

Self-Gen Modeling Updates

CED 2021



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Scenario Definitions

❑ High = High Electricity Demand Case

- High economic / demographic growth → high growth in building stock
- Low electricity rates
- Low PV adoption

❑ Low = Low Electricity Demand Case

- Low economic / demographic growth → low growth in building stock
- High electricity rates
- High PV adoption

❑ Mid = Mid Electricity Demand Case



PV & Storage Specific Input Updates

- Updated Interconnection data
 - BTM PV capacity: ~11,000 MW (Dec 2020)
 - About 1,400 MW installed in 2020
 - Revisions to historical years (2019 and earlier) added another 160 MW
 - BTM Storage capacity:
 - Will primarily rely on interconnection data this year
 - Last year: used interconnection data for IOU residential systems and SGIP incentive data for IOU non-residential systems and all POU systems
 - Significant upward revision of pre-2020 installed capacity (>10%)
- New Residential Appliance Saturation Study (RASS) data
 - Residential PV model uses RASS data to estimate average PV system size
 - Electricity consumption by space heating type, household size, etc.



Input Updates - Continued

- Federal Investment Tax Credit (ITC) extension
 - ITC extended by Congress in Dec 2020, after 2020 IEPR forecast
 - Tax credits for PV and Storage extended by two years
 - Residential tax credits would have expired after this year.
- PV Installed Costs
 - Analysis of DG Interconnection data sets show PV costs have stayed flat or increased slightly since 2019.

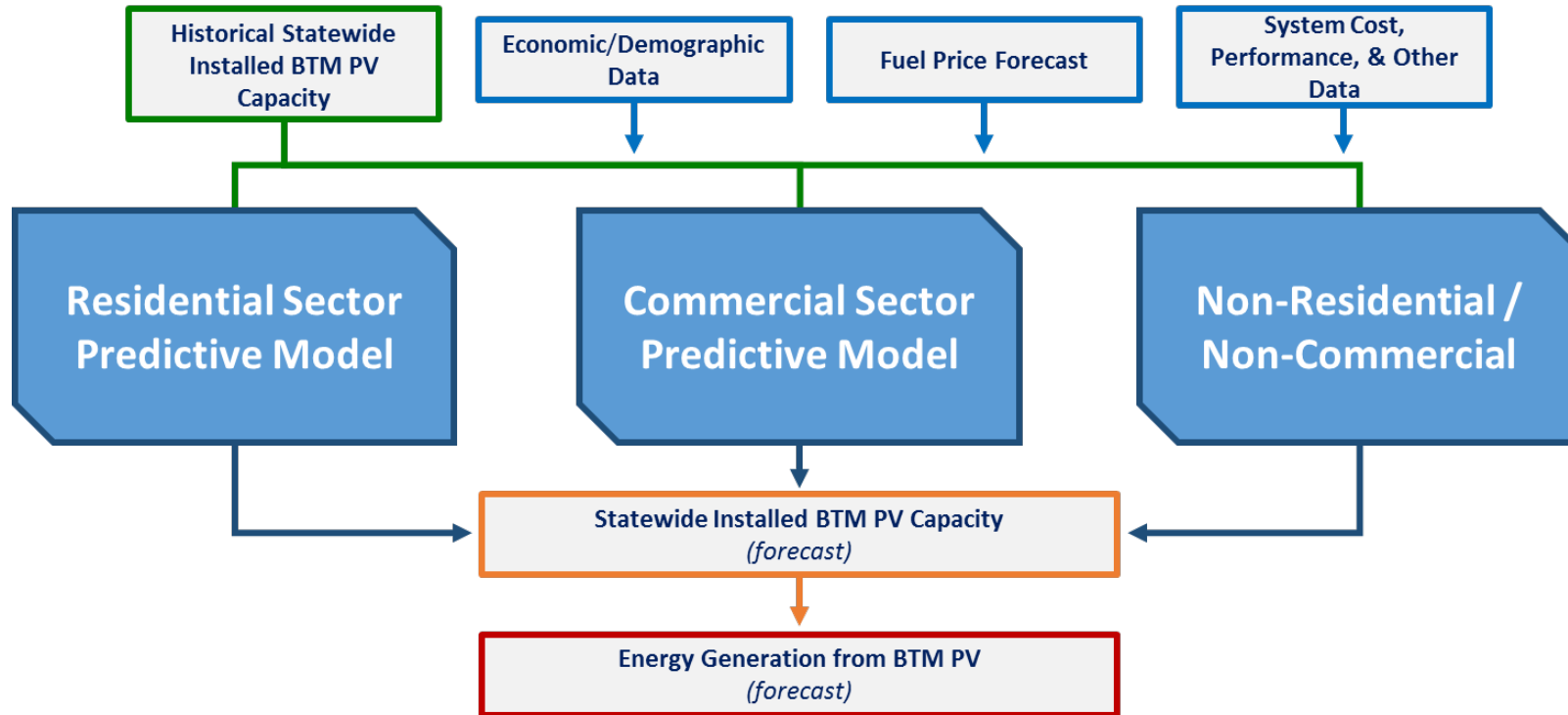


BTM PV – Modeling Updates

- Update PV scenarios to reflect NEM 2.0 successor (NEM 3.0) proposals.
 - NEM proceeding opened by the CPUC after completion of 2020 IEPR forecast.
 - CEC's current high demand (low PV adoption) case uses compensation scheme that is more optimistic than Joint IOU proposals.
- Incorporate compliance-based PV forecast for new homes into the Residential PV model
 - Accounting for Title 24 PV requirements
 - Previously, PV forecast for new homes was completed outside of PV model
 - Led to overestimating residential buildings stock available for PV adoption in existing buildings



Energy Commission PV Model



- Residential and commercial models predict PV penetration based on calculated payback / bill savings.



A Peek inside the Predictive Models

Estimate Building Stock Available for PV Adoption



Calculate Bill Savings of Adopting PV
based on estimated electricity consumption and PV generation
electricity rates, rate structures, and NEM compensation



Calculate Likelihood of PV Adoption
based on PV costs, incentives, bill savings, rate of return/payback,
max market share curves (based on economics) and adoption curves



Forecast PV Adoption
based on previous step, historical PV adoption, and taking into
account available building stock



NEM 3.0

- CPUC opened NEM 3.0 proceeding in late 2020
 - Expect a final decision late this year or early next year
 - Applies only to three large IOUs
- Under the original Net Energy Metering, and the NEM successor tariff (NEM 2.0) the state has compensated customer exports at retail electric rates. NEM 3.0 is expected to change that.
- More than a dozen proposals were submitted from stakeholders
 - Including one from the three large IOUs (Joint IOU proposal)



Current Assumption on NEM 3.0

- How do we currently model NEM 3.0?

Demand Case	Compensation Scheme
Low Demand	<ul style="list-style-type: none">Retail rate compensation for exportsAnnual netting
High Demand	<ul style="list-style-type: none">\$0.10 / kWh for exports\$ 3 / kW monthly grid chargeMonthly nettingStill models a “net energy metering” structure
Mid Demand	<ul style="list-style-type: none">Residential Sector:<ul style="list-style-type: none">Average between high and low casesCommercial Sector:<ul style="list-style-type: none">\$0.10 / kWh for exports, no grid chargeMonthly netting

- Table shows NEM compensations used for 3 IOUs and SMUD.



Proposed Changes to Modeling NEM 3.0

- Incorporate proposals submitted to CPUC

Demand Case	Compensation Scheme
Low Demand	<ul style="list-style-type: none">• Maintain retail rate through 2026.• Starting in 2027:<ul style="list-style-type: none">• \$0.10 - \$0.12 /kWh export rate, no grid charge• Monthly netting, Net Billing arrangement
High Demand	<ul style="list-style-type: none">• “Simplified” Joint IOU proposal• SMUD proposed reform to NEM
Mid Demand	<ul style="list-style-type: none">• \$0.10 / kWh for exports, no grid charge• Monthly netting, Net Billing arrangement

- NEM 3.0 proposals necessitate modeling updates in PV models
 - Current models coded for a single statewide export rate and grid charge
 - Proposals have utility-specific export compensation rates, tariff-specific grid charges, and Net Billing compensation structure



Modeling Joint IOU and SMUD Proposals

- Joint IOU proposal includes time varying export compensations rates based on TOU periods
 - Modeling this would increase model run times
- Instead, staff calculated an average export compensation rate
 - Calculation based on IOU submissions of average electricity consumption and PV generation profiles to CPUC as part of NEM 3.0 proceeding
 - Calculate hourly exports, then average export rate:

$$Avg. Export Rate = \frac{\sum(PV Exports_{hour} \times Export Rate_{hour})}{Annual PV Exports}$$
 - Calculated average export rates are shown in table, and are used for modeling NEM 3.0 proposals
- SMUD proposal is easy to model.

Residential			
Utility	Tariff Id	Export rate	Grid charge
PGE	All	\$0.0575	\$10.93
SCE	All	\$0.0590	\$7.39
SDGE	All	\$0.0583	\$11.09
SMUD	All	\$0.0740	0

Commercial			
Utility	Tariff Id	Export rate	Grid charge
PGE	B-1	\$0.0575	\$16.34
PGE	B-6	\$0.0575	\$15.57
PGE	B-10	\$0.0575	\$9.27
PGE	B-19	\$0.0575	\$3.81
PGE	B-20	\$0.0575	\$3.38
SCE	TOU-GS-1	\$0.0590	\$11.13
SCE	TOU-GS-2	\$0.0590	\$5.35
SCE	TOU-GS-3	\$0.0590	\$4.89
SCE	TOU-8	\$0.0590	\$4.32
SDGE	Sch A	\$0.0583	\$17.19
SDGE	Sch AL-TOU	\$0.0583	\$7.67
SMUD	All	\$0.0740	0



Modeling Changes for Other POUs

- Several POUs have transitioned to Net Billing in recent years
 - IID, Modesto, Merced, Roseville, Redding, Riverside, Anaheim, Palo Alto
- For these POUs, PV models updated to reflect Net Billing compensation scheme for all scenarios
 - Since POUs do not use TOU rates, modeling is for the year, not hourly.
 - PV exports assumed to be 55% of annual generation for residential sector, 17% of annual generation for commercial sector.
 - Export rates tend to be around \$0.07 / kWh
- For POUs that have not transitioned to Net Billing, staff continue to model NEM with full retail rate compensation for exports.



BTM PV – Expected Impacts of Updates

Major Model Updates / Assumption Changes	Expected effect on the forecast of PV adoption
Updated NEM 3.0 scenarios	↓
Extension of Federal ITC	↑
Incorporate PV forecast for new homes into residential PV model	↓