

Based on my Personal Experiences:

Three Homes With Solar/PV Systems

Solar - Photovoltaic(PV) - Some Terms/Definitions

- **A Solar/Photovoltaic Cell:** A nonmechanical device that converts sunlight directly into electricity. Panels have improved significantly over time.
- **Kilowatt-hour (kWh):** A measure of electricity defined as a unit of work or energy, measured as 1 kilowatt(1,000watts) of power expended for 1 hour. You are charged for electricity usage based on kilowatts + fees/taxes.
- **Electric Meter(Dumb):** Measures the quantity of energy you used. A meter-reader would come by to read the meter.
- **Electric Meter(Smart-Dumb):** Measures the quantity of energy you used. Reports directly to the utility company wirelessly through a built-in transmitter. Eliminates the need for meter-readers.
- **Tiered Metering:** Tiered utility rates are a structure in which the more electricity you use, the higher your rate gets. You are allowed a certain amount of power (kilowatt hours) in each tier. Once you've reached the allotted amount in a tier, you move to the next higher price tier.

- **Smart Meter:** A Smart meter provides two-way communication between you and the utility company. It measures the quantity and **time-of-use** of energy used. And reports the information back to the utility company.
- **Time of-Use Metering:** Time-of-use metering is a method of measuring and charging a utility customer for energy consumption based on what time of day and what day of the week the energy is used.
- **Bi-Directional:** For this discussion - Which direction the power is flowing through the meter.
- **Net-Energy-Metering(NEM):** This is a tariff plan for customers with an eligible renewable generating system to receive a credit for the surplus electricity supplied to the electric grid. This credit is applied to their energy bill to offset all or part of the costs associated with the energy consumed each month. **Grandfathered for 20 years from PTO.**
- **Back-Up Battery(Basic):** A Battery System That Will Power Designated Circuits in the Event of a Power Outage.
- **Back-up Battery((Enhanced)(In Addition to Above)):** Stores Energy Produced by the Solar System or Grid and Delivers it at Some Other Time During the Day. Acts Like a Bank.

Net Metering 1.0 - 1996-2017

(ORIGINAL PROGRAM- TIERED BILLING)

When net metering was first introduced in California, the goal was to incentivize renewable energy installation at point-of-use. The state electric grid was stressed and used a lot of fossil fuels to produce the needed power. The original program, which applies to any customer enrolled before July 1, 2017, includes several substantial incentives.

First on the list is the **free interconnection**. **While interconnection typically has a startup fee, participants in the original program paid nothing to connect their solar system to the local grid. Every month, the continuing connection fee has been just \$1, regardless of the actual cost associated with managing the power exchanges each month.**

In the early days of Solar/NEM 1.0 you would have been an early adopter. As an early adopter, you got to pay a high price for a minimal financial benefit. The return-on-investment time was virtually – **NEVER**. You had to have some other motive. eg: off-grid, off-grid with a storage battery, green/environmental concerns, etc.

If you bought-in closer to the end on NEM 1.0, your return-on-investment time could be as little as 6-7 years. That's because - between 1996 and 2017 - system prices came down and system production went up significantly.

Net Metering 2.0 - 2017-2023

CALIFORNIA NET METERING 2.0 (CHANGES) PEAK HOURS - 2PM-8PM

In 2017, Net Energy Metering 2.0 rolled out. While it still contained many of the same incentives as the original program, it also passes along more costs but **guarantees participants a 20-year tariff plan**. Customers who signed up for net metering from July 1, 2017, to April 13, 2023, joined NEM 2.0.

Some changes include a one-time **interconnection fee of \$75** and a **monthly connection fee of anywhere from \$10 to \$20**. There's also a by-passable charge of \$0.02 kWh for users who don't use enough energy from the utility to cover the costs of their account. However, the bill credit amount remains the same, and the average monthly savings for a 10 kW system is/was a substantial \$204 per month. Even with these changes, **the average return on investment (ROI) for solar could be as soon as six+ years**.

Who Moved the Cheese?

Net Metering 3.0 - April 14, 2023 - Present

PEAK 4PM-9PM TOU-D-Prime

In the decades since net metering started, it has been very successful. So successful that California now faces more difficulty filling electricity needs during evening peak hours, making grid reliability the new priority. **To help reduce the amount of fossil fuels needed to support the grid while the sun is down, the state introduced a new net energy metering program, or NEM 3.0, to focus on solar installation and battery storage.**

The bill credit drops significantly to the export rate for the electricity you sell, which drops your compensation by as much as 75%. The change in bill credit is likely to reduce the average monthly savings by a significant amount. However, adding battery storage helps you reach a return on investment faster than if you don't have storage under this model.

Battery

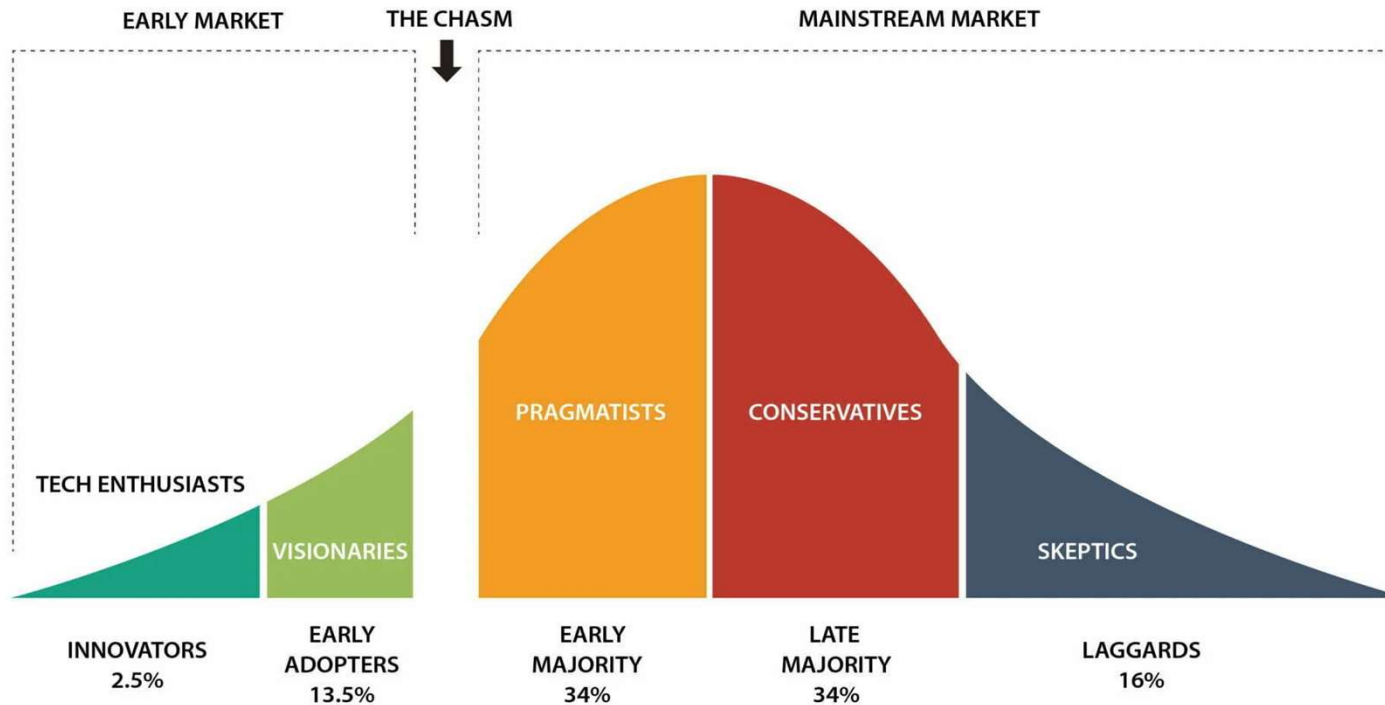
Does NEM 3.0 Require a Battery?

Under the new NEM 3.0 rate structure, the value of excess solar generated during the day is diminished by approximately 75%. But there is a strategically designed loophole – homeowners can maintain the value of solar power generated by incorporating a battery into their system.

This works by charging the battery during the day and powering the house from the battery during the peak price period.

The battery acts like an energy bank with no transaction fees.

The 5 Stages of the Technology Adoption Curve



2001 1.8kW - Newbury Park
18 100w Panels - all/w SW Orientation
Back-up Battery System (AGM - Absorbed Glass Mat)
Tiered Metering(4 tiers)
Rolling Black-Outs/Worked From Home
Reduced Electricity Charges - Minimized Highest Tier

In 2001 Solar Systems were a lot more expensive relative to their power output. The goal, back then, was to reduce the amount of energy that you used that was billed at the higher tier rates.

Widespread rolling blackouts were predicted for hot summer days due to excessive demand. The higher tiers were priced to be punitive enough to encourage energy savings.

Solar Systems did not make a lot of sense from the perspective of how long it would take the energy savings to pay back the initial investment. We put ours on mostly for the benefits of the battery backup system.

2018 4.8kW - Village 19
14-340w panels - all w/WSW Orientation
TOU-D-Prime(Time-of-Use) Metering
NEM 2.0 billing plan

This system has four fewer panels(14 vs 18) than the one we installed in 2001. But the power output per panel is 3.4X more(340 watts/panel vs 100 watts/panel). This system was sized to charge two EVs. But we never got the 2nd EV. We had a significant credit balance(\$700+) at the end of each billing(NEM) year.

Now this property is a rental. The tenants get all of the power - produced by the solar system - included in their rent. They don't have any electric vehicles. They can use quite a bit of heat and/or AC without incurring any electricity charges.

2023 6.0kW - Village 9

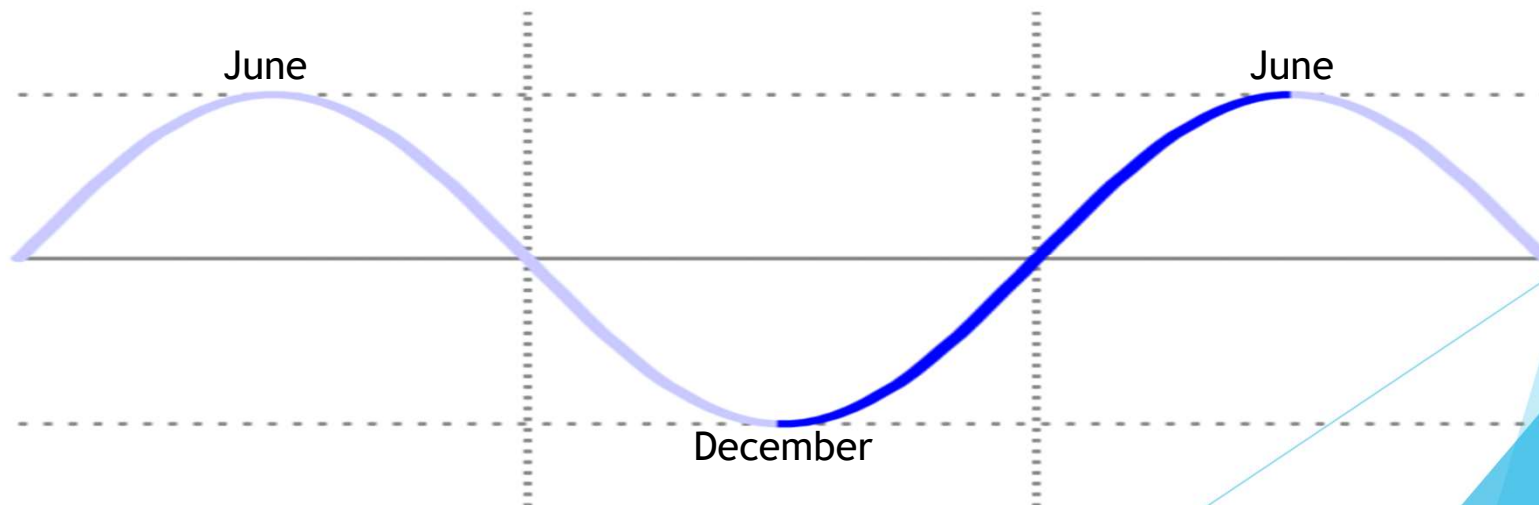
15-400w panels - 10 SW orientation - 5 NW orientation

**13 kWh Back-up Battery (Back-Up & Acts Like a Bank)
TOU-D-Prime and NEM 2.0**

While this system has a 25% higher potential production capacity than the system on the home in Village 19, it doesn't produce 25% more power. That's because the panels that are facing NW do not produce as much power as the ones that face SW. And there is a tall tree that casts a shadow on some of the panels, in the afternoon, during some parts of the year. That shade represents at least a few hundred dollars/yr. worth of lost power production.

Solar - Annual Billing

When you install a solar generation system you are required to be on a TOU(Time-of-Use) rate plan with annual NEM(Net Energy Metering). The Annual plan will have a “True-Up” bill at the end of each billing year where you will either be billed for the energy that you used that is above the amount of energy you produced or get a credit for the amount of energy that you produced that is over the amount you used. If a credit: it is at a reduced rate.
(A loose explanation to get the concept - does not consider TOU)



NEM - Net Energy Metering

- NEM 1.0(1996-2017) is most beneficial to homeowners.
- NEM 3.0(04/15/2023 - Forward) is most beneficial to utility companies.
- NEM 2.0(2017-2023) is between the two(closer to 1.0 than 3.0).
- Homeowners should be aware of net metering policies, as they can significantly affect the financial returns of a solar panel installation.
- NEM plans are grandfathered for 20 years from the Permit to Operate.

Considering Solar?

- Reputable Company - Ask For Referrals - Service Can Vary Significantly
- Acquisition Cost - Can Vary Significantly Between Vendors - Get Multiple Estimates
- System Size is Based on a Usage History Survey(+ Planned)
- Age of Roof? - Trees/Shade?
- Roof Orientation Relative to the Sun - Pitched or Flat?
- Electric Vehicles - Do You Have One and/or Are You Planning to Get One?
- Battery or No Battery?
- How Are You Going to Pay For It? Cash - Loan - Lease - PPA (Who Gets Tax Credits)
- Could the Price of Electricity Go Down?
- Does it Make Sense - Based on Age, Usage, Planned Length of Home Ownership?
- Who Moved The Cheese? - Tiered to Time-of-Use Metering - Changes to Peak
- Does it Add Value to Your Home? When Was it Installed? - NEM Runs w/the Property
- Best Bang for the Buck? Solar, Windows, Appliances, HVAC, Insulation or ?

Numerous Home Improvements:

Tankless Water Heaters
Hot Water Recirculation Systems - Switched/Timed/Flow Sensors
Dual-Pane Windows
Insulation
Attic/Whole-House Fans
Skylights/Solar Tubes
Whole-House Water Filters
Electric Bicycles/Scooters
Electric Golf Carts

Feel free to contact me if you have questions on any of the above.

THANK YOU

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