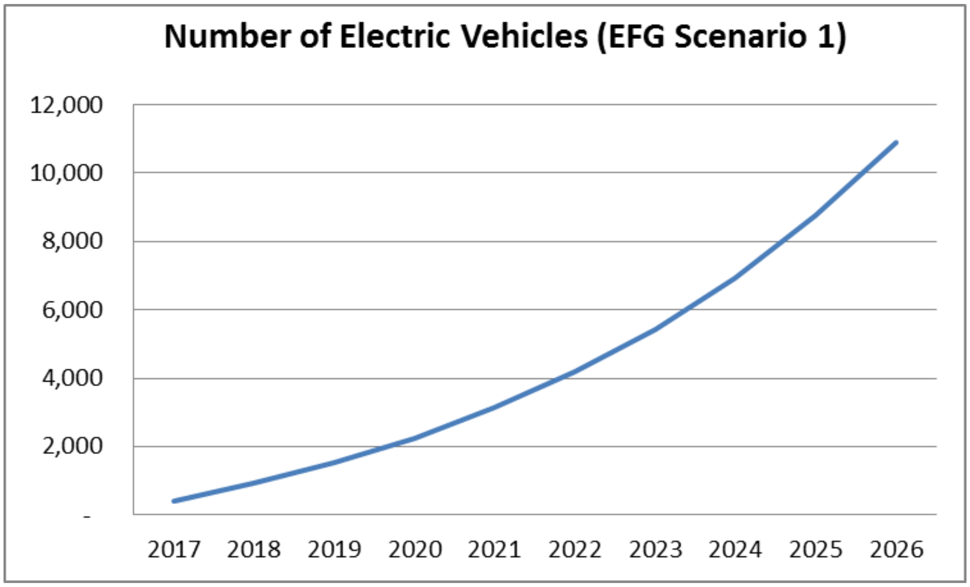


Of the 2,200 heat pumps sold through the incentive program, roughly 1,600 a year are directly attributable to the offered incentive. A recent GMP-study expects cold-climate heat pumps on average to use 2,085 kWh per year for heating and 140 kWh per year for cooling. Heat pump sales are derived by multiplying the net heat pump unit forecast with the winter and summer heat-pump annual usage.

4. Electric Vehicle Forecast

Like the heat pump forecast, electric vehicle (EV) forecast is added to the baseline sales forecast. EV sales are based on Energy Futures Group's (EFG) Scenario 1 forecast that was part of an electrification forecast study conducted for GMP last year. By 2026, EFG projects there will be roughly 11,000 electric vehicles in the GMP service territory starting from 300 vehicles in 2017. Figure 5 shows the electric vehicle forecast.

Figure 5: Electric Vehicle Forecast



By 2026, EFG estimates that 9% of all new car sales or roughly 2,000 new vehicles per year. In comparison EIA projects electric vehicles will account 6% of new car sales and Efficiency Vermont expects 12% of new car will be electric by 2026 (low case scenario). The vehicle forecast is translated into electric sales by multiplying the vehicle forecast by expected average use per vehicle. EFG expects partial plug-in EVs to account for 78% of the market and all electric vehicles to represent 22% of the market. The average annual vehicle use is 2,007 kWh. Electric vehicles are expected to account for over 34,000 MWh in annual consumption by 2028.

5. Customer Specific Load Adjustments

GMP provides monthly forecasts for their two large transmission customers - Global Foundries and OMYA.

In addition, GMP provides expected load gains and losses for large commercial and industrial customers that are not reflected in the historical sales trend and thus not captured by the baseline forecast models. By 2020, GMP expects an additional 19,800 MWh of non-residential sales that are not captured in the baseline forecast model.

3. Baseline Forecast Models

Baseline sales forecasts are derived from estimated linear regression models that relate monthly historical sales to economic conditions, price, weather conditions, and long-term appliance saturation and efficiency trends. Saturation and efficiency trends are combined to construct annual energy intensity projections that are then adjusted for future EE program savings projections. Once models are estimated, assumptions about future conditions are executed through the models to generate customer and sales forecasts.

Separate forecast models are estimated for the primary revenue classes. Models are estimated for the following:

- Residential
- Commercial (Small C&I)
- Industrial (Large C&I)
- Other

Residential and commercial models are constructed using an SAE modeling framework. This approach entails constructing generalized end-use variables (Heating, Cooling, and Other Use) that incorporate expected end-use saturation and efficiency projections as well as price, economic drivers, and weather. The SAE specification allows us to directly capture the impact of improving end-use efficiency and end-use saturation trends on class sales.

1. Residential

The residential forecast is generated using separate average use and customer forecast models. The average use model is estimated using an SAE specification where monthly average use is estimated as a function of a heating variable (*XHeat*), cooling variable (*XCool*) and other use variable (*XOther*) as shown below:

$$AvgUse_m = a + b_1 \times XHeat_m + b_2 \times XCool_m + b_3 \times XOther_m + \varepsilon_m$$

XHeat is calculated as a product of a variable that captures changes in heating end-use saturation and efficiency (HeatIndex), economic and other factors that impact stock utilization (HDD, household size, household income, and price). *XHeat* is calculated as:

$$XHeat_{y,m} = HeatIndex_y \times HeatUse_{y,m}$$

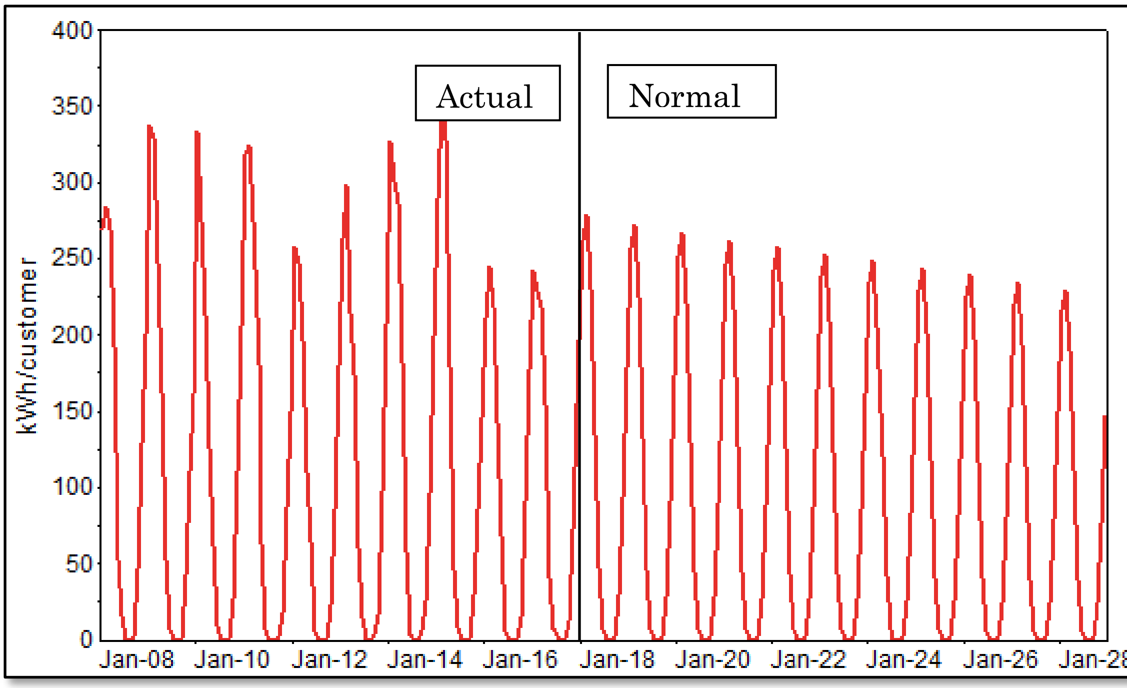
Where:

$$HeatUse_{y,m} = \left(\frac{HDD_{y,m}}{HDD_{09}}\right) \times \left(\frac{HHSize_y}{HHSize_{09}}\right)^{0.20} \times \left(\frac{Income_y}{Income_{09}}\right)^{0.20} \times \left(\frac{Price_{y,m}}{Price_{09}}\right)^{-0.10}$$

The heat index is a variable that captures heating end-use efficiency and saturation trends, thermal shell improvement trends, and housing square footage trends. The index is constructed from the EIA's annual end-use residential forecast for the New England census division. The economic and price drivers are incorporated into the HeatUse variable. By construction, the $HeatUse_{y,m}$ variable sums close to 1.0 in the base year (2009). This index value changes through time and across months in response to changes in weather conditions, prices, household size, and household income.

The heat index (*HeatIndex*) and heat use variable (*HeatUse*) are combined to generate the monthly heating variable XHeat. Figure 6 shows the calculated XHeat variable.

Figure 6: XHeat Variable



The strong decline in the XHeat is largely driven by expected efficiency improvements and significant adoption of more efficient heat pumps. Adoption of heat pumps referenced here is organic; program-driven adoption is addressed separately.

Similar variables are constructed for cooling (*XCool*) and other end-uses (*XOther*).

Figure 7 and Figure 8 show XCool and XOther.

Figure 7: XCool Variable

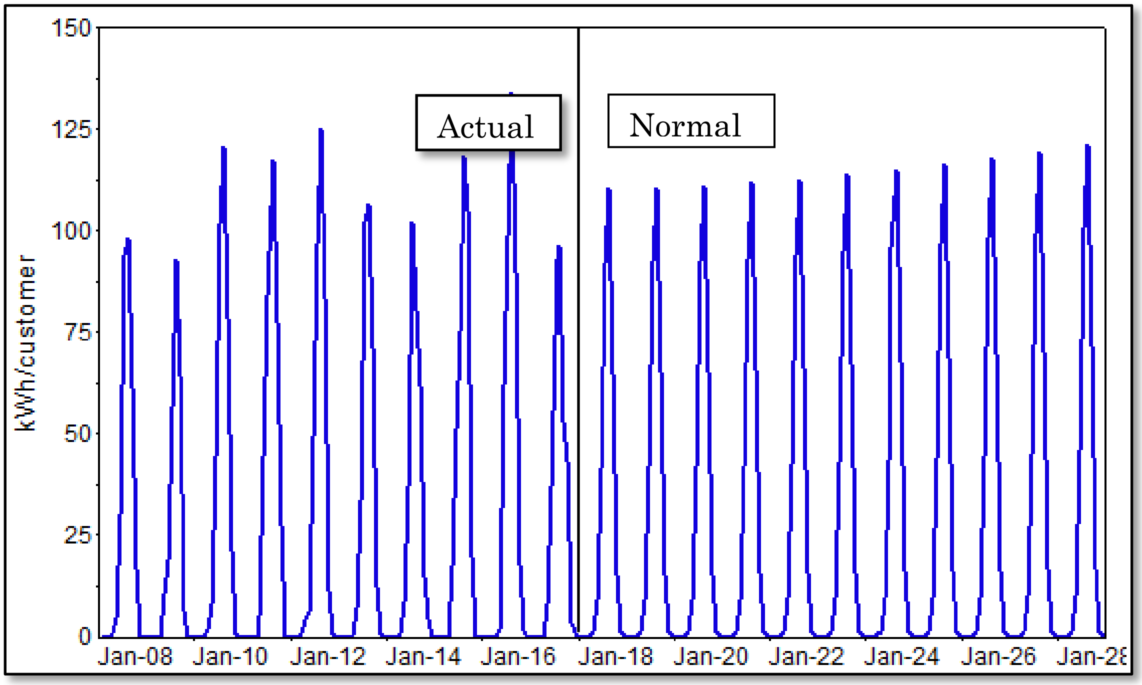
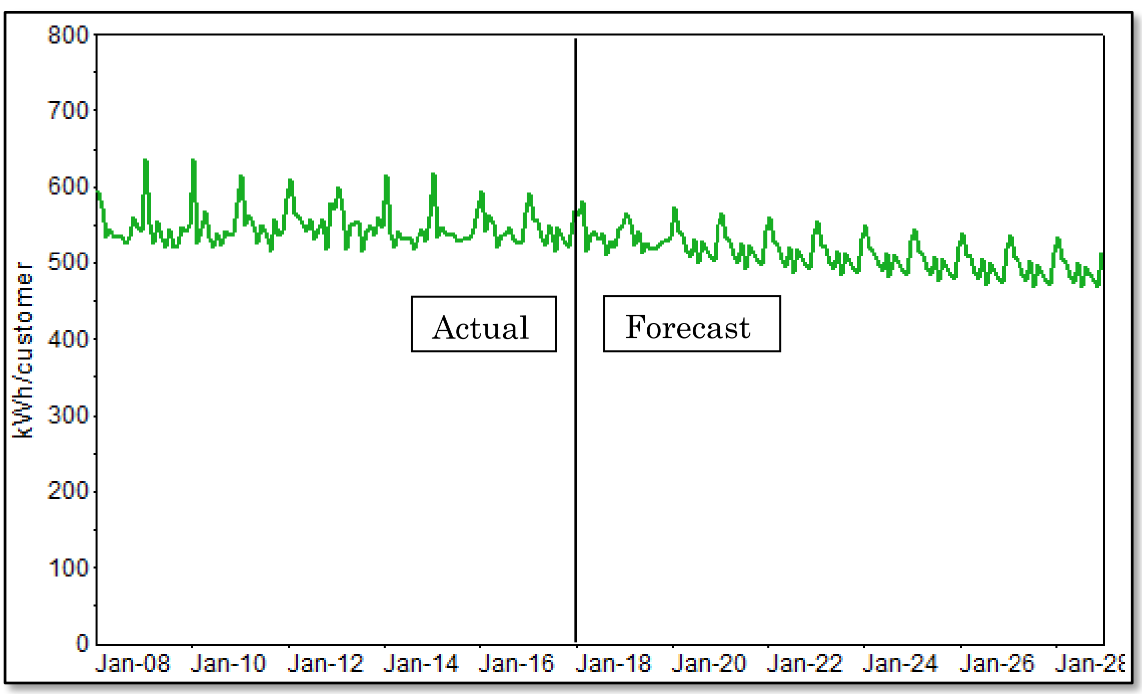


Figure 8: XOther Variable

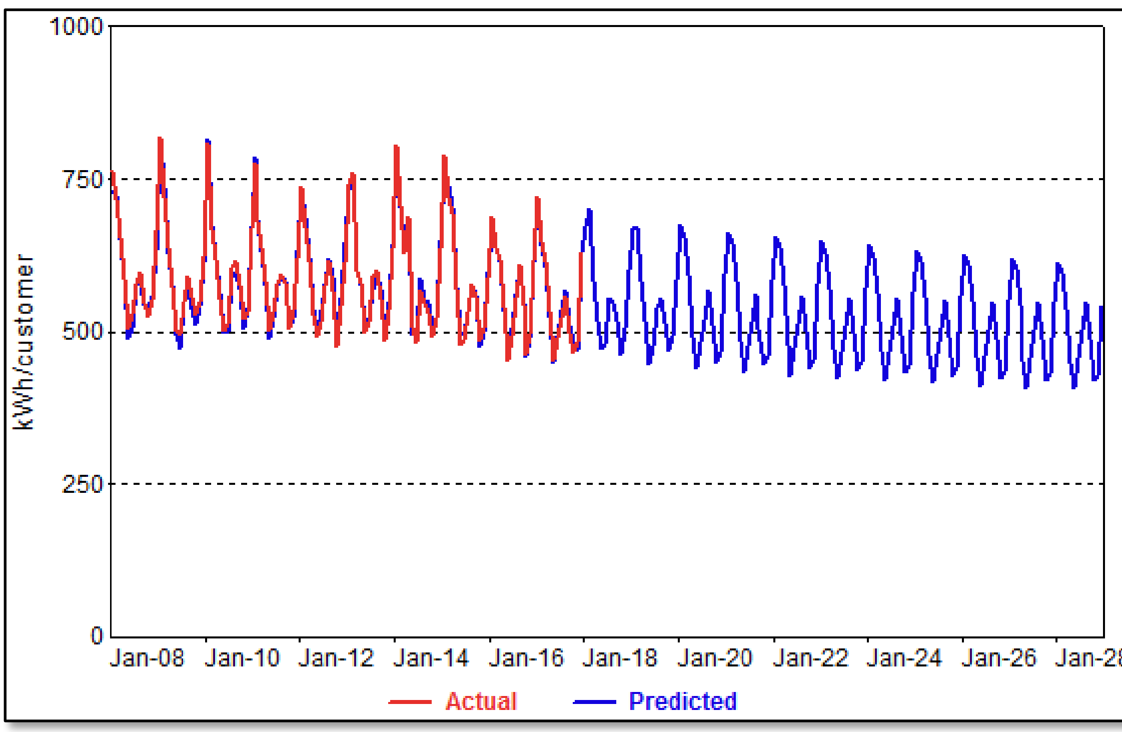


While cooling intensity is relatively small, cooling per household increases over the forecast period largely as a result of increasing heat pump saturation.

XOther (non-weather sensitive use) declines over the forecast period. The monthly variation in XOther reflects variation in the number of monthly billing days, lighting requirements, and monthly variation in water heater and refrigerator use. End-use intensities across non weather-sensitive end-uses are declining and, as a result, XOther also declines driving total average use downwards.

The end-use variables are used to estimate the residential average use model. Figure 9 shows actual and predicted residential average use.

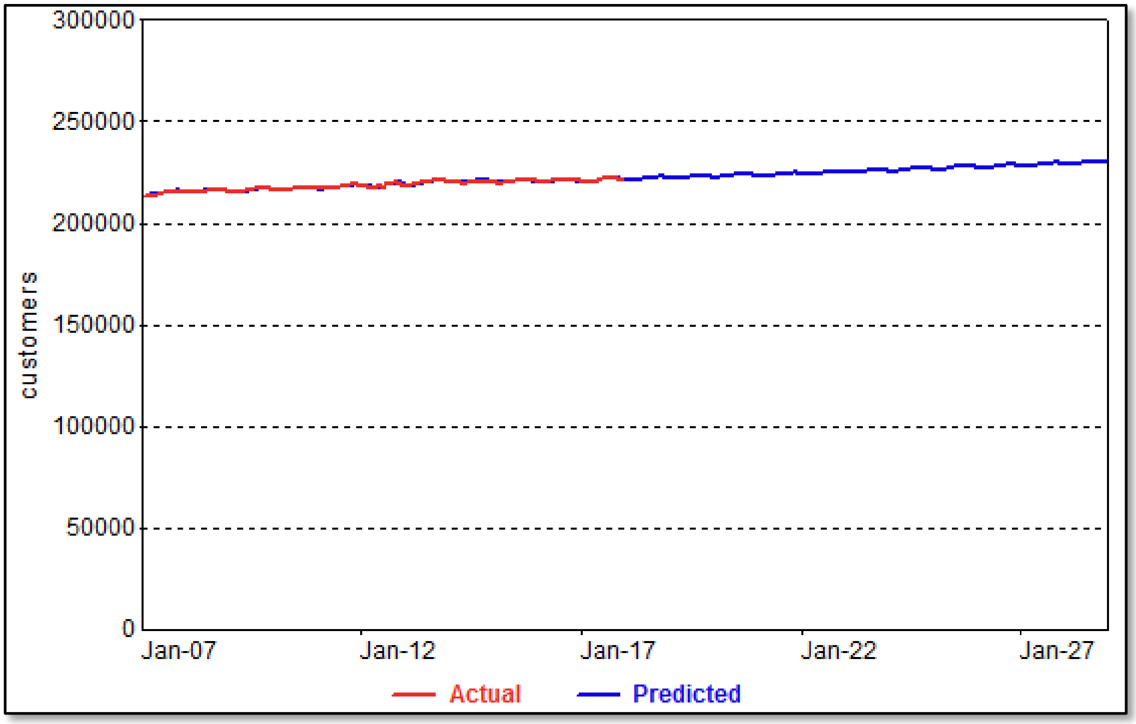
Figure 9: Residential Average Use



The model explains historical monthly sales variation well with an Adjusted R-Squared of 0.98 and a MAPE of 1.7%.

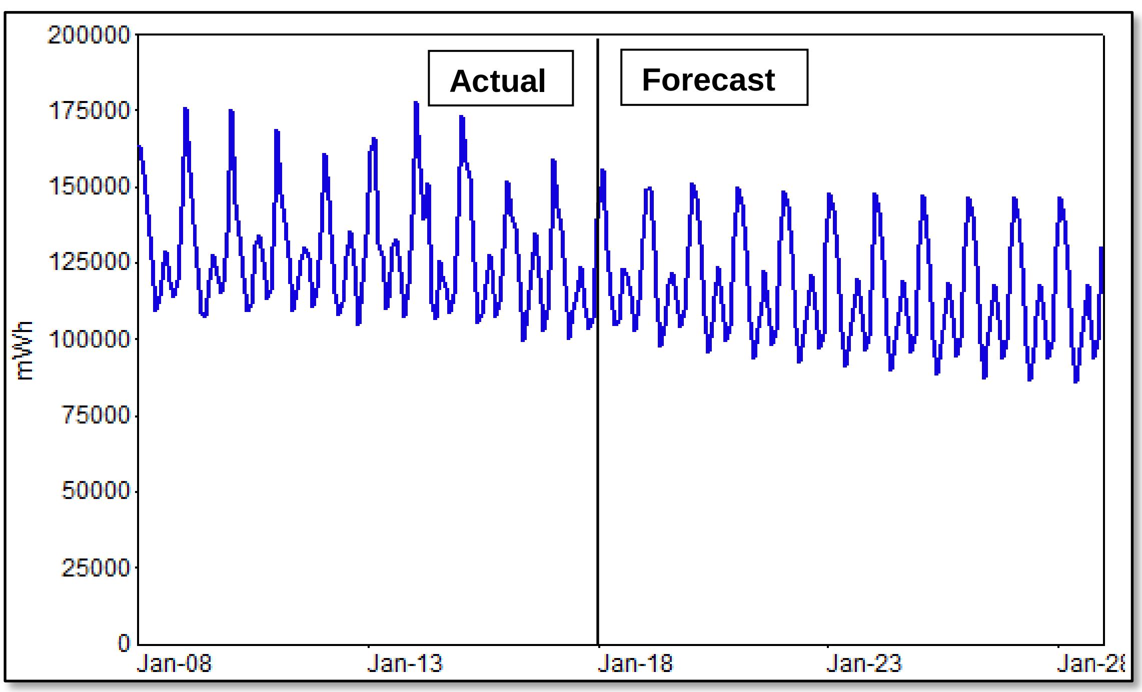
Residential customer projections are based on state household projections. The models explain historical customer growth well with an Adjusted R-Squared of 0.98 and MAPE of 0.1%. Figure 10 shows actual and predicted customers for GMP.

Figure 10: Residential Customer Forecast



Customer and average use forecasts are combined to generate monthly billed sales forecast. Figure 11 shows the monthly residential forecast for the combined GMP.

Figure 11: Residential Sales Forecast



2. Commercial

The commercial model is also based on SAE specification. Monthly commercial class sales and customers are derived adding the former North GS (general service) and TOU revenue class and the former GMP South commercial sales.

The SAE commercial model captures the impact of changing end-use intensity as well as economic conditions, price, and weather in the constructed model variables. As in the residential model, end-use variables XHeat, XCool, and XOther are constructed from end-use saturation and efficiency trends, regional output, price, and weather conditions. The commercial SAE model is defined as:

$$ComSales_m = a + b_1 \times XHeat_m + b_2 \times XCool_m + b_3 \times XOther_m + \varepsilon_m$$

The SAE model variables are constructed similarly to that of the residential model, the primary differences is that the end-use intensities are measured on a kWh per square foot basis (vs. kWh per household in the residential model), and output and employment are used to capture economic activity (vs. household income and population in the residential model).

The GMP commercial class is forecasted using a total sales model where XCool is defined as:

$$XCool_{y,m} = CoolEI_y \times CoolUse_{y,m}$$

Where:

$$CoolUse_{y,m} = \left(\frac{CDD_{y,m}}{CDD_{09}}\right) \times \left(\frac{ComVar_y}{ComVar_{09}}\right) \times \left(\frac{Price_{y,m}}{Price_{09}}\right)^{-0.10}$$

.

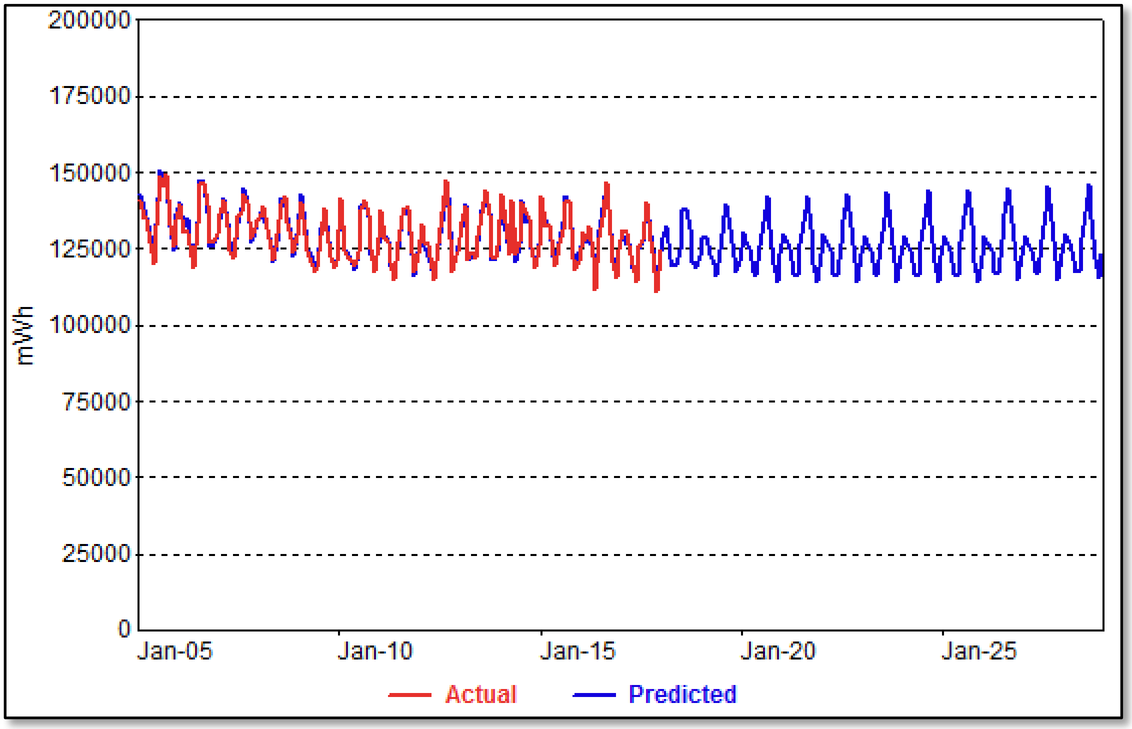
And

$$ComVar_{y,m} = \left(\frac{Emp_{y,m}}{Emp_{09}}\right)^{0.25} \times \left(\frac{GDP_{y,m}}{GDP_{09}}\right)^{0.25} \times \left(\frac{HHs_{y,m}}{HHs_{09}}\right)^{0.50}$$

In the constructed economic variable output and employment are weighted equally reflecting the relationship between economy and sales in the last five years.

A monthly variable is constructed for heating (XHeat) and other use (XOther) similar to that of XCool. The model variables are used to drive total sales through an estimated monthly regression model. Figure 12 shows the commercial sales model results.

Figure 12: Commercial Sales Forecast



This model fits commercial data well with an Adjusted R-Squared of 0.95 and model MAPE of 1.2%. Model statistics can be found in the Appendix A.

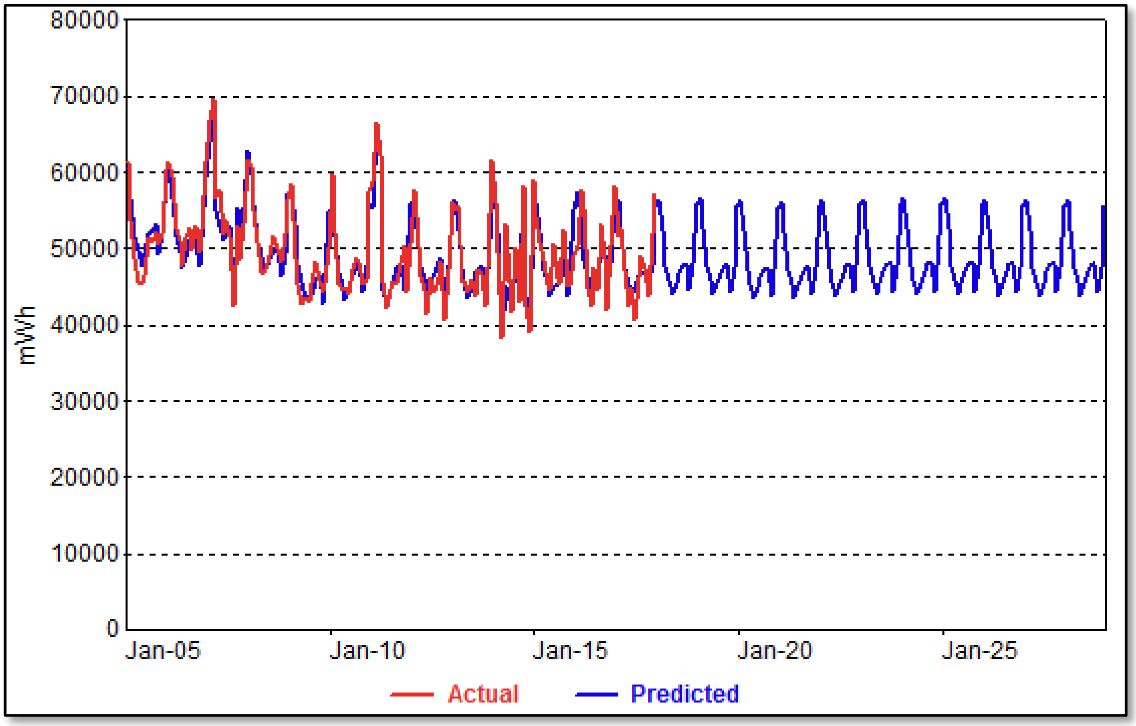
3. Industrial

Industrial sales are estimated using a generalized (vs. SAE model) model specification that is driven by economic projections. The economic variable includes both manufacturing employment projections and state GDP where half of the weight is on manufacturing employment (0.5). The constructed economic variable is summarized below:

$$IndVar_{y,m} = \left(\frac{ManEmp_{y,m}}{ManEmp_{09}} \right)^{0.50} \times \left(\frac{GDP_{y,m}}{GDP_{09}} \right)^{0.50}$$

Seasonal load variation is captured through a set of monthly binary variables. The industrial model excludes Global Foundries and OMYA sales as GMP provides an independent forecast for these customers. Figure 13 shows actual and predicted industrial sales.

Figure 13: Industrial Sales Forecast

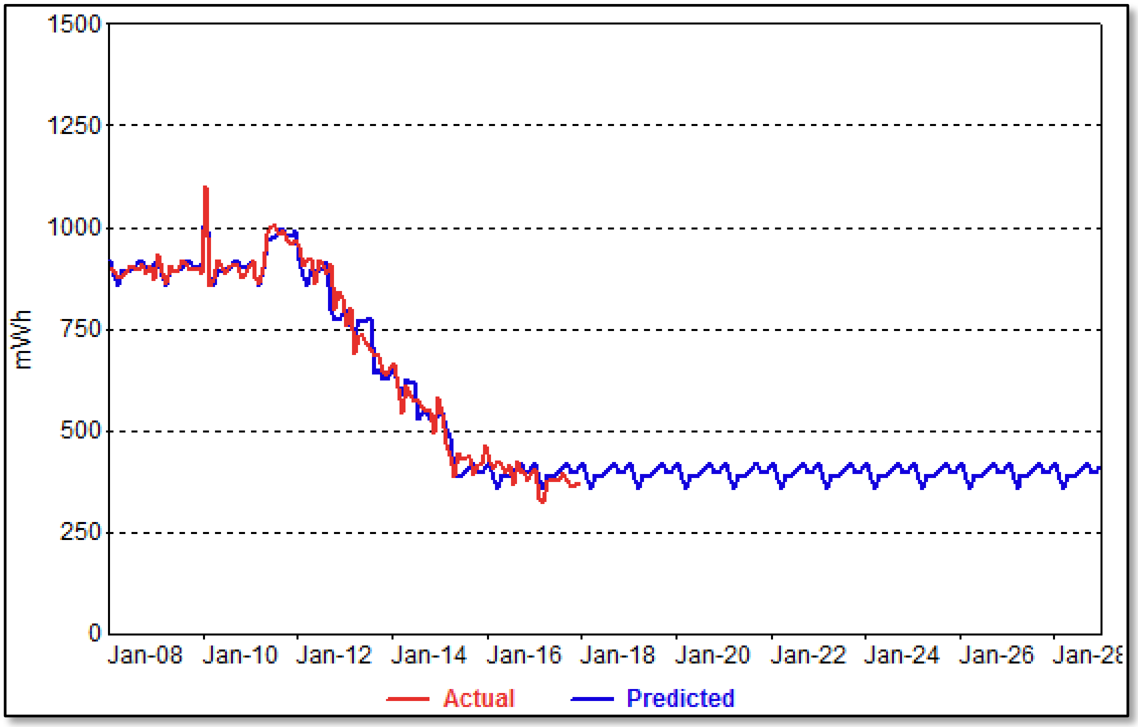


This model Adjusted R-Squared is 0.8 and the MAPE is 3.7%. The lower, relative to other models, Adjusted R-Square is due to the large variation in monthly billed sales data. There is significant month-to-month variation driven by customer-specific activity and billing adjustments that cannot be totally accounted for by economic drivers and weather conditions.

4. Other Use

Other Use sales are estimated using a simple regression model constructed to capture seasonal effects and shifts in the data. This class is dominated by street lighting, but also includes a small amount of other public authority sales. GMP has seen a significant drop in street lighting sales as existing lamps were replaced with high efficiency lamps. We assume some additional savings in the near-term and project flat sales after the savings adjustments. Figure 14 shows actual and forecasted sales for this revenue class

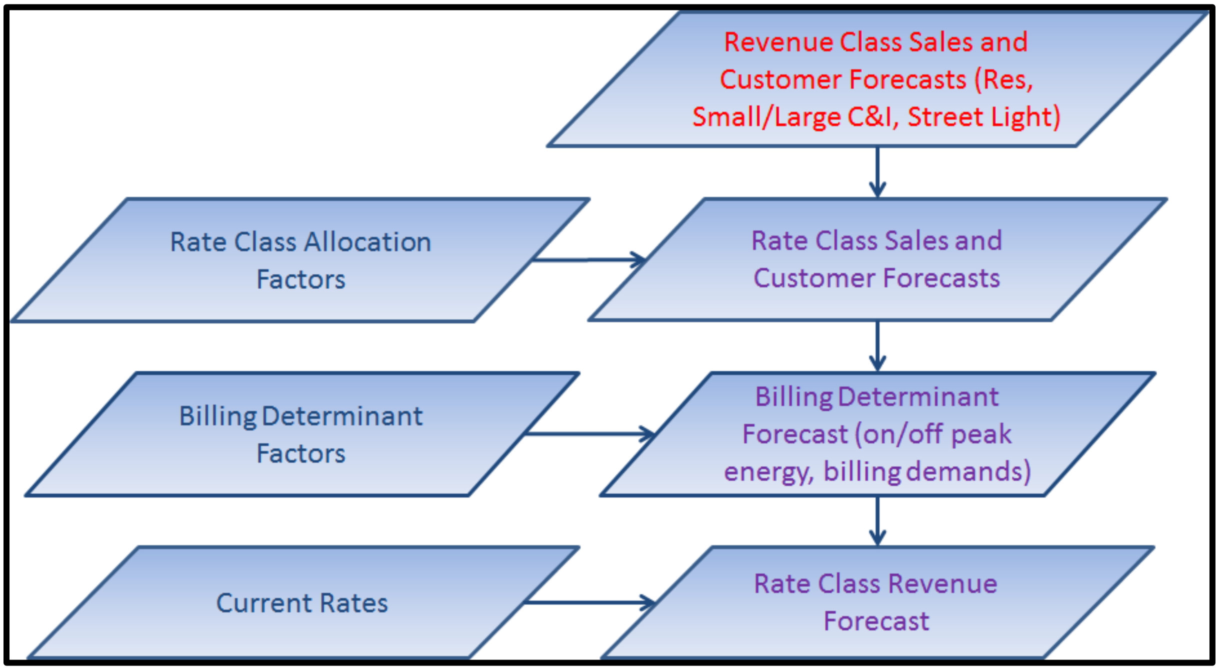
Figure 14: Other Sales Forecast (MWh)



4. Revenue Forecast

The revenue forecast is derived at the rate schedule level. Class sales forecasts are allocated to rate schedules and within rate schedules to billing determinants (i.e., customer, on and off-peak use, and billing demands). Revenues are then generated by multiplying rate schedule billing determinants by the current tariff rates. Figure 15 provides an overview of the revenue model.

Figure 15: Revenue Model



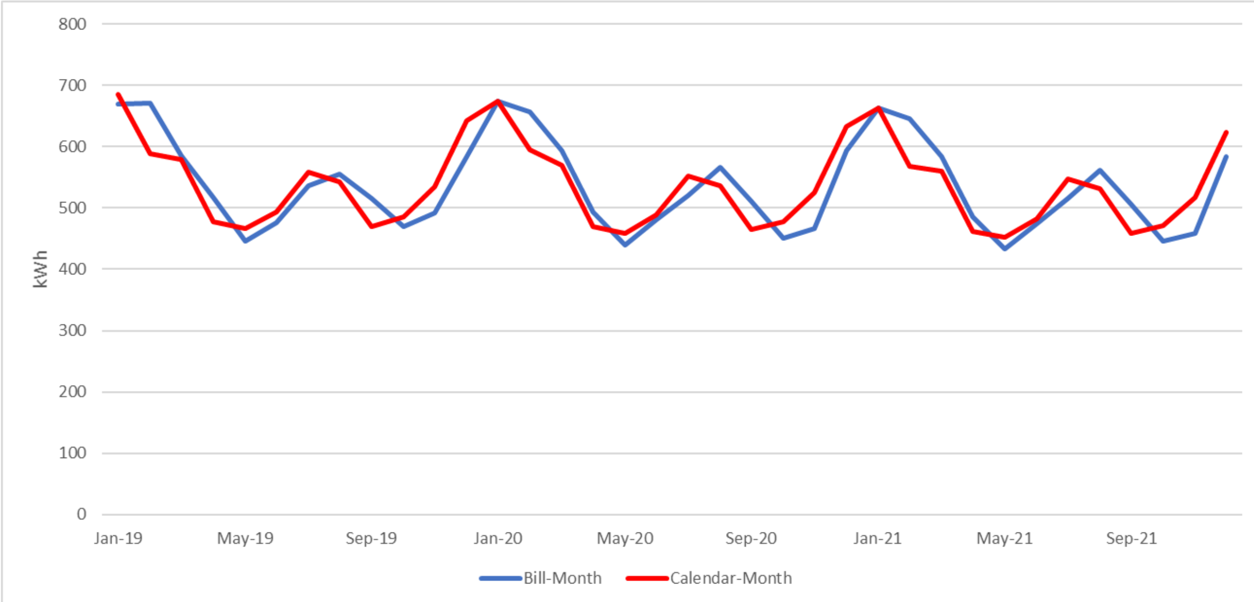
The process is described below.

1. Calendarize class sales forecast

The estimated models are based on monthly billed sales data. As such the forecast is also on a billed sales basis. For financial analysis and revenue projections sales are converted to a calendar-month basis.

The billing-month spans across calendar-months. In general, the billing month includes the last two weeks of the prior month and the first two weeks of the current month. The September billing-month for example includes the last half of August and the first half of September. The billing month period is determined by the meter read schedule. We use the meter-read schedule to construct monthly HDD and CDD (cycle-weighted degree-days) and number of billing days that are consistent with the billing month period. Utilities report revenues and costs on a calendar-month basis. A MetrixND Simulation Object is used to convert billed sales to calendar sales. This is done by replacing billing-month normal HDD and CDD with calendar-month normal HDD and CDD and replacing the number of billing days with the number of calendar days. Figure 16 shows the result of this simulation for the residential sales class.

Figure 16: Comparison of Billed and Calendar-Month Average Use

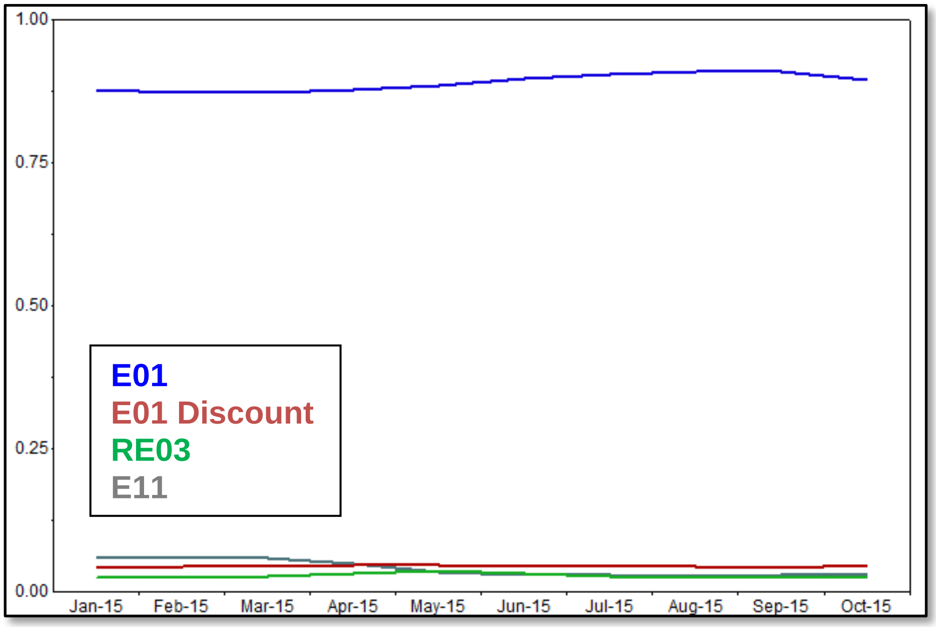


The blue line is the forecasted baseline average residential use on a billing month basis and the **red** line shows the forecast on a calendar-month basis.

2. Derive Rate Class Monthly Sales Forecast

Revenue class sales and customer forecasts are first allocated to the underlying rate schedules based on projected monthly allocation factors. The allocation factors are derived from historical billing data and simple regression models that allow us to capture any seasonal variation in the rate class shares. Residential class sales, for example, are allocated to rate schedules - E01, RE03, and E11 rate classes. Figure 17 shows historical and forecasted residential rate class sales shares.

Figure 17: Residential Rate Class Share Forecast (%)



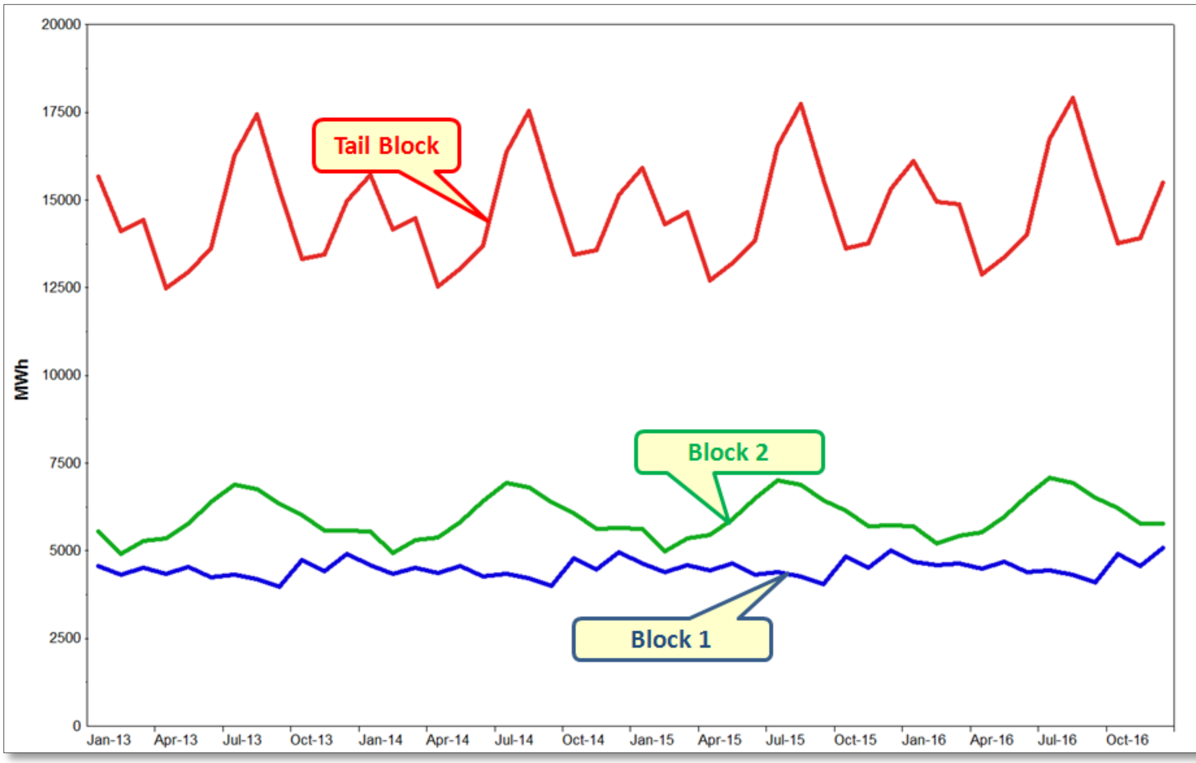
Approximately 97% of residential sales are billed under rate E01. The percentage is slightly lower in the winter months as the electric heat rate (E11) is higher in these months.

3. Estimate monthly billing determinants

In the next step, rate class sales (and customers counts for some rates) are allocated to billing blocks, time-of-use billing periods, and on and off-peak billing demand blocks. Billing block and demand factors are derived from historical billing data. For example, residential rate E11 has on-peak and off-peak energy billing periods that are priced differently. Rate E11 monthly sales are allocated to TOU periods based on historical on-peak and off-peak sales data.

Some of the rates are complex. The commercial rate RE02, for example, includes non-demand and demand billed sales and customers, load factor kWh blocks (for demand customers), and different demand charges for demand below 5 kW and demand above 5 kW. Figure 18 shows the resulting sales block forecasts for rate RE02 Demand Customers.

Figure 18: Rate RE02 Demand Customer - Sales Billing Block Forecast



4. Calculate Rate Schedule and Revenue Class Revenues

Once the billing determinants are derived, revenues are generated by multiplying the forecasted billing determinants by the current customer, energy, and demand charges. Revenues are aggregated by rate schedule and month. Rate schedule revenues are then aggregated to revenue classes: residential, commercial, industrial and street lighting.

5. Model Rate Restructuring

Starting in April 2016, GMP has begun to gradually merge most of the legacy GMP South rates into modified GMP North rates or completely new rates for the entire company. The rate restructuring occurs over the next five-years with the final rate tariffs effective April 2020. Major restructuring includes:

- Legacy South RE02 non-demand rate customers migrate to modified rate E06.
- Legacy South RE02 demand rate customers migrate to modified rates E06, E63, and new rate E08 based on the individual customer load characteristics.
- Legacy North E06 rate is split between rates E06 and E08.
- Legacy South RE10 customers will migrate to rates E06 and E63.

- Legacy South RE04, RE05, RE16 customers will join existing E63 customers in the modified company-wide rate E63.

New rates E06, E08 and E63 which are scheduled to begin in April 2016 combine parts of pre-existing rates, but have no historical billed data of their own. The new rates are estimated by allocating sales to the new rate schedules based on allocation factors provided by GMP. Revenue is then calculated by applying billing determinant factors to rate class sales.

6. Validate and Calibrate Revenue Calculation

To validate the revenue calculations, calculated revenues are compared to actual 2017 revenues on a per kWh basis. Estimated revenues are within 0.2% of actual revenues.

7. Fiscal Year Sales and Revenue Forecast

GMP uses a fiscal year for financial planning and reporting. The fiscal-year is from October to the following September. Fiscal Year 2019, for example, will run from October 2018 through September 2019. Table 14 and Table 15 show the fiscal year sales and revenue forecasts where sales and revenue are reported on a calendar-month basis.

Table 14: Fiscal Year Sales Forecast (MWh)

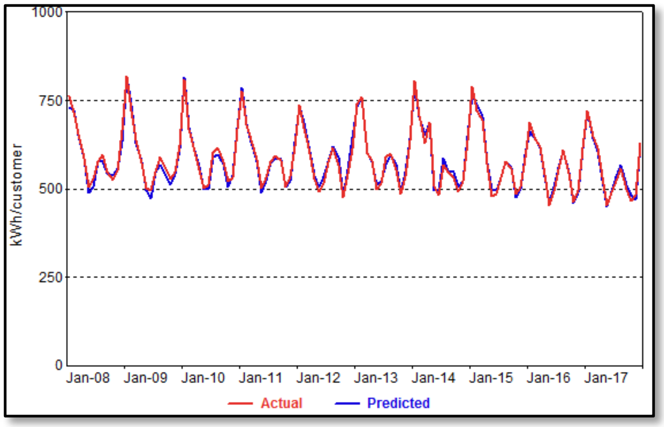
Year	Residential	Chg	Commercial	Chg	Industrial	Chg	Other	Chg	Total	Chg
2018	1,475,914		1,514,737		1,178,408		4,657		4,173,716	
2019	1,448,883	-1.8%	1,520,467	0.4%	1,182,356	0.3%	4,763	2.3%	4,156,468	-0.4%
2020	1,435,062	-1.0%	1,529,699	0.6%	1,175,132	-0.6%	4,763	0.0%	4,144,656	-0.3%
2021	1,411,987	-1.6%	1,527,704	-0.1%	1,175,612	0.0%	4,763	0.0%	4,120,065	-0.6%
2022	1,396,407	-1.1%	1,529,063	0.1%	1,178,532	0.2%	4,763	0.0%	4,108,764	-0.3%
2023	1,384,005	-0.9%	1,529,238	0.0%	1,179,177	0.1%	4,763	0.0%	4,097,182	-0.3%
2024	1,374,626	-0.7%	1,530,377	0.1%	1,179,172	0.0%	4,763	0.0%	4,088,937	-0.2%
2025	1,364,459	-0.7%	1,531,856	0.1%	1,178,351	-0.1%	4,763	0.0%	4,079,429	-0.2%
2026	1,355,285	-0.7%	1,534,325	0.2%	1,176,798	-0.1%	4,763	0.0%	4,071,171	-0.2%
2027	1,349,454	-0.4%	1,537,690	0.2%	1,174,922	-0.2%	4,763	0.0%	4,066,829	-0.1%
2028	1,347,171	-0.2%	1,541,920	0.3%	1,174,282	-0.1%	4,763	0.0%	4,068,136	0.0%
18-28		-0.9%		0.2%		0.0%		0.2%		-0.3%

Table 15: Fiscal Year Revenue Forecast ($)

Year	Residential	Chg	Commercial	Chg	Industrial	Chg	Other	Chg	Total	Chg
2018	265,977,367		228,172,138		122,075,792		2,738,422		618,963,718	
2019	261,940,833	-1.5%	229,764,614	0.7%	123,188,017	0.9%	2,800,489	2.3%	617,693,953	-0.2%
2020	259,975,368	-0.8%	231,353,300	0.7%	122,120,648	-0.9%	2,800,489	0.0%	616,249,805	-0.2%
2021	256,367,655	-1.4%	231,490,458	0.1%	121,985,659	-0.1%	2,800,489	0.0%	612,644,261	-0.6%
2022	254,024,848	-0.9%	231,824,066	0.1%	122,302,852	0.3%	2,800,489	0.0%	610,952,255	-0.3%
2023	252,187,152	-0.7%	231,963,674	0.1%	122,372,977	0.1%	2,800,489	0.0%	609,324,293	-0.3%
2024	250,934,708	-0.5%	232,090,085	0.1%	122,299,687	-0.1%	2,800,489	0.0%	608,124,969	-0.2%
2025	249,357,519	-0.6%	232,524,353	0.2%	122,283,544	0.0%	2,800,489	0.0%	606,965,905	-0.2%
2026	248,045,504	-0.5%	232,952,438	0.2%	122,115,105	-0.1%	2,800,489	0.0%	605,913,537	-0.2%
2027	247,245,569	-0.3%	233,504,291	0.2%	121,911,486	-0.2%	2,800,489	0.0%	605,461,835	-0.1%
2028	247,089,556	-0.1%	234,054,490	0.2%	121,769,894	-0.1%	2,800,489	0.0%	605,714,430	0.0%
18-28		-0.7%		0.3%		0.0%		0.2%		-0.2%

Appendix A: Model Statistics and Coefficients

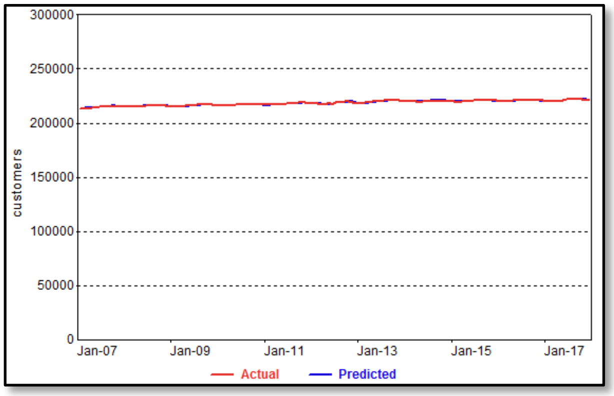
Figure 19: Residential Average Use Model



Variable	Coefficient	StdErr	T-Stat	P-Value
mStructRev.XHeat	0.726	0.029	24.847	0.00%
mStructRev.XCool	1.034	0.075	13.868	0.00%
mStructRev.XOther	0.901	0.013	70.018	0.00%
mBin.FebMar11	-46.288	9.787	-4.73	0.00%
mBin.AftJun15	-24.612	2.822	-8.722	0.00%
mBin.Mar	-25.234	4.812	-5.244	0.00%
mBin.Apr	-42.348	5.303	-7.986	0.00%
mBin.May	-34.985	6.273	-5.577	0.00%
mBin.Jun	-22.151	5.694	-3.89	0.02%
mBin.Oct	-18.205	6.329	-2.877	0.49%
mBin.Nov	-28.228	5.942	-4.75	0.00%
mBin.Feb13	28.216	13.481	2.093	3.87%
mBin.Apr14	110.702	13.874	7.979	0.00%
mBin.Jan17	38.329	13.557	2.827	0.56%

Model Statistics	
Iterations	1
Adjusted Observations	120
Deg. of Freedom for Error	106
R-Squared	0.979
Adjusted R-Squared	0.976
AIC	5.259
BIC	5.584
Log-Likelihood	-471.81
Model Sum of Squares	849,230.11
Sum of Squared Errors	18,272.95
Mean Squared Error	172.39
Std. Error of Regression	13.13
Mean Abs. Dev. (MAD)	9.7
Mean Abs. % Err. (MAPE)	1.69%
Durbin-Watson Statistic	1.626

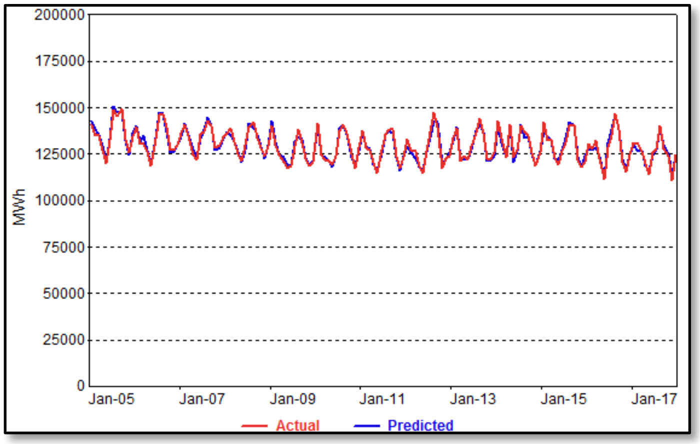
Figure 20: Residential Customer Model



Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	72282.481	9786.52	7.386	0.00%
Economics.HHs	563.639	37.549	15.011	0.00%
mBin.Jan	-875.386	147.247	-5.945	0.00%
mBin.Feb	-871.335	158.029	-5.514	0.00%
mBin.Mar	-871.039	157.353	-5.536	0.00%
mBin.Apr	-902.552	145.082	-6.221	0.00%
mBin.May	-450.071	115.968	-3.881	0.02%
mBin.Dec	-544.161	113.719	-4.785	0.00%
mBin.Jun12	-2009.87	342.459	-5.869	0.00%
mBin.Jul12	1083.886	336.325	3.223	0.16%
AR(1)	0.767	0.058	13.325	0.00%

Model Statistics	
Iterations	13
Adjusted Observations	131
Deg. of Freedom for Error	120
R-Squared	0.977
Adjusted R-Squared	0.975
AIC	11.906
BIC	12.148
F-Statistic	500.328
Prob (F-Statistic)	0
Log-Likelihood	-954.73
Model Sum of Squares	684,194,459.87
Sum of Squared Errors	16,409,901.84
Mean Squared Error	136,749.18
Std. Error of Regression	369.8
Mean Abs. Dev. (MAD)	261.27
Mean Abs. % Err. (MAPE)	0.12%
Durbin-Watson Statistic	2.154

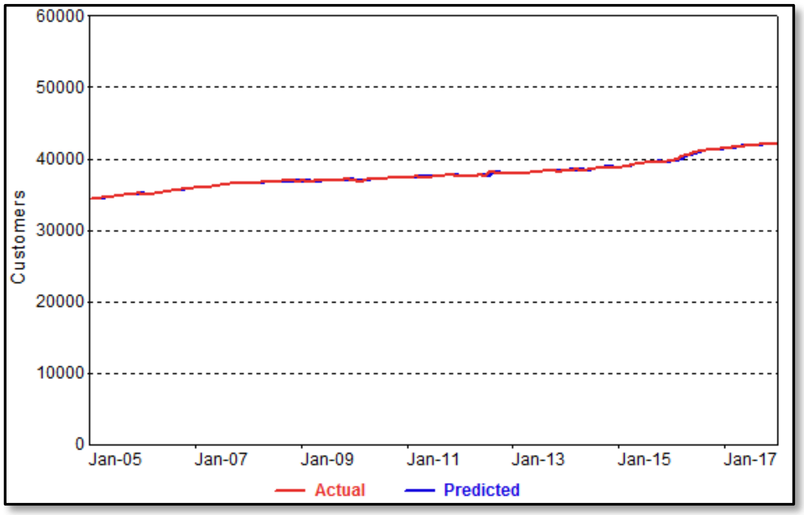
Figure 21: Commercial Sales Model



Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	40132.587	4025.489	9.97	0.00%
mStructRev.XHeat	21092392.46	951984	22.156	0.00%
mStructRev.XCool	81005.357	2562.368	31.613	0.00%
mStructRev.XOther	7780.145	404.607	19.229	0.00%
mBin.Apr	-1646.899	533.655	-3.086	0.25%
mBin.Sep	1733.535	628.64	2.758	0.66%
mBin.Oct	3393.557	605.761	5.602	0.00%
mBin.Dec08	4707.581	1801.241	2.614	0.99%
mBin.Feb13	6536.091	1814.923	3.601	0.04%
mBin.Mar14	-5969.261	2007.456	-2.974	0.35%
mBin.Apr14	16399.991	2044.491	8.022	0.00%
mBin.May16	-4486.483	1833.82	-2.447	1.57%
mBin.Jul17	-7370.562	1834.194	-4.018	0.01%
mBin.Sep12Plus	4941.307	582.294	8.486	0.00%
mBin.Yr2017Plus	-1964	876.993	-2.239	2.67%
MA(1)	0.423	0.085	4.997	0.00%

Model Statistics	
Iterations	14
Adjusted Observations	156
Deg. of Freedom for Error	140
R-Squared	0.952
Adjusted R-Squared	0.947
AIC	15.256
BIC	15.569
F-Statistic	186.732
Prob (F-Statistic)	0
Log-Likelihood	-1,395.33
Model Sum of Squares	10,735,865,180.55
Sum of Squared Errors	536,604,240.33
Mean Squared Error	3,832,887.43
Std. Error of Regression	1,957.78
Mean Abs. Dev. (MAD)	1,499.82
Mean Abs. % Err. (MAPE)	1.15%
Durbin-Watson Statistic	1.865

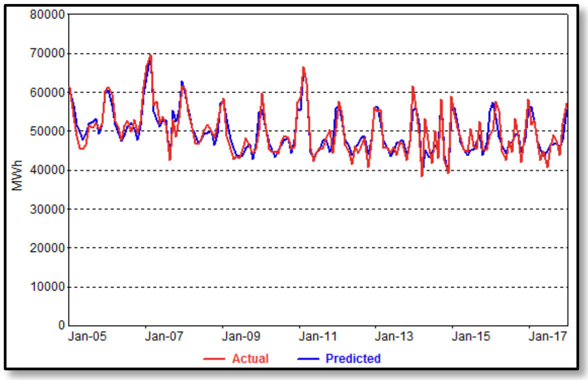
Figure 22: Commercial Customer Model



Variable	Coefficient	StdErr	T-Stat	P-Value
Economics.NManEmp	147.863	8.057	18.35	0.00%
AR(1)	0.989	0.008	116.7	0.00%

Model Statistics	
Iterations	12
Adjusted Observations	155
Deg. of Freedom for Error	153
R-Squared	0.995
Adjusted R-Squared	0.995
AIC	9.893
BIC	9.932
Log-Likelihood	-984.61
Model Sum of Squares	575,310,529.74
Sum of Squared Errors	2,988,360.65
Mean Squared Error	19,531.77
Std. Error of Regression	139.76
Mean Abs. Dev. (MAD)	95.52
Mean Abs. % Err. (MAPE)	0.25%
Durbin-Watson Statistic	2.534

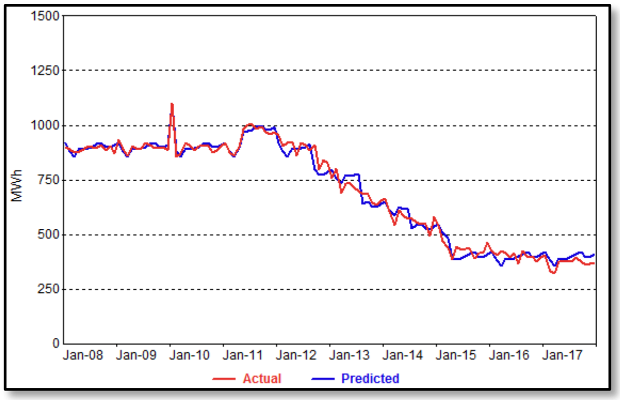
Figure 23: Industrial Sales Model



Variable	Coefficient	StdErr	T-Stat	P-Value
mEcon.IndVar	53549.428	816.168	65.611	0.00%
mWthrRev.CDD60	18.227	8.778	2.076	3.98%
mBin.Yr07	3844.68	915.435	4.2	0.01%
mBin.Jan11Plus	-1232.747	493.956	-2.496	1.38%
mBin.Yr2016Plus	1708.579	651.106	2.624	0.97%
mBin.Jan	3880.521	1086.75	3.571	0.05%
mBin.Mar	-4971.477	1132.312	-4.391	0.00%
mBin.Apr	-6896.629	1085.689	-6.352	0.00%
mBin.May	-9096.448	1095.012	-8.307	0.00%
mBin.Jun	-9324.953	1431.944	-6.512	0.00%
mBin.Jul	-10579.802	2416.049	-4.379	0.00%
mBin.Aug	-10442.82	2827.002	-3.694	0.03%
mBin.Sep	-7950.265	2050.261	-3.878	0.02%
mBin.Oct	-9004.395	1182.069	-7.617	0.00%
mBin.Nov	-4940.069	1104.302	-4.473	0.00%
mBin.Dec	3158.083	1083.327	2.915	0.42%
mBin.Feb07	9585.623	2905.183	3.299	0.13%
mBin.Aug07	-12087.037	2901.397	-4.166	0.01%
mBin.Feb11	14932.243	2782.79	5.366	0.00%
mBin.Mar11	15911.246	2791.455	5.7	0.00%
mBin.Mar14	-8770.012	2791.249	-3.142	0.21%
mBin.Sep14	10931.654	2794.157	3.912	0.02%
mBin.Nov14	-8224.982	2779.175	-2.96	0.37%

Model Statistics	
Iterations	1
Adjusted Observations	156
Deg. of Freedom for Error	133
R-Squared	0.829
Adjusted R-Squared	0.801
AIC	15.903
BIC	16.352
Log-Likelihood	-1,438.77
Model Sum of Squares	4,535,249,287.39
Sum of Squared Errors	936,571,151.87
Mean Squared Error	7,041,888.36
Std. Error of Regression	2,653.66
Mean Abs. Dev. (MAD)	1,856.78
Mean Abs. % Err. (MAPE)	3.73%
Durbin-Watson Statistic	1.832

Figure 24: Other Sales Model



Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	911.603	10.966	83.127	0.00%
mBin.MayDec11	78.94	12.493	6.319	0.00%
mBin.Sep12Plus	-123.566	10.753	-11.491	0.00%
mBin.AftAug13	-147.921	13.684	-10.81	0.00%
mBin.AftJul14	-100.558	14.505	-6.932	0.00%
mBin.Apr15Plus	-129.776	12.166	-10.667	0.00%
mBin.Jan	8.495	14.748	0.576	56.59%
mBin.Feb	-30.572	14.377	-2.127	3.59%
mBin.Mar	-54.039	14.377	-3.759	0.03%
mBin.Apr	-16.112	14.406	-1.118	26.60%
mBin.May	-22.497	14.335	-1.569	11.97%
mBin.Jun	-16.864	14.335	-1.176	24.22%
mBin.Jul	-10.307	14.327	-0.719	47.35%
mBin.Aug	2.527	14.327	0.176	86.04%
mBin.Sep	8.728	14.287	0.611	54.26%
mBin.Oct	-13.057	14.287	-0.914	36.29%
mBin.Nov	-14.065	14.287	-0.985	32.72%
mBin.Jan10	182.894	33.854	5.402	0.00%

Model Statistics	
Iterations	1
Adjusted Observations	120
Deg. of Freedom for Error	102
R-Squared	0.983
Adjusted R-Squared	0.98
AIC	7.066
BIC	7.484
F-Statistic	348.424
Prob (F-Statistic)	0
Log-Likelihood	-576.21
Model Sum of Squares	6,044,940.80
Sum of Squared Errors	104,096.19
Mean Squared Error	1,020.55
Std. Error of Regression	31.95
Mean Abs. Dev. (MAD)	23.01
Mean Abs. % Err. (MAPE)	3.92%
Durbin-Watson Statistic	1.475