

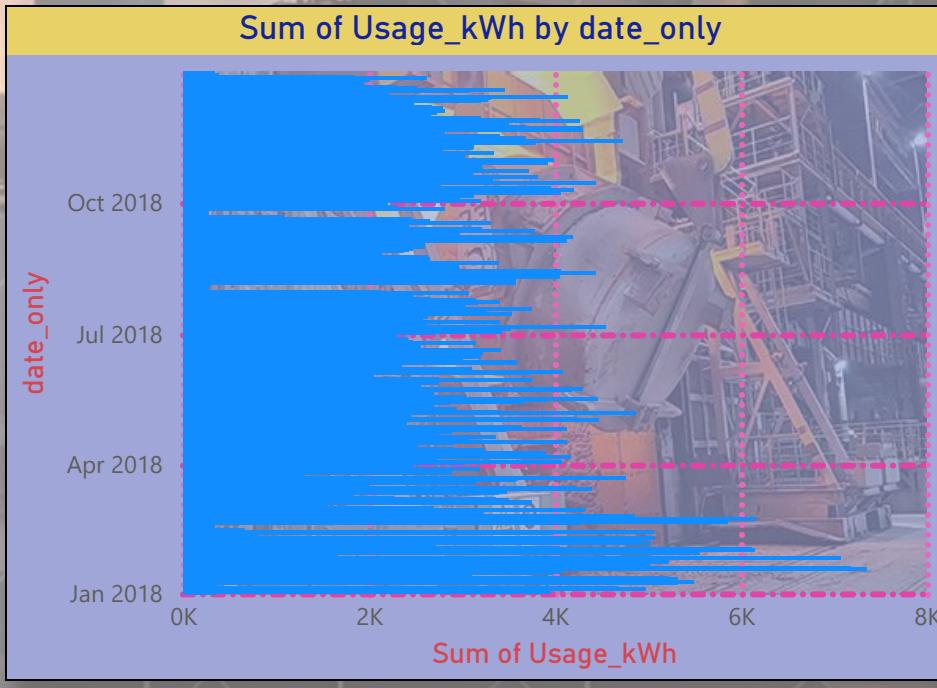
These values and expectations were created before finished all my analysis and modeling.
The new cost saving prediction is around 20K.



****Estimated Savings:**
\$13,500/year (5% energy reduction).

Sum of Usage_kWh and AvgkW...

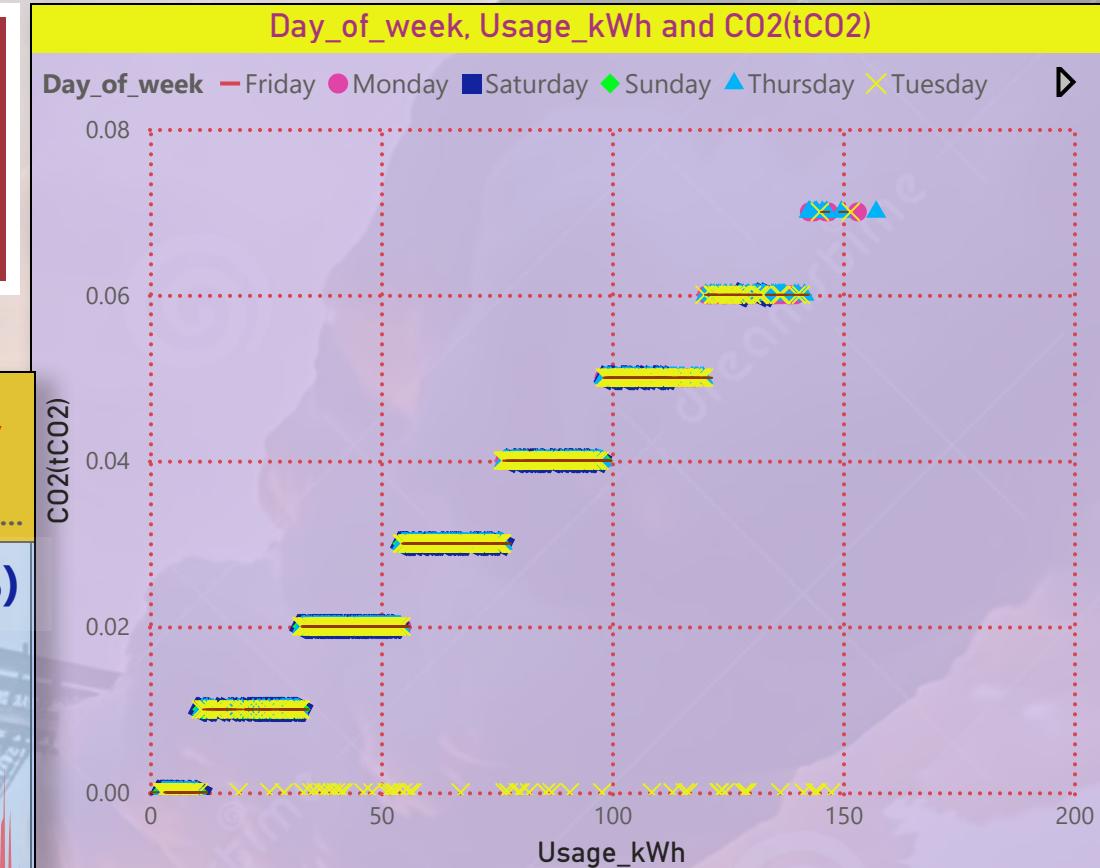
Goal: 26.0 (-5%)



Ave: 27.39

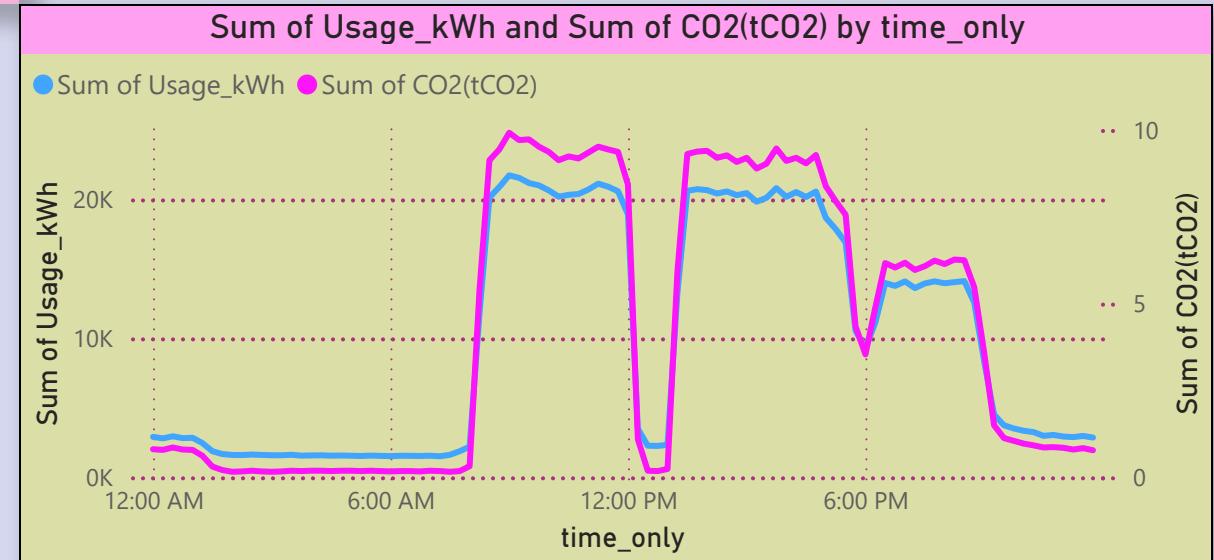
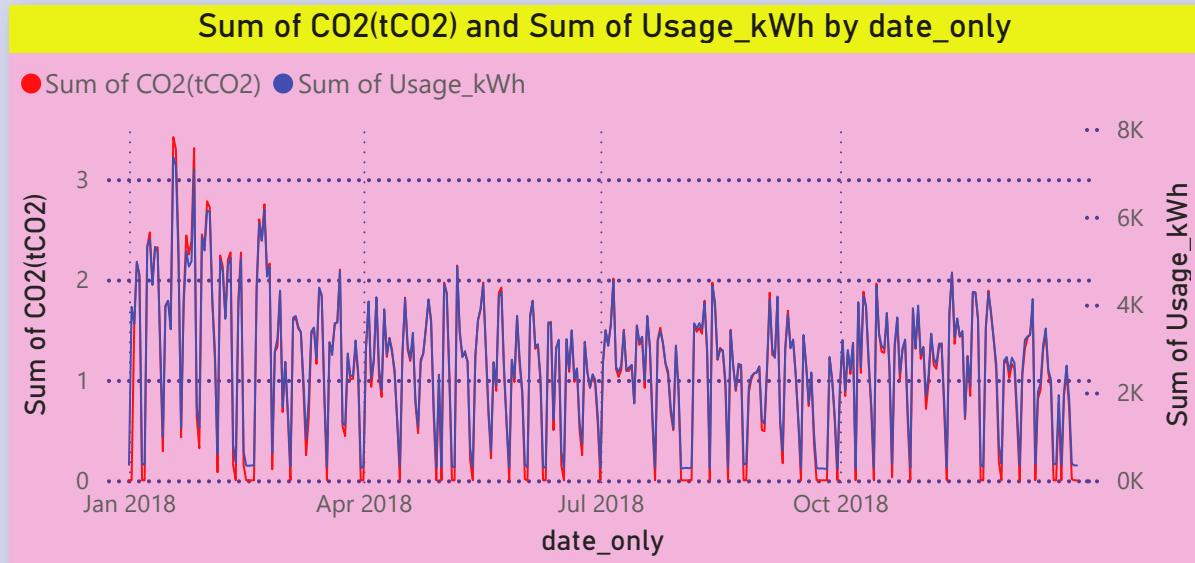
****Based on \$0.10/kWh and industry reports (EIA, IEA)**

Created by Susan Schnitzel
PowerBI used in my portfolios. They are not always annotated and not always pretty, because did a lot of pasting and cutting for another format. I also have 3 -4 different dashboards



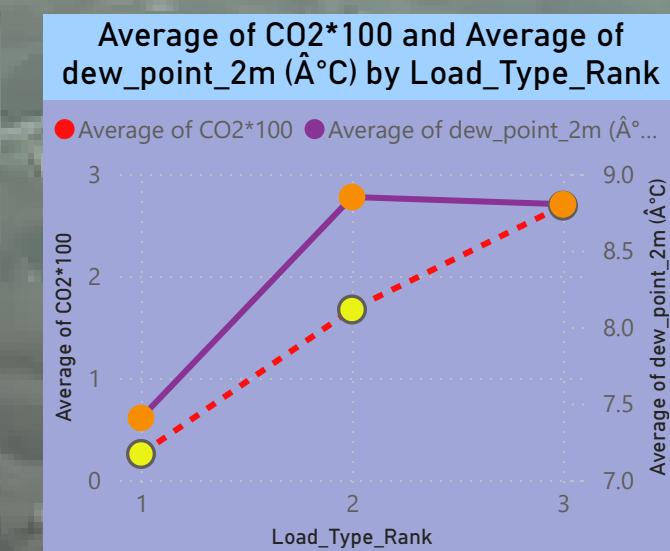
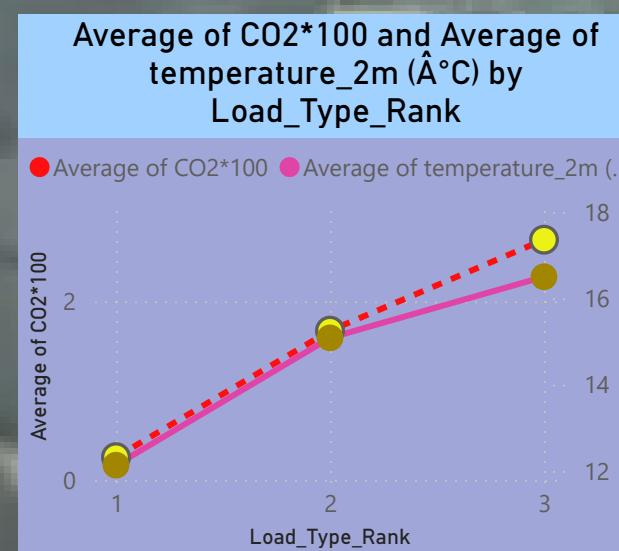
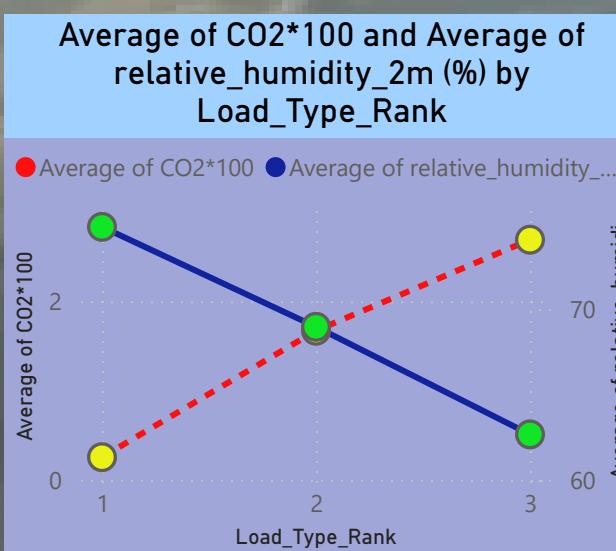
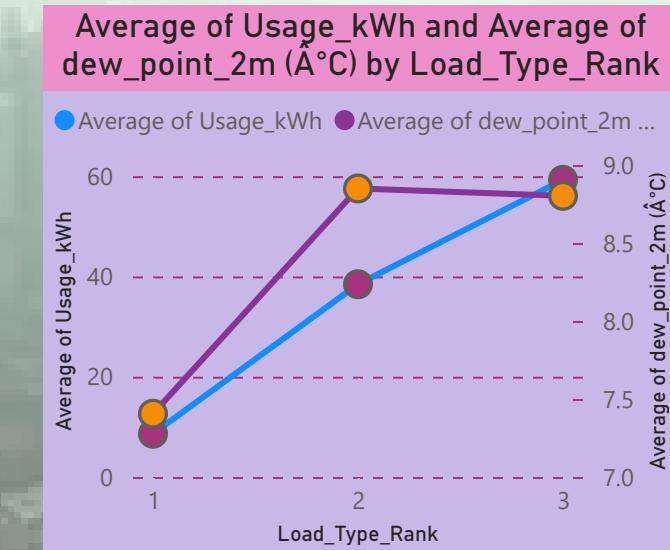
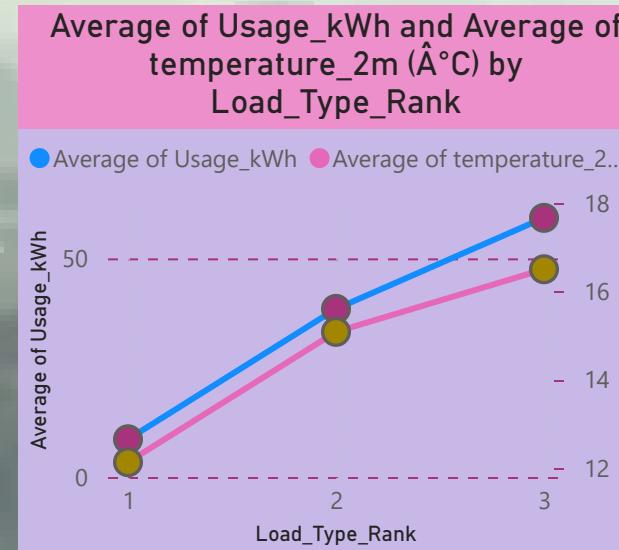
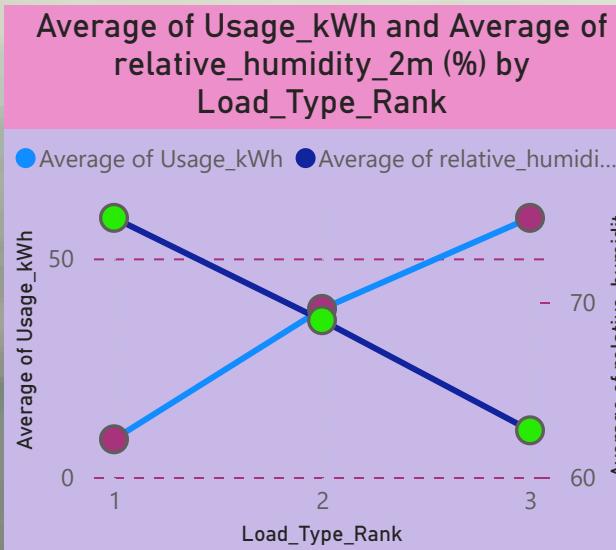
Day_of_week	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	Total
Friday	3.89	26.76	45.27	62.77	87.43	108.20	127.04	145.56	33.20
Monday	3.72	25.55	45.75	63.37	87.10	107.87	128.18	145.82	33.14
Saturday	3.65	26.18	40.95	64.85	86.86	105.85	127.82		15.92
Sunday	3.42	25.76	39.00	64.30	88.67	104.22			7.55
Thursday	3.84	25.26	44.83	63.47	86.38	108.19	128.74	146.56	35.11
Tuesday	5.25	25.91	45.00	63.94	86.50	107.35	126.64	148.34	34.43
Wednesday	3.87	25.36	44.85	63.38	87.40	107.93	127.03	145.36	32.25
Total	3.88	25.87	44.35	63.46	86.98	107.77	127.61	146.10	27.39

Comparison of the Usage_kWh and CO2 Over Year and over Time (sum)





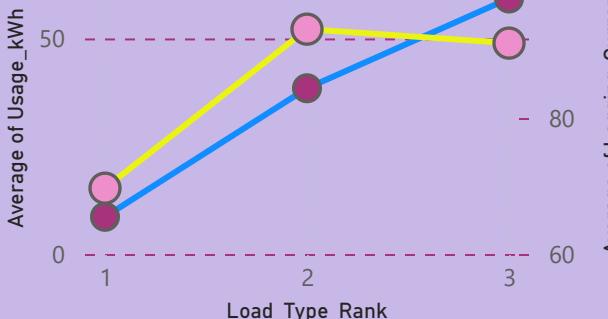
Weather with CO2 and kWh Comparison



Comparisons of kWh and CO2 with Load Rank (and other energy)

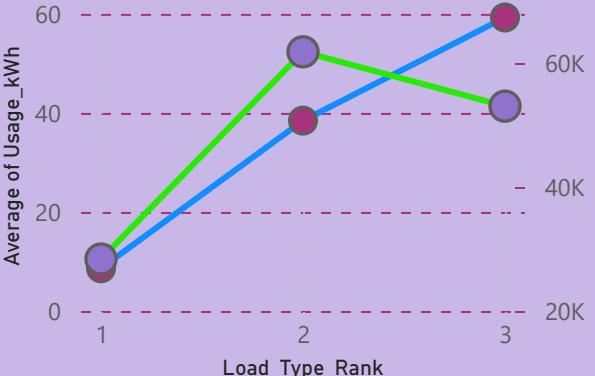
Average of Usage_kWh and Average of Lagging_Current_Power_Factor by Load_Type_Rank

● Average of Usage_kWh ● Average of Lagging_Curre...



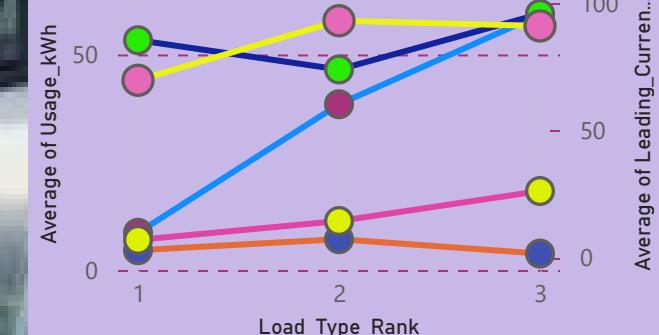
Average of Usage_kWh and Average of NSM by Load_Type_Rank

● Average of Usage_kWh ● Average of NSM



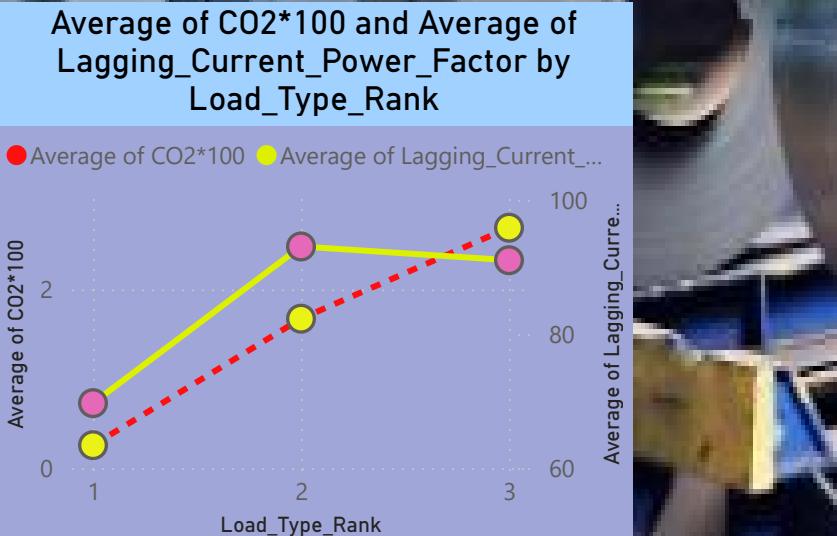
Average of Usage_kWh, Average of Leading_Current_Power_Factor, Average of Leading_Current_Reactive_Power_kV...

● Average of ... ● Average of L... ● Average of ...



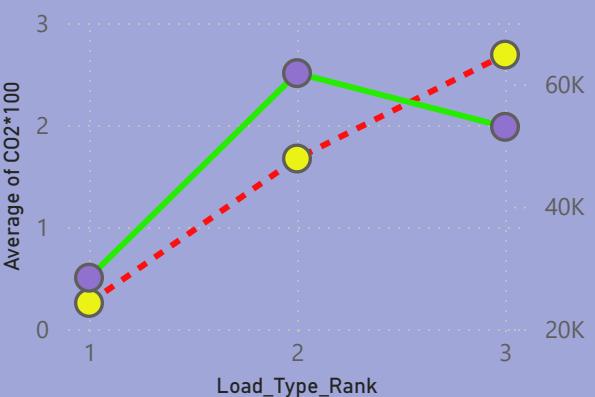
Average of CO2*100 and Average of Lagging_Current_Power_Factor by Load_Type_Rank

● Average of CO2*100 ● Average of Lagging_Current_Power_Factor



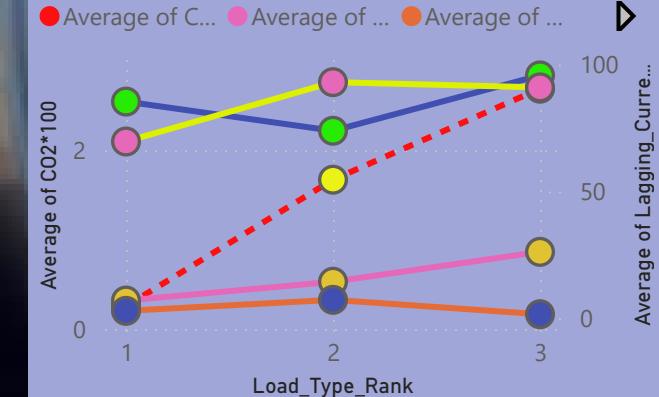
Average of CO2*100 and Average of NSM by Load_Type_Rank

● Average of CO2*100 ● Average of NSM

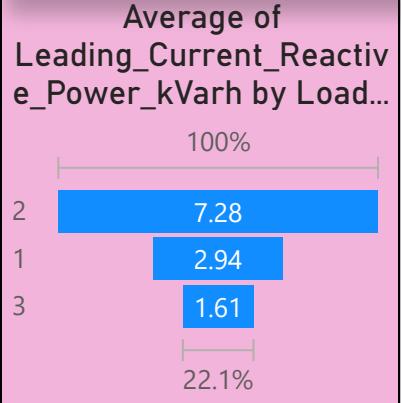


Average of CO2*100, Average of Lagging_Current_Reactive_Power_kVarh, Average of Leading_Current_Reactive_P...

● Average of C... ● Average of ... ● Average of ...

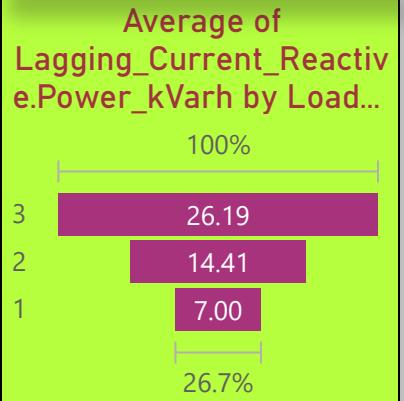


Leading Current Reactive Power (kVarh): This measures the reactive energy associated with capacitive loads. It occurs when current leads voltage, often used for power factor correction.



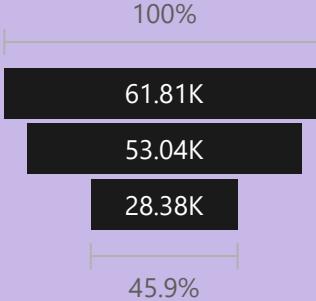
LOAD RANK
The Load type classifications are used to analyze energy consumption patterns in steel plants.
Light (1): Lowest demand (e.g., <30% of peak capacity).
Medium (2): Moderate demand (e.g., 30–70% of peak).
Maximum (3): Highest demand (e.g., >70% of peak).

Lagging Current Reactive Power (kVarh): This measures the reactive energy consumed by inductive loads. It occurs when current lags behind voltage, meaning the system requires extra energy to maintain magnetic fields.

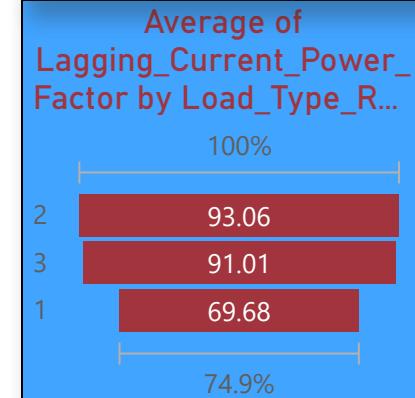


NSM: Number of Steel Melts (Steel production cycles)

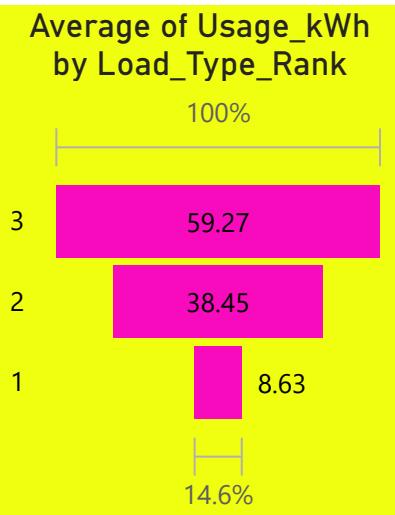
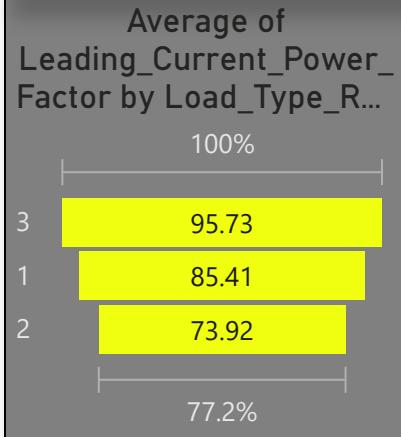
Average of NSM by Load_Type_Rank



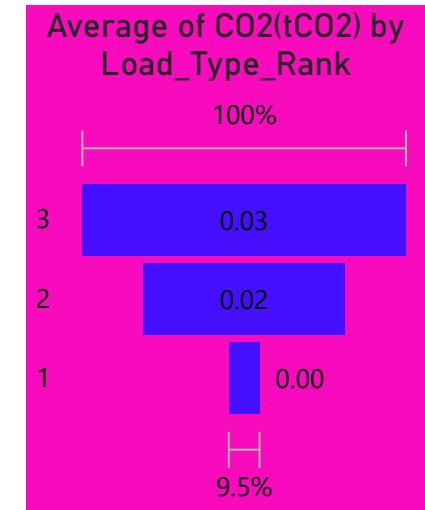
Lagging Current Reactive Power (kVarh): Measures the reactive energy consumed by inductive loads when current lags behind voltage.



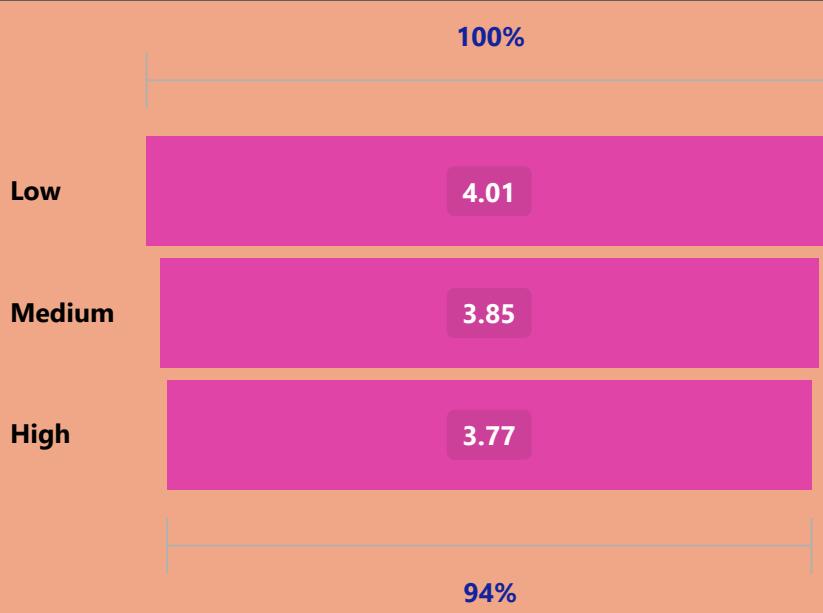
Leading Current Reactive Power (kVarh): Measures the reactive energy associated with capacitive loads when current leads voltage.



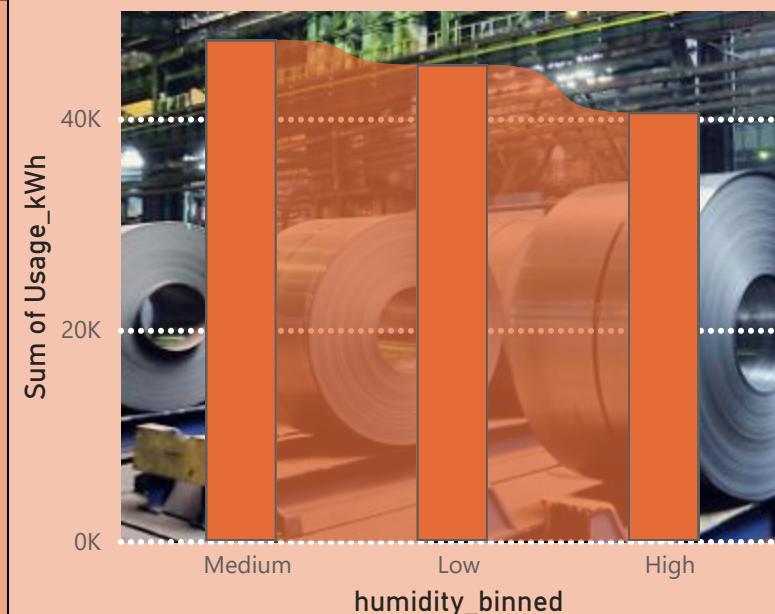
NOTE: These funnel plots are not the typical statistical types using standard errors. These plots are used to show the energy usages and CO2 averages at different Load Ranks



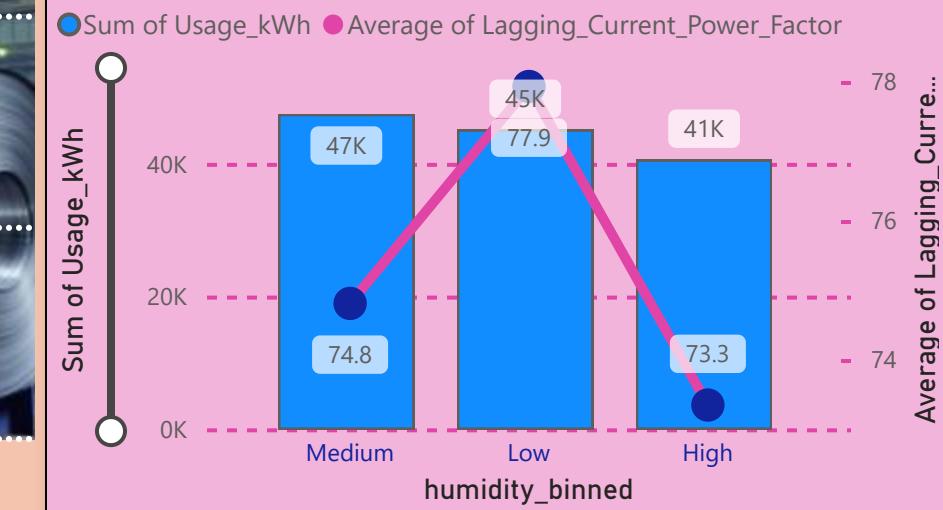
Average of Usage_kWh by humidity_binned



Sum of Usage_kWh by humidity_binned

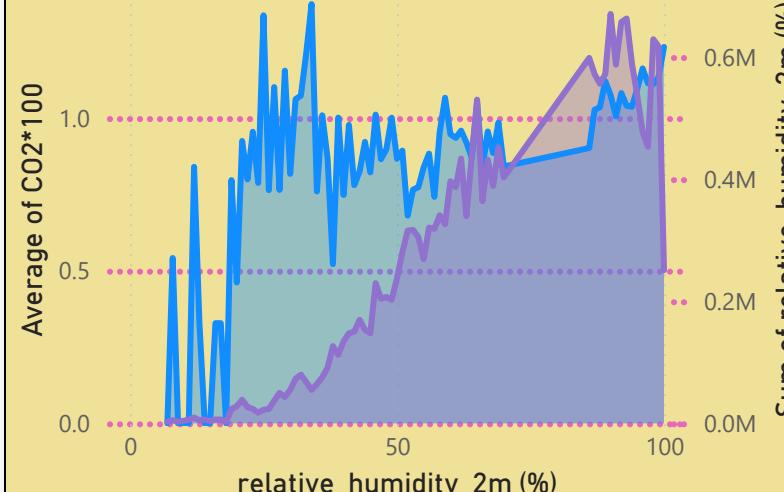


Sum of Usage_kWh and Average of Lagging_Current_Power_Factor by humidity_binned



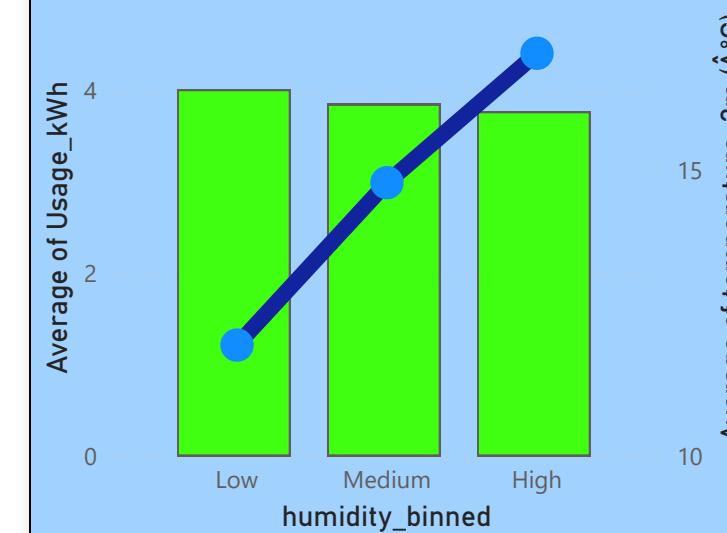
Average of CO2*100 and Sum of relative_humidity_2m (%) by relative_humidity_2m (%)

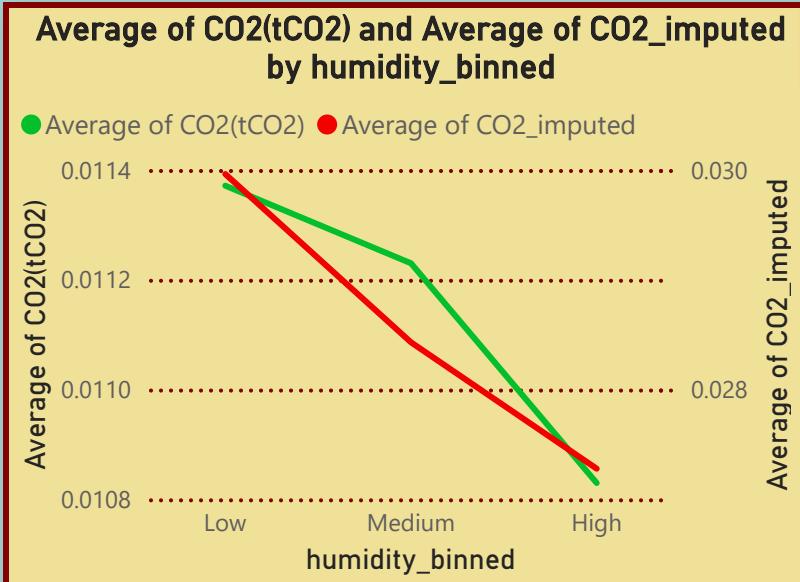
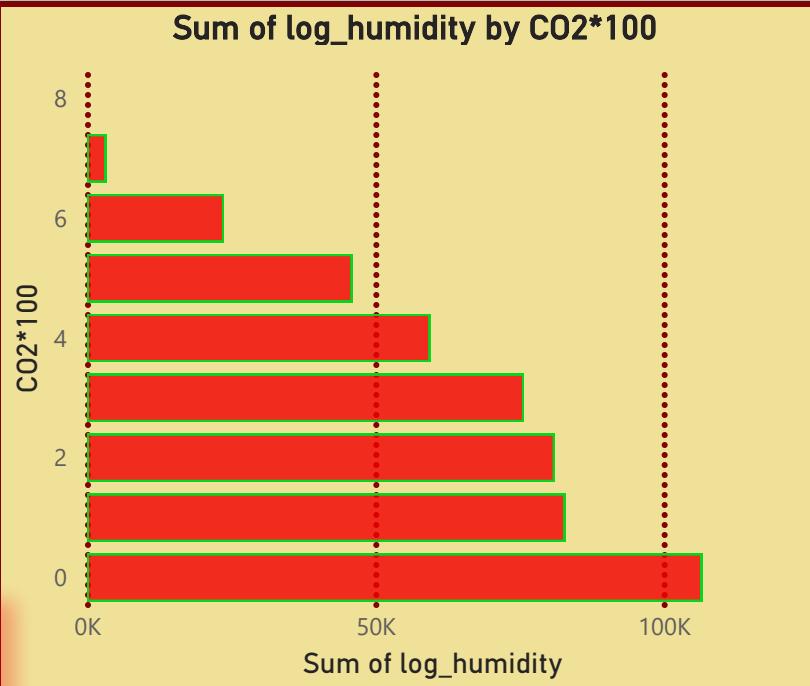
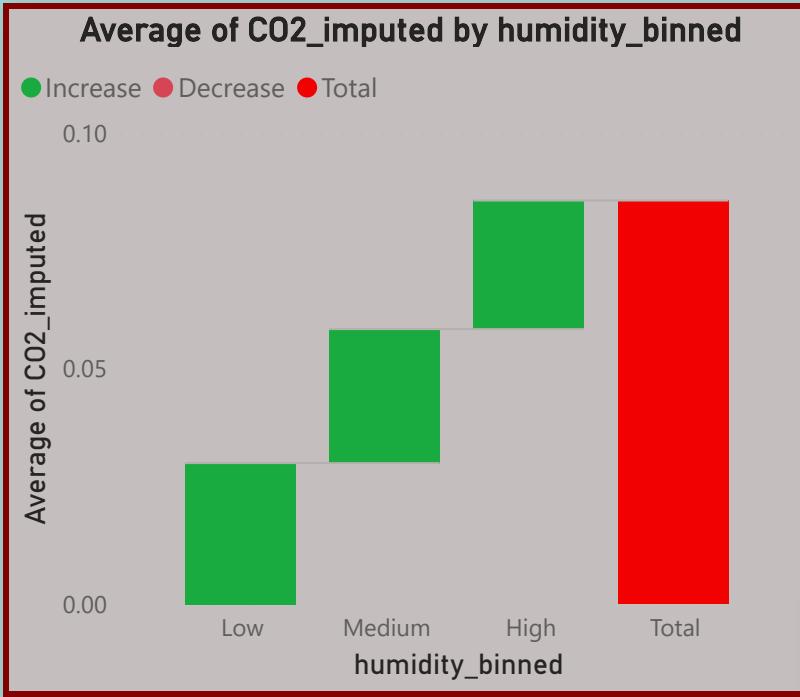
● Average of CO2*100 ● Sum of relative_humidity_2m (%)



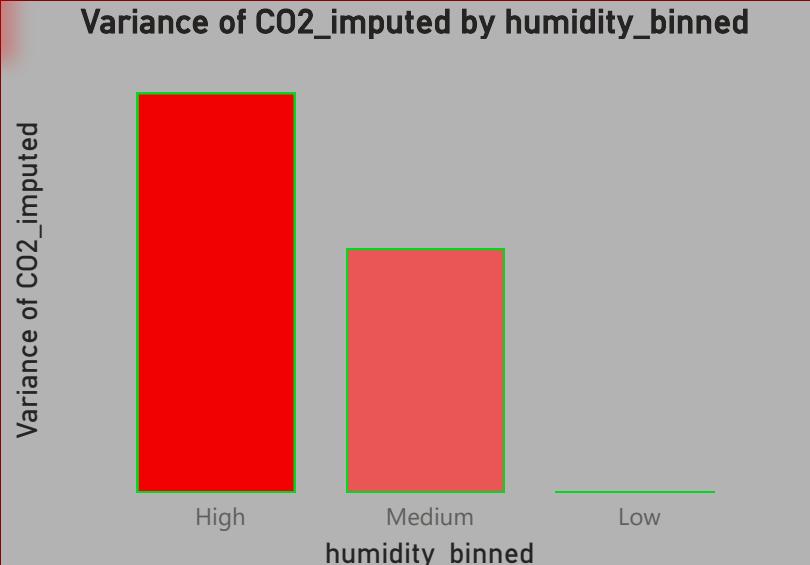
Average of Usage_kWh and Average of temperature_2m (°C) by humidity_binned

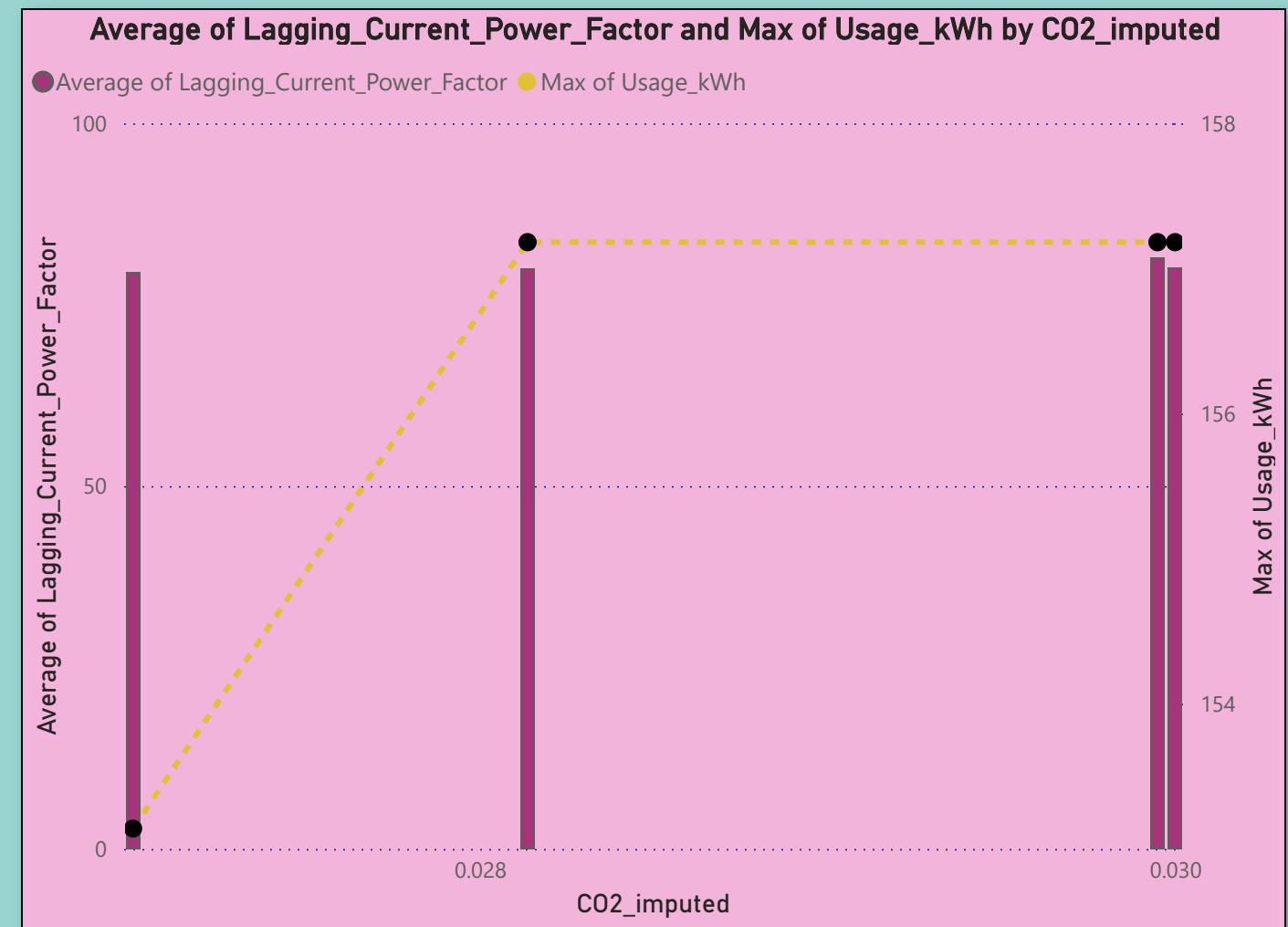
● Average of Usage_kWh ● Average of temperature_2m ...

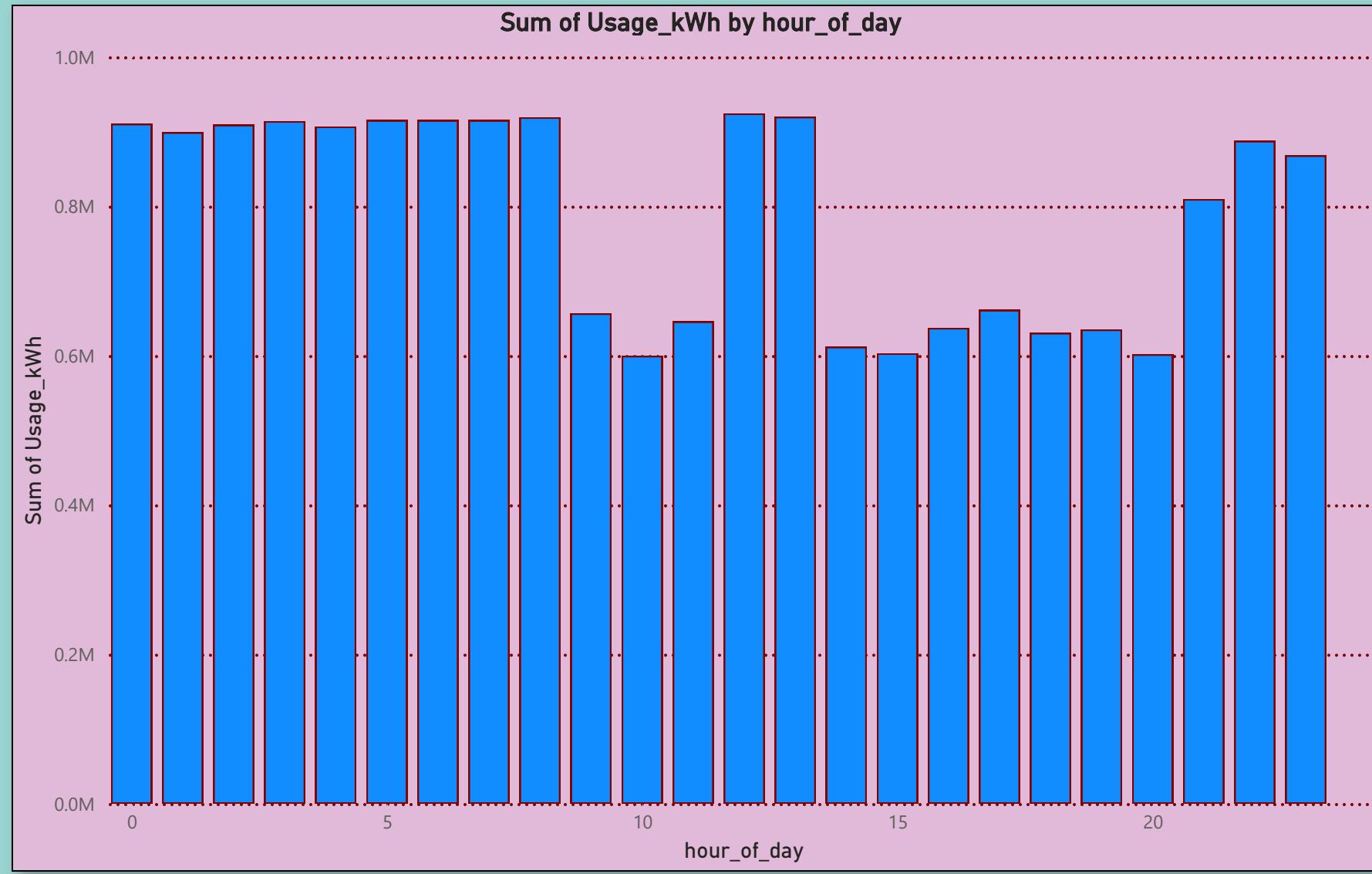


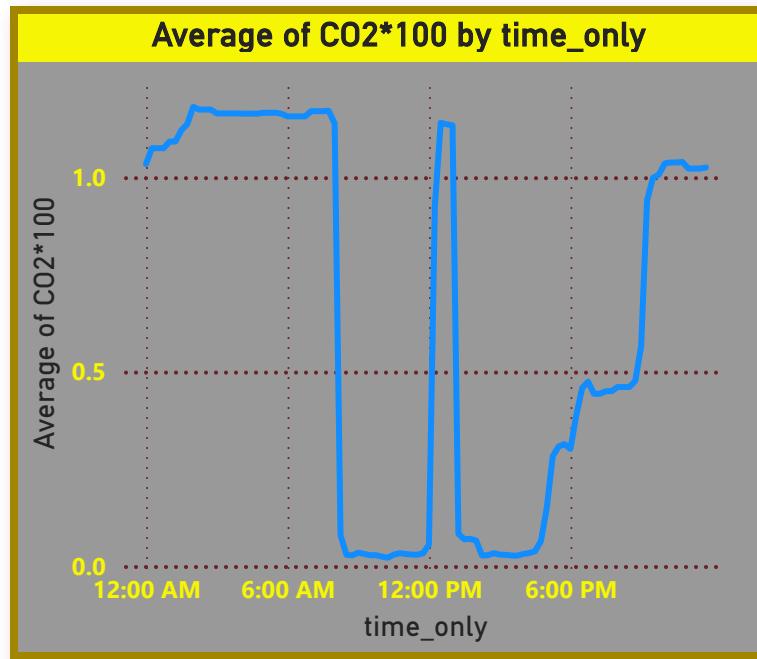


CO2 and CO2_imputed Graphing comparison with Humidity Bins.

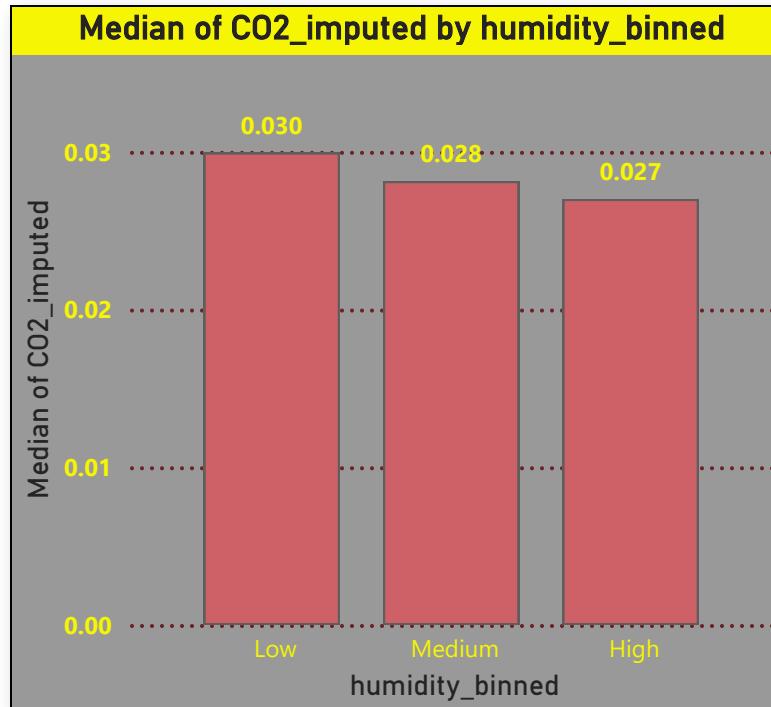
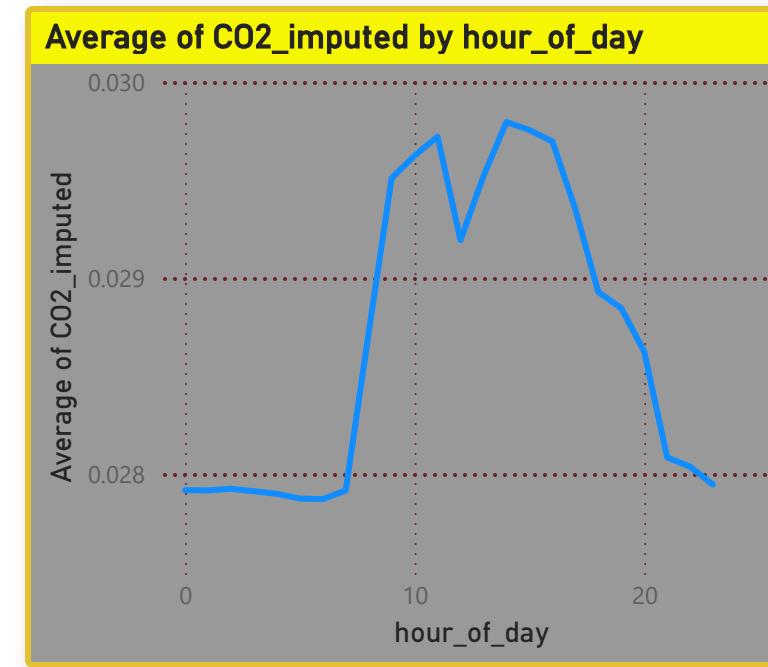




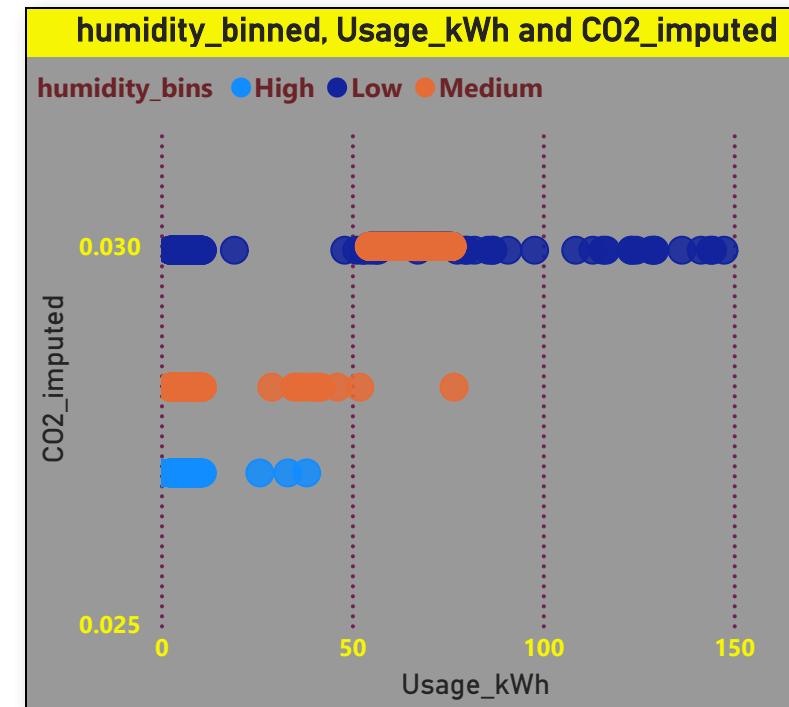




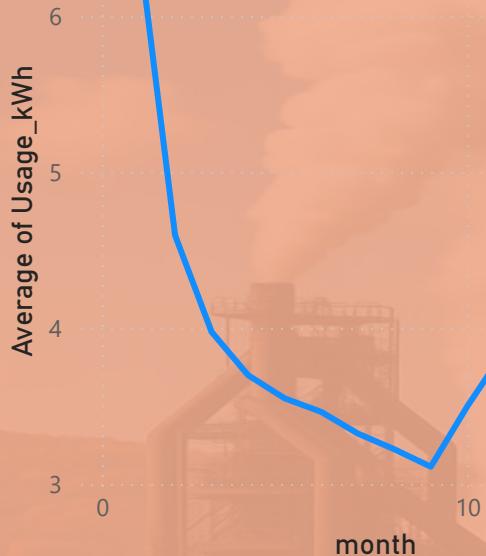
Imputing to
take care of
missing data



Adding Usage
kWh, (used in
models)



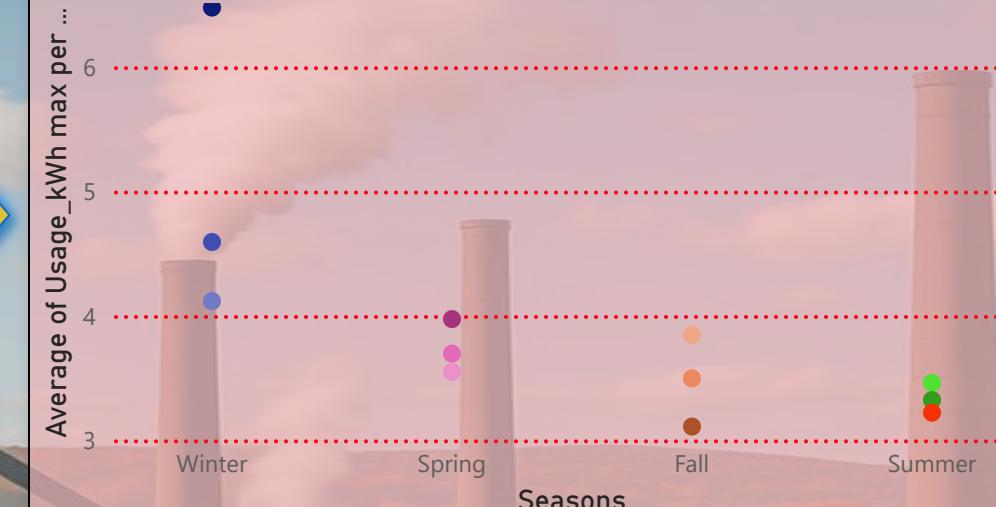
Average of Usage_kWh by month



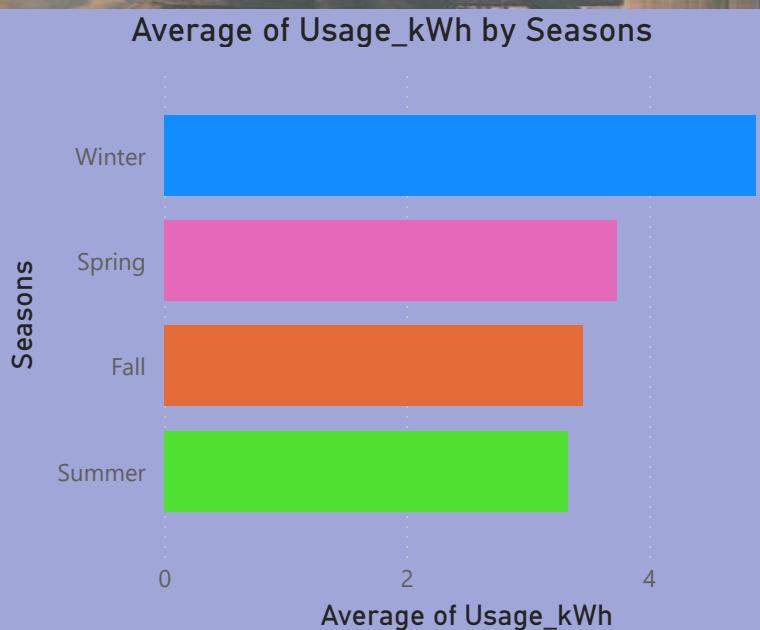
Average of Usage_kWh per month 2 by Seasons and month

ZEROS REMOVED

month ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 ● 11 ● 12



Average of Usage_kWh by Seasons



Average of Usage_kWh per month 2 by Seasons

ZEROSREMOVED

Seasons

Summer

Average of Usage_kWh

Average of Usage_kWh

Seasons

Summer

Average of Usage_kWh

Seasons

Summer

Average of Usage_kWh

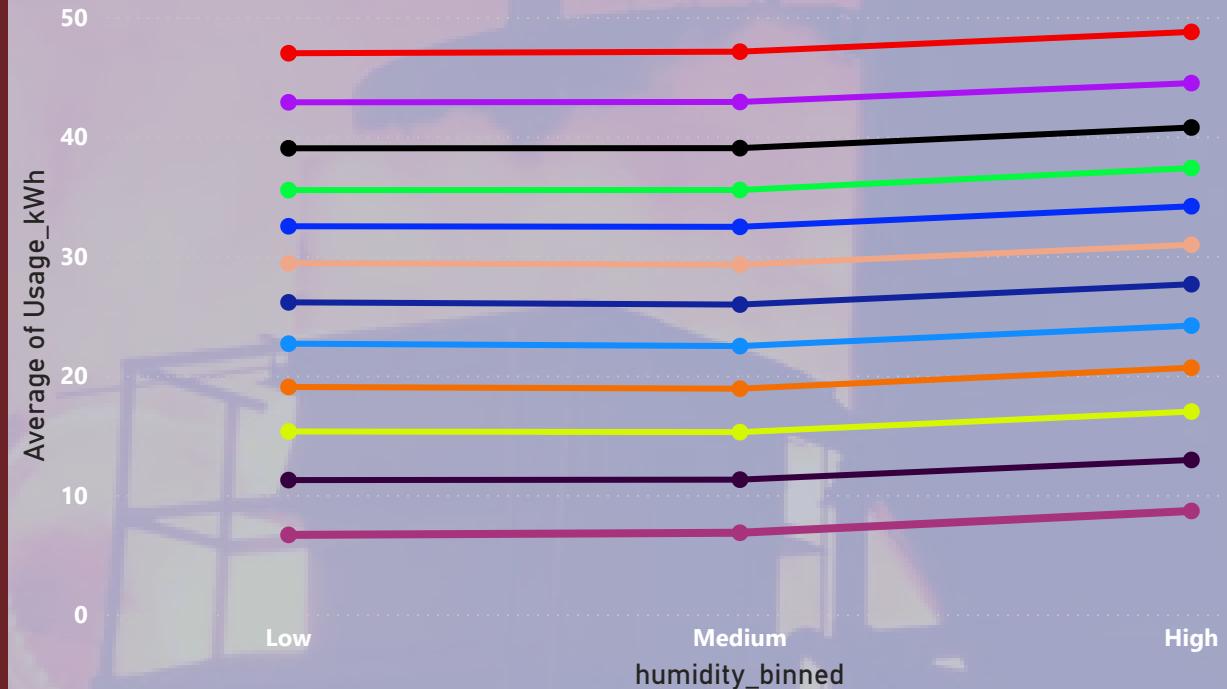


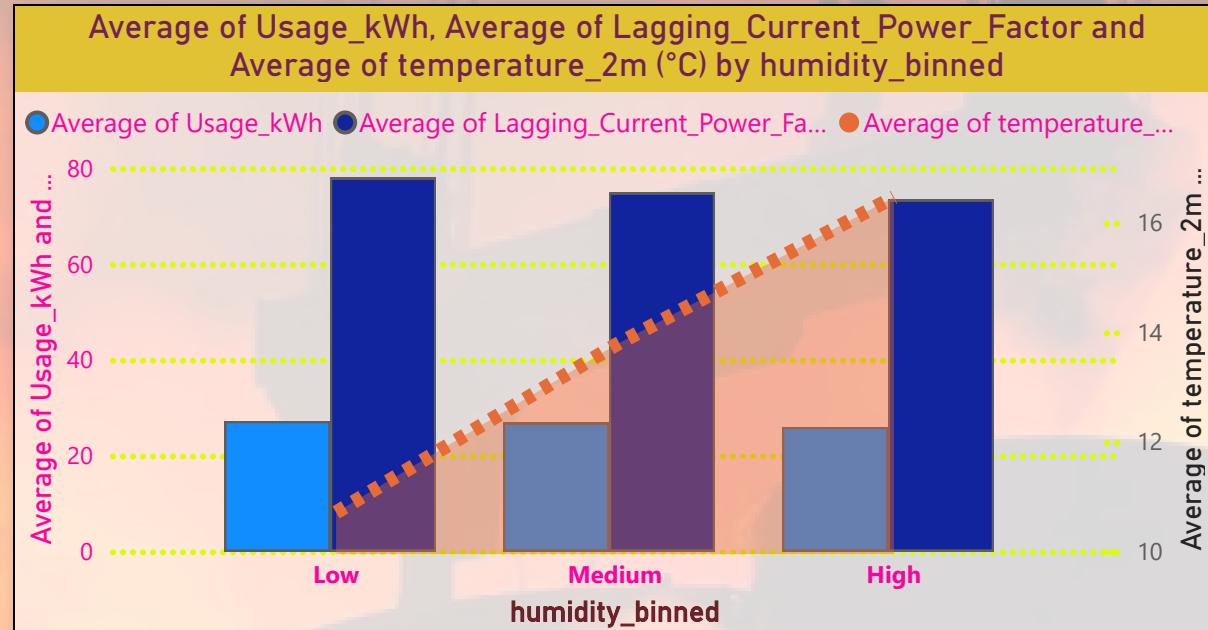
Usage (kWh) by Month column

humidity_bin...	1	2	3	4	5	6	7	8	9	10	11	12	Total
High	8.65	4.27	4.05	3.67	3.52	3.47	3.31	3.22	3.20	3.40	3.71	4.29	3.77
Low	6.65	4.59	4.07	3.73	3.62	3.46	3.27	3.09	3.03	3.50	3.85	4.11	4.01
Medium	6.83	4.45	3.98	3.64	3.57	3.48	3.34	3.17	3.08	3.50	3.87	4.21	3.85
Total	6.48	4.59	3.97	3.70	3.55	3.46	3.32	3.22	3.11	3.50	3.85	4.12	3.88

Average of Usage_kWh by humidity_binned and month

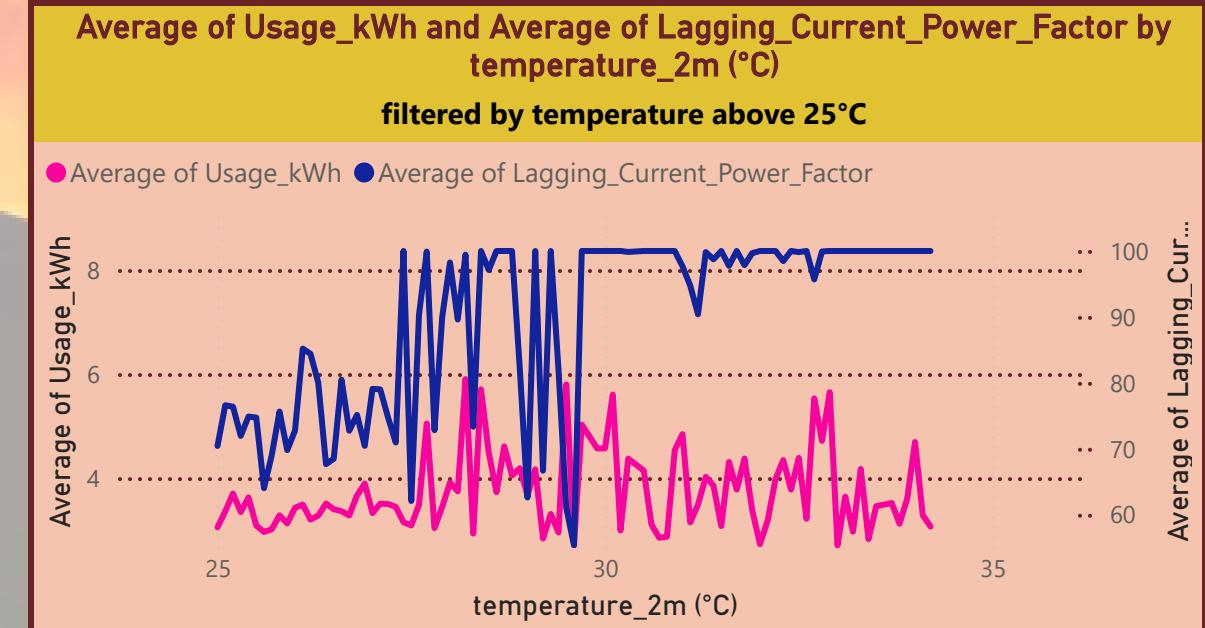
month ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 ● 11 ● 12

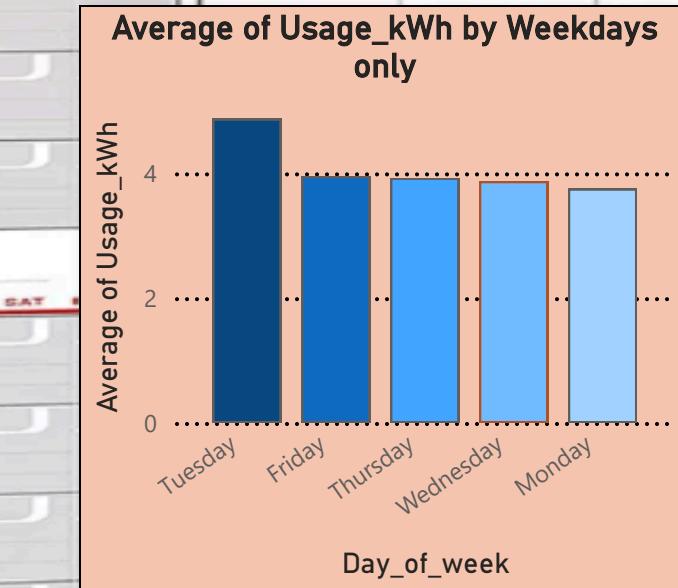
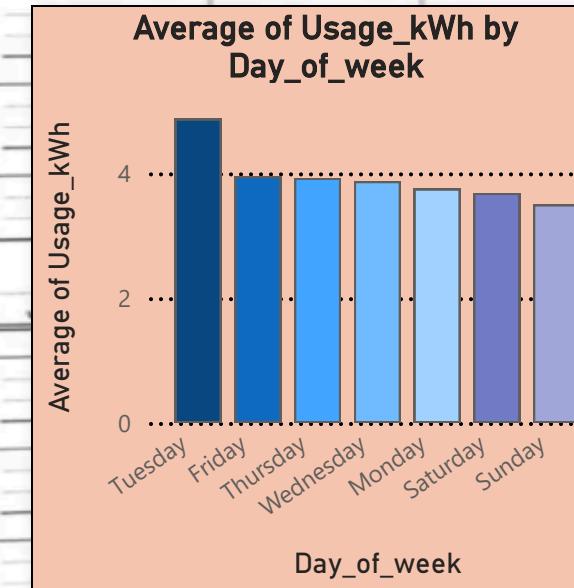
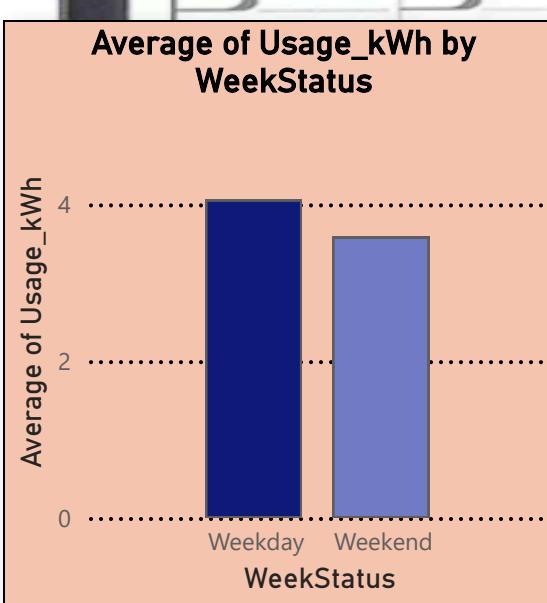
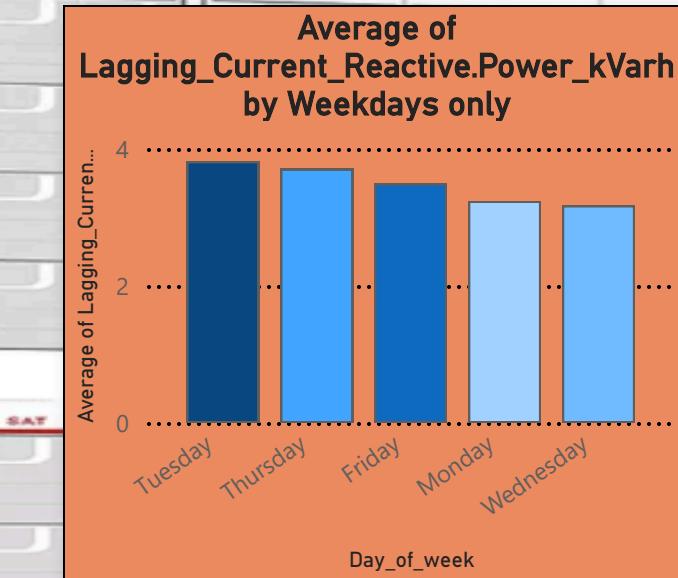
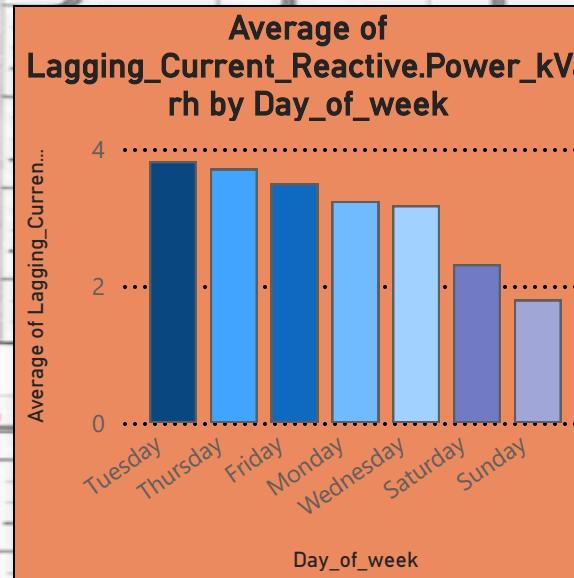
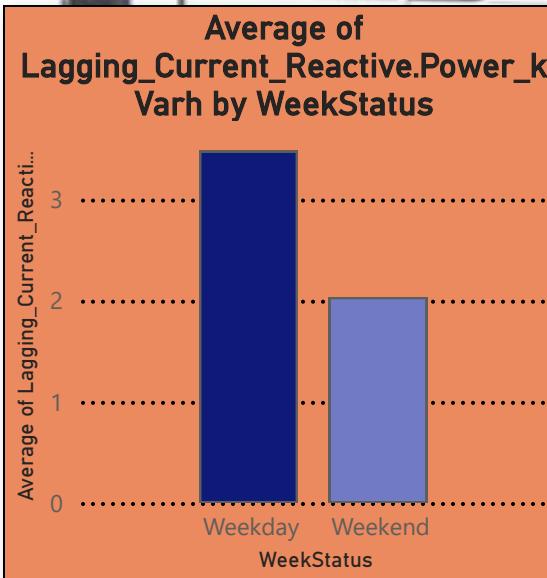




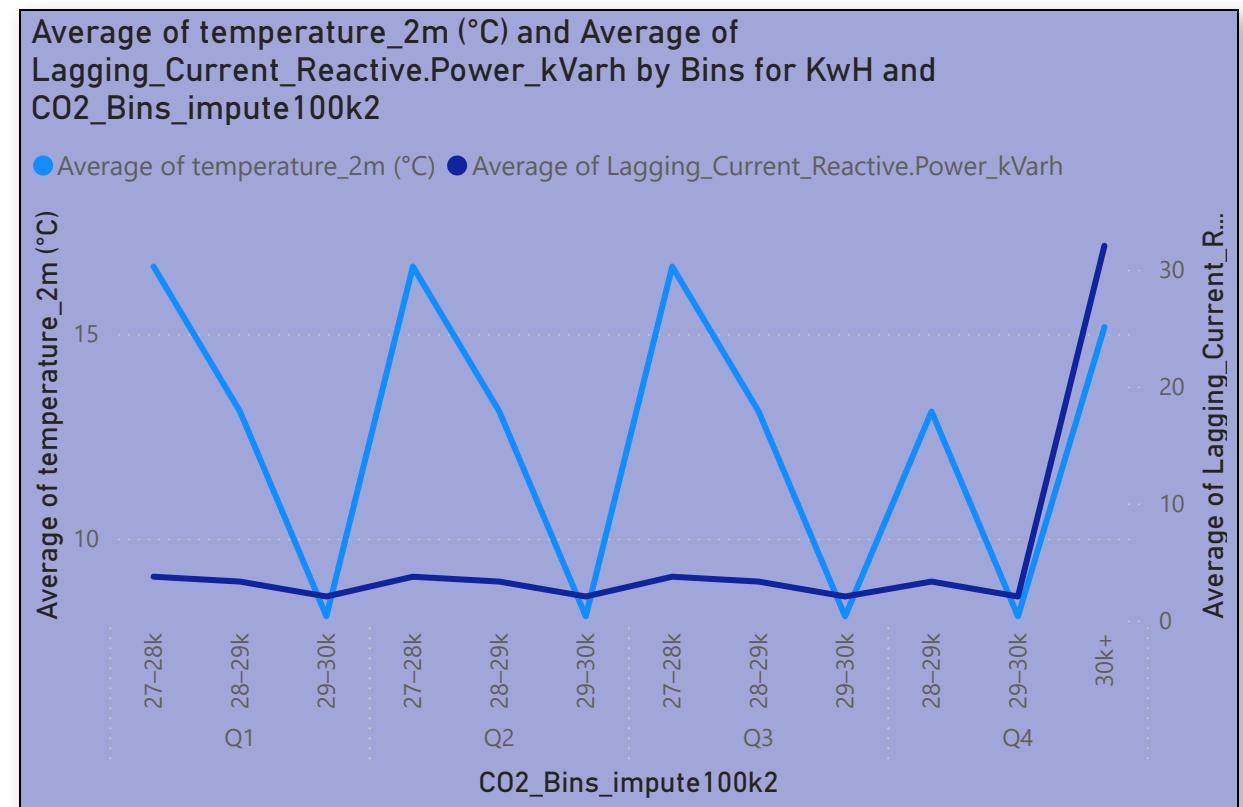
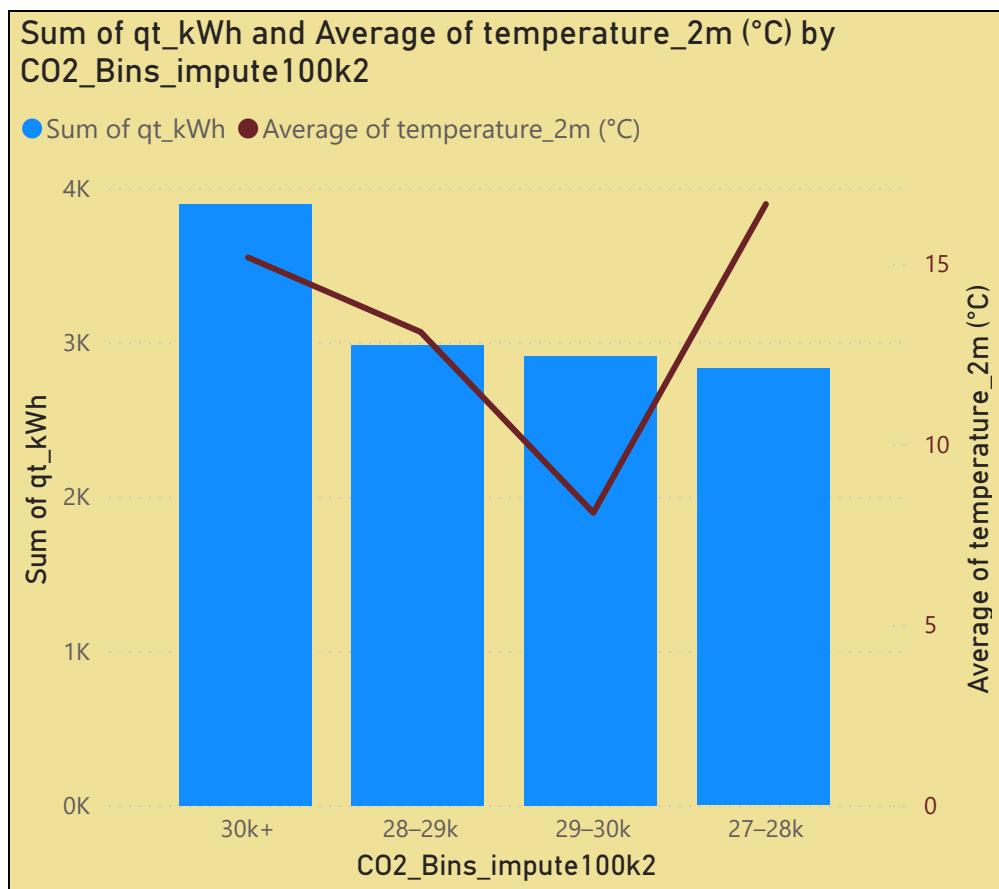
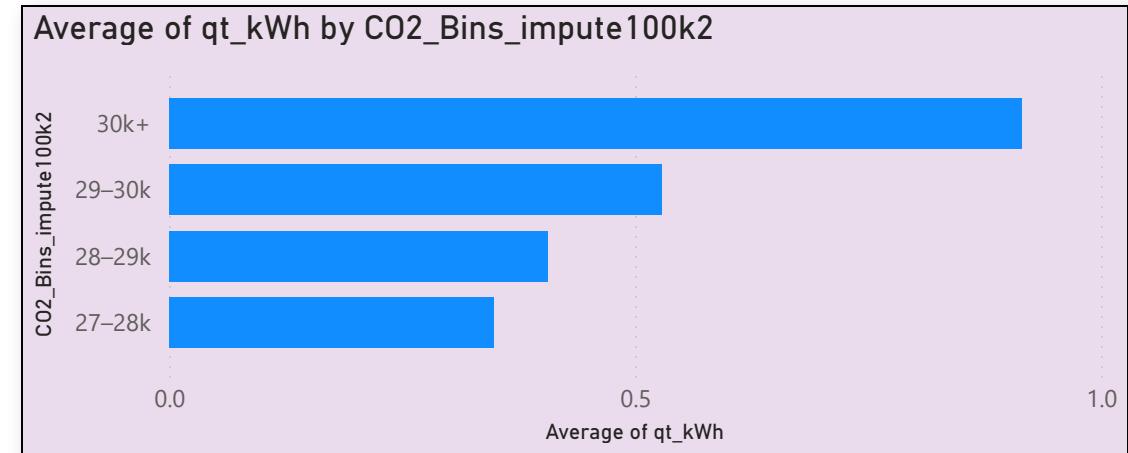
Lagging Power Factor (avg) by humidity bin rank
column months with 25C or above

humidity_binned	5	6	7	8	9	Total
High	99.88	99.37	83.70	74.46	100.00	81.44
Low	99.91	99.35	82.59	80.87	100.00	85.97
Medium	99.91	99.38	82.75	72.92	100.00	80.70
Total	99.91	99.39	83.81	74.56	100.00	81.64

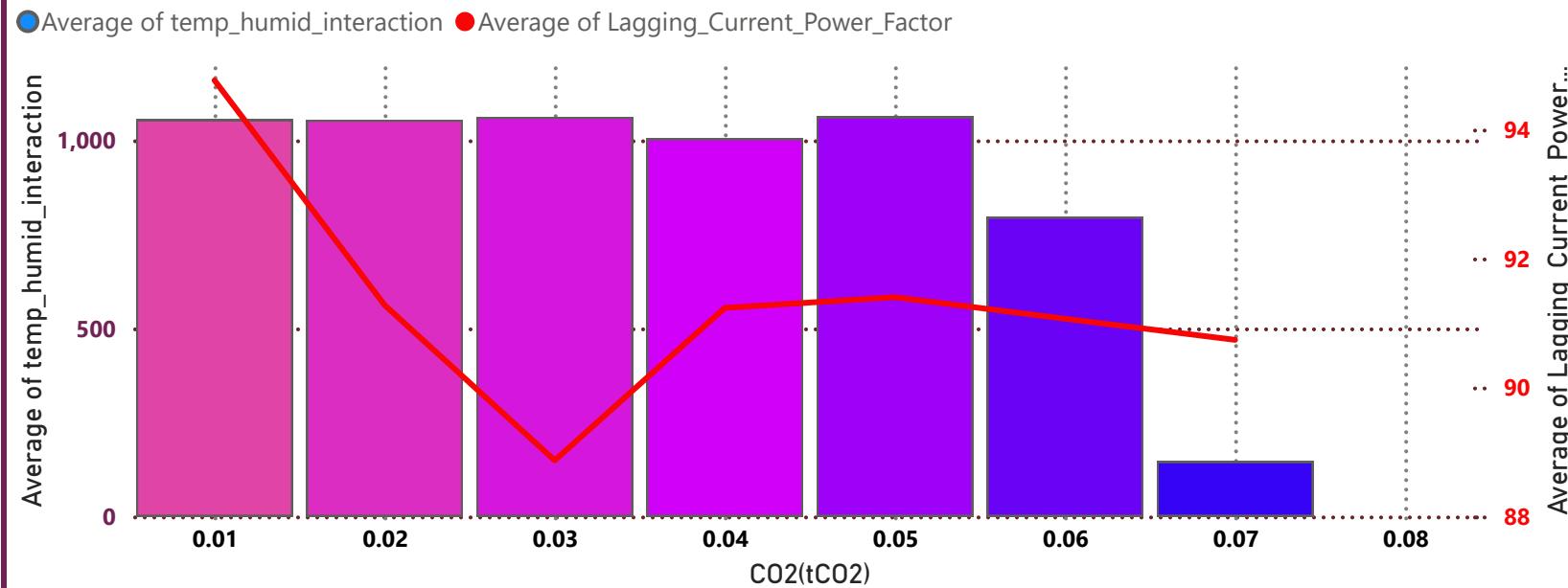




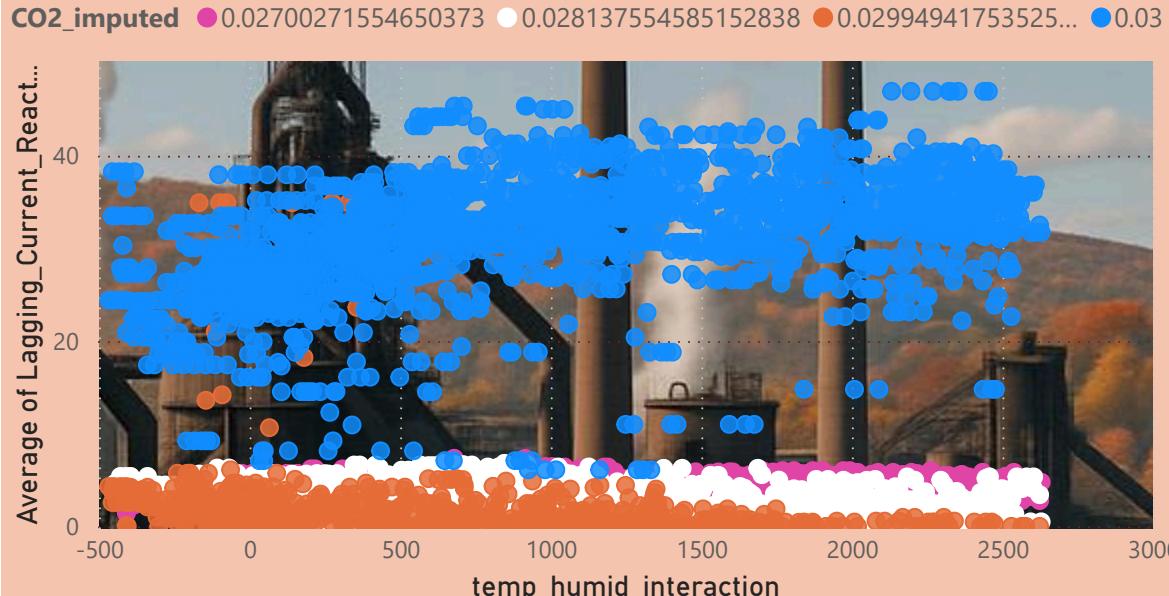
Imputed CO2 Bins by Humidity Bins					
CO2x100 Sums					
humidity_binned	27-28k	28-29k	29-30k	30k+	Total
High	26251			15941	27135
Low		28235		27891	29693
Medium	30506			27733	33205
Total	26251	30506	28235	38593	40381



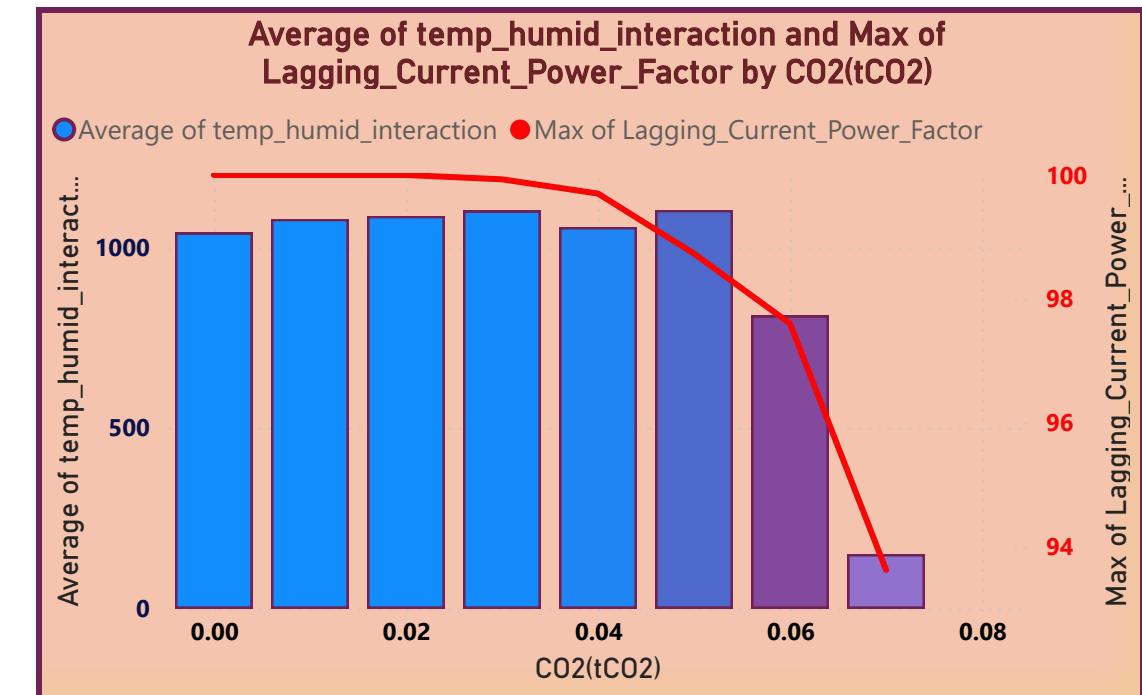
Average of temp_humid_interaction and Average of Lagging_Current_Power_Factor by CO2(tCO2)



Average of Lagging_Current_Reactive.Power_kVarh by CO2_imputed and temp_humid_interaction



Average of temp_humid_interaction and Max of Lagging_Current_Power_Factor by CO2(tCO2)

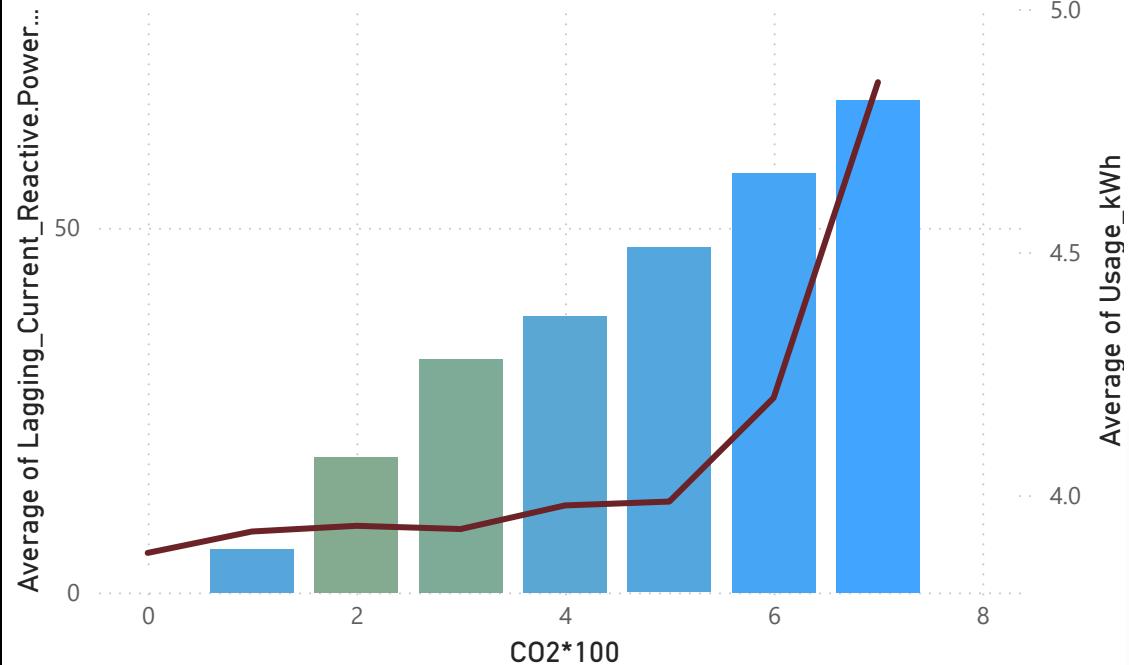


Humidity Bins by Temperature Bins												
CO2x100 Values												
humiditybinby10	-15.00	-10.00	-5.00	0.00	5.00	15.00	20.00	25.00	30.00	Total		
Total	1.5237	1.0548	1.0970	1.0906	1.1431	1.0721	1.1290	1.2871	1.8530	1.1524		
0			0.0000	0.5000						0.4286		
10		0.3333	0.8636	1.6250						1.0357		
20	2.7500	1.8147	1.3077	2.3550		2.8125	2.1667	2.6250		1.9038		
30	2.7813	1.2270	1.8452	1.8806	2.7034	1.9750	2.9211	2.5714		1.9403		
40	1.6445	1.4566	1.8406	1.3413	2.1763	2.0131	1.9511	1.2823	0.3438	1.7433		
50	1.4670	1.0351	1.0195	1.6146	1.7173	2.0519	1.4735	1.8488	1.7599	1.5242		
60	0.2941	0.5678	0.9167	1.2609	1.1852	1.2630	1.5654	1.8208	1.8581	1.2916		
70	0.0000	0.5708	0.7128	0.8191	0.8733	0.9317	1.3878	1.6445	2.3636	1.0732		
80		0.2100	0.9311	0.3827	0.7325	0.5851	1.0577	0.9368	2.6250	0.7443		
90			0.8153	1.0096	0.6266	0.5688	0.7148	0.8796		0.7278		
100			1.5000	0.0000	1.0769	0.2594	0.6637			0.6054		

Humidity Bins by Temperature Bins												
Usage kWh (Avg)												
humiditybinby10	-15.00	-10.00	-5.00	0.00	5.00	15.00	20.00	25.00	30.00	Total		
0			3.63	13.82						12.36		
10			13.65	21.39	37.81					25.42		
20	60.22	41.61	31.13	52.76		62.50	47.83	58.44		43.40		
30	59.90	29.57	42.79	44.25	59.24	44.16	64.89	57.21		44.37		
40	35.72	33.34	42.60	35.44	48.57	45.64	43.15	30.37	11.58	40.20		
50	34.06	25.10	25.05	36.62	39.51	46.04	33.29	42.06	39.93	35.10		
60	10.72	15.18	22.53	30.54	28.16	29.37	35.43	40.78	41.71	30.22		
70	4.89	16.32	18.93	20.42	21.47	22.35	32.09	36.99	53.01	25.66		
80		8.43	23.47	11.57	18.54	15.39	24.84	22.55	56.95	18.80		
90			20.41	24.61	16.12	15.12	17.98	21.28		18.34		
100			36.07	3.36	25.90	8.65	16.84			15.80		
Total	34.41	25.56	26.73	26.77	27.10	25.54	26.48	29.81	41.81	27.39		

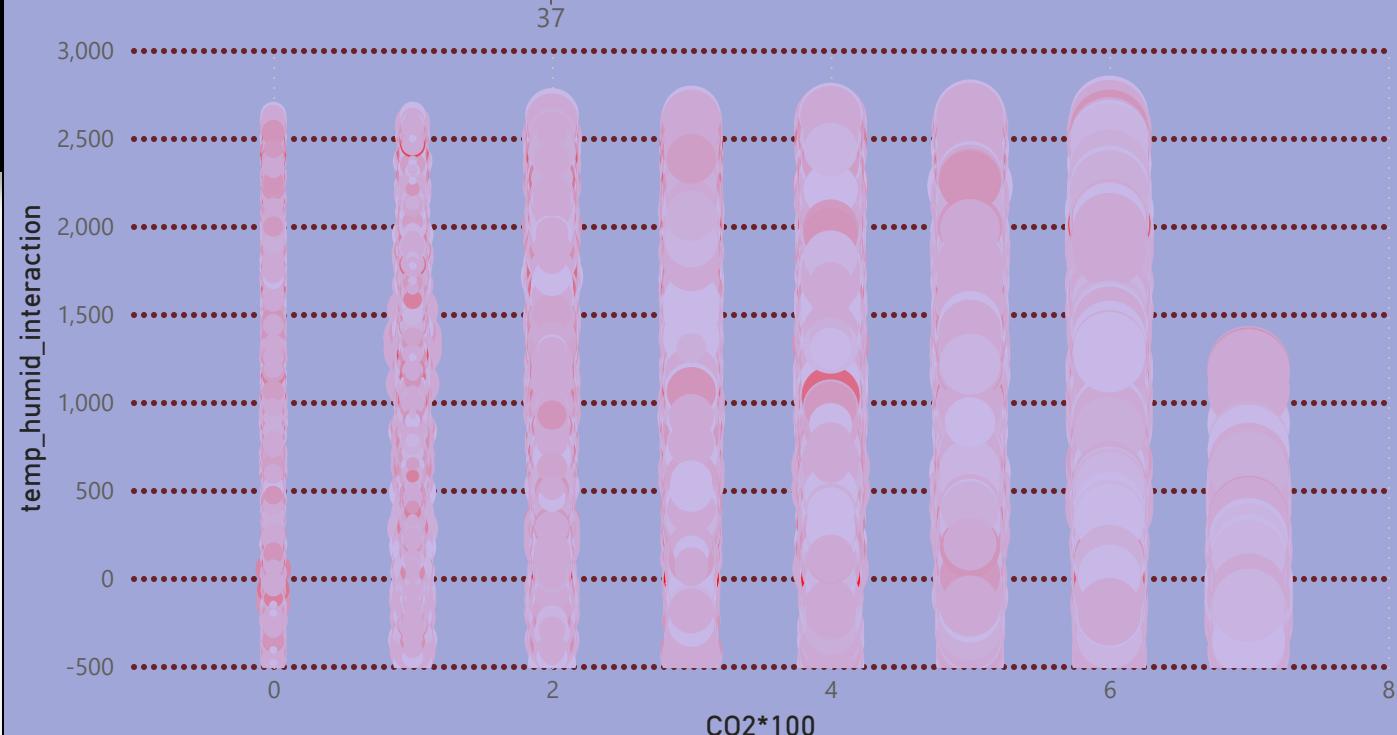
Average of Lagging_Current_Reactive.Power_kVarh and Average of Usage_kWh by CO2*100

● Average of Lagging_Current_Reactive.Power_kVarh ● Average of Usage_kWh



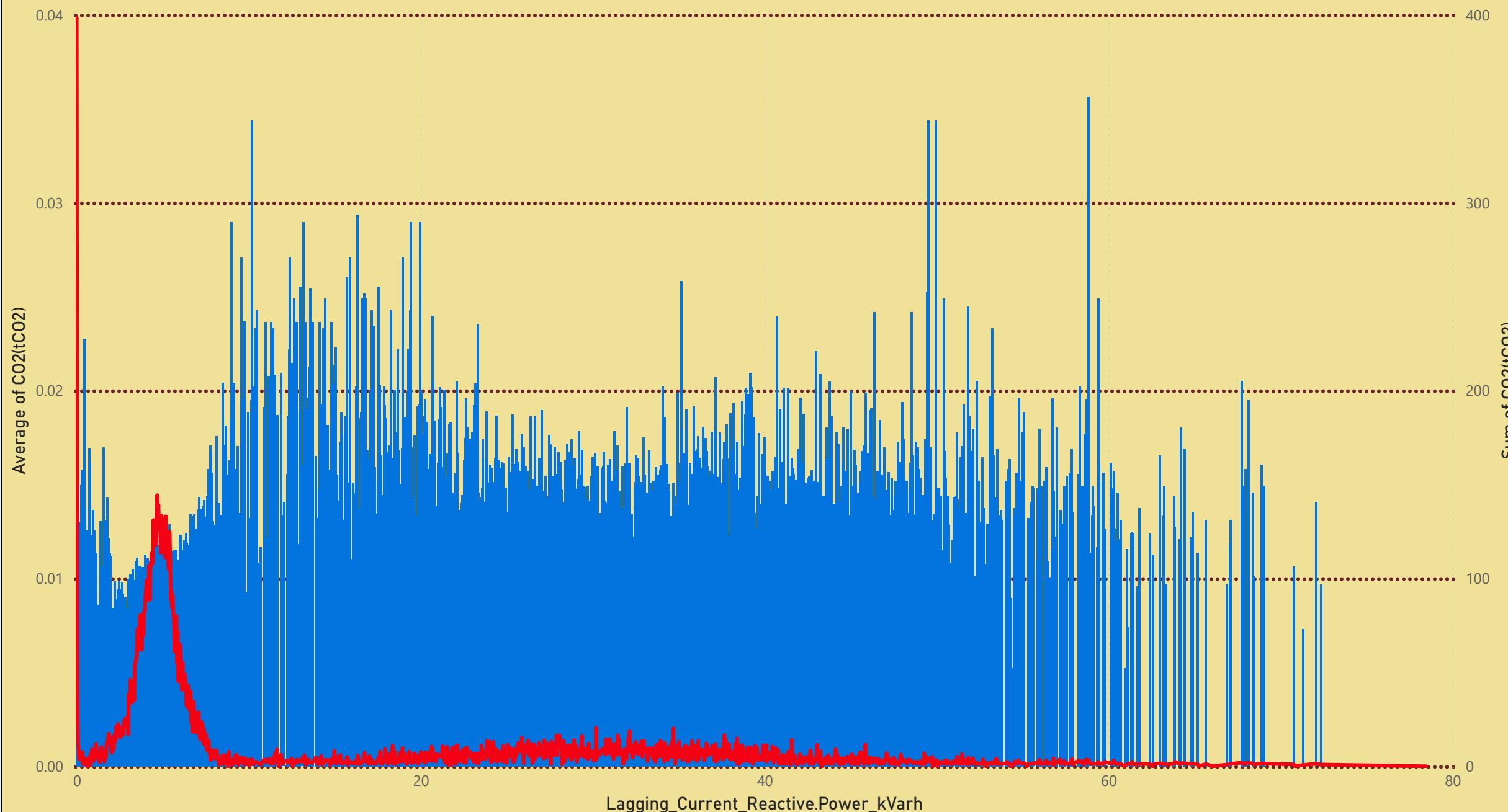
Average of Lagging_Current_Reactive.Power_kVarh by CO2*100 and temp_humid_interaction

Count of temp_humid_interaction 1 37 73

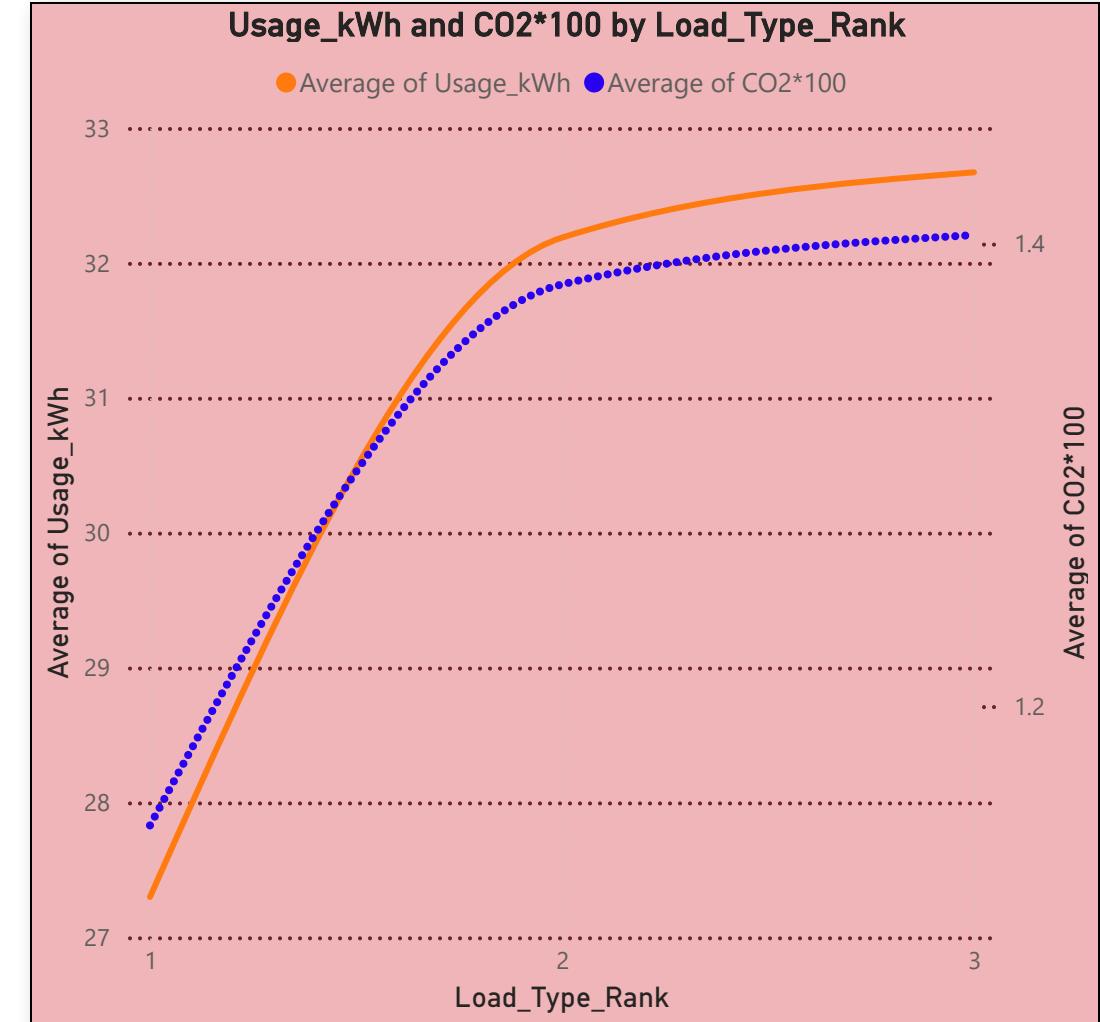
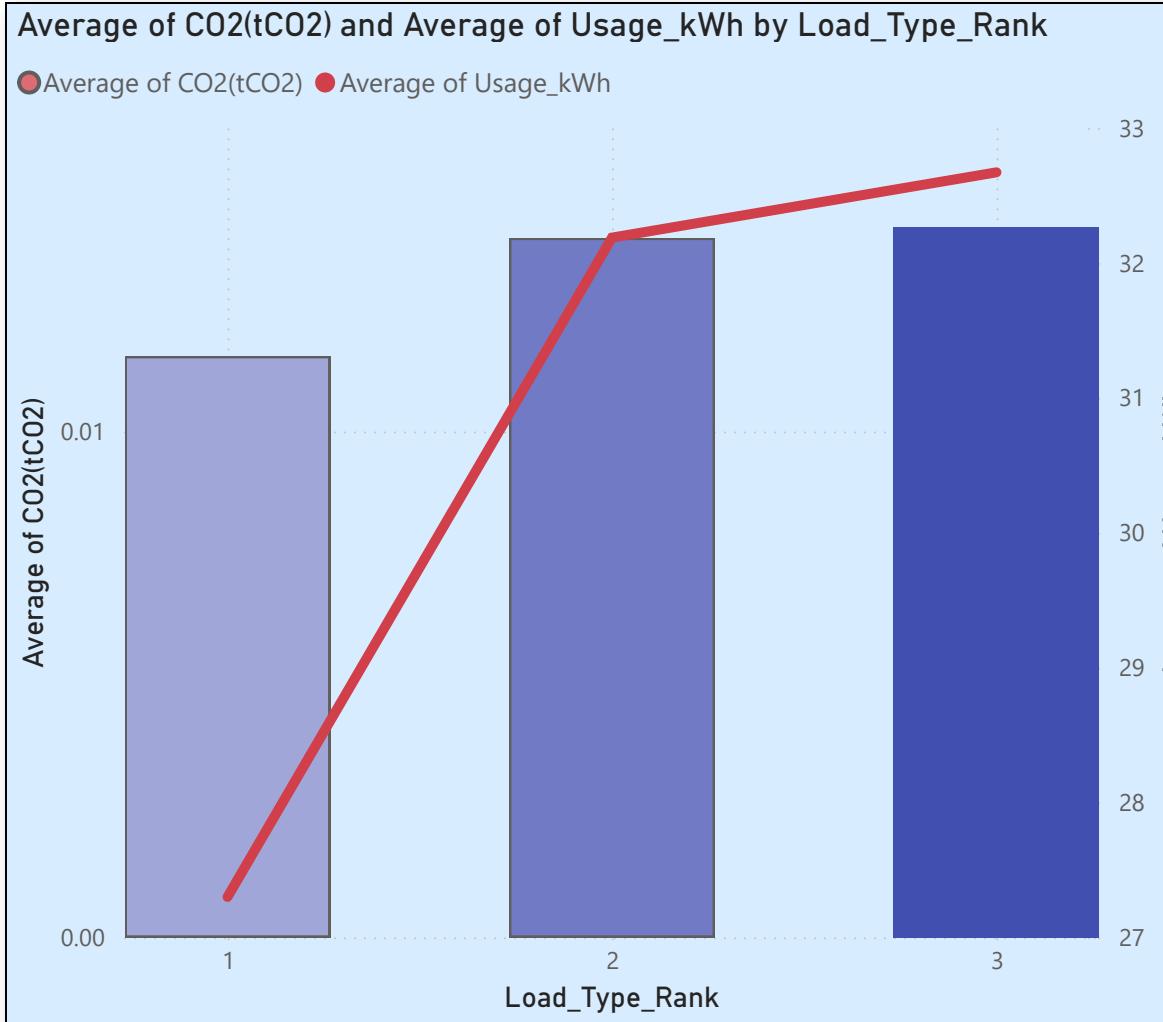


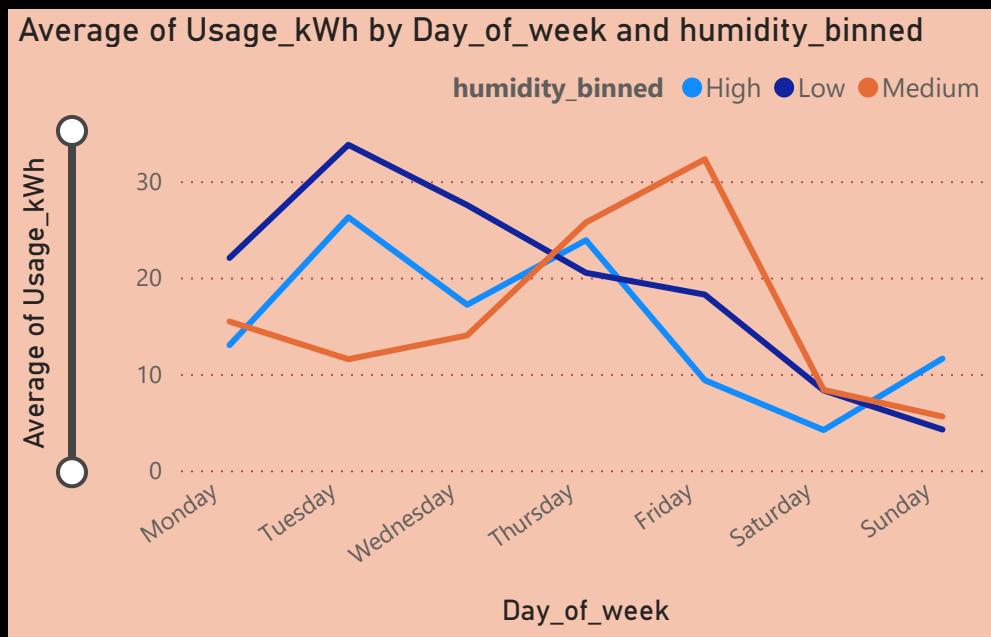
CO2 (avg & sum) vs. Reactive.Power_kVarh

● Average of CO2(tCO2) ● Sum of CO2(tCO2)



Usage kWh and CO2 Emission vs. Load Rank

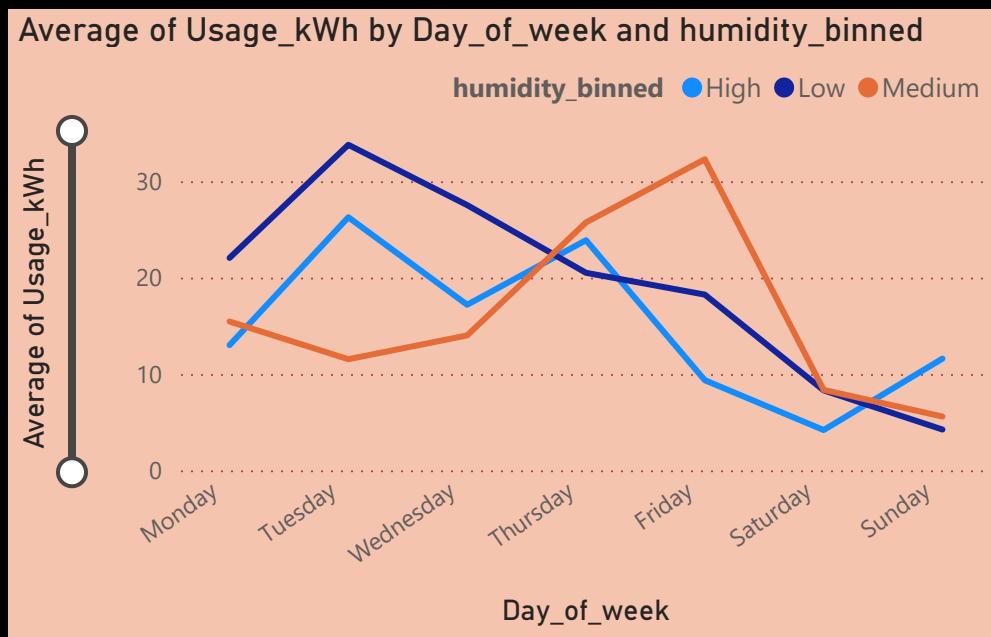




humidity_binned	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
High	76.14	76.14	73.08	74.45	73.73	6.59	72.18	76.14
Low	76.14	147.46	76.32	76.32	76.00	74.09	58.86	147.46
Medium	76.21	76.75	76.07	75.53	75.64	76.21	67.18	76.75
Total	76.21	147.46	76.32	76.32	76.00	76.21	72.18	147.46

Average Energy Usage by Day of Week and Humidity Bins

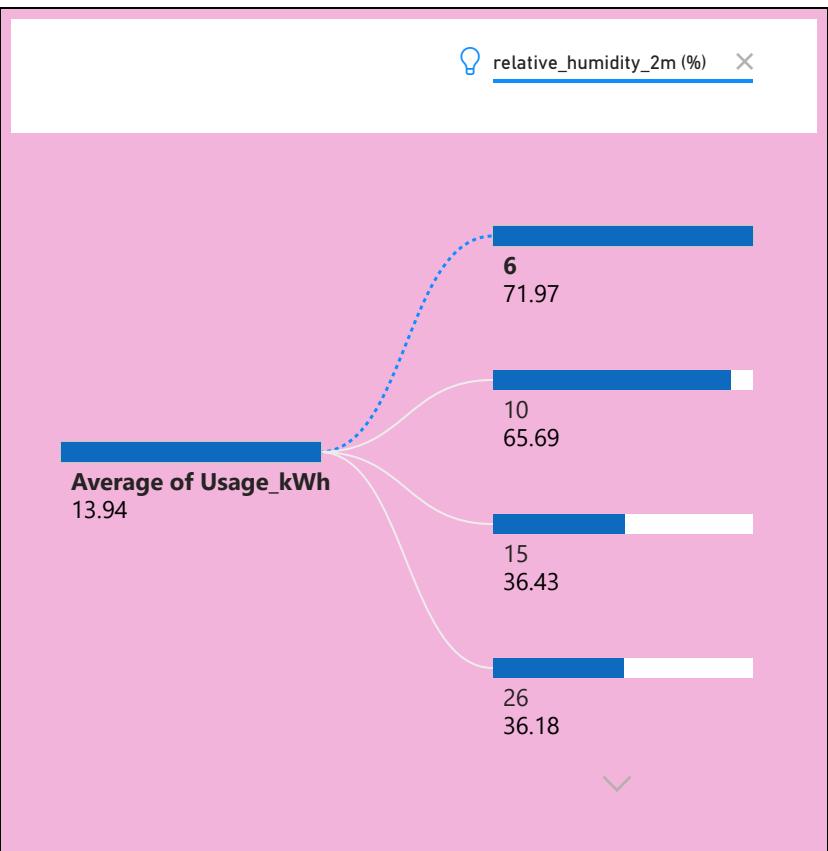
Slicers for Seasons added on TOP



humidity_binned	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
High	76.14	76.14	73.08	74.45	73.73	6.59	72.18	76.14
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Total	76.21	147.46	76.32	76.32	76.00	76.21	72.18	147.46

Average Energy Usage by Day of Week and Humidity Bins

Slicers for Seasons added on TOP



Key influencers Top segments



What influences Usage_kWh to Decrease ?

When...

Load_Type_Rank is 1

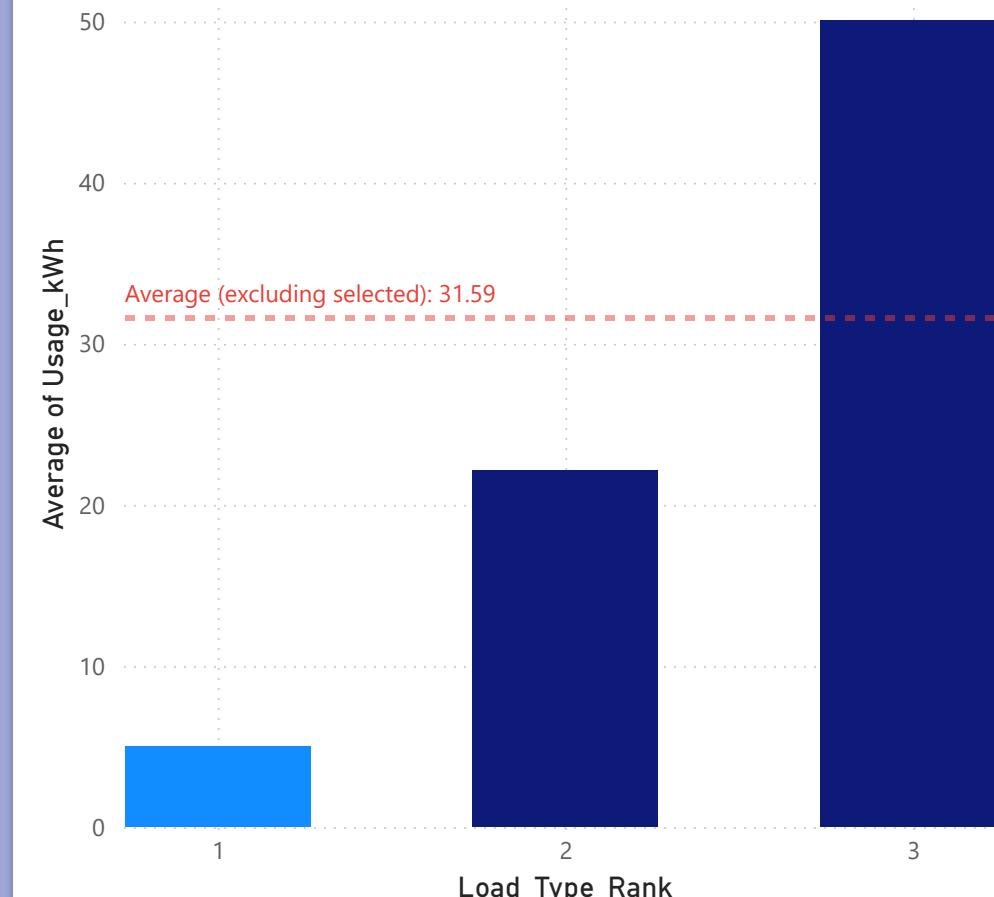


Day_of_week is Sunday

Day_of_week is Saturday

humidity_binned is High

← Usage_kWh is more likely to decrease when Load_Type_Rank is 1 than otherwise (on average).



Only show values that are influencers