

Exhibit to Agenda Item #1

Board Energy Resources & Customer Services Committee
Wednesday, September 5, 2018, scheduled to begin at 5:30 p.m.
Customer Service Center, Rubicon Room

Agenda

1. IRP

- Goals
- 2018 IRP progress and findings to date
- Achieving SD-9 goals
- Importance of electrification

2. Scenario overview

3. Scenario analysis

- Electrification: Cost and impacts
- 1,000,000 MT GHG in 2040
- 350,000 MT GHG in 2040
- Bill impact analysis
- Electrification: Costs and savings for customers

4. Scenario comparison

5. Recommendation



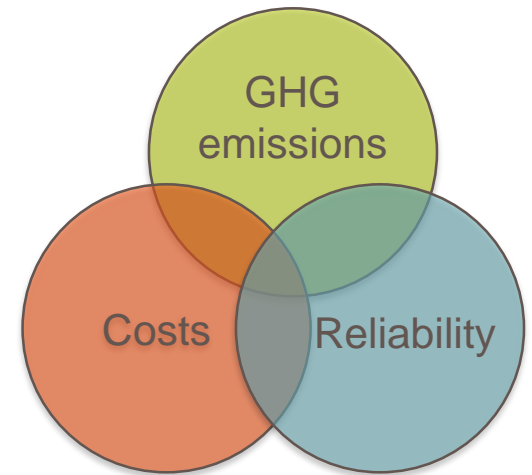
Environmental leadership: SMUD resource planning

- SMUD leads in renewable energy
 - SMUD has invested \$130M in early development of renewables that exceeded State goals
 - Greenergy and SolarShares are innovative and award winning customer programs
- SMUD's carbon goals exceed the State's
 - Current state goal: 20% of 1990 GHG by 2050 ("80X50")
 - Current SMUD goal: 10% of 1990 GHG (350,000 MT) by 2050
 - Leaders in Energy Efficiency exceeding State goals

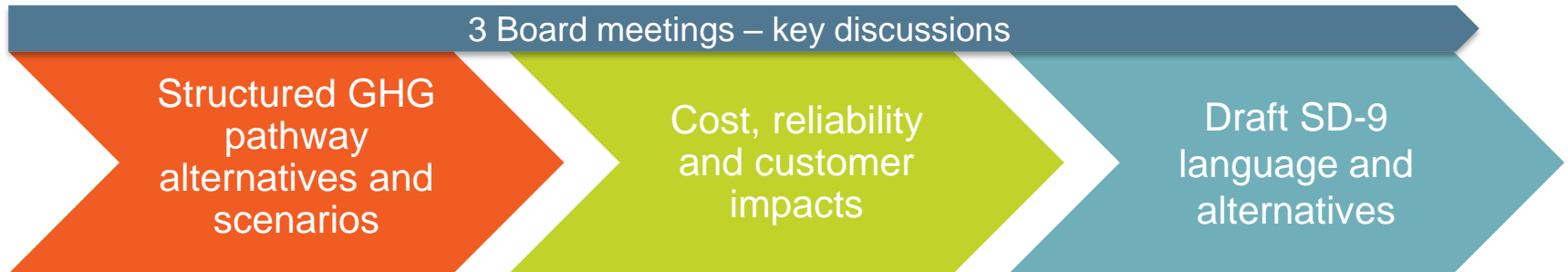


Integrated Resource Plan (IRP)

- Strategic objective is to establish long-term (2030, 2040 & 2050) carbon targets while balancing:
 - Environmental Leadership
 - Cost and Customer Impacts
 - Reliability
- IRP will be reassessed every 5 years to capture critical industry changes
 - IRP will be filed with the CEC.



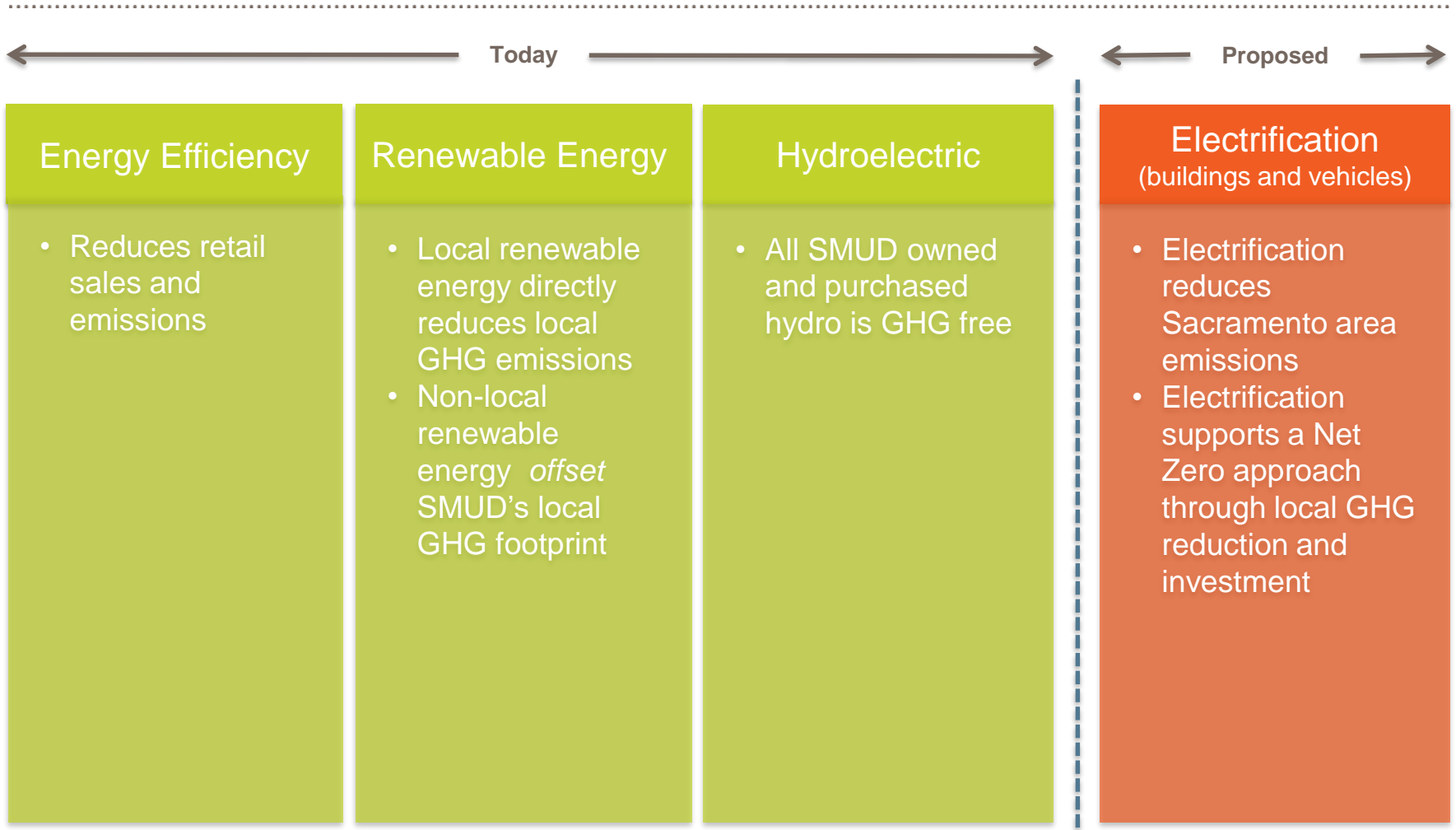
2018 IRP: process to date



Key findings to date

- Absolute Zero GHG is not feasible at this time
- Thermal plants are critical for system reliability with current technology
- Some GHG emissions are required to reliably run the system in 2040
 - Staff has studied a 2040 Net Zero alternative

How does SMUD achieve SD9 goals?

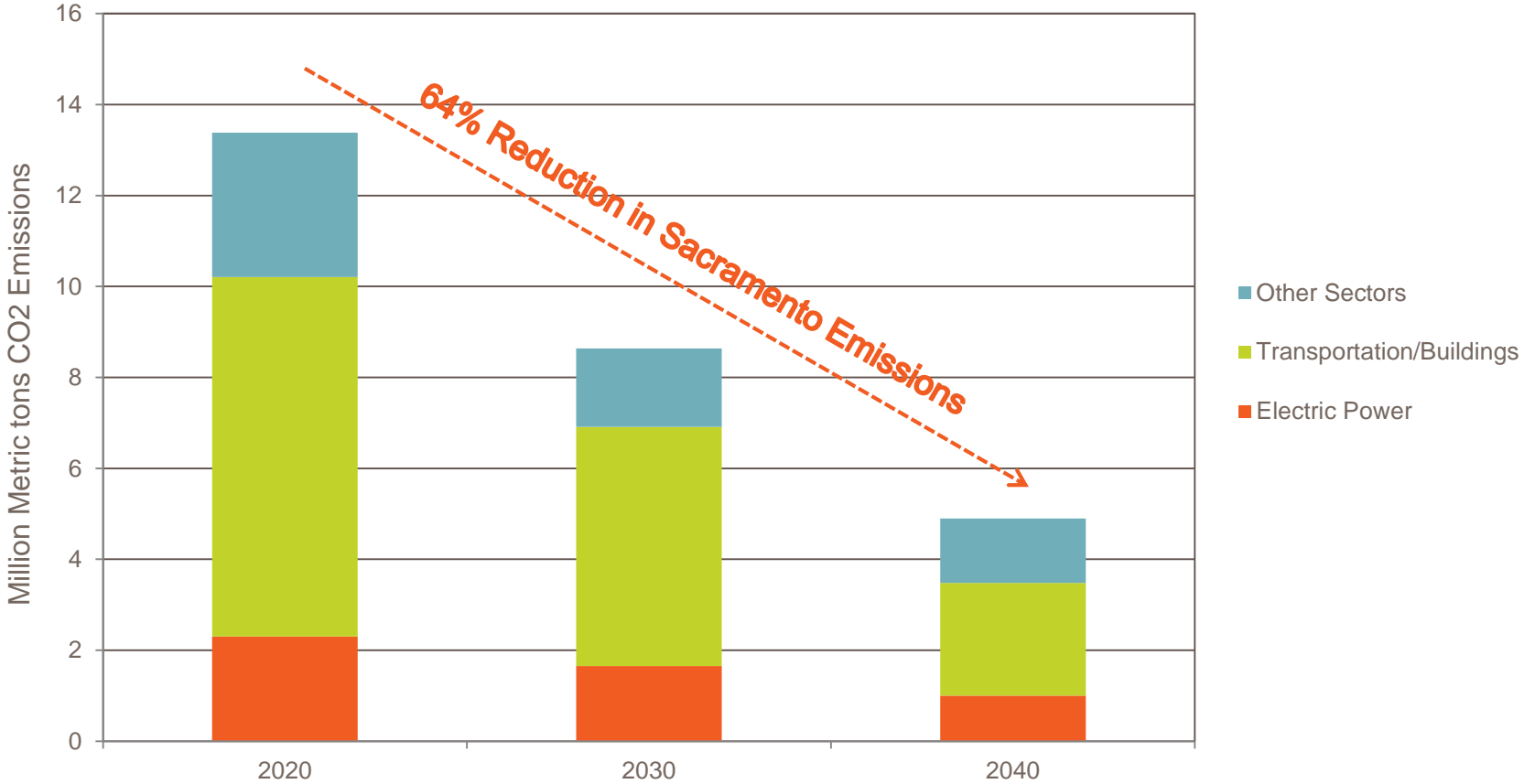


Why invest in electrification?

Delivers local benefits and supports SMUD's strategic goals

Benefits	SD-2 Rates	SD-3 Credit Mkt	SD-5 Cust Rel	SD-7 Enviro L'ship	SD-9 Resource Plan	SD-10 R&D	SD-13 Econ Dev	SD-18 Emerge Tech
SMUD's electrification investments lower Sacramento emissions			✓	✓	✓	✓	✓	✓
Electrification improves air quality for local disadvantaged and low-income communities			✓	✓				
Electrification sales support lower rates	✓	✓	✓				✓	
Local investments will benefit the local economy			✓				✓	

Electrification significantly reduces Sacramento area GHG emissions



• Electric emissions are ~1,000,000 MT in 2040 for all scenarios

Board Option Overview

Option 1

- Target: 1,000,000 MT GHG in 2040
- Net Zero in 2040
- Aggressive electrification investments

Option 2

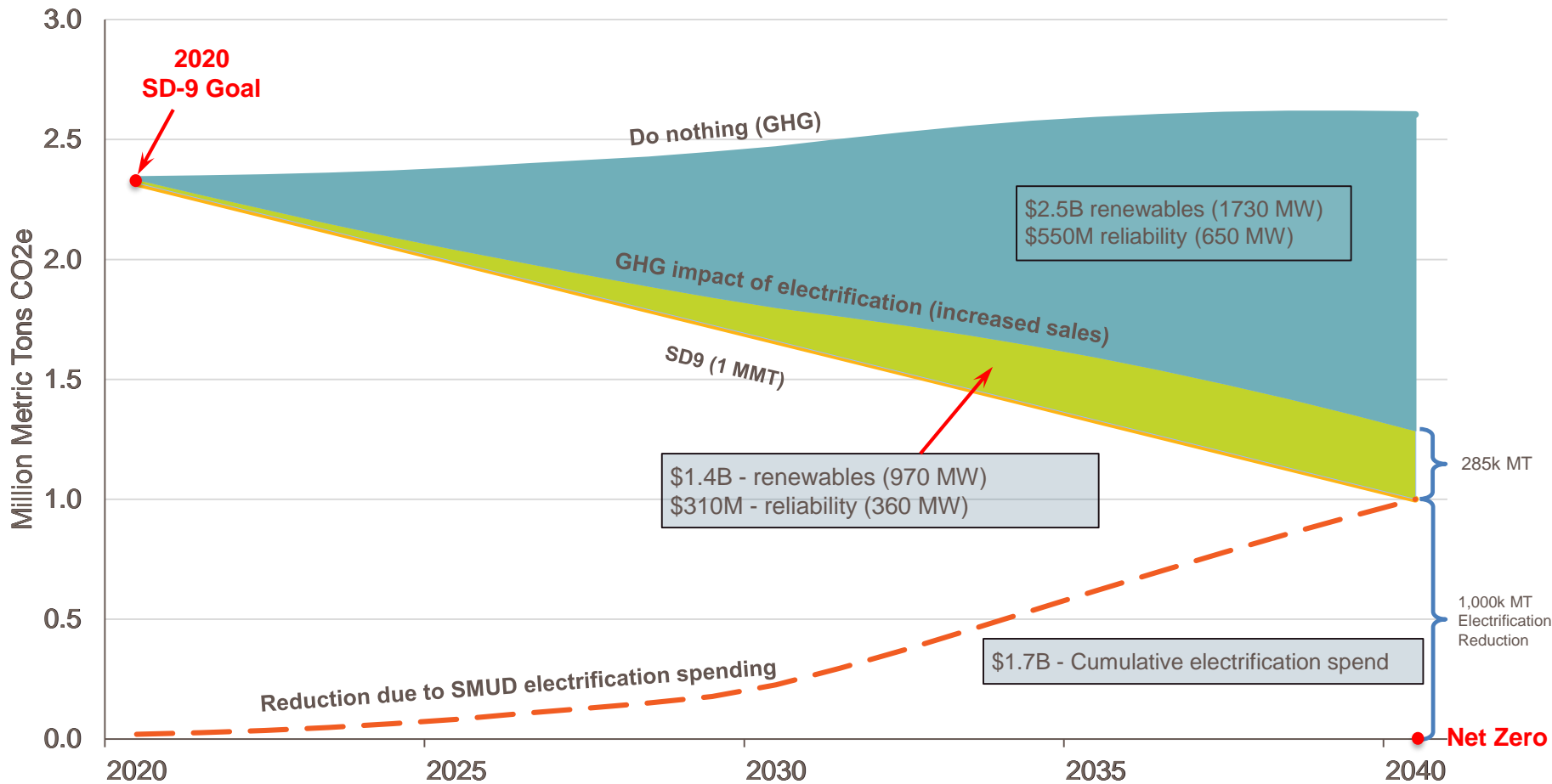
- Target in 2040:
 - 750,000 MT
 - 500,000 MT
 - 350,000 MT
- Net Negative in 2040
- Lower GHG target met through non-local renewables
- Aggressive electrification investments

Option 3

- Target: 350,000 MT GHG in 2040
- Net Zero in 2040
- Lower GHG target met through non-local renewables
- Reduced electrification investments and higher local emissions

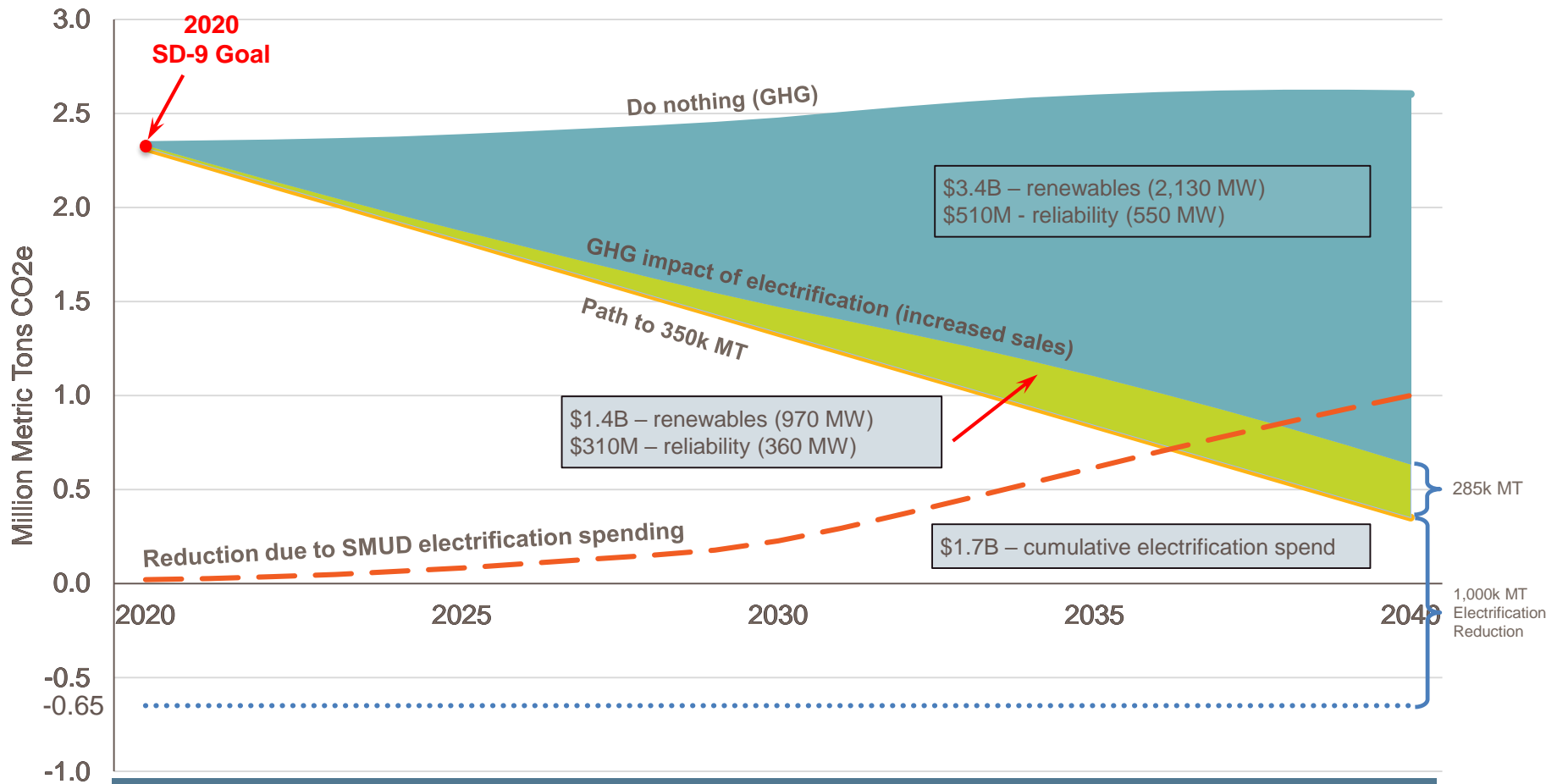
Option 1

Overview of investment and GHG impact



Option 2

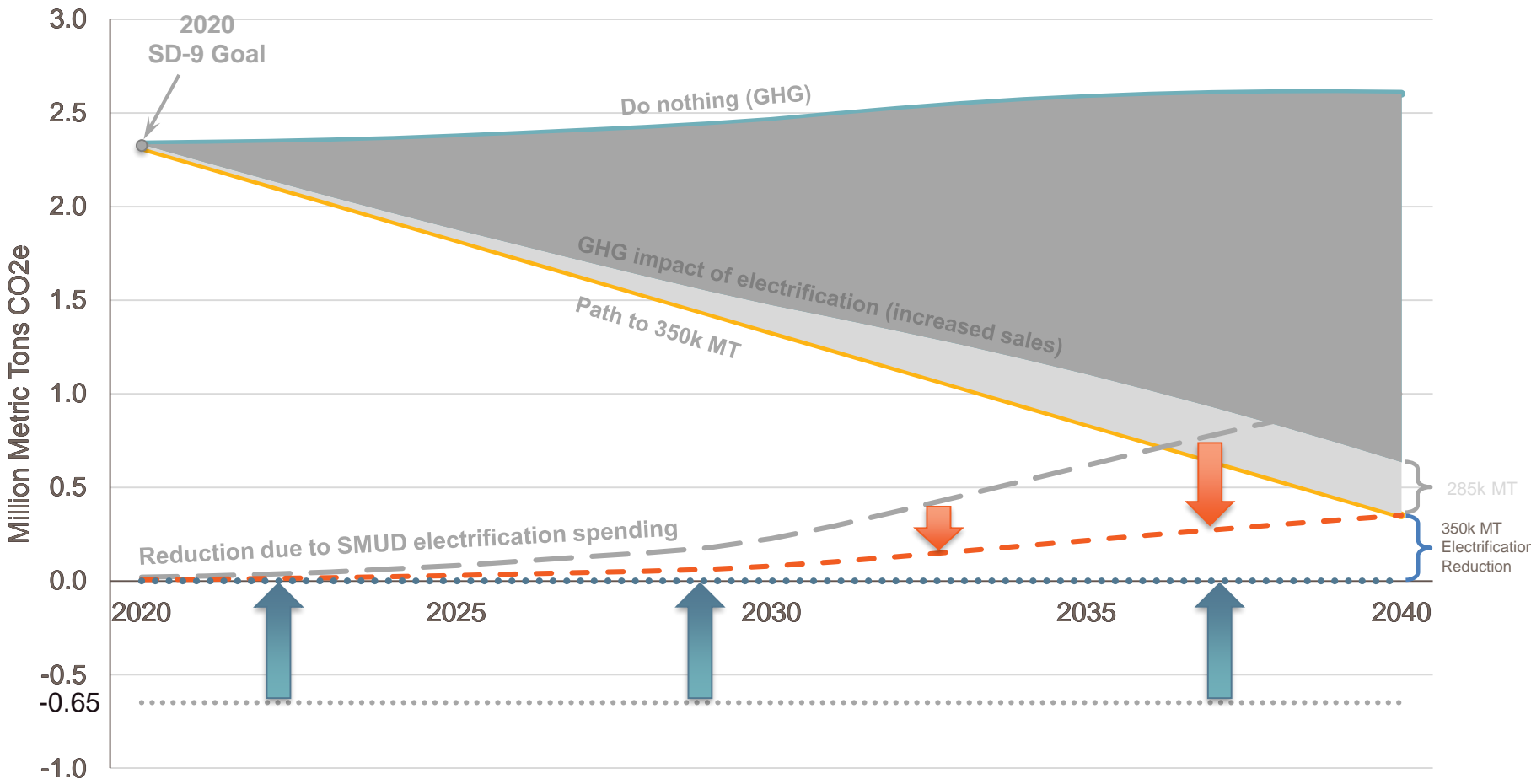
Overview of investment and GHG impact



- GHG reductions below 1,000,000 MT achieved by non-local renewables

Option 3

Overview of investment and GHG impact

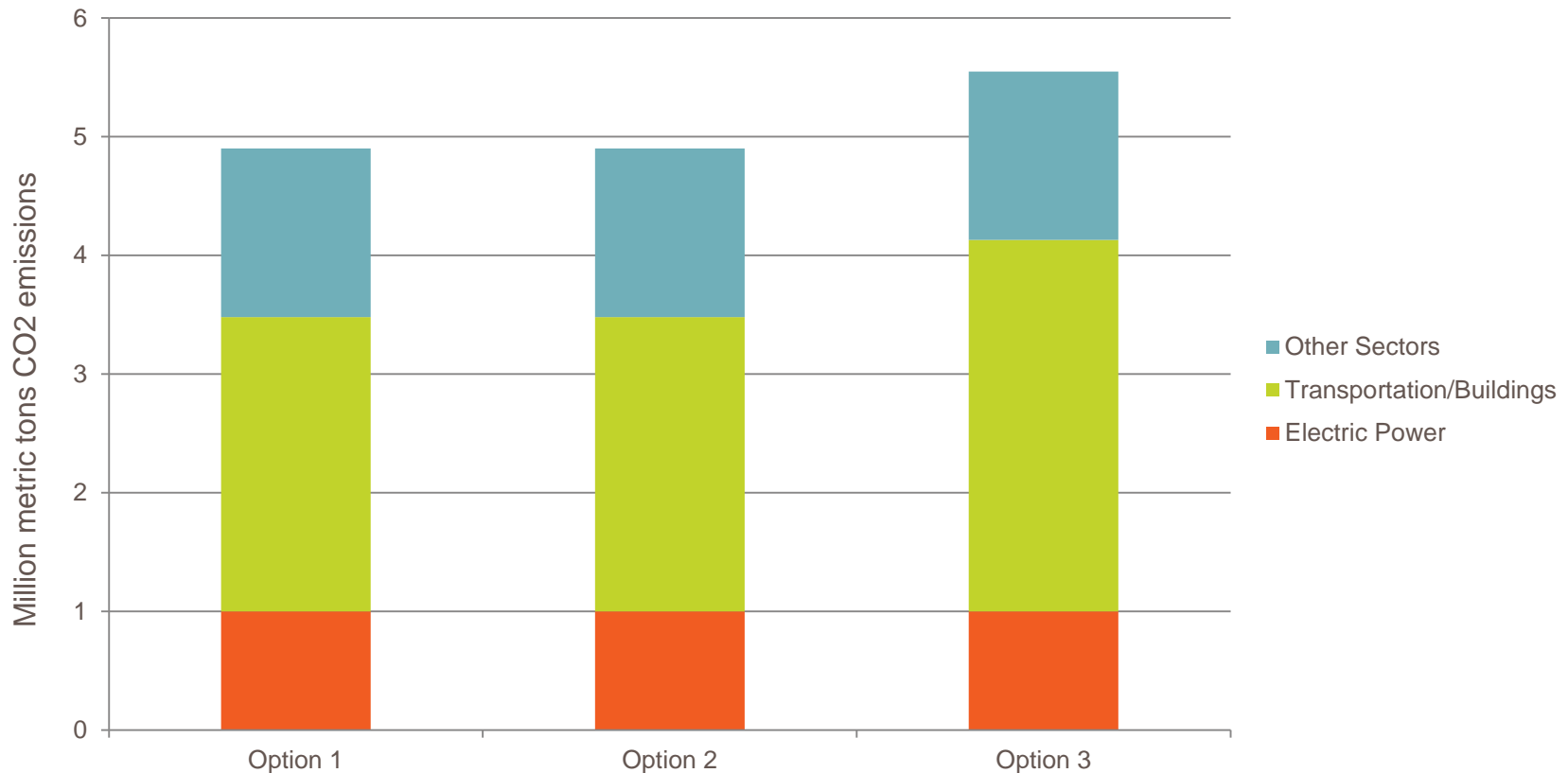


Option comparison

Option	(a) Cumulative Electrification & EE Spend (2016 \$B)	(b) Cumulative Renewable/ Reliability Spend (2016 \$B)	(a) + (b) Cumulative Total Spend (2016 \$B)	2040 SMUD System GHG (MMT)	2040 Sac Area GHG Emissions (MMT)	2040 Avg Electric Bill Increase over 2020 (\$/Month)
1 1 MMT	\$1.7	\$4.8	\$6.5	1.00	4.9 (64% below 2020)	\$76 (74%)
2 750k MT	\$1.7	\$5.1	\$6.8	1.00	4.9	\$79 (77%)
2 500k MT	\$1.7	\$5.4	\$7.1	1.00	4.9	\$82 (80%)
2 350k MT	\$1.7	\$5.6	\$7.3	1.00	4.9	\$83 (81%)
3 350k MT	\$1.1	\$5.3	\$6.4	1.00	5.5 (59% below 2020)	\$92 (89%)

- SMUD emissions stay at 1,000,000 MT in all options.
 - Emissions in Options 2 and 3 are offset by non-local renewables
- Sacramento area emissions stay at 4.9 MMT in 2040
 - Emissions in Option 3 increase due to less local electrification investments
- Long-term commitments to non-local renewables limit options for reducing bill impacts
 - Less local electrification investments would be primary means of mitigating bill impacts

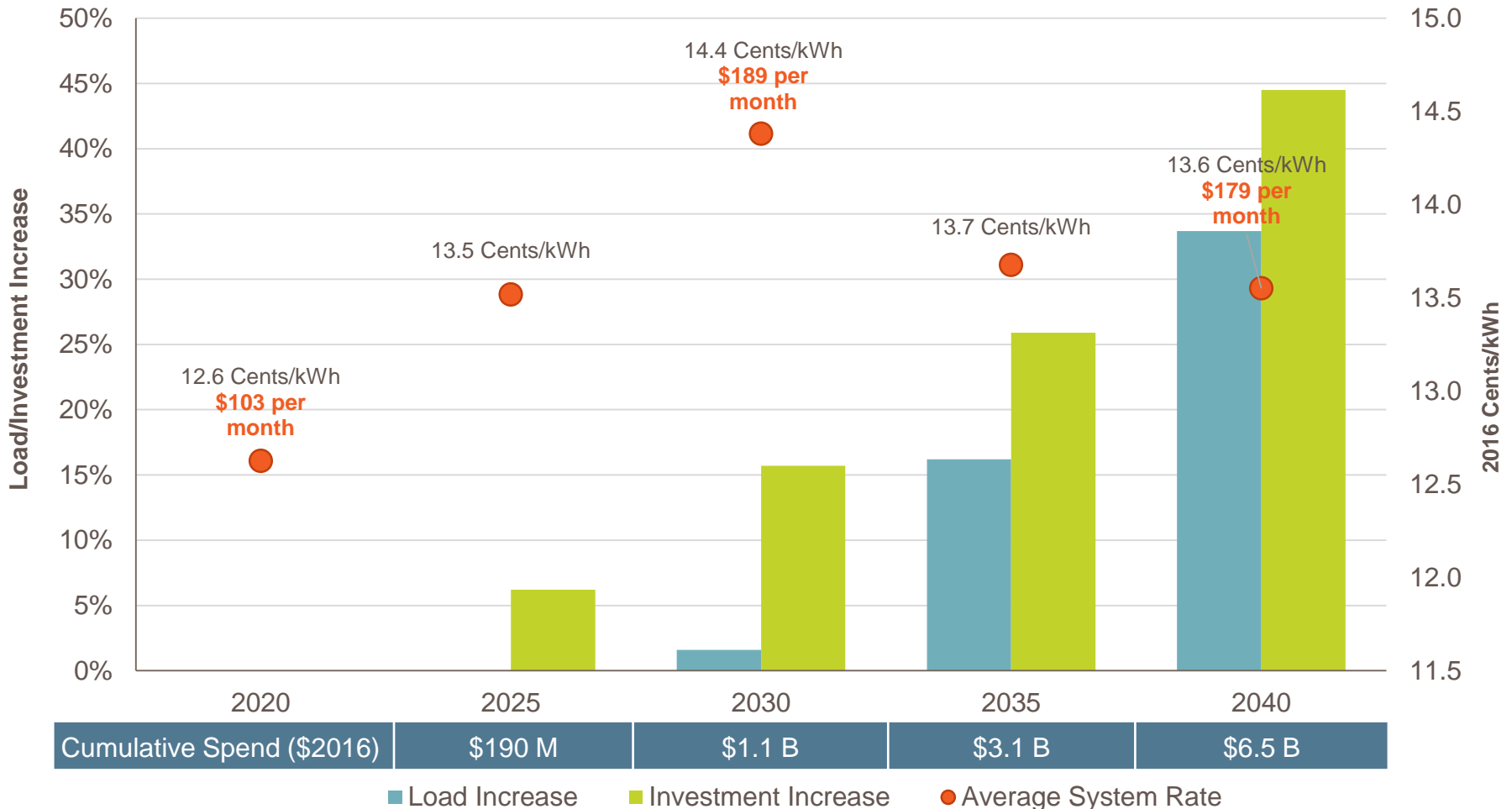
Option analysis: Impact on Sacramento area GHG emissions



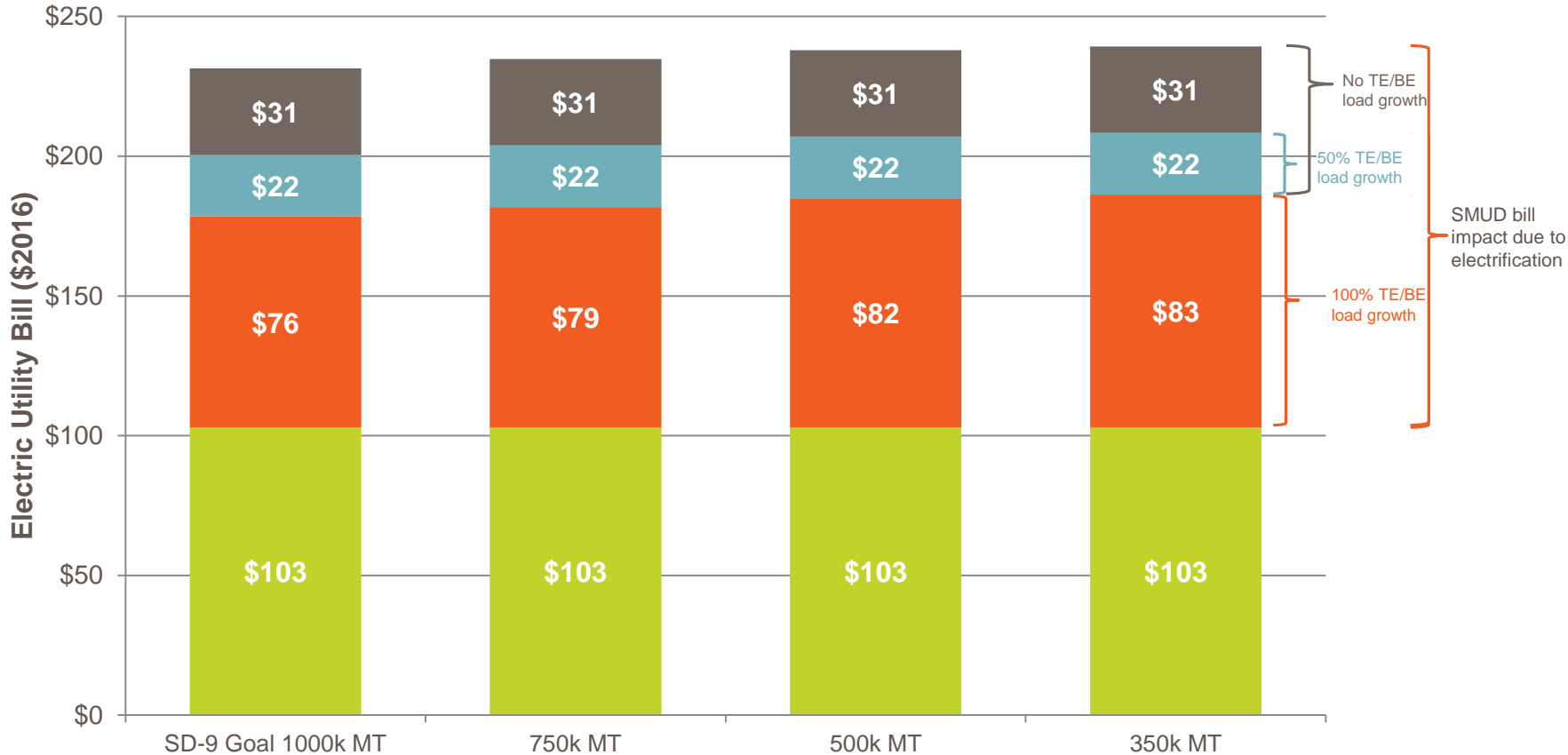
- Additional non-local RE investment in Option 2 doesn't reduce local GHG
- Reduced electrification spending increases local emissions in Option 3

Option 1

Cumulative costs and rate impacts



Risk analysis: 2040 bill impacts from changes to retail sales



- Baseline average monthly bill increase is \$76
- Bills could increase on average by up to \$53 more monthly depending on how electrification impacts retail sales



Electrification: Natural Gas and Gasoline bill impacts

- Average bill savings of \$101 per month from avoided natural gas and gasoline purchases
- Customers that do not switch will not have these bill savings
 - Disadvantaged communities and low-income customers may require additional support and focus
- Capital investments will partially or completely offset bill savings
 - Cost differential between gasoline and electric vehicles
 - Upfront cost of a heat pump space or water heater vs natural gas equipment
 - Panel upgrades required due to increased electrification loads
 - Home improvements and electrical wiring required to accommodate electrification

Staff Recommendation

- Modify SD-9 to include the following goals:
 - 2030 Power Supply GHG Goal: 1.65 million metric tons
 - 2040 Power Supply GHG Goal: 1.0 million metric tons offset by investments to achieve Net Zero
- Net Zero means SD-9 emissions will be offset by other carbon reduction measures, including electrification
- New renewables, energy efficiency, large hydro and GHG offsets will all continue to count for SD-9
 - Add SD-9 language incorporating electrification emission reduction credit
- SD-9 footprint will continue to be adjusted for weather, hydro conditions and wholesale sales