

Rooftop Solar Economics

Issue Brief for Public Utility Board

Ray Johnson
Power Management Section Manager

Brittany Broyles
Customer Energy Solutions Manager

Jing Liu
Rates and Forecasting Manager



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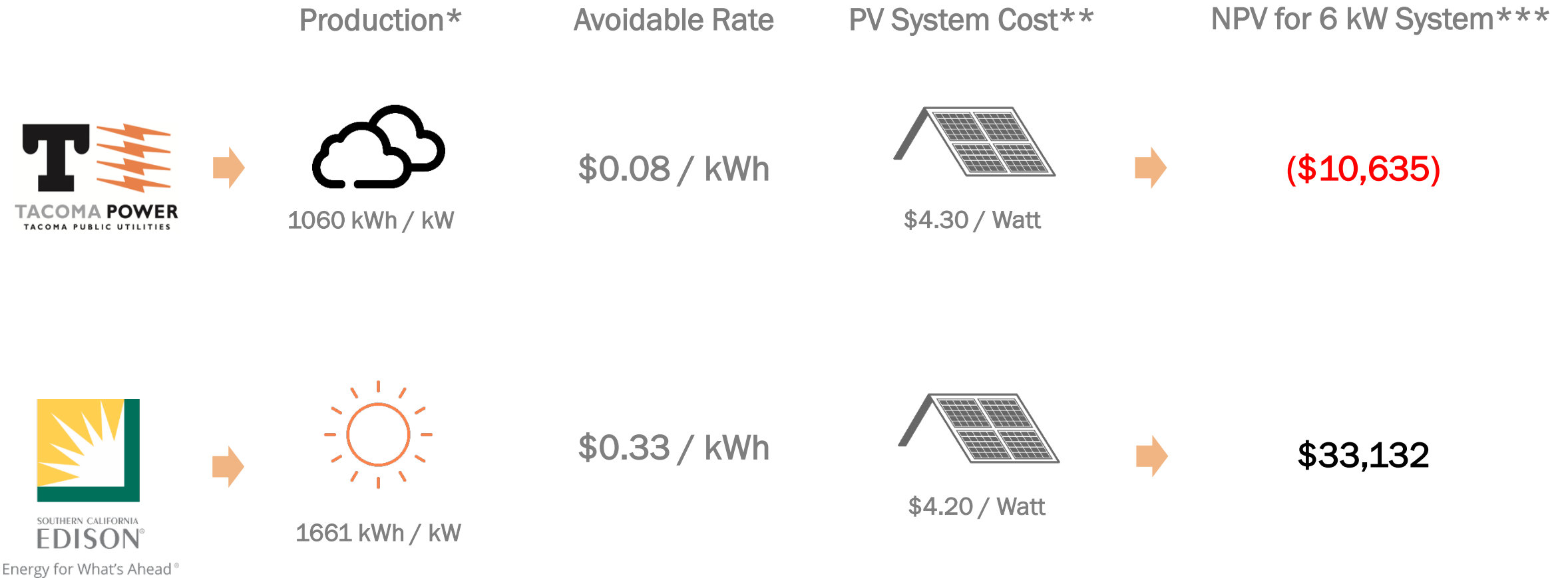
Appendix

Current Solar Economics

Part 1

Current Solar Economics

Solar Economics: Tacoma vs. California



*Indicative estimate from NREL PV Watt tool, **Based on 2022 installed costs from Lawrence Berkely National Laboratory study, *** Assumes full Federal Investment Tax Credit

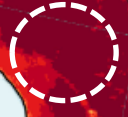
Direct Normal Solar Irradiance

National Solar Radiation Database Physical Solar Model

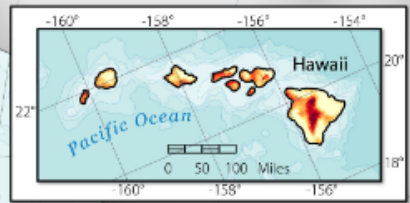


Washington

TACOMA POWER
TACOMA PUBLIC UTILITIES



SOUTHERN CALIFORNIA
EDISON
Energy for What's Ahead®



About the Data

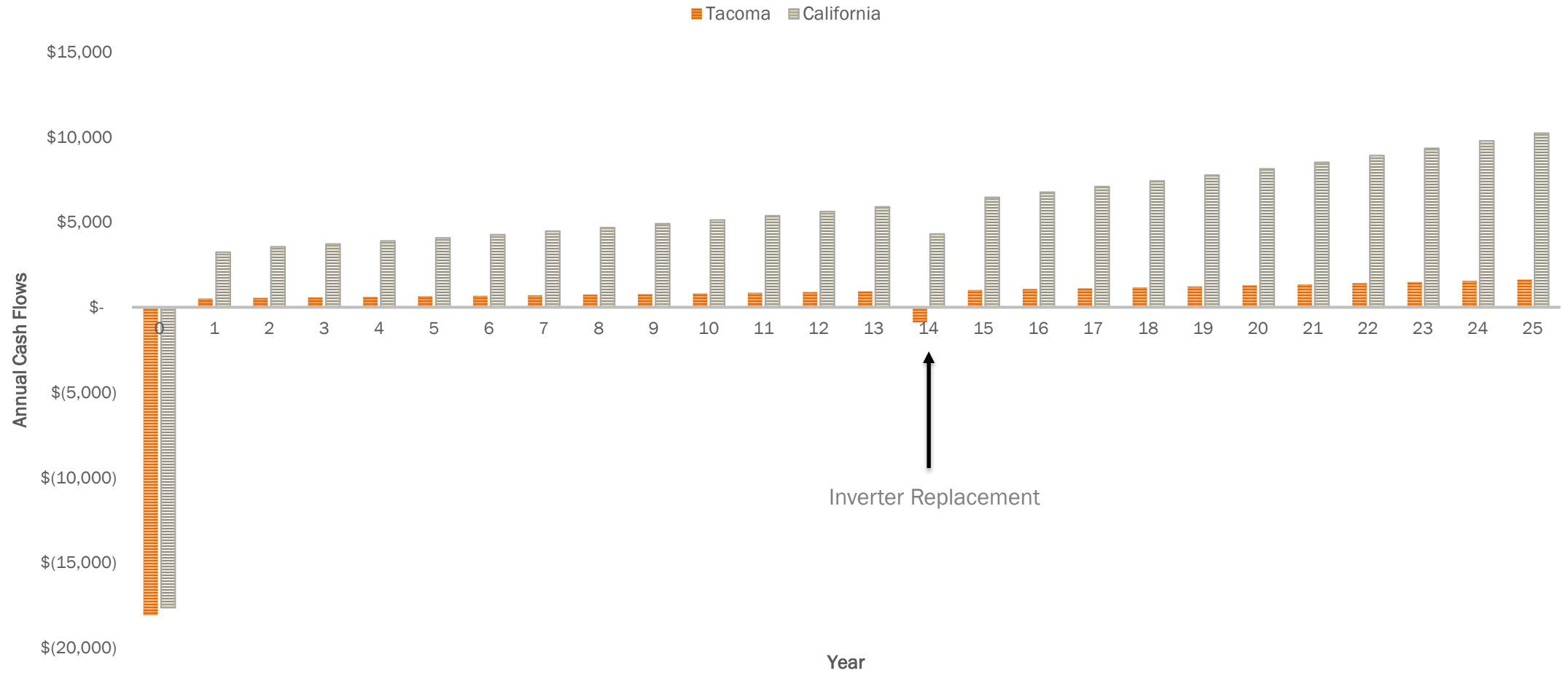
This map provides annual average daily total solar resource using 1998-2016 data (PSM v3) covering 0.038-degree latitude by 0.038-degree longitude (nominally 4 km x 4 km). For more information, visit: <https://nsrdb.nrel.gov> Email us at: nsrdb@nrel.gov

kWh/m ² /Day
≥ 7.5
7.0 to 7.4
6.5 to 6.9
6.0 to 6.4
5.5 to 5.9
5.0 to 5.4
4.5 to 4.9
4.0 to 4.4
< 4.0



Current Solar Economics

Annual Cashflows for 6 kW System: Tacoma vs. California

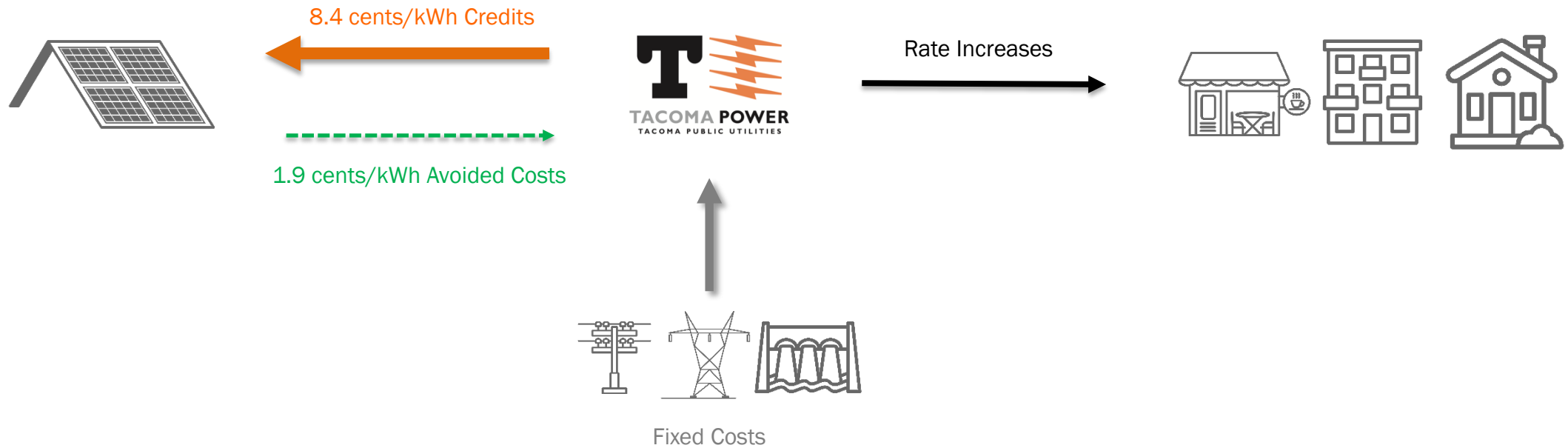


Cost Shifting

Part 2

Solar Cost Shifts

Non-Solar Customers Subsidize Solar Customers



Solar Cost Shifts

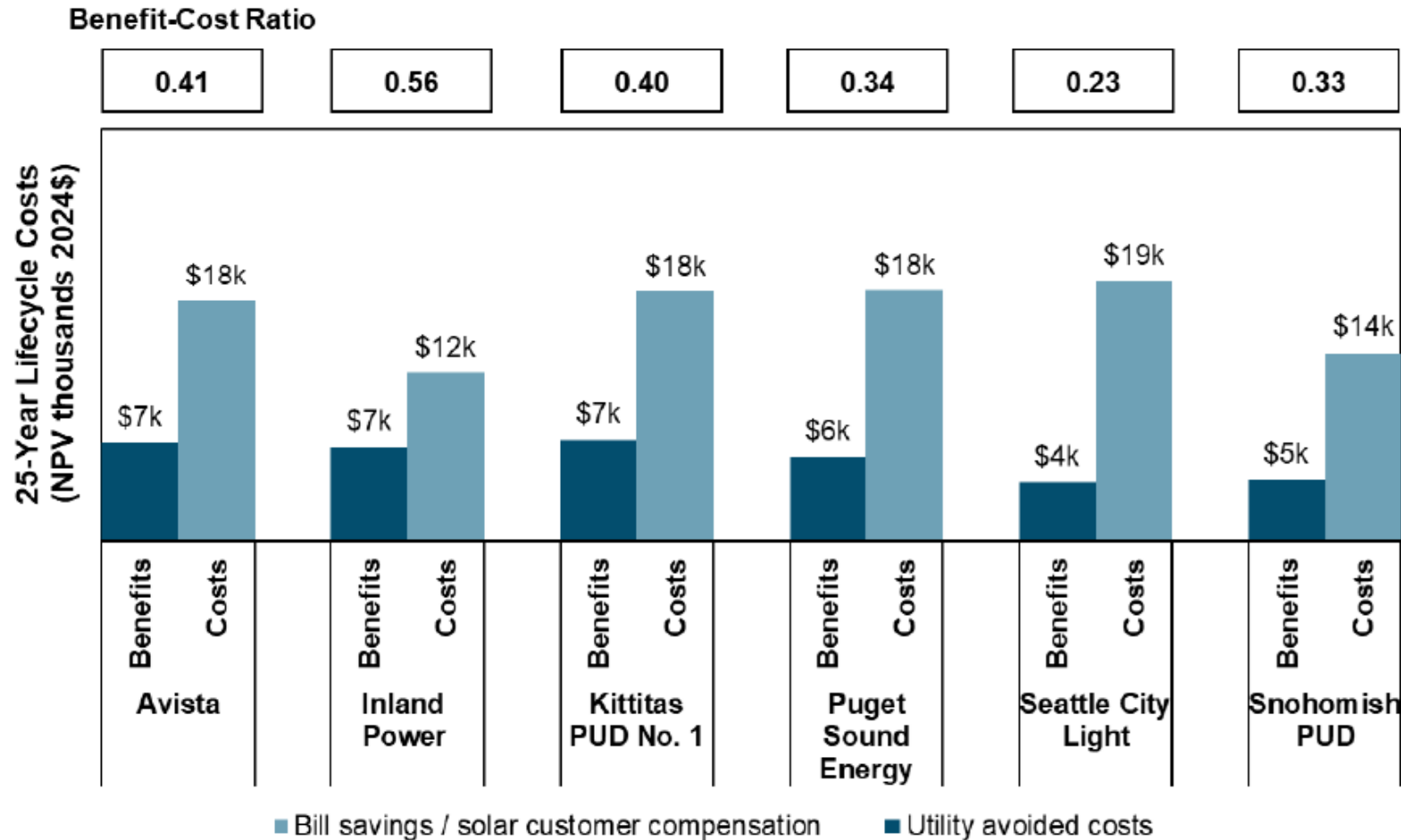
The Mechanics of Cost Shifting

	Cost of Service	Solar Customer's Contribution	Cost Shifted to Non-Solar Customers
Fixed Customer-Related (per Month)	\$25.30	\$25.30	\$0
Energy per kWh	\$ 0.045351	\$ 0.019326	\$ 0.026025
Delivery per kWh	\$ 0.038207	\$ 0.000000	\$ 0.038207

- ✓ Under Washington State net metering policy, solar customers' generation is valued at the retail volumetric rate: \$0.084/kWh in the Tacoma Power service area.
- ✓ While roof-top solar does generate energy to offset the utility's production cost, solar generation usually happens during mid-day when the market price for energy is very low; solar customers still rely on the utility to provide power during high-cost peak hours, yet each kWh generated at noon is valued the same as each kWh consumed at 7pm. Roof top solar enables Tacoma Power to avoid some costs, estimated at \$0.019/kWh. This is a fraction of our cost of service.

Solar Cost Shifts

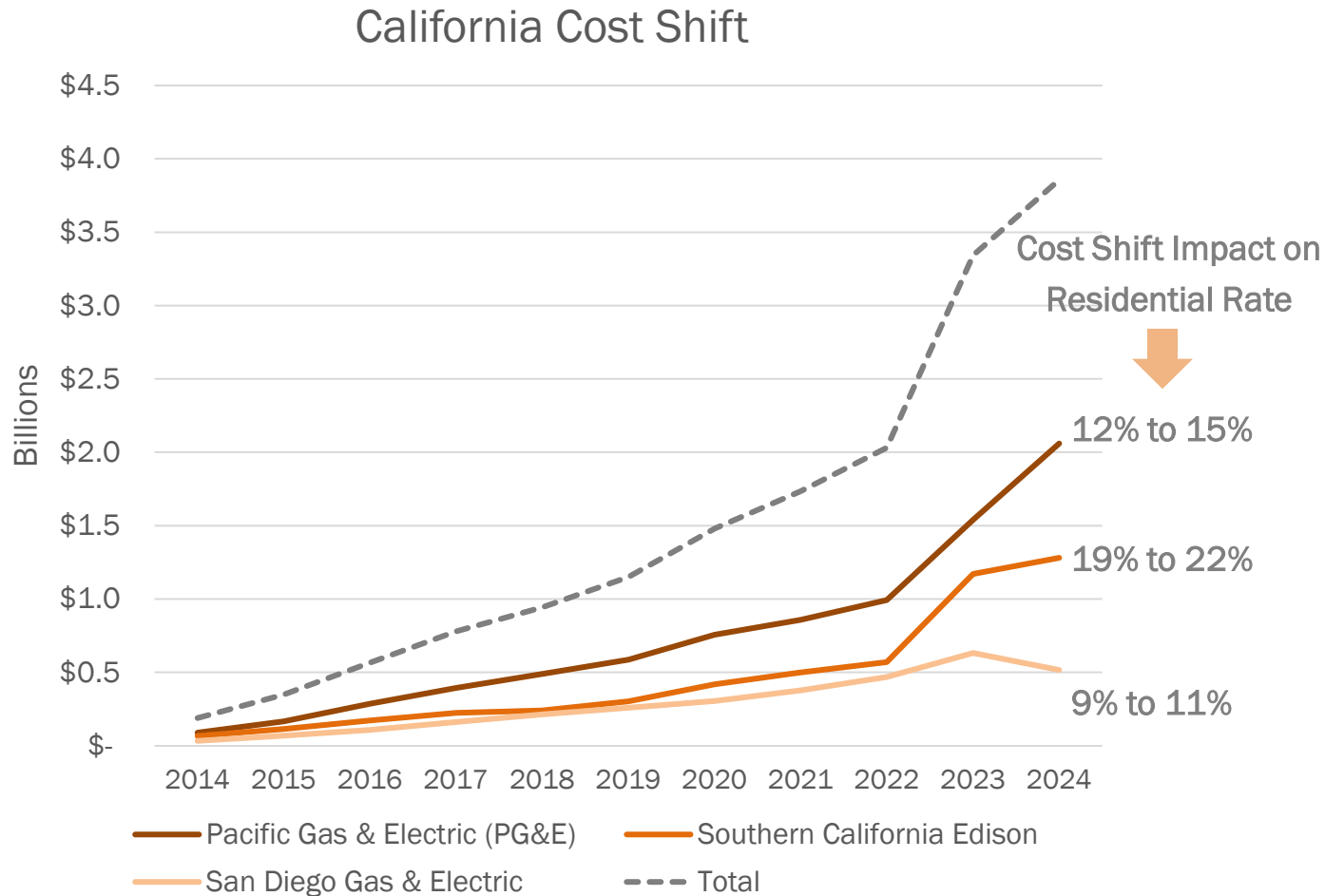
Ratepayer Impact by Utility for a 7 kW System



\$5,000 to \$15,000 cost shift depending on utility Over the lifetime of the system. Preliminary calculations indicate a shift of about **\$12,000** for Tacoma Power.

Solar Cost Shifts

California Cost Shifts Drive Rate Modifications



Rate Changes

- ✓ Due to magnitude of cost shifting in California, the California Public Utility Commission (CPUC) recently made reforms to California's net metering rules.
- ✓ Net Energy Metering 3.0 reduces how much money is paid for rooftop solar energy exported to the grid.
- ✓ The changes to California's net metering policy cut the value of solar energy credits by about **75 percent** for PG&E, SCE, and SDG&E customers – the compensation is based on utility avoided costs.
- ✓ The CPUC is also contemplating implementing an **income-graduated fixed charge** aimed at mitigating the impacts to income-qualified customers from the cost shift

Solar & Income- Qualified Customers

Part 3

Do we have any sense yet whether adding solar panels to low-income housing is significantly impacting bills positively for low-income customers?

Recent Public Utility Board Question

Solar & Income-Qualified Customers

All Rooftop Solar Installation Trend

6.7

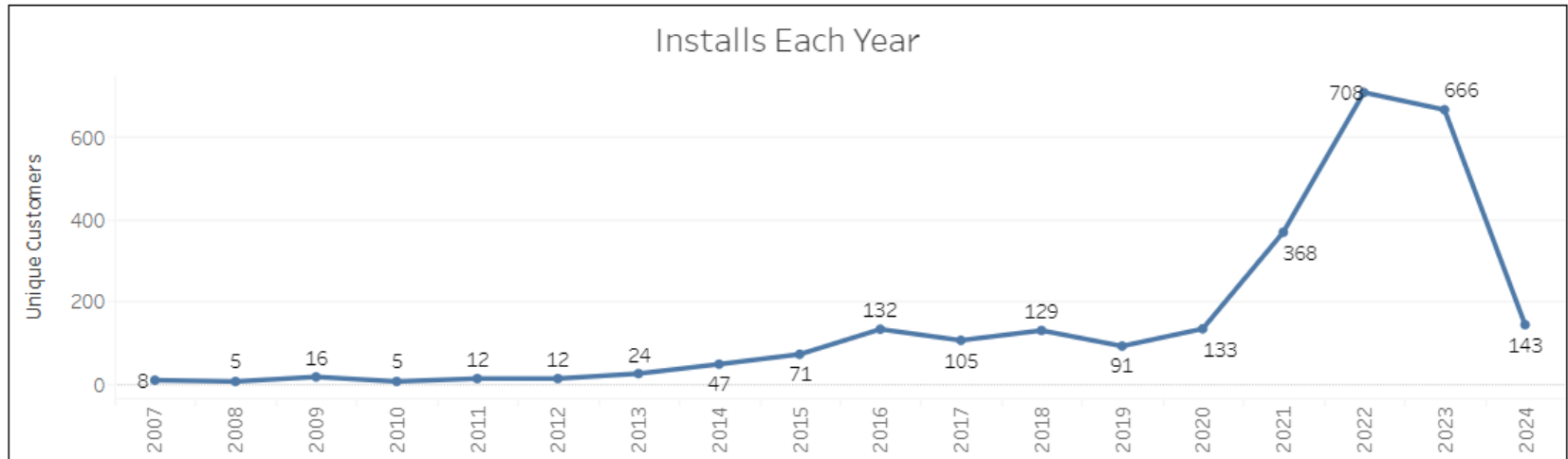
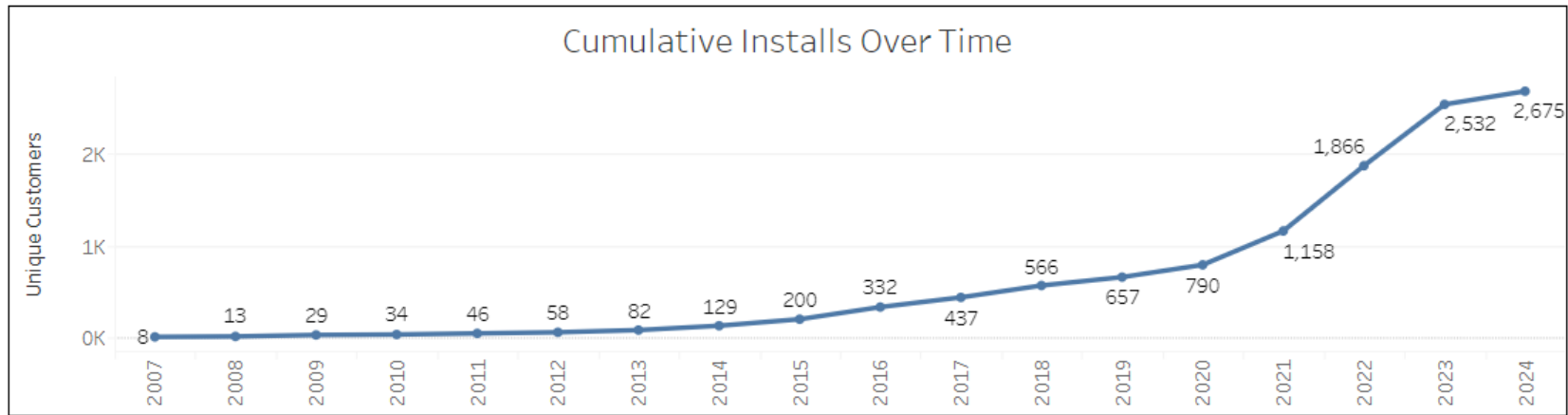
Average System Size (kW)

17,977

Total Installed Capacity (kW)

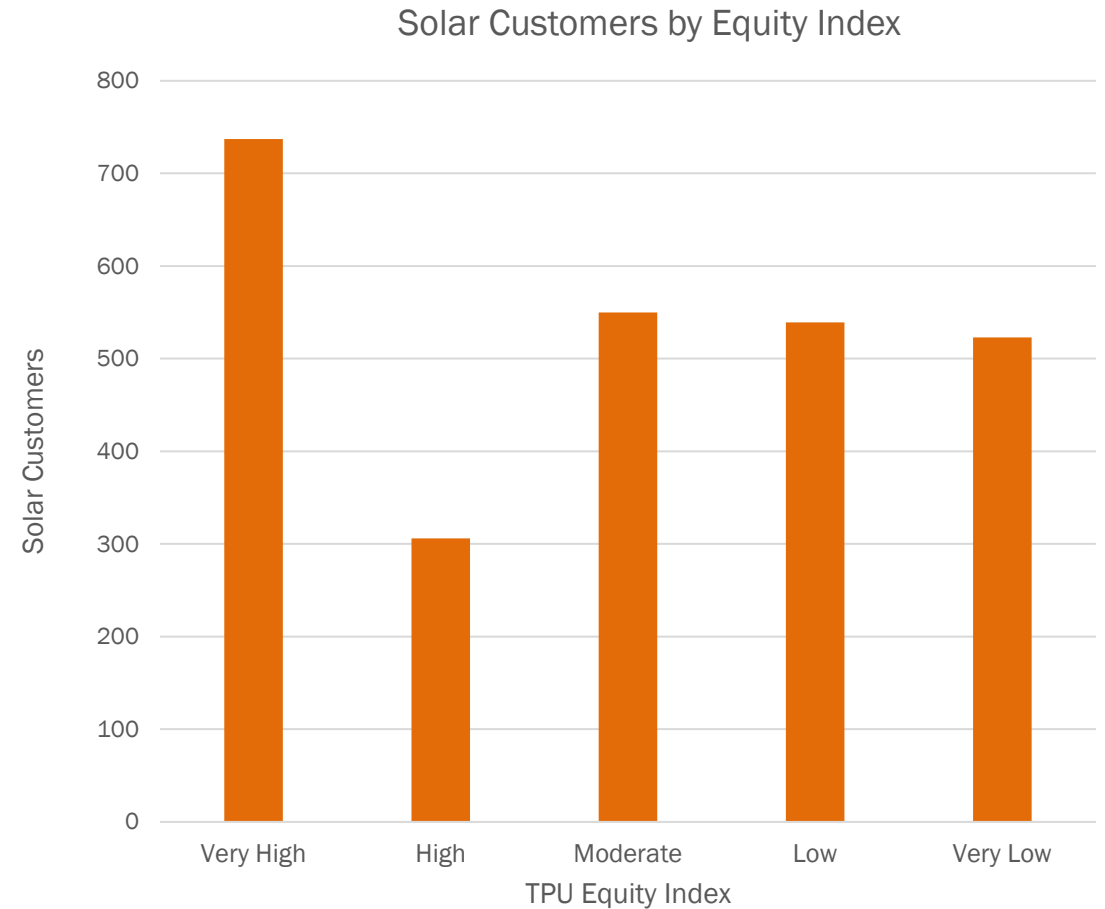
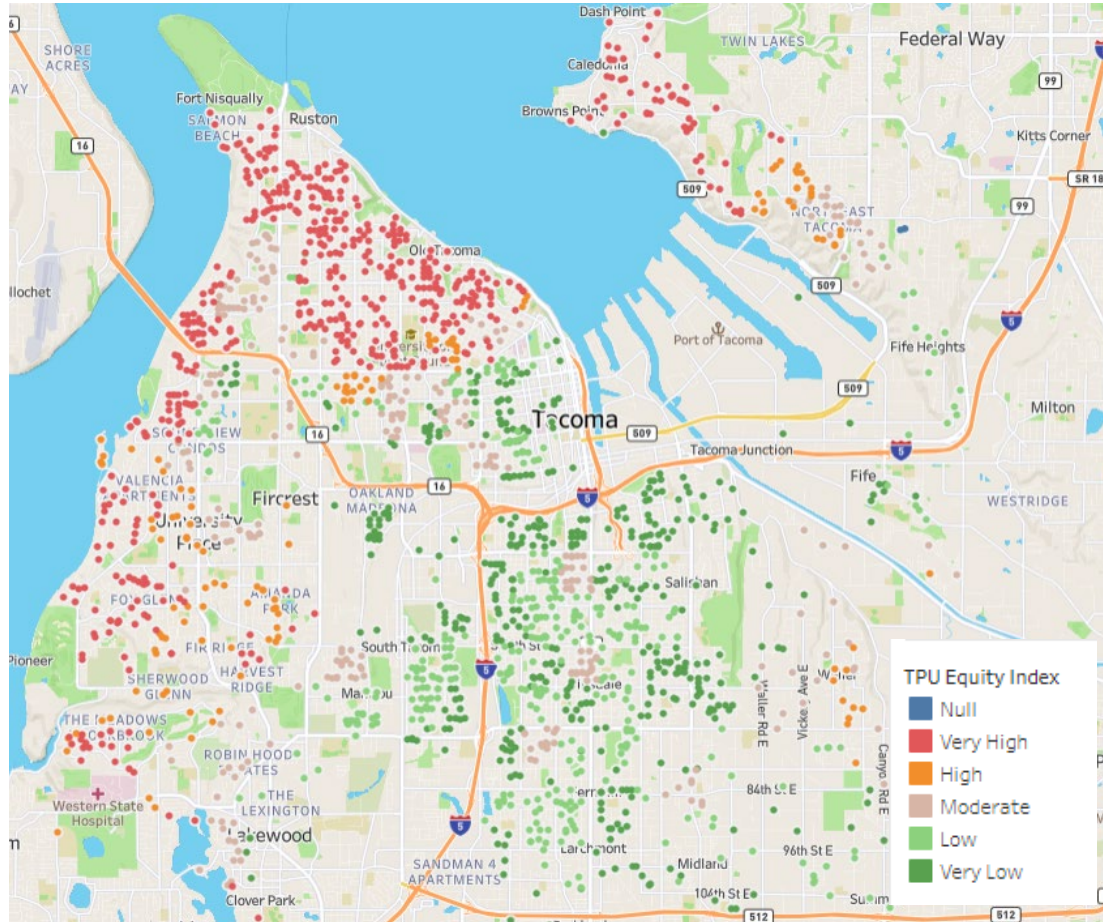
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Pending Installation



Solar & Income-Qualified Customers

Solar Customers Span a Variety of Equity Index Areas



Solar & Income-Qualified Customers

Challenges for Income-Qualified Customers

Access

Many of Tacoma Power's income-qualified customers do not own a home where rooftop solar panels could be installed.

For renters and multifamily projects there are challenges associated with ensuring the tenants receive the benefits of a project.

Financial

It is likely that income-qualified customers that could purchase a solar system will need to use financing. High interest rates coupled with the likelihood of lower credit scores increases the cost.

The Federal investment tax credit (ITC) requires sufficient Federal tax liability. Income-qualified customers may have low Federal tax liability, which could constrain their ability to fully realize the ITC subsidy.

Higher financing costs and inability to realize the investment tax credit will cause the net present value of a solar system to decrease vs. the baseline – which is already significantly negative.

Solar & Income-Qualified Customers

Challenges for “Master Metered” Multifamily Solar Customers

Risks for tenants:	Excludes the utility from supervising correct billing and rate determination.
	Potential for landlords to charge arbitrary rates for electricity in their Common Area Maintenance (CAM) charges.
Challenges for tenants:	Tenants lose control of applying for income-qualified bill assistance.
	Tenants lose control of participation in-unit conservation projects that could lower their bills.
Equity imbalance:	Master metering for multifamily buildings can result in an equity imbalance between landlords and tenants.
	Landlords gain control over electricity charges and usage.

Solar & Income-Qualified Customers

Current Alternatives

Energy Efficiency


- Heating/Cooling- High efficiency heat pumps
- Weatherization
 - Free insulation!
- Heat pump hot water heaters
- B&O Tax- Providing free LEDs, refrigerators, equipment maintenance
- Free Energy Audits
- Deferred zero interest loans
- Forgivable loans

Bill Assistance Programs

- Bill Credit Assistance Program (BCAP)

Solar & Income-Qualified Customers

Empowering Moves for BCAP





MVP MOVES

MVP MOVE #32
Getting ahead with bill payment discounts and resources.
[Lower bills. Save money. Simple.]

On the Bill Credit Assistance Plan, qualifying customers can earn as much as \$92 each month in credits on their utility bill. Total discounts are based on the number of services received.


For more information and to apply online visit
[MyTPU.org/Assistance](https://www.mytpu.org/Assistance)



EMPOWERING MOVE #32
Getting ahead with bill payment discounts and resources.

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[MyTPU.org/Assistance](https://www.mytpu.org/Assistance)



Solar & Income-Qualified Customers

Future Energy Equity Projects:

Here are some additional opportunities we are researching in the coming year:

Setting up Energy Program Equity Scorecards

Research into Evergreen Options resiliency hubs (solar + storage)

Creating small business programs

Energy efficiency grants for shelters and non-profits

Mobility programs

Appendix

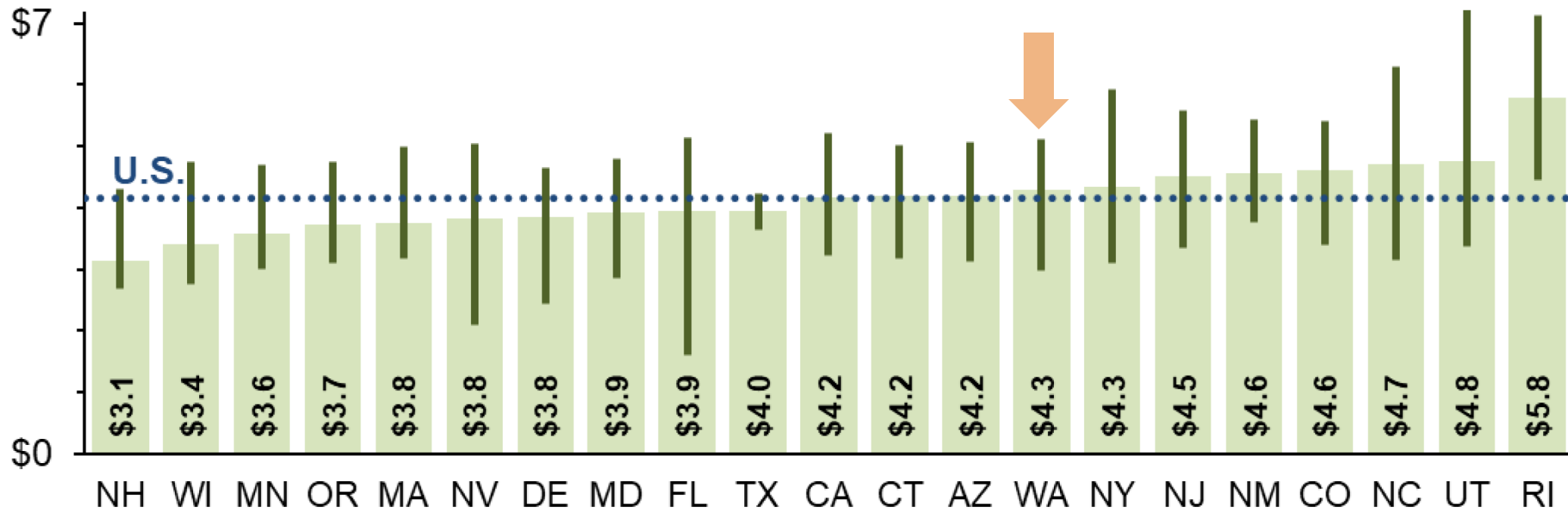
Part IV

Appendix

Installed Costs

Residential Systems Installed in 2022

Median Installed Price and 20th/80th Percentiles (2022\$/W_{DC})



Appendix

Indicative Tacoma Power Cost Shift

NPV \$ (12,674)

1	\$	(1,296,808)	\$	(508)
2	\$	(1,335,713)	\$	(523)
3	\$	(1,375,784)	\$	(539)
4	\$	(1,417,057)	\$	(555)
5	\$	(1,459,569)	\$	(572)
6	\$	(1,503,356)	\$	(589)
7	\$	(1,548,457)	\$	(607)
8	\$	(1,594,911)	\$	(625)
9	\$	(1,642,758)	\$	(644)
10	\$	(1,692,041)	\$	(663)
11	\$	(1,742,802)	\$	(683)
12	\$	(1,795,086)	\$	(703)
13	\$	(1,848,939)	\$	(725)
14	\$	(1,904,407)	\$	(746)
15	\$	(1,961,539)	\$	(769)
16	\$	(2,020,385)	\$	(792)
17	\$	(2,080,997)	\$	(815)
18	\$	(2,143,427)	\$	(840)
19	\$	(2,207,729)	\$	(865)
20	\$	(2,273,961)	\$	(891)
21	\$	(2,342,180)	\$	(918)
22	\$	(2,412,445)	\$	(945)
23	\$	(2,484,819)	\$	(974)
24	\$	(2,559,363)	\$	(1,003)
25	\$	(2,636,144)	\$	(1,033)

3.4%	Inflation Rate
3.0%	Res Energy & Delivery Rate Growth Rate
2,552	Customers
6.7	Average size
7	E3 size
0.957143	Ratio