

Low Carbon Grid Study (LCGS): Phase I Results

Results Summary: California's electric sector can cut its carbon footprint in half by 2030. Using conservative assumptions and proven technology, the study identifies the grid's ability to achieve these reductions with minimal rate impact, minimal curtailment of renewable energy, and without compromising reliability.

Background

California has progressive emissions reduction and clean energy policies in place, including:

- AB 32 emissions target of 1990 levels by 2020
- 33% Renewables Portfolio Standard (RPS)
- Executive order S-3-05 emissions target of 80% below 1990 levels by 2050

The California Air Resources Board (CARB) has suggested that a mid-term emissions target will help frame planning efforts to put California on track to meet the 2050 goal. Previous studies have examined California and its 2020 and 2050 targets, but few have analyzed a carbon-constrained electricity system in a mid-term timeframe or by modeling the electric sector in detail. The Low Carbon Grid Study (LCGS) fills a need for robust, technical information on if and how the electric sector can achieve significant GHG emissions reductions by 2030, as a mid-term target toward California's established 2050 goals.

Methodology

Identified a need for 50% reductions in grid GHG emissions by 2030 in order to be on track for 2050, based on assumptions from CARB, CEC, CPUC and WECC.

Developed 2030 cases to analyze emissions, investments, and savings associated with the 50% reductions goal.

- *Baseline Case:* assumes California's existing policies are maintained until 2030, but implements no additional low-carbon measures.
- *Target Case:* generation and flexibility resource portfolio developed to meet the emissions target of 50% below 2012 levels by 2030.
- *Accelerated Case:* developed to achieve deeper reductions to scale up toward the 2050 goal.

These cases were run in a production cost model to examine system costs and emissions in the year 2030. These results were analyzed further to identify net ratepayer costs and the cost of carbon reductions.

Minimal rate impact of Target Case: Costs and savings are roughly equal

Revenue Requirements for the Year 2030	
Target Case Costs	+ \$5,300 Million
Target Case Savings	- \$5,500 Million
Reduction in Revenue Required	- \$200 Million
Savings per Megawatt Hour (MWh)	- \$0.6/MWh
Percent of 2012 rates	- 0.4%

Costs: capital expenditure, fixed operation and maintenance, energy efficiency and demand response program costs, and capacity payments. Savings: fuel, variable operation and maintenance, and carbon credit costs.
All costs and savings calculated relative to the Baseline Case.

Phase I Production Cost Modeling:

National Renewable Energy Laboratory (NREL)

Phase II Additional Consultation:

GE Energy Consulting
JBS Energy Inc.

Phase II Peer Review

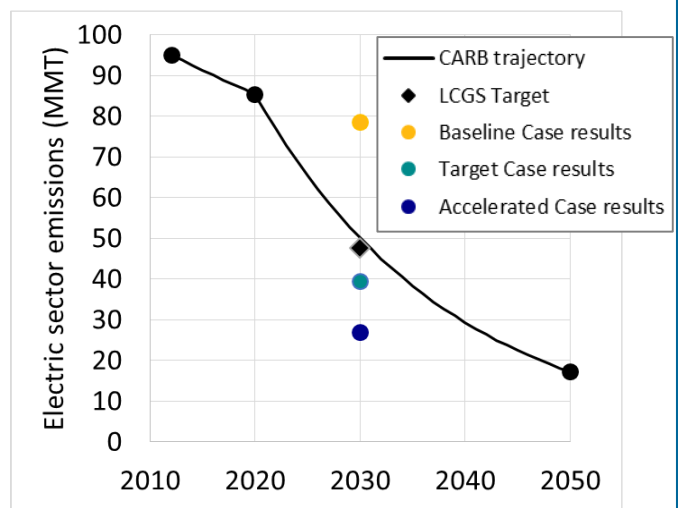
An Independent Technical Review Committee

Phase I & II Funding

Twenty-eight energy companies, organizations & foundations

Emissions results on the trajectory to 2050:

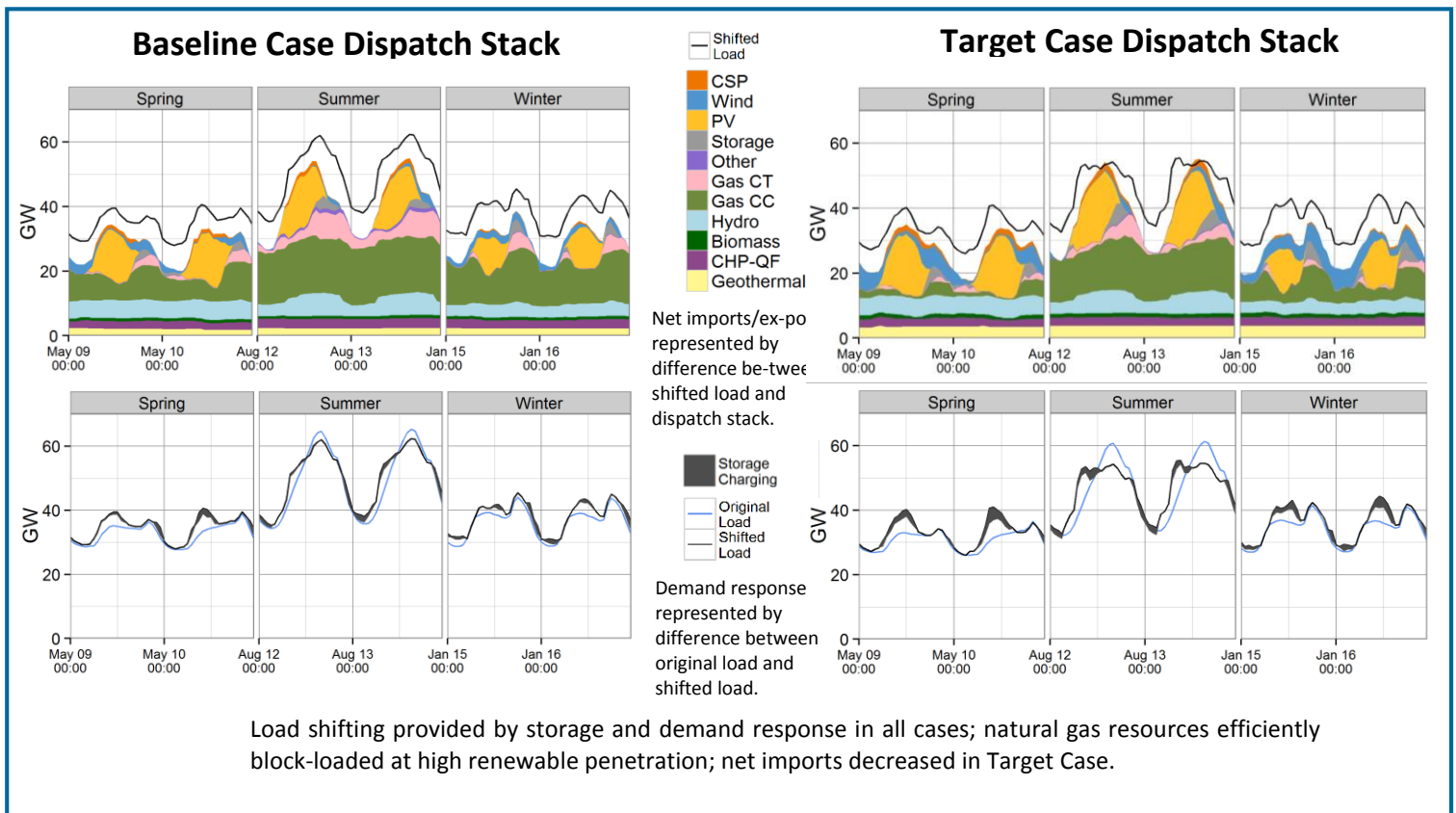
Target and Accelerated Case reductions exceed LCGS goal



Emissions reductions in Baseline and Accelerated Cases exceeded recommendations for reductions needed to be on track for 2050.
Black diamond is LCGS target of 50% below 2012 levels in 2030. Black line represents CARB's constant percentage reductions trajectory from 2020 to 2050.¹

Phase I Results

- Emissions:** Target Case exceeded the LCGS 2030 emissions goal. Accelerated Case demonstrated the ability to achieve deeper reductions to scale toward the 2050 goal.
- Minimal rate impact:** New infrastructure and program costs were balanced by fuel savings from reduced fossil use, efficient use of grid resources, and avoided emissions costs. Utility revenue required to implement the Target Case, compared with the Baseline Case, resulted in no significant rate impact.
- Efficient natural gas use:** Short term system flexibility and regulation was served primarily by imports, exports, demand response, dispatchable hydro, and energy storage. This freed up the natural gas fleet to serve primarily as block-loaded intermediate generation.
- Clean imports:** In 2030, regional trading was mostly renewable, rather than carbon-intensive fossil energy. Annual import quantity was roughly half of today, but import patterns and regional flows were not drastically different from 2013.



Next Steps: Phase II

The second Phase of the LCGS will build off of Phase I results, running sensitivities and scenarios to identify additional ways to achieve deep carbon reduction. Phase II will include input from an independent technical review committee and a robust rate impact analysis will be performed by JBS Energy. Final report expected January 2015.

More information

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