

PG&E E-ELEC MEASUREMENT AND EVALUATION (M&E) FINDINGS

WLRA and AEIC's Joint Conference

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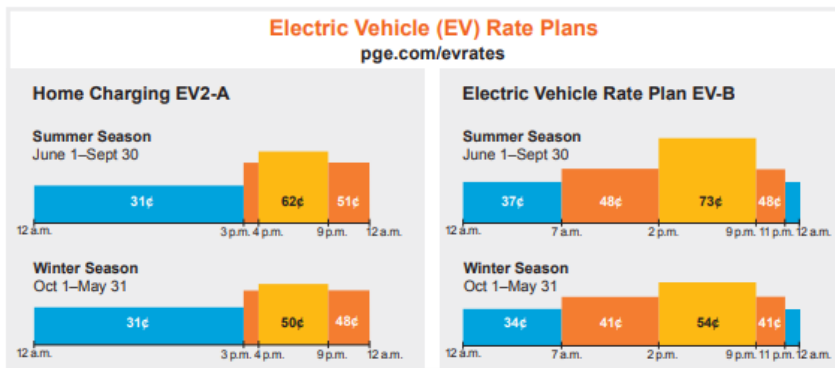
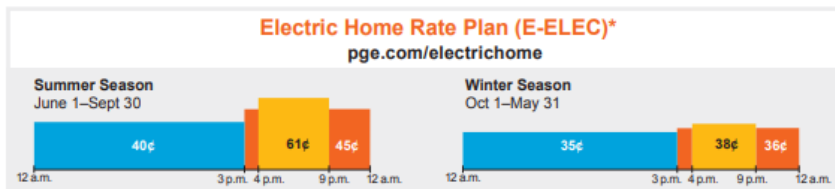
AGENDA

- » What is the E-ELEC rate and overview of E-ELEC enrollment as of 12/12/2024
- » Key findings from the evaluation
 - **Customer Trends Analysis**
 - **Load Shape Analysis**
 - **Bill Impact Analysis** – using Verdant's Bill Calculator
 - Pre/Post bill impacts - one year of pre-ELEC usage on previous rate AND one year of post-E-ELEC usage on E-ELEC rate
 - Post-only price sensitivity impacts – rate impact only with one year of post-ELEC usage on BOTH E-ELEC rate and customer's previous rate
 - **Load Impact Analysis**
 - Ex post and ex ante

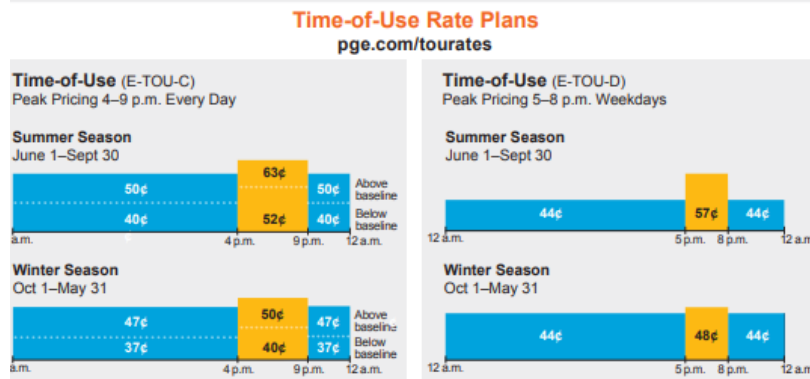
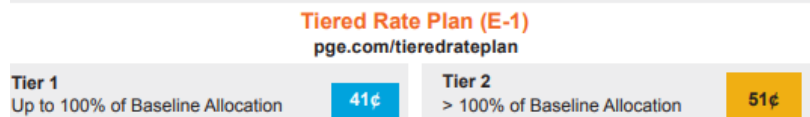
E-ELEC RATE STRUCTURE

- » E-ELEC is a PG&E residential rate intended to promote/encourage/foster home electrification
 - TOU rates with different \$/kWh based on:
 - Winter (Jan-May and Oct-Dec)
 - Summer (Jun-Sep)
 - Time-of-Use periods (off-peak, super off-peak and on-peak (4pm-9pm) rates)
 - A base services charge of \$15
 - Offset by lower volumetric rates
 - Eligible electrification technologies include EV charging, solar PV, Heat pumps, and energy storage technologies
 - E-ELEC is also the default rate for customers on Net Billing Tariff (NBT)
 - The net energy metering (NEM) successor tariff

PG&E RESIDENTIAL RATE PLANS



OFF-PEAK PEAK PARTIAL PEAK



Source: <https://www.pge.com/assets/pge/docs/account/rate-plans/residential-electric-rate-plan-pricing.pdf>

OVERALL E-ELEC ENROLLMENT

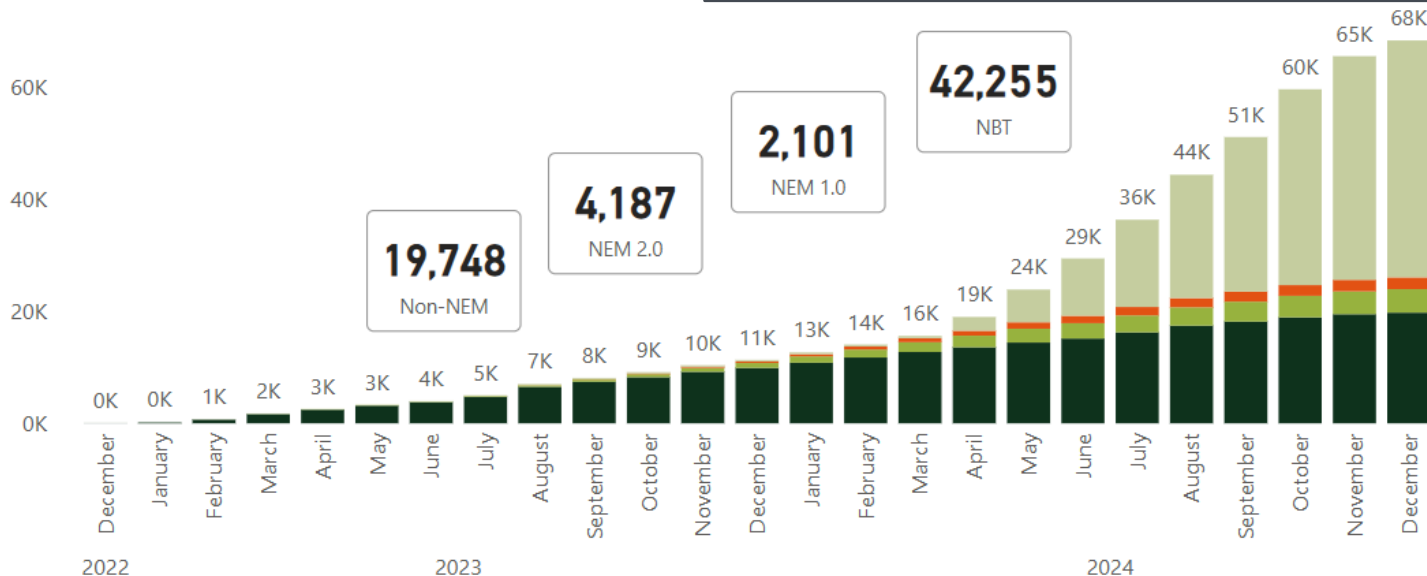
Cumulative E-ELEC Enrollment by NEM Designation as 12/12/2024

E-ELEC Cumulative Enrollment

● Non-NEM ● NEM 2.0 ● NEM 1.0 ● NBT

68K E-ELEC customers

1.4% of all PG&E residential customers by Dec 2024

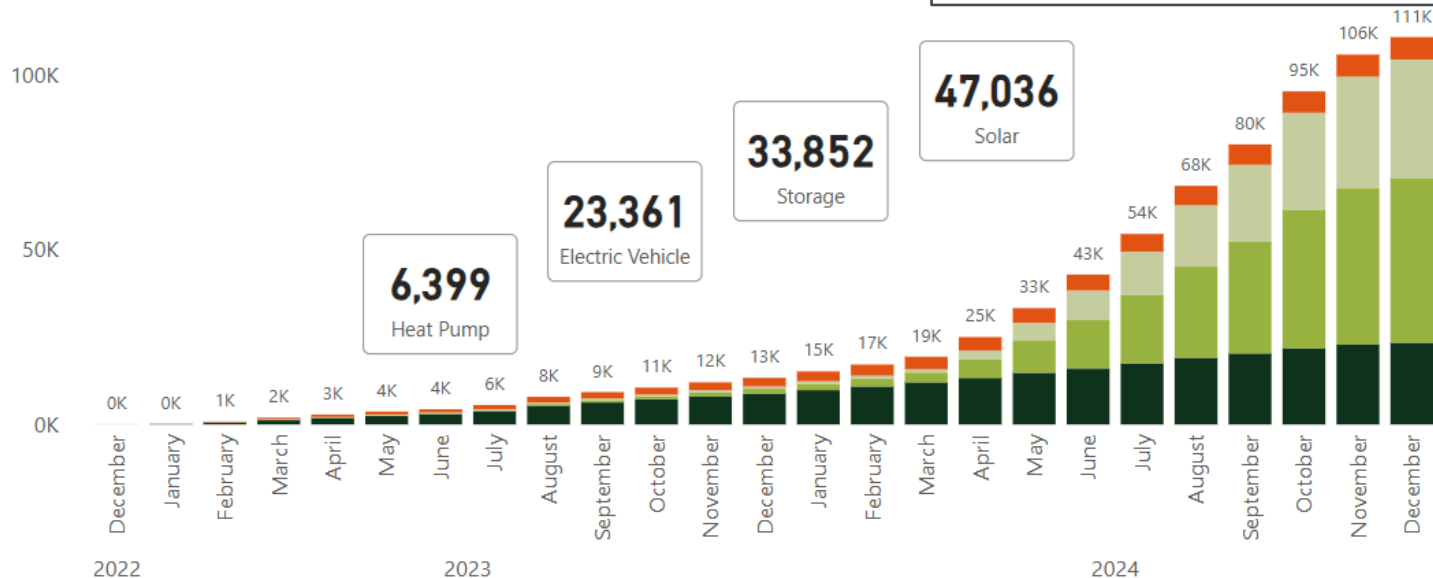


OVERALL E-ELEC ENROLLMENT

Cumulative E-ELEC Enrollment by Eligible Technologies 12/12/2024

E-ELEC Cumulative Enrollment

● Electric Vehicle ● Solar ● Storage ● Heat Pump

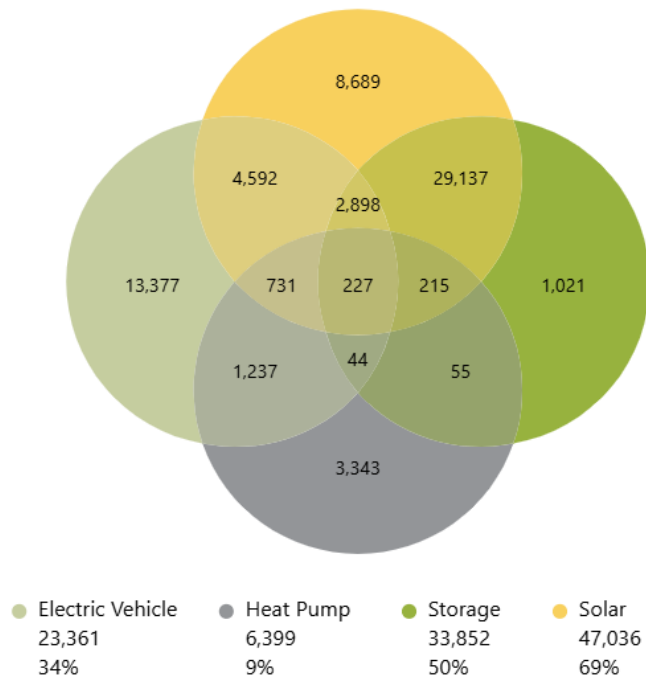


CUSTOMER TRENDS ANALYSIS

Distribution of Technology Installations

- » Over 111K eligible technologies installed
- » Solar (69%) and storage (50%) represent the greatest share of adoption – mostly NBT
- » Electric vehicles represent 34% of adoption –
- » Heat pumps – 9% adoption
- » 15 unique combinations of technologies across Phases

E-ELEC Technologies Installed

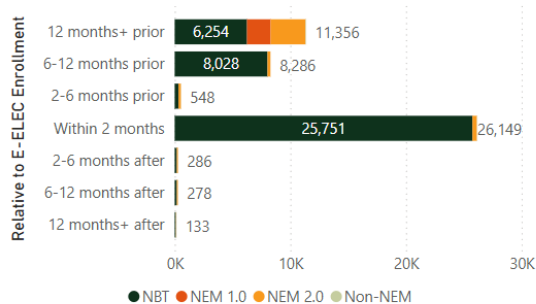


CUSTOMER TRENDS ANALYSIS

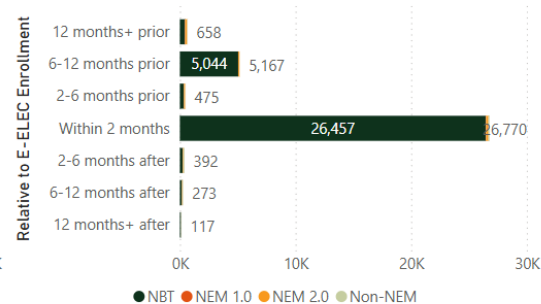
Timing of Electrification Adoption

- » Solar and storage mostly installed at time of E-ELEC enrollment (mostly NBT)
- » EV charging adoption occurs mostly at time of E-ELEC enrollment (79%)
- » Most heat pumps installed one year prior

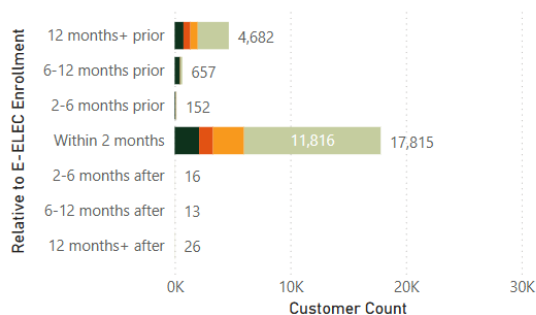
Solar Installation Timing



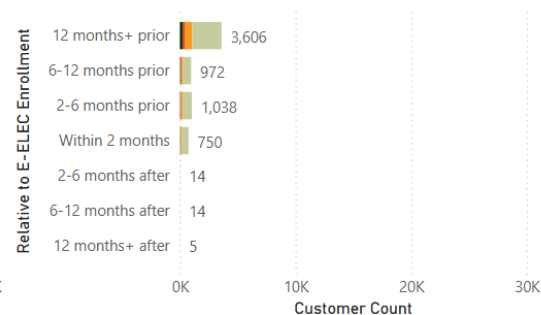
Storage Installation Timing



EV Charging Installation Timing



Heat Pump Installation Timing



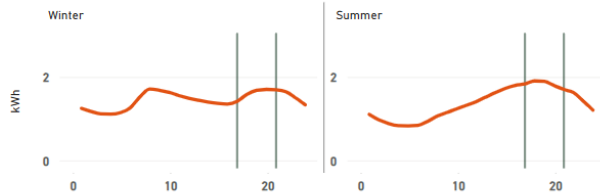
LOAD SHAPE ANALYSIS

Daily Load Shapes by Phase, Technology* and Season

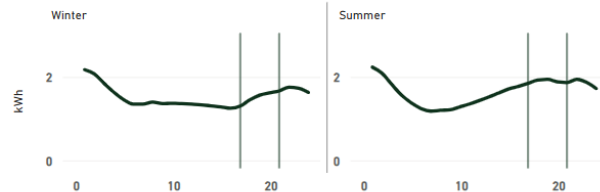
*There are 15 unique technology groupings and over 30 segmentations. These summaries highlight a few of them.

- » **Heat pumps**
 - Evidence of winter heating
- » **Electric Vehicles**
 - Evidence of overnight charging
- » **Solar and storage**
 - NBT storage discharge during on-peak

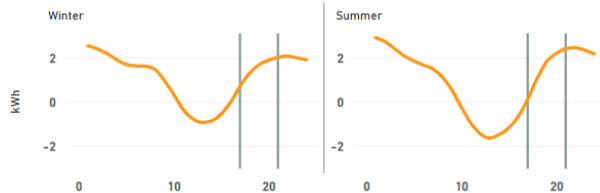
Phase 1 Heat Pump Only



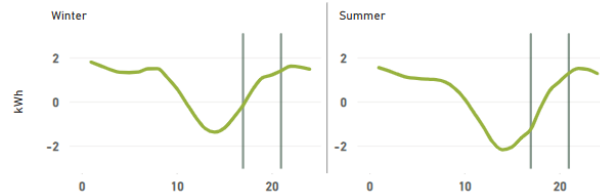
Phase 1 EV Only



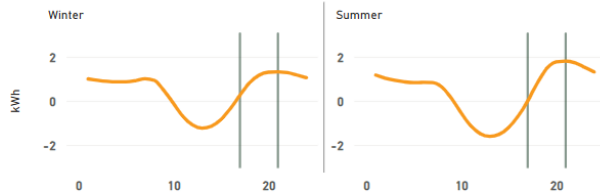
Phase 2 Solar Only



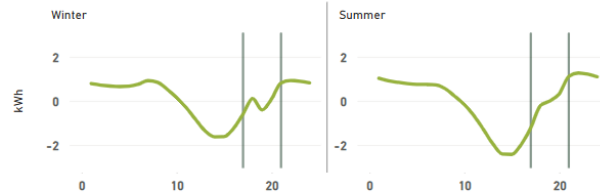
Phase 2 Solar and Storage



NBT Solar Only



NBT Solar and Storage



Hour Ending

LOAD SHAPE ANALYSIS

Non-NEM Load Shape Heatmaps (Average Hourly kWh)

Phase 1 Heat Pump Only

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.6	1.5	1.3	1.2	1.1	1.2	1.3	1.1	1.0	1.0	1.2	1.4
2	1.5	1.4	1.3	1.1	1.0	1.0	1.1	1.0	0.9	0.9	1.1	1.4
3	1.5	1.4	1.2	1.0	0.9	0.9	1.0	0.9	0.8	0.8	1.1	1.3
4	1.5	1.4	1.2	1.0	0.9	0.9	1.0	0.9	0.8	0.8	1.1	1.3
5	1.5	1.4	1.2	1.0	0.9	0.9	0.9	0.8	0.8	0.8	1.2	1.4
6	1.7	1.6	1.4	1.1	1.0	0.9	1.0	0.9	0.8	0.9	1.3	1.6
7	2.1	2.0	1.7	1.4	1.2	1.0	1.0	1.0	0.9	1.1	1.6	1.9
8	2.3	2.2	2.0	1.6	1.3	1.1	1.2	1.1	1.1	1.2	1.7	2.1
9	2.2	2.1	1.8	1.5	1.3	1.2	1.3	1.2	1.1	1.2	1.6	2.0
10	2.1	1.9	1.7	1.5	1.3	1.3	1.4	1.2	1.1	1.2	1.6	2.0
11	1.9	1.8	1.7	1.4	1.3	1.4	1.5	1.3	1.2	1.2	1.6	1.9
12	1.7	1.7	1.6	1.4	1.3	1.5	1.7	1.4	1.2	1.2	1.5	1.7
13	1.7	1.6	1.5	1.3	1.3	1.6	1.8	1.5	1.3	1.2	1.5	1.6
14	1.6	1.5	1.4	1.3	1.3	1.6	2.0	1.6	1.4	1.2	1.4	1.5
15	1.6	1.5	1.4	1.2	1.3	1.7	2.1	1.8	1.5	1.2	1.4	1.5
16	1.6	1.4	1.3	1.2	1.3	1.8	2.2	1.9	1.5	1.2	1.3	1.5
17	1.6	1.5	1.4	1.2	1.3	1.9	2.2	1.9	1.6	1.2	1.4	1.6
18	1.9	1.7	1.5	1.3	1.4	2.0	2.3	2.0	1.7	1.3	1.6	1.9
19	2.0	1.9	1.6	1.3	1.5	2.0	2.3	2.0	1.7	1.3	1.7	2.0
20	2.1	1.9	1.7	1.4	1.4	1.9	2.2	1.8	1.7	1.4	1.7	2.0
21	2.1	1.9	1.7	1.5	1.4	1.8	2.0	1.8	1.7	1.3	1.6	2.0
22	2.0	1.9	1.7	1.5	1.5	1.8	1.9	1.7	1.5	1.2	1.5	1.9
23	1.9	1.7	1.6	1.4	1.3	1.5	1.7	1.4	1.3	1.1	1.4	1.7
24	1.7	1.6	1.4	1.2	1.2	1.3	1.4	1.2	1.1	1.0	1.2	1.5

Phase 1 EV Only

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2.3	2.2	2.2	2.1	2.1	2.2	2.4	2.3	2.2	2.2	2.2	2.2
2	2.2	2.1	2.1	2.0	2.0	2.1	2.2	2.1	2.0	2.0	2.1	2.1
3	2.0	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.8	1.7	1.8	1.9
4	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.6	1.7
5	1.6	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.4	1.5
6	1.5	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.3	1.4
7	1.5	1.5	1.4	1.3	1.2	1.2	1.2	1.2	1.1	1.2	1.3	1.4
8	1.6	1.5	1.5	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.4	1.5
9	1.5	1.4	1.4	1.3	1.2	1.2	1.2	1.2	1.1	1.2	1.3	1.5
10	1.5	1.4	1.4	1.3	1.2	1.2	1.3	1.3	1.2	1.2	1.4	1.5
11	1.4	1.4	1.3	1.2	1.2	1.3	1.4	1.3	1.2	1.2	1.4	1.4
12	1.4	1.4	1.3	1.2	1.2	1.4	1.5	1.4	1.3	1.2	1.3	1.4
13	1.4	1.3	1.3	1.2	1.2	1.4	1.6	1.4	1.3	1.2	1.3	1.4
14	1.4	1.3	1.3	1.2	1.2	1.5	1.8	1.5	1.4	1.2	1.3	1.3
15	1.3	1.3	1.2	1.1	1.2	1.6	1.9	1.6	1.4	1.2	1.3	1.3
16	1.3	1.2	1.2	1.1	1.2	1.6	2.0	1.7	1.5	1.2	1.2	1.3
17	1.4	1.3	1.2	1.1	1.2	1.7	2.0	1.8	1.6	1.2	1.2	1.4
18	1.6	1.4	1.3	1.2	1.3	1.8	2.1	1.9	1.7	1.3	1.5	1.6
19	1.8	1.6	1.4	1.3	1.4	1.9	2.2	1.9	1.8	1.4	1.6	1.7
20	1.8	1.7	1.6	1.4	1.4	1.8	2.1	1.8	1.8	1.5	1.6	1.8
21	1.9	1.7	1.6	1.5	1.5	1.8	2.0	1.8	1.8	1.5	1.6	1.8
22	1.9	1.8	1.7	1.6	1.7	2.0	2.0	1.9	1.8	1.6	1.6	1.8
23	1.9	1.8	1.7	1.6	1.7	1.8	2.0	1.8	1.7	1.5	1.6	1.8
24	1.8	1.7	1.6	1.6	1.6	1.7	1.8	1.7	1.6	1.5	1.5	1.7

4 p m - 9 p m
On - peak

LOAD SHAPE ANALYSIS

NEM Load Shape Heatmaps (Average Hourly kWh)

Phase 2 Solar Only

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2.2	2.1	1.8	1.6	1.4	1.6	1.7	1.5	1.4	1.3	1.5	1.9
2	2.1	2.0	1.7	1.5	1.3	1.5	1.5	1.4	1.2	1.1	1.5	1.8
3	2.0	1.9	1.6	1.4	1.2	1.3	1.3	1.2	1.2	1.1	1.4	1.7
4	2.0	1.9	1.6	1.3	1.2	1.2	1.2	1.1	1.1	1.0	1.4	1.7
5	2.1	2.0	1.7	1.4	1.2	1.1	1.2	1.1	1.0	1.0	1.5	1.8
6	2.3	2.2	1.8	1.5	1.2	1.1	1.2	1.1	1.1	1.1	1.7	2.0
7	2.7	2.6	2.2	1.8	1.3	1.1	1.2	1.2	1.2	1.3	2.1	2.5
8	3.0	2.7	2.4	1.6	1.0	0.7	0.8	1.0	1.2	1.4	2.2	2.8
9	2.5	1.9	1.6	0.7	0.0	-0.2	0.1	0.3	0.5	0.9	1.4	2.3
10	1.5	0.7	0.4	-0.5	-1.2	-1.1	-0.7	-0.7	-0.5	0.1	0.3	1.5
11	0.4	-0.4	-0.8	-1.7	-2.2	-2.1	-1.6	-1.7	-1.5	-0.9	-0.4	0.6
12	-0.3	-0.9	-1.7	-2.5	-3.0	-2.7	-2.2	-2.4	-2.3	-1.7	-0.9	-0.1
13	-0.4	-1.1	-2.0	-3.0	-3.4	-2.9	-2.4	-2.6	-2.6	-2.1	-1.0	-0.4
14	-0.3	-0.9	-2.0	-3.2	-3.5	-2.9	-2.3	-2.6	-2.5	-2.1	-0.7	-0.2
15	0.2	-0.5	-1.8	-3.0	-3.3	-2.6	-2.0	-2.2	-2.1	-1.7	-0.1	0.3
16	0.9	0.2	-1.3	-2.4	-2.7	-1.9	-1.3	-1.4	-1.3	-0.9	0.7	1.1
17	1.7	1.1	-0.3	-1.5	-1.7	-1.0	-0.4	-0.4	-0.2	0.2	1.4	1.9
18	2.3	2.0	0.7	-0.2	-0.4	0.2	0.8	0.7	1.1	1.1	1.9	2.3
19	2.5	2.3	1.6	1.0	0.8	1.4	1.9	1.7	1.9	1.6	1.9	2.4
20	2.5	2.3	2.0	1.6	1.6	2.1	2.4	2.1	2.2	1.6	1.9	2.5
21	2.6	2.3	2.1	1.9	1.8	2.3	2.4	2.2	2.1	1.6	1.8	2.4
22	2.6	2.4	2.1	1.9	1.9	2.2	2.3	2.0	1.9	1.5	1.8	2.3
23	2.4	2.2	2.0	1.8	1.7	1.9	2.1	1.8	1.6	1.4	1.6	2.1
24	2.2	2.0	1.8	1.6	1.5	1.7	1.7	1.5	1.4	1.2	1.5	1.9

Phase 2 Solar and Storage

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3.0	2.4	1.7	1.2	1.0	1.4	1.6	1.7	1.6	1.4	1.6	2.1
2	2.7	2.1	1.6	1.1	0.8	0.9	1.0	1.1	1.3	1.0	1.4	1.8
3	2.6	2.2	1.6	1.1	0.8	0.9	1.0	0.9	1.0	1.0	1.4	1.7
4	2.6	2.2	1.6	1.1	0.7	0.8	0.9	0.8	1.0	1.0	1.4	1.7
5	2.7	2.3	1.8	1.2	0.8	0.8	0.9	0.8	0.9	1.0	1.5	1.8
6	2.8	2.5	2.0	1.3	0.8	0.7	0.9	0.9	0.9	1.0	1.7	2.0
7	3.2	2.8	2.4	1.5	0.9	0.7	1.0	1.0	1.1	1.2	2.1	2.5
8	3.4	2.9	2.4	1.4	0.9	0.7	0.9	1.0	1.1	1.4	2.2	2.9
9	2.8	2.1	1.8	1.0	0.5	0.5	0.8	0.8	0.8	1.1	1.4	2.3
10	1.9	1.1	0.9	0.4	-0.3	0.0	0.4	0.4	0.4	0.6	0.7	1.6
11	0.8	0.2	0.0	-0.6	-1.4	-1.1	-0.4	-0.2	-0.2	0.0	0.1	1.0
12	0.2	-0.5	-0.8	-1.7	-2.8	-2.6	-1.5	-1.3	-1.1	-0.8	-0.5	0.4
13	-0.2	-0.9	-1.4	-2.9	-3.9	-3.6	-2.5	-2.4	-2.2	-1.6	-0.8	0.0
14	-0.1	-0.9	-1.9	-3.6	-4.5	-4.1	-3.1	-3.1	-2.8	-2.0	-0.8	-0.1
15	0.2	-0.8	-2.2	-3.9	-4.8	-4.2	-3.1	-3.1	-2.9	-2.0	-0.2	0.4
16	0.8	-0.2	-1.9	-3.5	-4.3	-3.8	-2.7	-2.6	-2.3	-1.4	0.4	0.9
17	1.3	0.6	-1.0	-2.5	-3.2	-3.0	-2.1	-2.0	-1.6	-0.4	0.9	1.2
18	1.9	1.3	0.2	-1.0	-1.6	-1.6	-0.9	-0.8	-0.2	0.7	1.3	1.7
19	2.2	1.6	1.0	0.3	-0.1	-0.1	0.3	0.3	0.5	0.9	1.4	1.9
20	2.3	1.8	1.3	0.8	0.6	0.6	0.9	0.3	0.1	1.0	1.4	2.0
21	2.5	1.8	1.3	0.9	0.8	0.8	1.1	1.0	1.2	1.0	1.4	1.9
22	2.7	2.1	1.5	1.0	1.0	1.1	1.4	1.2	1.3	1.1	1.4	2.1
23	2.6	2.1	1.6	1.0	0.9	0.9	1.3	1.1	1.1	1.0	1.3	1.8
24	2.4	1.9	1.4	1.0	0.7	0.8	1.2	1.0	1.0	0.9	1.1	1.6

4 pm - 9 pm
On - peak

LOAD SHAPE ANALYSIS

NBT Load Shape Heatmaps (Average Hourly kWh)

NBT Solar Only

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.1	1.0	0.9	0.9	0.9	1.2	1.4	1.2	1.0	0.8	0.9	1.0
2	1.1	1.0	0.9	0.8	0.8	1.0	1.2	1.1	0.9	0.8	0.9	1.0
3	1.0	0.9	0.8	0.7	0.7	0.9	1.1	1.0	0.8	0.7	0.8	0.9
4	1.0	0.9	0.8	0.7	0.7	0.9	1.0	0.9	0.8	0.7	0.8	0.9
5	1.0	0.9	0.8	0.7	0.7	0.8	1.0	0.9	0.8	0.7	0.8	0.9
6	1.1	1.0	0.9	0.8	0.7	0.8	0.9	0.9	0.8	0.7	0.9	1.0
7	1.2	1.1	1.0	0.8	0.7	0.7	0.9	0.9	0.8	0.8	1.0	1.1
8	1.2	1.1	0.9	0.6	0.3	0.4	0.6	0.7	0.7	0.8	0.9	1.1
9	0.9	0.5	0.4	0.0	-0.4	-0.3	0.1	0.1	0.2	0.4	0.4	0.8
10	0.4	-0.2	-0.3	-0.8	-1.2	-0.9	-0.5	-0.5	-0.5	-0.2	-0.2	0.4
11	-0.2	-0.8	-1.1	-1.5	-1.8	-1.5	-1.0	-1.2	-1.2	-0.9	-0.7	-0.2
12	-0.7	-1.1	-1.5	-2.0	-2.3	-1.8	-1.4	-1.5	-1.6	-1.4	-1.0	-0.5
13	-0.8	-1.2	-1.7	-2.3	-2.5	-2.0	-1.5	-1.7	-1.8	-1.6	-1.0	-0.7
14	-0.6	-1.0	-1.7	-2.4	-2.6	-1.9	-1.3	-1.5	-1.7	-1.5	-0.8	-0.5
15	-0.2	-0.7	-1.5	-2.2	-2.4	-1.6	-1.0	-1.2	-1.4	-1.2	-0.3	-0.1
16	0.3	-0.1	-1.1	-1.8	-1.9	-1.1	-0.5	-0.6	-0.7	-0.6	0.3	0.5
17	0.9	0.5	-0.4	-1.1	-1.1	-0.4	0.1	0.1	0.1	0.1	0.8	1.1
18	1.3	1.1	0.4	-0.2	-0.2	0.5	1.0	0.9	0.9	0.8	1.1	1.3
19	1.4	1.3	1.0	0.6	0.7	1.2	1.7	1.6	1.5	1.1	1.2	1.4
20	1.4	1.3	1.2	1.0	1.1	1.7	2.1	1.9	1.7	1.2	1.2	1.4
21	1.4	1.3	1.2	1.1	1.3	1.8	2.2	1.9	1.7	1.1	1.2	1.4
22	1.4	1.3	1.2	1.1	1.3	1.8	2.1	1.8	1.5	1.1	1.1	1.3
23	1.3	1.2	1.1	1.0	1.1	1.6	1.9	1.6	1.3	0.9	1.0	1.2
24	1.2	1.1	1.0	0.9	1.0	1.4	1.6	1.4	1.1	0.8	0.9	1.1

NBT Solar and Storage

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.9	0.8	0.7	0.6	0.7	1.0	1.4	1.1	1.0	0.7	0.8	1.1
2	0.8	0.8	0.7	0.6	0.6	0.9	1.2	1.0	0.9	0.6	0.8	1.0
3	0.8	0.7	0.6	0.5	0.6	0.8	1.1	0.9	0.8	0.6	0.8	1.0
4	0.8	0.7	0.6	0.5	0.6	0.7	1.0	0.9	0.8	0.6	0.8	0.9
5	0.8	0.8	0.6	0.5	0.5	0.7	0.9	0.8	0.7	0.6	0.8	1.0
6	0.9	0.8	0.7	0.6	0.6	0.7	0.9	0.8	0.7	0.6	0.8	1.0
7	1.1	1.0	0.8	0.7	0.5	0.6	0.8	0.8	0.7	0.7	0.9	1.1
8	1.1	1.0	0.9	0.5	0.3	0.3	0.5	0.6	0.6	0.7	0.9	1.2
9	0.9	0.6	0.5	0.2	-0.1	-0.1	0.1	0.2	0.3	0.4	0.5	0.9
10	0.6	0.2	0.0	-0.3	-0.6	-0.6	-0.2	-0.2	-0.1	0.0	0.1	0.5
11	0.2	-0.3	-0.5	-1.0	-1.5	-1.3	-0.7	-0.7	-0.5	-0.4	-0.3	0.1
12	-0.2	-0.7	-1.1	-1.9	-2.6	-2.1	-1.3	-1.3	-1.0	-0.9	-0.7	-0.2
13	-0.5	-1.1	-1.7	-2.8	-3.6	-3.0	-1.9	-1.9	-1.5	-1.3	-0.9	-0.5
14	-0.6	-1.2	-2.1	-3.3	-4.0	-3.3	-2.4	-2.3	-2.0	-1.6	-0.9	-0.5
15	-0.4	-1.0	-2.3	-3.4	-4.0	-3.2	-2.3	-2.3	-2.0	-1.6	-0.6	-0.2
16	-0.1	-0.6	-1.9	-3.0	-3.4	-2.6	-1.8	-1.8	-1.5	-1.1	-0.1	0.2
17	0.4	0.0	-1.1	-2.1	-2.4	-1.7	-1.1	-1.0	-0.6	-0.4	0.3	0.6
18	0.7	0.5	-0.2	-0.9	-1.1	-0.6	-0.1	-0.1	0.3	0.2	0.6	0.8
19	-0.1	-0.3	-0.6	-0.9	-0.6	-0.1	0.5	0.5	-0.4	0.4	0.7	1.0
20	0.5	0.1	-0.2	-0.3	-0.1	0.5	1.0	0.5	-0.2	0.5	0.7	1.1
21	1.1	0.9	0.6	0.6	0.6	1.1	1.6	1.2	1.2	0.6	0.8	1.1
22	1.1	1.0	0.8	0.7	0.8	1.3	1.7	1.3	1.3	0.6	0.8	1.2
23	1.1	1.0	0.8	0.7	0.8	1.3	1.6	1.3	1.2	0.6	0.8	1.1
24	1.0	0.9	0.7	0.7	0.7	1.1	1.5	1.2	1.0	0.6	0.8	1.1

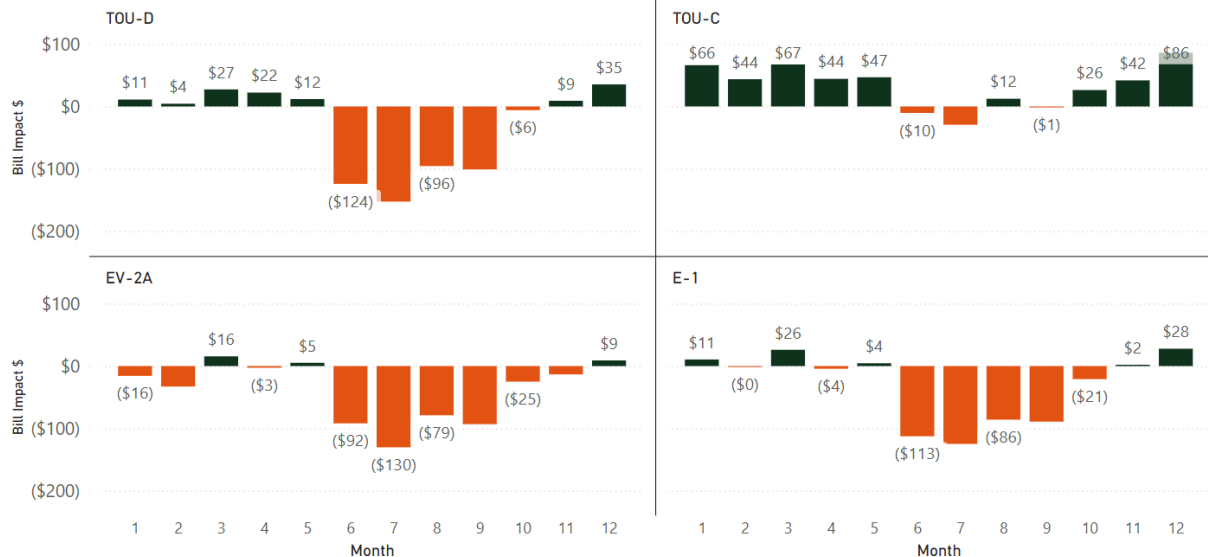
4 p m - 9 p m
On - peak

PRE/POST BILL IMPACT ANALYSIS

Phase 1 Monthly Bill Impacts by Pre-Rate

- » Most significant savings during winter months – dependent on pre-rate
 - Greater winter \$/kWh on TOU-C
- » Increased bills in summer
 - Impact of technology in the post-period
 - Lower super-off peak \$/kWh for EV-2A
 - TOU-D 5pm-8pm on-peak

Bill Increase (-) Bill Reduction (+) by Month and Pre-E-ELEC Rate



PRE/POST BILL IMPACT ANALYSIS

Non-NEM Monthly Bill Impacts by Technology

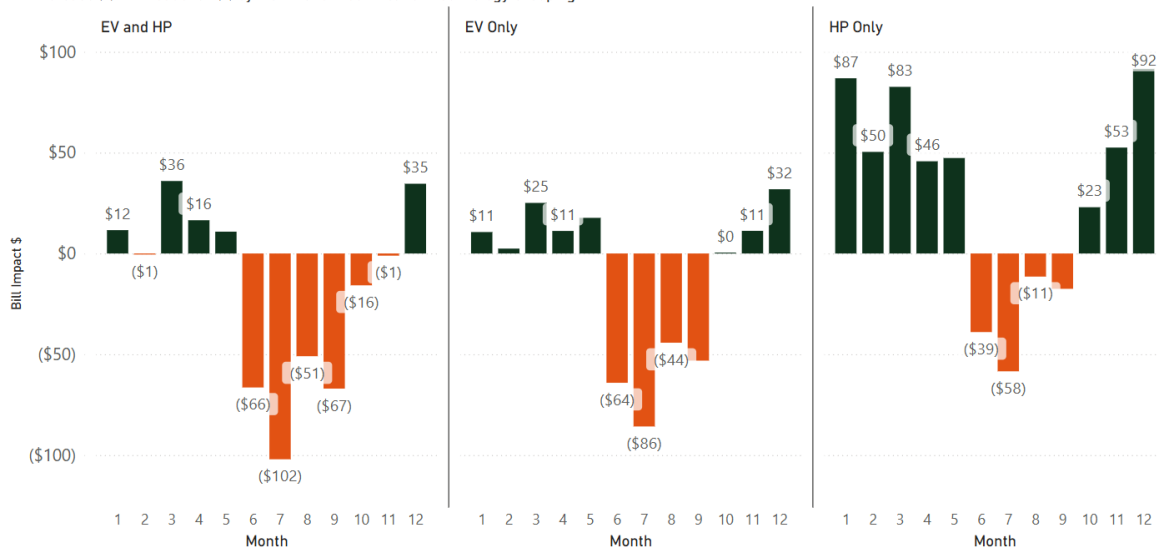
» Most heat pumps installed 12 months prior to E-ELEC

- Represents a rate impact
- Greater winter \$/kWh on TOU-C

» EV charging begins at E-ELEC enrollment (80% of customers)

- Here we observe the rate change AND technology impact

Bill Increase (-) Bill Reduction (+) by Month and Electrification Technology Grouping



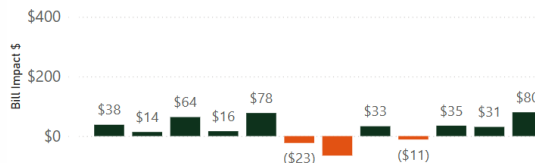
PRE/POST BILL IMPACT ANALYSIS

NEM Monthly Bill Impacts by Pre-Rate

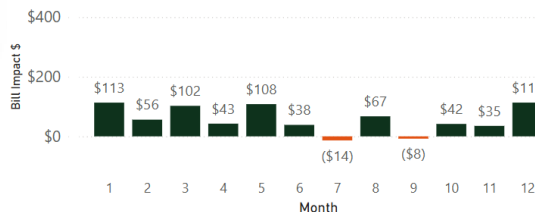
- » Most savings positive — independent of tech
 - Solar install will lower bills given lower delivered load and NEM export compensation
- » Greatest bill savings with storage
 - Arbitraging during on-peak hours
 - Charging from solar during lower cost hours

Bill Increase (-) Bill Reduction (+) by Month and Pre-E-ELEC Rate

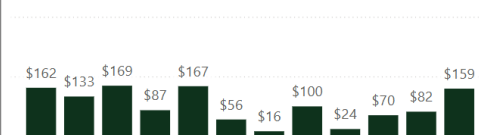
Solar and EV



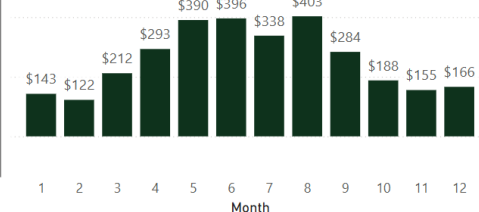
Solar, EV and HP



Solar and HP



Solar, Storage and EV



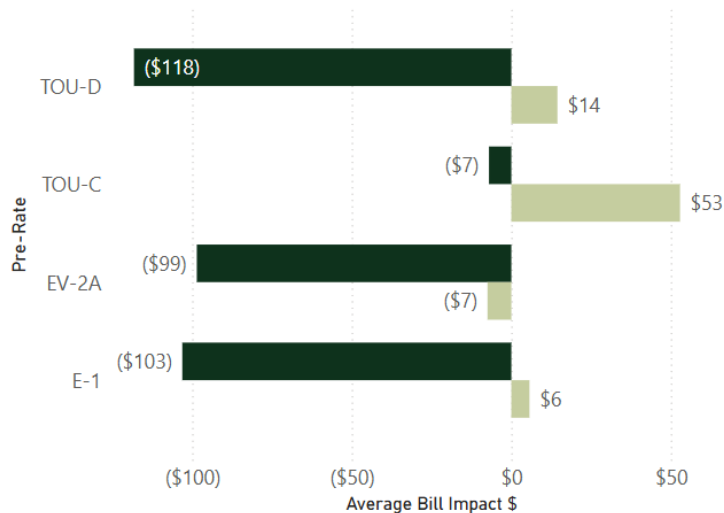
PRE/POST BILL IMPACT ANALYSIS

Average Monthly Bill Impacts by Season

» Non-NEM

Phase 1 Average Monthly Bill Increase (-) Bill Reduction (+) by Season and Pre-Rate

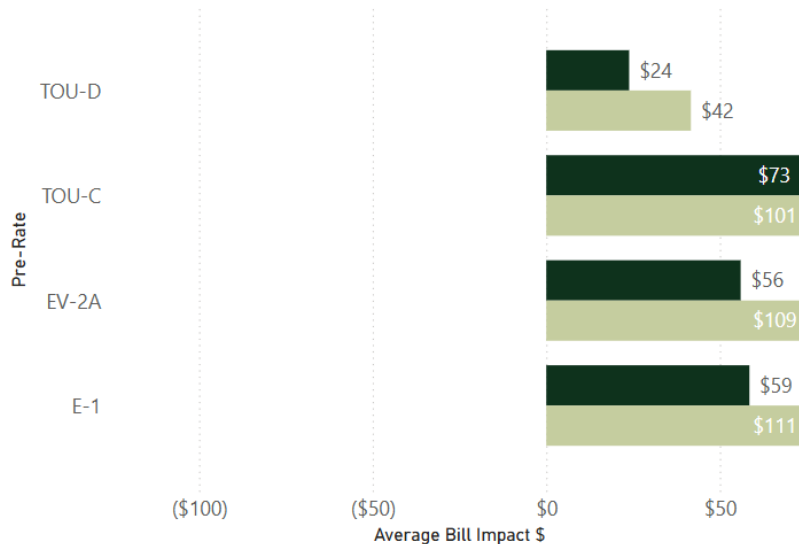
Season ● Summer ● Winter



» NEM

Phase 2 Average Monthly Bill Increase (-) Bill Reduction (+) by Season and Pre-Rate

Season ● Summer ● Winter

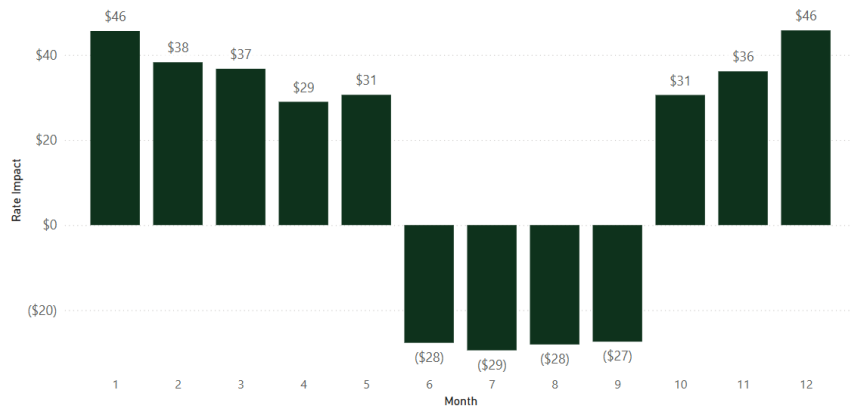


POST-ONLY PRICE SENSITIVITY

Overall Rate Impact by Phase

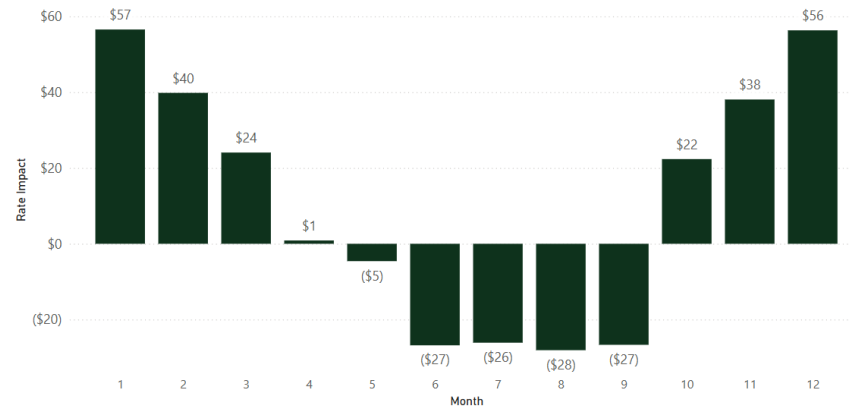
>> Non-NEM

Bill Increase (-) Bill Reduction (+) by Month



>> NEM

Bill Increase (-) Bill Reduction (+) by Month



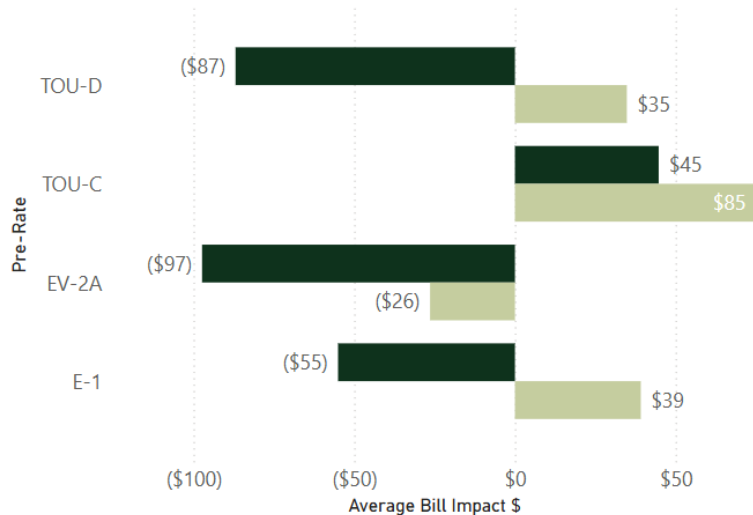
POST-ONLY PRICE SENSITIVITY

Monthly Rate Impacts by Phase, Pre-Rate and Season

» Non-NEM

Average Monthly Bill Impacts on E-ELEC vs Previous Rate by Month (using Post Usage Only)

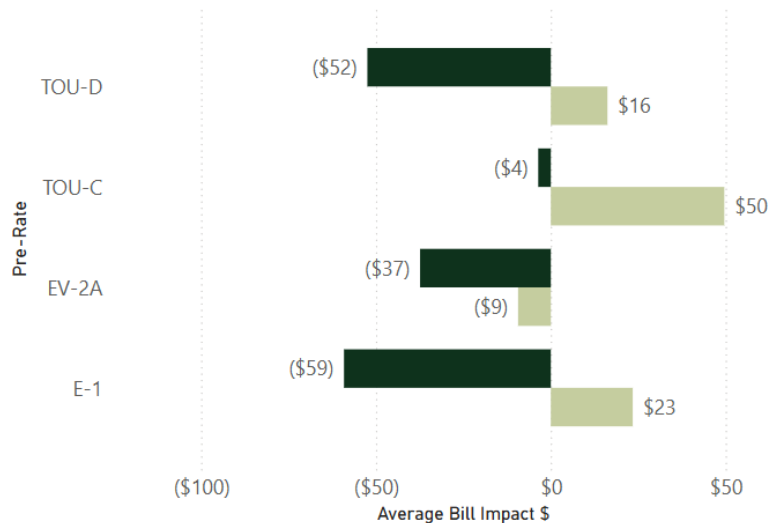
Season ● Summer ● Winter



» NEM

Average Monthly Bill Impacts on E-ELEC vs Previous Rate by Month (using Post Usage Only)

Season ● Summer ● Winter



LOAD IMPACT EVALUATION

Objectives

- » Objective: Estimate the per customer and aggregate ex post and ex ante load impacts from E-ELEC rate transition.
 - **Average Weekday**, Average Weekend, and Peak Day impacts
- » Supplemental to existing E-ELEC load impact analyses conducted through the CA LIP (Residential TOU report).
- » Phase 1 and Phase 2 only (no NBT customers)
- » Focused on technology groupings rather than rate transitions

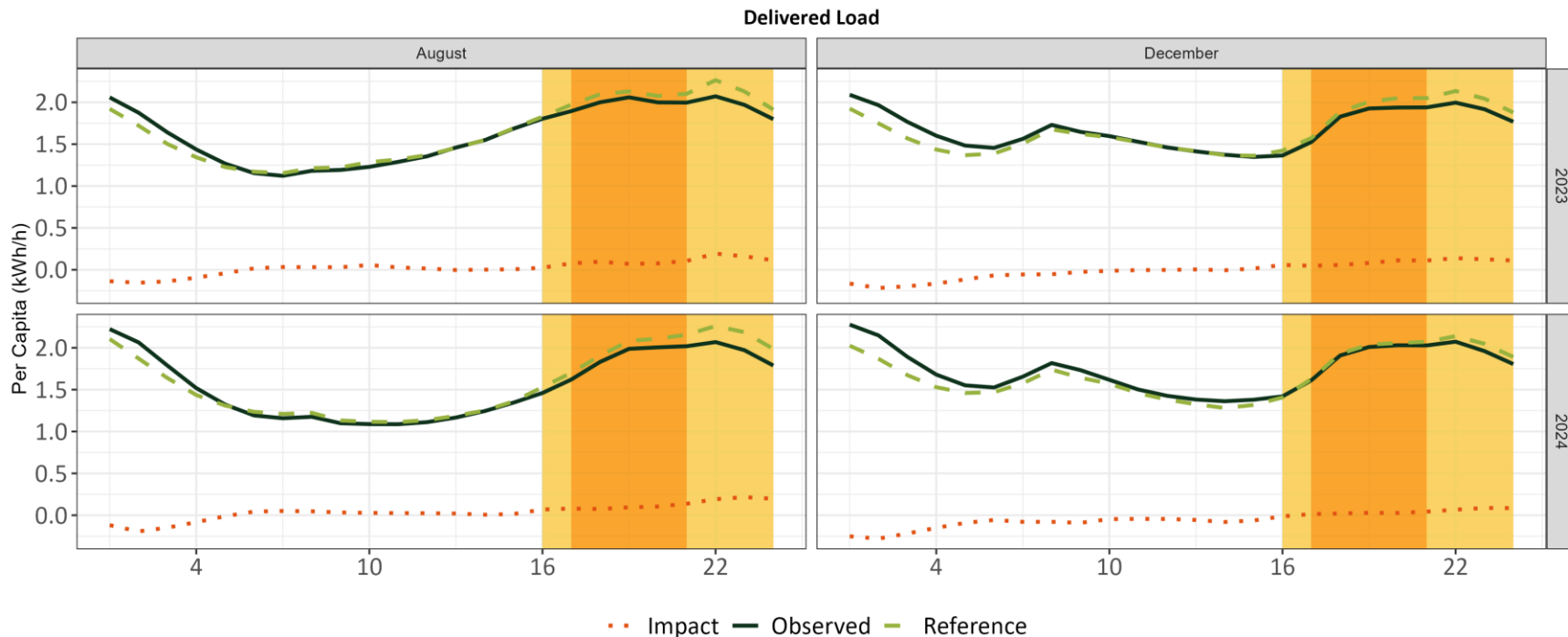
LOAD IMPACT EVALUATION

Approach

- » Impact Methodology: Difference-in-Difference modeling with a matched control group.
- » Matching segmentation included installed technology, rate, and climate region (Costal, Inland, Costal/Inland).
- » Analysis Inclusion Criteria
 - Must have installed electrification technology prior to E-ELEC enrollment.
 - Must have one year of pre- and post-data with stable technologies.
- » Modeled Technology Groups
 - **EV Only, Heat Pump Only, EV+Solar, Heat Pump+Solar, EV+Heat Pump, and EV+Heat Pump+Solar**
 - No Battery Storage impacts due to limited sample resulting from inclusion criteria, however the largest rate transition for customers included in the analysis is EV2A

EX POST LOAD IMPACTS – PER CAPITA LOAD SHAPE

Average Weekday Impacts - Phase 1 and Phase 2 (Combined)



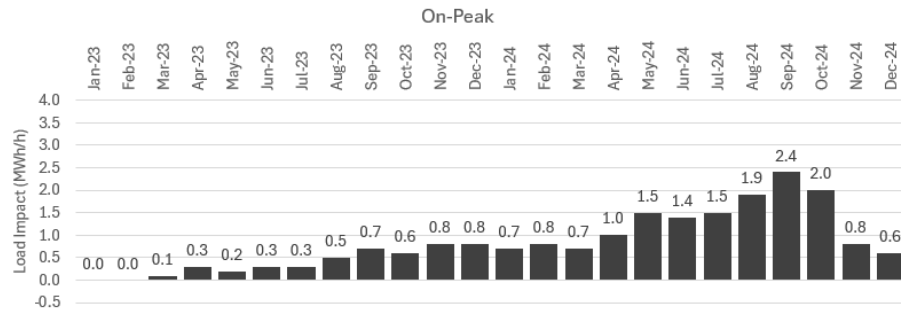
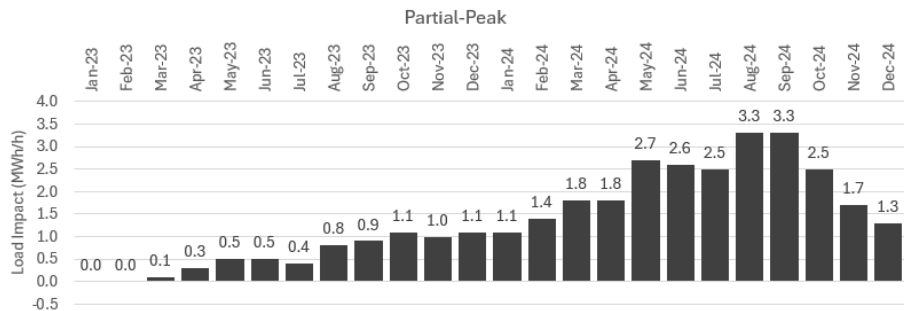
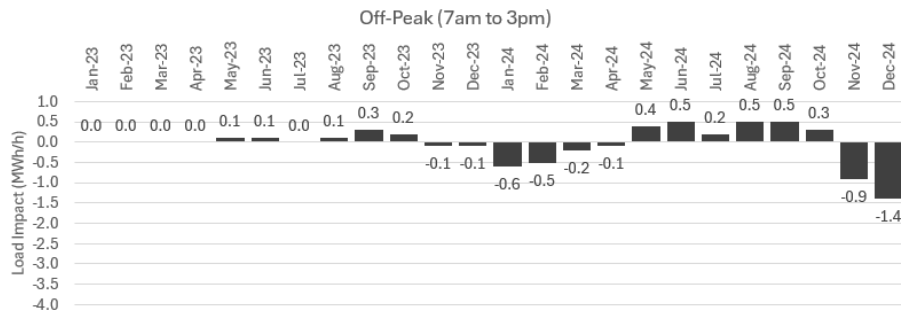
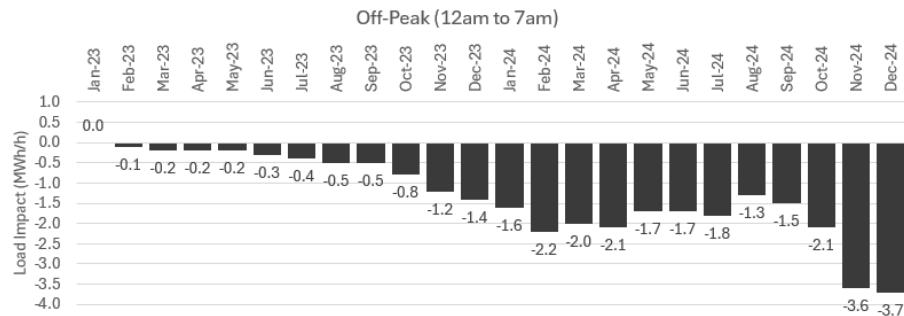
EX ANTE LOAD IMPACTS – SUMMER AND WINTER

1-in-2 Average Weekday

Month	TOU Period	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Impact (%)	Temp (F)
		Ref. Load	Load Impact	Ref. Load	Load Impact		
Aug.	Off-Peak (12am to 7am)	35.45	-2.38	1.548	-0.104	-6.7%	61.7
	Off-Peak (7am to 3pm)	27.00	0.14	1.179	0.006	0.5%	70.5
	Partial-Peak	46.04	3.38	2.010	0.148	7.4%	70.1
	Peak	46.22	1.96	2.018	0.085	4.2%	77.0
Dec.	Off-Peak (12am to 7am)	38.34	-3.85	1.674	-0.168	-10.0%	47.3
	Off-Peak (7am to 3pm)	33.73	-0.64	1.473	-0.028	-1.9%	53.0
	Partial-Peak	44.35	1.70	1.936	0.074	3.8%	51.2
	Peak	45.74	1.28	1.997	0.056	2.8%	53.0

EX POST LOAD IMPACTS – AVG. WEEKDAY IMPACTS

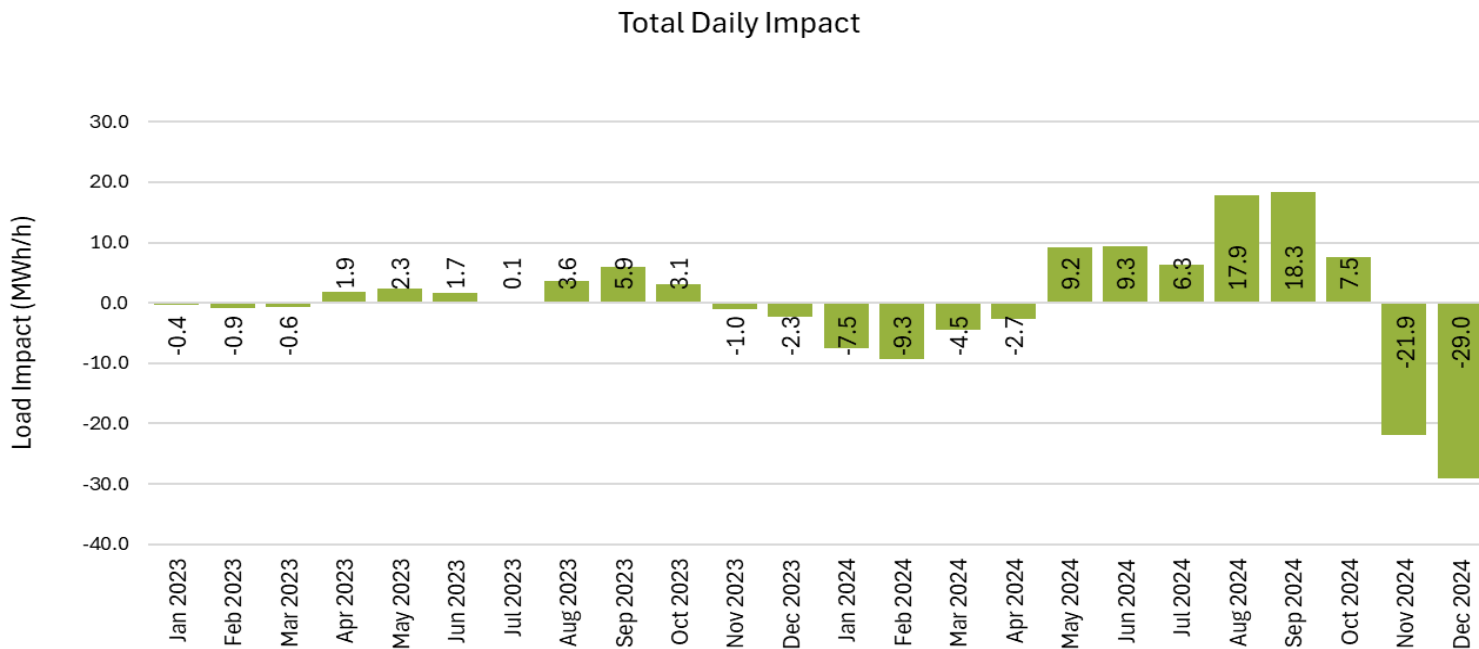
Phase 1 and Phase 2 Avg. Hourly Aggregate Load Impacts by Month and TOU Period



* Note differing y-axis scaling on the top and bottom graphics

EX POST LOAD IMPACTS – AVG. WEEKDAY IMPACTS

Phase 1 and Phase 2 Aggregate Daily Load Impact



EX POST LOAD IMPACTS – AUGUST PEAK DAY

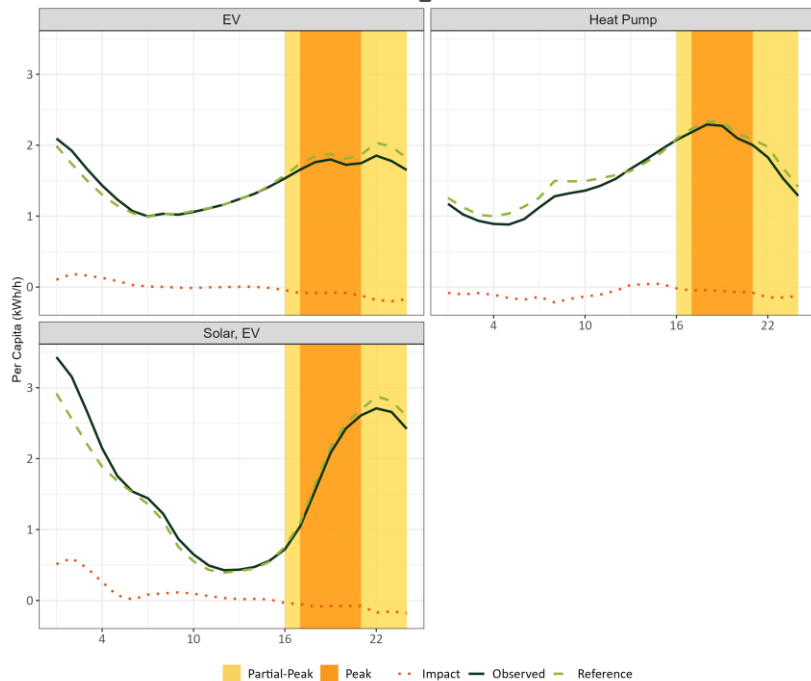
Peak Day Load Impacts – Peak Period (4PM to 9PM - Delivered Load)

Year	Phase	Enrolled Customers Represented	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Impact (%)	Temp (F)
			Ref. Load	Load Impact	Ref. Load	Load Impact		
2023	Phase 1 and Phase 2	6,099	15.84	0.66	2.596	0.108	4.2%	81.0
	Phase 1	5,919	15.35	0.63	2.593	0.107	4.1%	80.9
	Phase 2	180	0.49	0.03	2.724	0.166	6.1%	84.8
2024	Phase 1 and Phase 2	19,759	47.30	1.74	2.394	0.088	3.7%	81.5
	Phase 1	15,774	36.70	1.51	2.327	0.096	4.1%	80.6
	Phase 2	3,985	10.60	0.23	2.659	0.057	2.1%	84.9

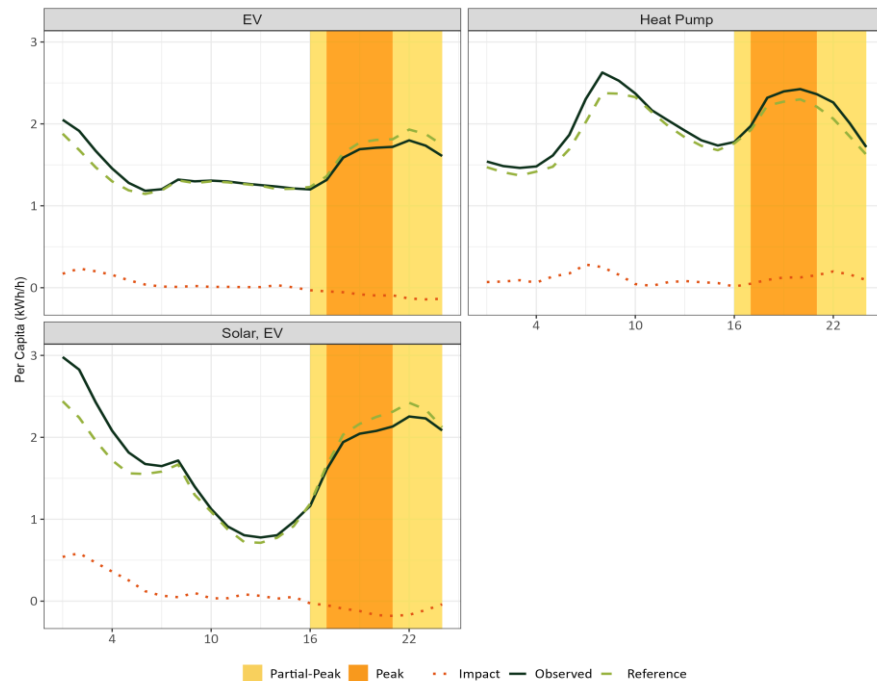
EX ANTE LOAD SHAPE BY SELECT TECHNOLOGY

1-in-2 Average Weekday EV, Solar + EV, and Heat Pump (Delivered Load)

August



December



EX ANTE LOAD IMPACTS BY SELECT TECHNOLOGY

1-in-2 Average Weekday EV, Solar + EV, and Heat Pump (Summer and Winter)

Technology Group	Month	TOU Period	Enrolled Customers Represented	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Impact (%)	Temp (F)
				Ref. Load	Load Impact	Ref. Load	Load Impact		
EV	Aug.	Off-Peak (12am to 7am)	13,262	18.41	-1.33	1.388	-0.100	-7.2%	61.0
		Off-Peak (7am to 3pm)	13,262	15.57	0.06	1.174	0.004	0.4%	69.4
		Partial-Peak	13,262	24.57	1.98	1.853	0.149	8.1%	68.8
		Peak	13,262	24.23	1.19	1.827	0.090	4.9%	75.4
Solar +EV	Aug.	Off-Peak (12am to 7am)	3,930	7.94	-1.12	2.019	-0.285	-14.1%	63.0
		Off-Peak (7am to 3pm)	3,930	2.29	-0.23	0.584	-0.058	-9.9%	72.0
		Partial-Peak	3,930	8.89	0.53	2.262	0.135	6.0%	72.3
		Peak	3,930	7.93	0.29	2.018	0.074	3.7%	79.8
Heat Pump	Aug.	Off-Peak (12am to 7am)	3,331	3.73	0.40	1.118	0.121	10.8%	62.9
		Off-Peak (7am to 3pm)	3,331	5.36	0.23	1.610	0.070	4.4%	73.1
		Partial-Peak	3,331	5.96	0.37	1.790	0.110	6.1%	72.5
		Peak	3,331	7.43	0.20	2.230	0.060	2.7%	80.4
	Dec.	Off-Peak (12am to 7am)	3,331	5.17	-0.43	1.551	-0.128	-8.2%	45.6
		Off-Peak (7am to 3pm)	3,331	6.84	-0.31	2.054	-0.094	-4.6%	51.6
		Partial-Peak	3,331	6.08	-0.39	1.824	-0.117	-6.4%	49.5
		Peak	3,331	7.28	-0.37	2.186	-0.110	-5.0%	51.2

COMPARISONS BETWEEN EX POST AND EX ANTE

August Ex Post Versus Ex Ante

Analysis	Year	TOU Period	Enrolled Customers Represented	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Impact (%)	Temp (F)
				Ref. Load	Load Impact	Ref. Load	Load Impact		
Ex Post	2023	Off-Peak (12am to 7am)	6,340	9.10	-0.47	1.435	-0.074	-5.1%	63.6
		Off-Peak (7am to 3pm)	6,340	8.80	0.13	1.388	0.021	1.5%	72.2
		Partial-Peak	6,340	12.89	0.78	2.034	0.123	6.0%	70.8
		Peak	6,340	13.16	0.54	2.075	0.085	4.1%	77.0
	2024	Off-Peak (12am to 7am)	19,759	30.51	-1.30	1.544	-0.066	-4.3%	61.2
		Off-Peak (7am to 3pm)	19,759	23.51	0.49	1.190	0.025	2.1%	70.9
		Partial-Peak	19,759	39.33	3.33	1.990	0.168	8.5%	70.5
		Peak	19,759	39.34	1.94	1.991	0.098	4.9%	77.5
Ex Ante	--	Off-Peak (12am to 7am)	22,904	35.45	-2.38	1.548	-0.104	-6.7%	61.7
		Off-Peak (7am to 3pm)	22,904	27.00	0.14	1.179	0.006	0.5%	70.5
		Partial-Peak	22,904	46.04	3.38	2.010	0.148	7.4%	70.1
		Peak	22,904	46.22	1.96	2.018	0.085	4.2%	77.0

LOAD IMPACT ANALYSIS

» Load Impacts are Technology Driven

- Heat pumps – reductions in load across all TOU periods in the summer and increases in loads across all TOU periods in winter.
- EVs – increases in load in the Off-Peak hours (12am to 7am).
- EVs – decreases in load in the Peak and Partial Peak Period, with larger average decreases in the 9pm to midnight hours
- Impacts do not vary dramatically by Climate Region

» Largest Changes in Load Occur in the Off-Peak Hours (12am to 7am) and Partial Peak-Hours (9pm-12 am)

- Avg Weekday 1-in-2 August impacts were estimated to be 6.7% load increase during 12am to 7am (0.104 kWh/h increase)
- Avg Weekday 1-in-2 August impacts were estimated to be 7.4% load decrease during the partial-peak (0.148 kWh/h decrease)

» While Phase1 and Phase 2 impacts differ, they follow the same pattern

» There is not a consistent measurable difference between first- and second-year impacts.

- Verdant found that for some hours and modeling segments there were statistically significant differences between year one and year two participant impacts, but not consistently.
- Verdant recommends this be re-examined when there is more time to allow for greater first and second year participation

QUESTIONS?

Thank you!

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Ethan Barquest

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CUSTOMER TRENDS ANALYSIS

High-Level Findings

Key Findings from Customer Trends Analysis

~68K of PG&E residential customers enrolled in E-ELEC by Dec 2024 (1.i and 1.ii)

- 1.4% of all residential customers
- 1.1% of all electric baseline customers

Incentive program and DR participation (2.i)

- 21% of E-ELEC and 28% of all other residential customers participate in ELRP
- 0.6% of E-ELEC and 0.4% of all other residential customers participate in SGIP

Electrification Costs (2.ii)

- EVs range from \$30-60K
- Heat pumps range from \$5-25K
- Purchased solar ranges from \$10-40K
- Storage ranges from \$5-25K

Over 111K qualifying electrification technologies installed – 15 unique pairings of technologies (3.i)

- Solar PV – 69%
- Storage – 50%
- Electric Vehicles – 34%
- Heat Pumps – 9%

Electrification technologies installed within 2 months of E-ELEC enrollment (3.ii)

- Storage – 79%
- Electric Vehicle – 69%
- Solar PV – 55%
- Heat Pumps – 12%

Latest rates prior to E-ELEC enrollment (1.i)

- TOU (mostly TOU-C) – 58%
- E1 (mostly dual fuel) – 31%
- EV rate – 9%

Installations post-E-ELEC adoption (3.ii)

- 90% of customers purchased or installed their equipment at or before E-ELEC
- “Somewhat Likely” or “Extremely Likely” to install technologies NOT already installed in the next year:
 - EV (9%), HP (12%), Solar (18%), Storage (20%)

LOAD SHAPE ANALYSIS

High-Level Findings

Key Findings from Load Shape Analysis



Load shapes for customers in incentive programs (4.ii)

- Load shapes are similar for customers participating in incentive programs compared to non-incentivized customers
- Load shapes differ most notably by technologies installed, season, phase, etc.

Overnight EV charging is evident with EV customers (4.i)

- Lower super off-peak rates overnight encourage that behavior

Heat pump usage (4.i)

- Increase in load during morning hours and early evening during winter indicative of heat pump usage

Solar customers (4.i)

- NBT solar customers tend to be smaller than NEM customers
- Pairing of storage evident – particularly with NBT

Storage dispatch (4.i)

- Storage discharge on-peak visible in the load shape for NBT customers
- Behavior observed in the SGIP

Total E-ELEC Load Shape (4.i)

- 850 MWh net load during summer
- 964 MWh net load during winter

BILL IMPACT ANALYSIS

Pre/Post Analysis

Key Findings from Bill Impact Analysis



Bill Impact Modeling conducted on one-year of pre- and post-E-ELEC adoption (5.i)

- Impacts complicated by some electrification in the pre-period and different geographic, temporal effects and electric demands of different technologies

Bill Impacts relative to Pre-Rate (5.ii)

- Significant differences in bill impacts depending on pre-rate
- Transitioning over to E-ELEC generally leads to bill increases when technology is installed at same time as E-ELEC service
- Higher winter on- and off-peak rates for TOU-C leads to bill reductions on E-ELEC
- Lower off-peak EV-2A rates lead to bill increases on E-ELEC

Phase 2 solar customers (5.i)

- Bill reductions are observed throughout months
- Solar generation adoption leads to reductions in delivered load and customers are compensated for export of excess generation

Overall Bill Savings (5.i and ii)

- Phase 1 customers who transition from TOU-C experience bill reductions of roughly \$53 per month in the winter and a \$7 increase during summer months
- Phase 1 customers transitioning from an EV-2A rate realize bill increases of \$7 per month in winter and \$99 in summer

BILL IMPACT ANALYSIS

Post-Only Price Sensitivity Analysis

Key Findings from Price Sensitivity Analysis



1) Overall bill savings on E-ELEC compared to other rates, but dependent on rate compared against

- Phase 1 customers realize bill savings during winter months – Jan through May and Oct – Dec
- Phase 1 customers realize bill increases being on E-ELEC during summer months – Jun – Sept
- Similar impacts for Phase 2 customers

2) Lower bills realized for Phase 1 customers on E-ELEC compared to TOU-C

- Average summer bills \$85 less, on average, on E-ELEC
- Average winter bills \$45 less
- Annual savings of \$71

3) Increased bills for Phase 1 customers on E-ELEC compared to EV-2A

- Monthly summer bills are \$97 more, on average, on E-ELEC
- Monthly average winter bills \$26 more
- Average overall monthly increase of \$50

4) Lower bills for Phase 2 customers on E-ELEC compared to TOU-C

- Average monthly summer bills \$4 more, on average, but \$50 savings during winter months

5) Increased bills for Phase 2 customers on E-ELEC compared to EV-2A

- Average monthly summer bills \$37 are more, on average, and \$9 more during winter months