Clean Coalition
Making Clean Local Energy Accessible Now

Example impacts of avoided conventional energy generation operating for 20 years associated with DER development and operation equivalent to 25 megawatts (MW) PV

Summary

Ratepayer impacts

- No direct energy generation cost impact to non-participating ratepayers
- $47 million in PG&E ratepayer peak capacity savings
- $6 million in ratepayer savings statewide from avoided transmission losses
- $15 million in ratepayer savings statewide from avoided transmission proportional capacity-related costs over 20 years[1]

Economic impacts of 25 MW PV installation, or equivalent DER and energy efficiency investment[2]

- $100 million in new local private investment
- $116 million in total added regional economic output
- $35 million in local wages from construction and installation, representing 635 near-term construction job-years (FTE)
- $15 million in wages from operations and maintenance over 20 years, representing an additional 260 job-years (13 permanent jobs, FTE, $740,000 in annual wages)
- $2.9 million in construction-related state sales tax revenues

Environmental impacts:

- 39,000,000 lbs greenhouse gas (GHG) reduction annually,[3] equivalent to avoiding the GHG impact of 850 homes' electric usage
- 7,000,000 gallons water saved annually[4]
- 160 acres land preserved through secondary use of roof and parking lot areas[5]

Peak capacity savings

Reduction in the summer peak centralized electricity generation will occur because of increases in distributed renewable generation; distributed PV has a high aggregate availability during these hours, exceeding 80%. On this basis, added PV will provide $94.4 value per year per kW of effective capacity. Increasing the supply of solar energy during peak periods, and the resulting shift of net peak demand from non-solar resources to 6pm, would reduce the effective capacity of PV to 20%. However, the addition of energy storage enables dispatch of PV generation and thermal capture to align with peak periods, as reflected in time-of use (TOU) energy and demand charge price schedules. This results in peak capacity savings equaling $2,360,000 annually or $47 million over 20 years from 25 MW CM capacity.

Transmission and distribution line loss savings

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[1] CAISO 2013 Transmission Access Charge (TAC) schedule and infrastructure projections
[2] NREL JEDI model results from $2.75/W(dc) 2015 estimated gross weighted average cost. Higher or lower costs by installation type or year installed will proportionately influence results.
[3] NREL Emissions Health Calculator, PG&E service territory
[4] DOE 2009
[5] Civil Society Institute, "Hidden Costs of Electricity" (Sep 2012)

Based on PG&E Bay Area reported loss rates, combined avoided transmission and distribution avoided losses from distributed generation (DG) average 5%, or 789 MWh per year, for each 10 MW of PV DG installed. At an average current retail value of 15¢/kWh, the value of avoided losses is $118,350 per year, totaling $2,367,000 over 20 years. The use of average loss values is conservative, as the marginal rate of line loss is twice the average rate of loss[6], and any reduction will actually realize the marginal rate, particularly during peak demand periods.

New transmission capacity savings

Reduced demand on transmission will reduce or defer the need for additional investment to expand transmission capacity, slowing the growth in future Transmission Access Charge (TAC) rates and reducing charges across the board for all energy utilizing the system. Based on the average costs of new capacity investments and repayment, each 10 MW of added local energy storage or PV DG capacity will reduce the need for added transmission capacity investment by 0.05% relative to CAISO business as usual (BAU) projections and the related growth in TAC rates. This will be realized as $305,400 in annual system-wide savings from a 0.0012¢/kWh reduction in TAC rates applied to the 254,000 GWh[7] consumed within CAISO transmission system electricity by 2020. Actual savings are likely higher, as evidenced by the $2.6 billion in planned transmission projects canceled in the 2017-18 CAISO Transmission Planning Process due primarily to excess growth in rooftop PV and energy efficiency above levels already accounted for in forecasts.

Emissions reductions

Displacing combined-cycle natural gas (CCNG) generation or CHP with 10 MW of PV in the project area will yield 15,785 MWh of emissions-free generation per year, significantly reducing annual emissions equivalent to removing 1,567 cars from the road, or offsetting the emissions of 2,052 average homes in PG&E territory — even more in San Francisco, which has significantly lower average household energy usage. Local electric or thermal energy storage will have comparable emissions reductions if sourced from renewable energy.

Annual reductions:

CO_2: 16,448,300 lbs (7461 metric tons)
NO_X: 30,700 lbs
Mercury (Hg): 0.016 lbs

For these Qualifying Facilities contributing to California's Renewable Portfolio Standard (RPS), at a base price of $10/Mt for avoided CO_2 the annual market value of emissions reduction is $74,610; however, the market rate is likely to substantially exceed $10/Mt in future years.

Public health: Based on a mortality reduction rate of 0.004/MW, and a 0.5 reduction in health-induced work loss days for PV displacing conventional generation, 25 MW of PV would avoid 0.1 deaths annually and result in 12.5 fewer work loss days annually.

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[6] Dr. David Patton, PhD, expert witness in transmission costs for NY PUD
[7] California Energy Demand 2012-2022 Final Forecast Volume 1: Statewide Electricity Demand and Methods, Mid Energy Demand