



Customer-side Distributed Generation Impacts

Lead Commissioner Workshop on Revised
Electricity and Natural Gas Demand
Forecasts 2014 – 2024

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Key Sources of Data

- Annual/Quarterly power plant reporting to CEC (Form CEC 1304)
- Emerging Renewables Program
- Self-Generation Incentive Program
- California Solar Initiative
- New Solar Homes Partnership
- POU PV (SB 1 Report to CEC)
- California Solar Initiative – Thermal



Key Sources of Data

- DG incentive program EM&V reports
 - CSI 2010 Impact Evaluation (2007 – 2010)
 - SGIP 11th Year Impact Evaluation (2002 – 2011)
- DOE/EIA PV cost projections developed for AEO 2013
- CEC sponsored report on CHP market potential (ICF CHP Policy Analysis)



Updates for Revised Forecast

- DG Program updates
- Revised electric and gas rates
- Revised housing data and floorspace
- Adoption in Residential sector limited to owner occupied dwellings
- Using predictive model for PV adoption in Commercial sector rather than a trend analysis.



Predictive Modeling (Residential Sector PV/SHW)

- Underlying structure similar to payback/cash flow model used by EIA/NREL
- Payback calculations based on system and maintenance costs, incentives, and fuel rates
- Estimated payback applied to a Bass Diffusion adoption curve
- Results for adoption differ by demand scenario since projected fuel rates and number of homes vary by scenario



Predictive Modeling

(Residential Sector PV/SHW...continued 2)

- PV system cost and performance data come from incentive program data and EIA's AEO 2013 forecast report
- SHW system cost and performance data based on CSI Thermal program database and CPUC sponsored study
- Residential sector end-use model output used for system sizing and valuing net surplus compensation



Predictive Modeling (Commercial Sector PV/CHP)

- Meeting onsite demand for power and two thermal end-uses (CHP): hot water and space heating
- CEUS survey data used to compile and summarize building electric and gas demand
 - 2900 sites represented in survey
 - 12 Building Types
 - 4 Building Size Categories



Predictive Modeling

(Commercial Sector PV/CHP...continued 2)

- CEUS profiles are then benchmarked to QFER calibrated Commercial sector model output and floorspace projections
- Use DrCEUS building energy use simulation tool to create load shapes for CHP thermal analysis
- Map CEUS site profiles to retail electric/gas tariffs
- Retail electric/gas tariff details escalated based on retail electric/gas rate forecast developed for CED 2013 Revised



Predictive Modeling

(Commercial Sector PV/CHP...continued 3)

- CHP technology details come from SGIP program data and CEC sponsored report conducted by ICF
- PV system details come from CSI program data and projections made by EIA
- Use DrCEUS generated load shapes and technology profiles to estimate impacts: generation, onsite use, export, and grid purchase



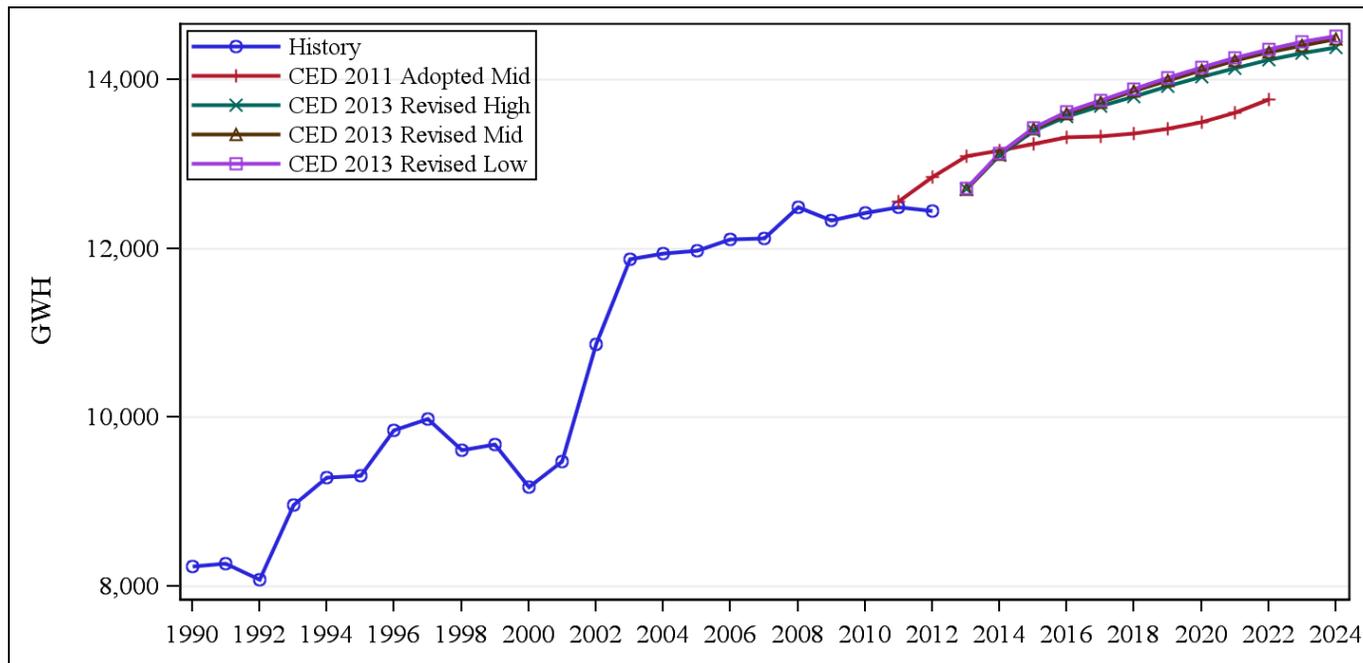
Predictive Modeling

(Commercial Sector PV/CHP...continued 4)

- Incorporate CSI/SGIP incentives and Federal tax credit for PV/CHP
- Economic analysis and adoption modeling same as Residential sector PV/SHW model



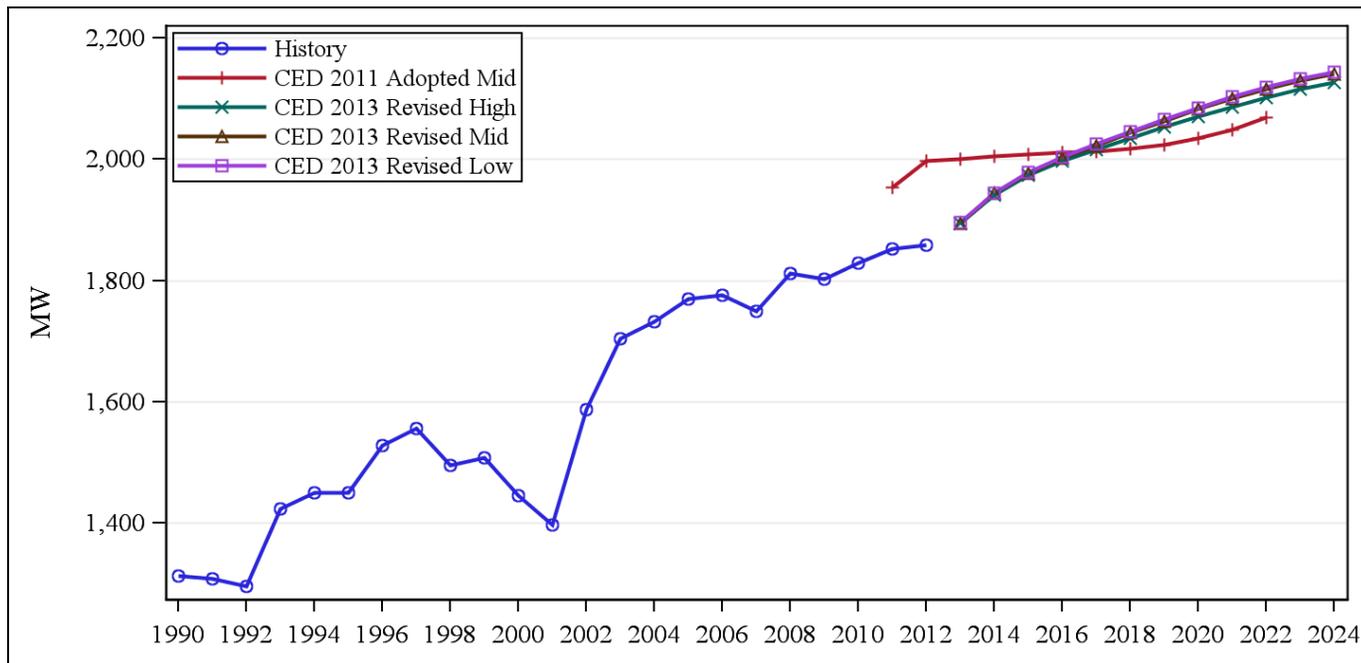
Results: Statewide Non-PV Energy Impact



CED 2011 Mid Case: .7% annual growth. 13,800 GWH by 2022.
 CED 2013: 1.2%-1.3% annual growth. 14,380 – 14,500 GWH by 2024.



Results: Statewide Non-PV Peak Impact

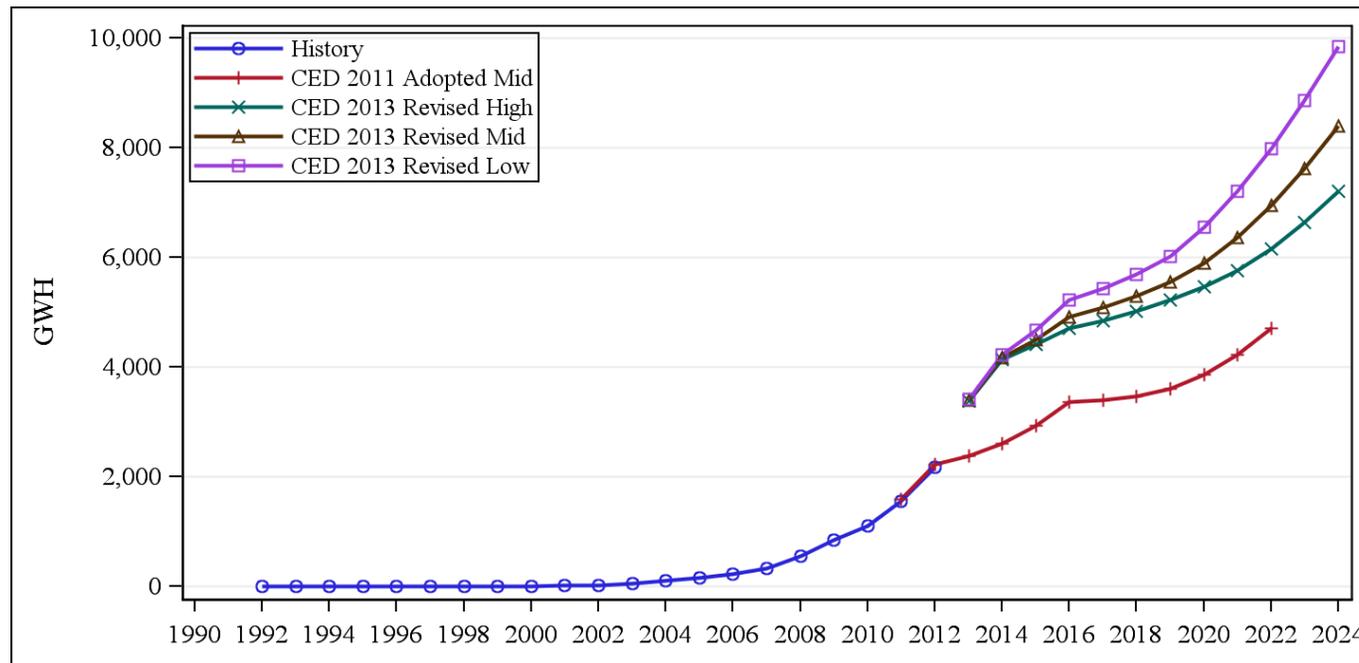


CED 2011 Mid Case: .4% annual growth. 2,070 MW by 2022.

CED 2013: 1.1%-1.2% annual growth. 2,127 – 2,144 MW by 2024.



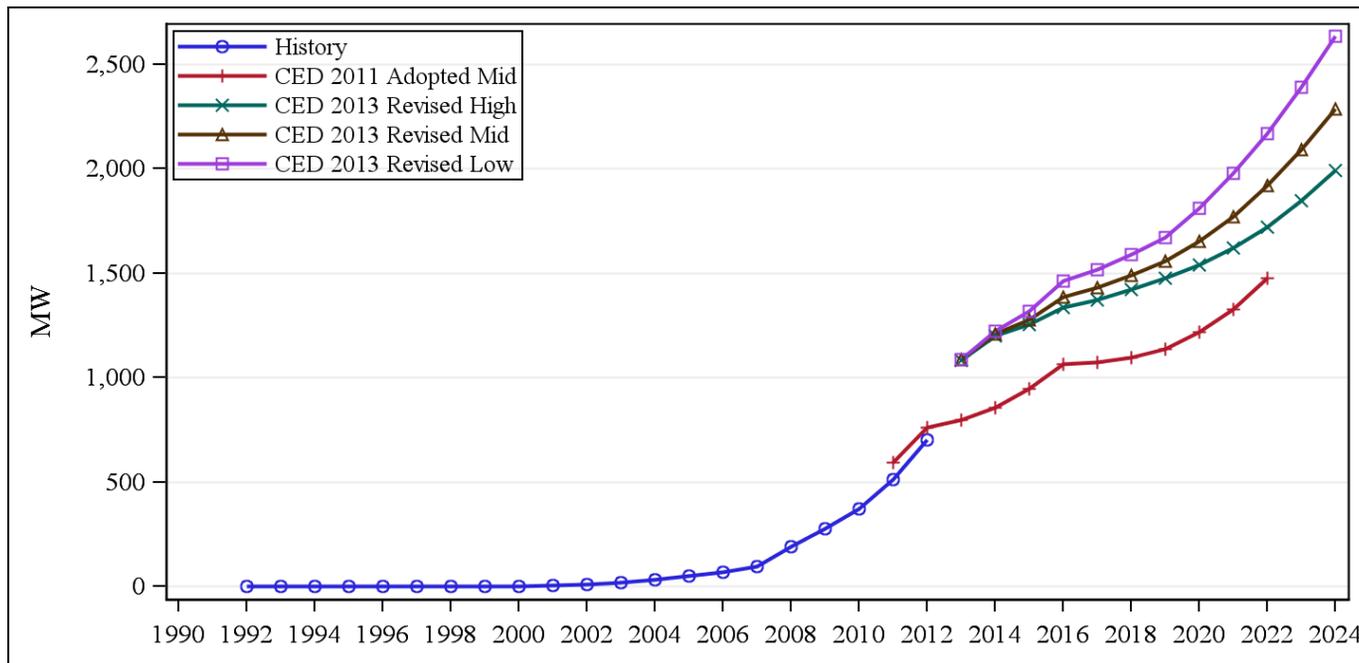
Results: Statewide PV Energy Impact



CED 2011 Mid Case: 8% annual growth. 4,700 GWH by 2022.
CED 2013: 10.5%-13.5% annual growth. 7,200 – 9,800 GWH by 2024.



Results: Statewide PV Peak Impact



CED 2011 Mid Case: 7% annual growth. 1,475 MW by 2022.

CED 2013: 9%-11.6% annual growth. 2000 – 2,600 MW by 2024.



Key Uncertainties

- Net Energy Metering redesign
- Retail electric tariff redesign
- Federal Tax Credit
- CHP
 - Interconnection
 - Standby and departing load charges



Next Steps

- Ongoing data updates
- Revise Residential Sector model
 - Incorporate utility specific retail rates
 - Use RASS survey to develop residential profiles similar to method used in profiling CEUS survey data for commercial sector
- Focus on CHP in Industrial/Mining