OBAR Climate Action Committee
PG&E Pacific Energy Center
Thank you!

Shedding Light on Solar

Overview of Solar Finance

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Solar Finance

Two types of Residential Solar Ownership

Homeowner owns the system

- Cash purchase
- Home Equity Loan
- Unsecured Solar Loan
- Property-Tax Loan (PACE – Property Assessed Clean Energy)

Homeowner does not own the system

(Third Party Ownership or TPO)

- Power Purchase Agreement (PPA)
- Lease

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*Homeowner **owns** the system – pros and cons*

Pros: Eligible for 30% federal income tax credit (ITC) on *total* system cost.
Electricity price is known for 25+ years.
Probably don't need to insure your system separately (check with your insurer).
Con: Homeowner is responsible for system production, maintenance & repairs*

Cash purchase
- Excellent return on investment
- Highest upfront cost

Home Equity Loan
- Good interest rate (4-8%) = good ROI. Can be minimal upfront cost
- Low interest rate depends on good credit score. Home is at risk on default

Unsecured Solar Loan
- Home is not at risk on default. Minimal upfront cost
- Need good credit. High interest rates (~7-14%)** = lower ROI

Property-Tax Loan (PACE - Property Assessed Clean Energy)
- Minimal upfront cost. Good credit is not needed. Repayment is transferable to new owners
- Higher interest rates (5 yr: ~6.5% … 30 year: ~8.5%)*** = lower ROI

* However, almost all installers provide at least a 10 year workmanship warranty
** One source (Lightstream): https://www.lightstream.com/solar-financing
*** ABAG: http://abag.ca.gov/bayren/pace/pdfs/PACEcomparison_060315.pdf

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Solar Finance

*Homeowner **does not own** the system – pros and cons*

- Power Purchase Agreement (PPA): Pay per kWh for energy generated by the system (monthly payment is not fixed)
- Lease: Pay a set monthly fee for energy generated by the system
- PPAs and Leases may be $zero down, fully pre-paid, or partial-down

Pros (PPAs and Leases)

- Not responsible for any system maintenance
- Can be zero upfront cost to go solar and save money
- Payback for lower cost of electricity is immediate (for $0 down systems)

Cons (PPAs and Leases)

- Not directly eligible for the 30% federal tax credit
- Home is encumbered with a lien (commonly 20 years)
- May complicate sale of home
- PPAs and leases may have an “escalator” clause increasing your payments over time

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Solar Finance - Terms

Important Terms

- *Kilowatt (kW)*
  - Physics unit of **power**: the rate of doing work
  - A 100-watt bulb consumes 100 watts when it's on
  - Most solar PV equipment is rated in watts: a 4 kW solar system
- *Kilowatt-hour (kWh)*
  - Physics unit of **energy**: The amount of work done
  - PG&E bills you per kWh
  - EV batteries are rated in kWh (Leaf: 24 kWh or 30 kWh, Tesla: up to 100 kWh)
  - A 100-watt bulb, on for 10 hours, consumes 1 kWh of energy

- 1 GWh = 1000 Megawatt-hours (MWh)
  - Average natural gas plant generates about 1000 MWh per hour
- 1 MWh = 1,000 Kilowatt-hours
  - Average US household consumes almost 1000 kWh per month

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Solar Finance - Metrics

- Simple Payback (years)
  Total investment divided by annual savings
- Simple Return on Investment (percent)
  Annual savings divided by total investment, times 100
- Simple Cost per kilowatt-hour (¢/kWh)
  Total investment divided by total lifetime energy generated

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Solar Finance – Cash Purchase Example

Assumptions

- $1500/year bill, 7500 kWh/year consumption. $1500/7500 kWh = 20¢/kWh (≈PG&E average)
- 4.2 kW Solar (DC) generates ~6000 kWh/yr and offsets 80% of use and about 80% of charges

- Simple Payback - *Total investment divided by annual savings*

  Example: **$12,290** total system cost

  (4.2 kW * **$3.50/watt** = $14,700 - $4410 ITC + $2000 inverter in 15 years = $12,290)

  6000 kWh at 20¢/kWh = $1200 savings per year

  $12,290 / $1200 = **10.2 years***

- Simple ROI - *Annual savings divided by total investment, times 100*

  $1200 / $12,290 times 100 = **9.7%*** (for 25 years)

- Simple Cost per kWh - *Total investment divided by lifetime energy generated*

  6000 kWh/yr * 25 years = 150,000 kWh. Include 0.5%/year degradation: 141,000 kWh.

  $12,290 / 141,000 kWh = **8.7¢ per kWh**

- **8.7¢/kWh (fixed for 25 years) is under half PG&E's average rate today**
- **Internal Rate of Return (IRR) is often higher** (inverter replacement uses future dollars)
  Requires assumptions on future discount rate and grid price

* Payback will be shorter & ROI will be greater with PG&E rate raises

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Solar Finance – Comparing ROI

Common investment interest rates today

- 10 year US treasuries: ~2.5%
- Savings account interest: under 1%
- 1 year CD, 5 year CD: both under 1%
- Stock Market: 7-10%/year over the long run but … watch out below!
- Equity-indexed annuity: 2-3% minimum, higher if the index performs well
  - Lower return than index, may have annual cap and surrender charges

All of these returns are taxable

Returns on municipal bonds are generally not taxable

- AAA rated: 1 year, 3 year 5 year: all under 1%

Returns on solar (purchase/loan/lease/PPA) are NOT taxable

- Returns are just savings you'd otherwise pay to your utility
- Solar ROI on cash purchase is ~10% non-taxable

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*Solar Finance – Net Metering**

- From the Solar Energy Industries Association (SEIA)

  Net metering is a billing mechanism that credits solar energy system owners for the electricity they add to the grid

- NEM is simple in concept

  You're paid for solar at the same rate you would pay for grid energy

- NEM has some complicating factors

  But ***FIRST***… PG&E Rate Plans, Tiers, Baselines, Territories, and Time of Use

* Also Net Energy Metering or NEM

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Solar Finance – Net Metering

- Rate Plans*
  - E-1, E-6, E-TOU-A, E-TOU-B EV-A, EV-B, …
  - How your per-kWh charges are determined
- Tiers
  - ~~Tier 1 (Baseline), Tier 2, Tier 3~~ (until 2/28/2017)
  - Baseline, 101%-400% of Baseline, High Usage (from 3/1/2017)
  - Per-kWh charges depend on *how much* energy you use
- Time of Use (TOU)
  - Peak, Partial-Peak, Off-Peak
  - Per-kWh charges depend on *when* you use energy
- Territories
  - Berkeley/Oakland is in the "T" territory (coastal, mild)

- Most non-solar, non-EV, homeowners are on E-1
- PG&E requires new solar customers to be on a TOU plan

* List of PG&E Electric Rate Plans: https://www.pge.com/tariffs/EPS.SHTML#EPS

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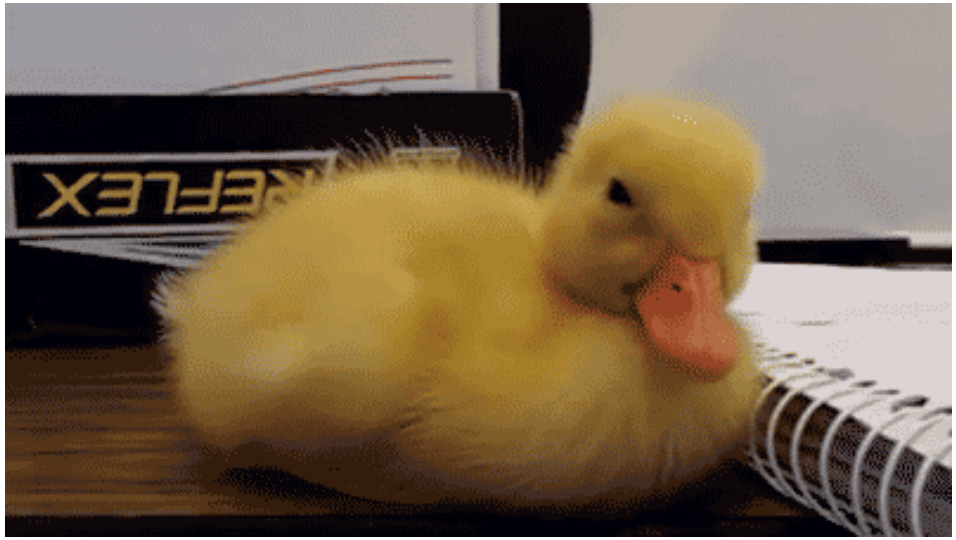
Solar Finance – Nap Metering



Pithy stat:
In 2016, solar was the top new source of energy-generating capacity in the US

How are we doing?

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Solar Finance – Net Metering

NEM – complicating factors

- The Minimum Bill
  - ~$10/month – cannot be offset with solar

- Non-Bypassable Charges (NBCs) (from Dec. 2016)
  - ~2.3¢/kWh for each kWh drawn from the grid – cannot be offset with solar
  - Based on *hourly* Net Metering (had been monthly)

The Minimum bill and NBCs are why you can offset 100% of your kWh *usage* with solar, but not 100% of your *bill*

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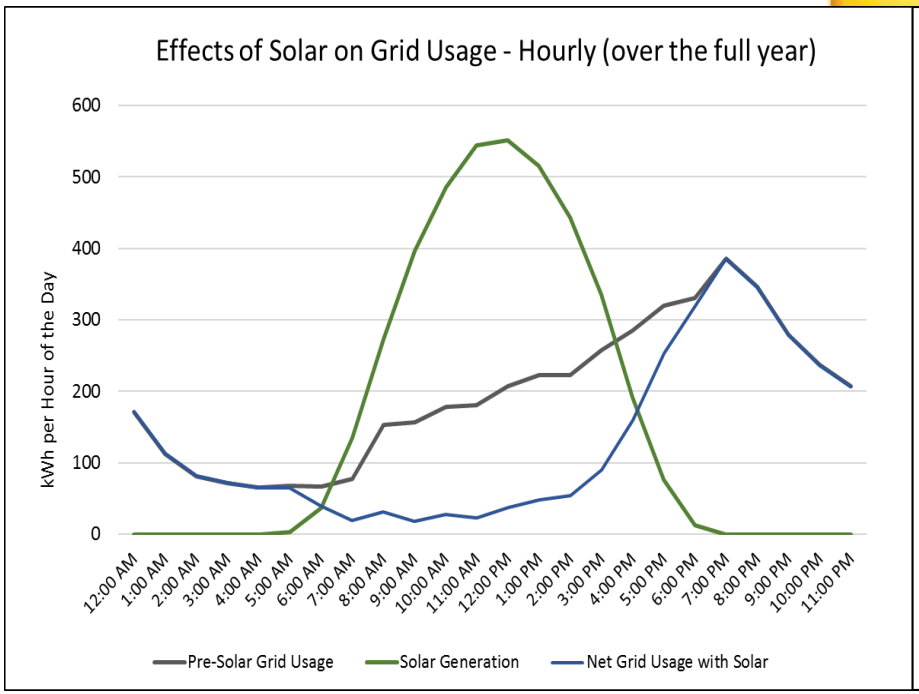
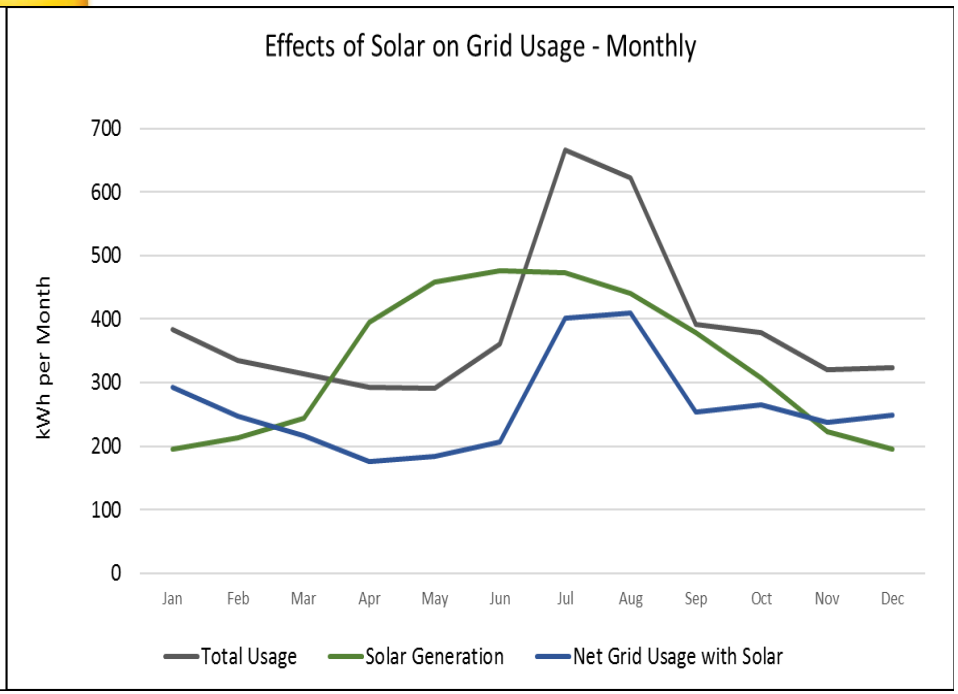
Solar Finance – Net Metering

Example impact of Non-Bypassable Charges





Totals Pre-Solar Grid Usage: 4684 kWh/yr

Solar Generation: 4000 kWh/yr (~85% of grid usage)

Net Grid Usage with Solar: 3142 kWh/yr (~67% of grid usage)

Percent of solar energy used by home ("self-consumption") ≈ 39%

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Solar Finance – Net Metering

- Net Metering Summary
  - You're paid the full retail price, based on your rate plan
    - Minus the minimum bill
      (if you don't use $10 worth of grid energy)
    - Minus Non-Bypassable Charges
  - PG&E: After generating 100% of your usage (yearly basis), you're paid the wholesale rate (~4¢/kWh)
  - PG&E: You'll receive monthly statements with detailed charges but you pay just once per year at the "True Up"
  - PG&E will not permit a solar system that will generate significantly more energy than the household consumes*

* However, PG&E will OK an interconnection based on a future purchase of an EV, etc.

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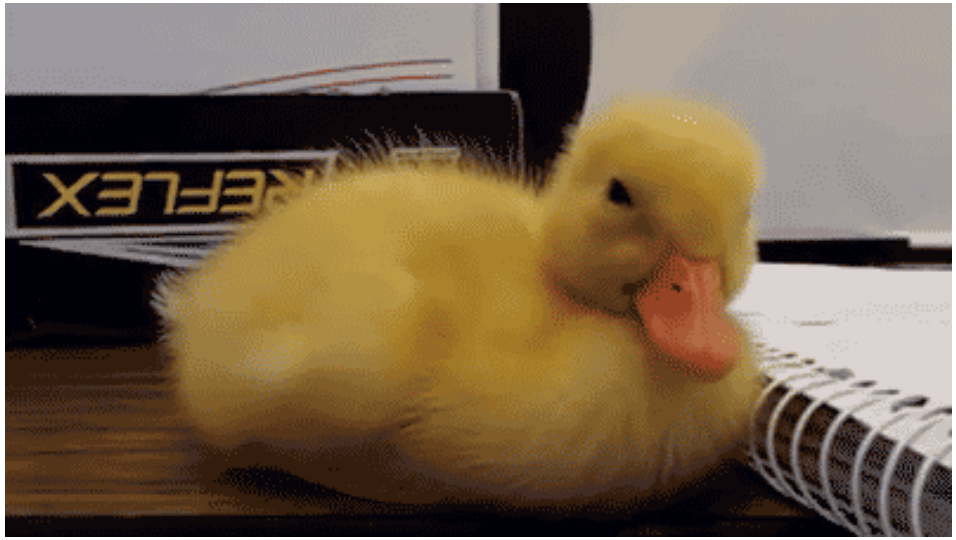
Solar Finance – Nap Metering



Pithy stat:
Each kilowatt of solar will save
$250-$300/year on your energy bill

Go Solar!

Thanks!

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