



Workshop on Clean Power Plan Rules and Electricity Topics in the Cap-and-Trade Regulation

December 14, 2015

California Environmental Protection Agency

 **Air Resources Board**

Approximate Schedule

- 9:30-10: Overview and CEQA Scoping Highlight
- 10-11:30: Clean Power Plan Analysis and Options
- 11:30-1: Regional Considerations (Clean Power Plan and Cap-and-Trade)
- 1-1:45: Lunch
- 1:45-3:15: Options for Integrating Federal and State Programs
- 3:15-4:45: Cap-and-Trade Electricity Issues
- 4:45-5: Time for Additional Comments

Environmental Analysis to be Prepared

- Environmental Analysis (EA) developed for proposed actions that may result in significant impacts on the environment.
- EA prepared according to the requirements of ARB's certified program under the California Environmental Quality Act (CEQA).
- The CEQA Environmental Checklist (CEQA Guidelines Appendix G) is used to identify and evaluate potential impacts to the environment.
- ARB will prepare an Environmental Analysis, as an appendix to the Clean Power Plan compliance strategy and the Cap-and-Trade amendments package, according to the requirements of its certified regulatory program under the California Environmental Quality Act (CEQA).
- Because staff currently expects that these two efforts will be closely intertwined, we expect to prepare a single Environmental Analysis that will address both efforts.

Environmental Analysis to be Prepared

- The EA will include:
 - Beneficial impacts
 - Foreseeable methods of compliance
 - Potential for adverse impacts
 - Feasible alternatives and mitigation measures to reduce/avoid significant impacts
- Input welcomed on appropriate scope and content of EA.
- Draft EA will be released for 45 day public comment period.



Clean Power Plan Analysis and Options

December 14, 2015

California Environmental Protection Agency

 **Air Resources Board**

CPP Analytic Requirements Overview

- Core elements are listed in 40 CFR 60.5740 and 40 CFR 60.5745. These include:
 - Identification of affected EGUs
 - Identification of applicable emission standards
 - Identification of applicable state measures and backstop
 - Demonstration that EGUs will achieve all applicable emissions goals
 - Projections of EGU emissions and future operating characteristics
 - Applicable schedules and compliance milestones

Progress to date – Affected EGUs

- All potentially affected EGUs have been contacted and we are reviewing responses.
- We are calculating applicable state targets based on updated EGU list.
- Final EGU list and target will be included for review in state plan submission.

Affected Units

- As of 12/10/15 there are:
 - 93 facilities
 - 240 units
 - 67 companies
 - 36,872 MWs of nameplate capacity
 - ~100 Million MWhs
 - ~43.3 Million MTCO₂

Note: 8 facilities have not responded; ARB is considering them “affected units” at this time.

Affected Units

- Located in 15 different air districts
- Facilities located throughout California
- List is posted on CPP website
- Most facilities are located in:
 - SCAQMD - 69 Units; 23 Facilities
 - SJVAPCD - 46 Units ; 22 Facilities
 - BAAQMD - 31 Units; 12 Facilities
 - MDAQMD - 24 Units; 12 Facilities
 - SDAPCD - 18 Units; 6 Facilities



Progress to date – Compliance Demonstration

- CEC/CPUC/ARB team is considering scenarios for this demonstration.
- Scenarios are likely to be based on those developed in the Integrated Energy Policy Report (IEPR) process now nearing conclusion.
- Modifications may be appropriate to reflect CPP needs, Scoping Plan analyses, SB 350 policies, etc.
- Scenarios and initial results presented today are based on the draft IEPR demand forecasts released earlier this year.

California Energy Demand Forecast Scenarios

The California Energy Demand Forecast includes three cases designed to capture a reasonable range of demand outcomes over the next 10 years:

- The low energy demand case includes lower economic/demographic growth, higher assumed rates, and higher self-generation impacts
- The mid case uses input assumptions at levels between the high and low cases
- The high energy demand case incorporates relatively high economic/demographic growth and climate change impacts, and relatively low electricity rates and self-generation impacts
- A “stress case” scenario is added for purposes of addressing the Clean Power Plan and is not part of the official California Energy Commission demand forecast

Low Demand Case Scenario

Moody's Analytics Below-Trend Long Term Growth Scenarios

- Unemployment rate stays higher than in the baseline, at nearly 6%, until early 2018
- The Eurozone recovery is slower than expected. Gains in U.S. exports are slow
- National light-duty vehicle sales decline to 16.2 million in 2016
- National housing starts decline to 1.3 million units by 2016
- GHG Allowance Price Projection: \$76/ton in 2026
- Natural Gas Price \$6.33 per Thousand Cubic Feet at Malin, Oregon in 2026 (2014 Real Values)
- Oil and gasoline prices are expected to trend higher at just above the overall rate of inflation. Prices are expected to top \$100 per barrel early in the next decade
- The Federal Reserve raises short-term interest rates in the fourth quarter of 2015

Mid Demand Case Scenario

Moody's Analytics Baseline Scenario

- National unemployment rate stays below 5 percent through 2018
- The Federal Reserve will normalize U.S. monetary policy by late 2017, but the European Central Bank will not be able to normalize policy until near decade's end. While the long run fair value euro/dollar exchange rate is an estimated \$1.25, the euro is expected to fall as low as parity with the dollar
- National light-duty vehicle sales are above 16.5 million in 2016
- National housing starts break 1.4 million units by 2016
- Oil and gasoline prices are expected to trend higher at just above the overall rate of inflation. Prices are expected to top \$100 per barrel early in the next decade
- The Federal Reserve raises short-term interest rates in mid-2015

Mid Demand Case Scenario (continued)

Moody's Analytics Baseline Scenario

- Annual growth from 2013–2026 is 1.2 percent
- CED 2014 Mid AAEE Forecast (30,658 GWh by 2026)
- 33% RPS continues through forecast period (78,949 GWh in 2026)
- GHG Allowance Price Projection (\$38/ton in 2026)
- Natural Gas Price \$4.71 per Thousand Cubic Feet at Malin, Oregon in 2026 (2014 Real Value)
- Average Hydro Generation (2000-2013)
- Generate 2030 results by extrapolating average annual growth rate between 2025-2026 simulation results

High Demand Case Scenario

IHS Global Insight Optimistic Scenario

- Unemployment rate falls to 4.1 percent by 2018
- European Central Bank's (ECB) quantitative easing successfully steers the Eurozone away from its current economic malaise. Eurozone growth strengthens more than in the baseline as fiscal conditions improve, credit conditions ease, and pent-up demand is released
- National light-duty vehicles sales reach more than 18.2 million in 2016
- National housing starts break 1.4 million units by 2016
- GHG Allowance Price Projection (\$25/ton in 2026)
- Natural Gas Price \$3.79 per Thousand Cubic Feet at Malin, Oregon in 2026 (2014 Real Value)
- The current drivers of the oil price decline continue: OPEC producers protecting market share, U.S. production gains continue, and non-U.S. economic growth improves. Oil prices start to pick up gradually, starting in late 2015
- Federal Reserve raises short-term interest rates in the second half of 2015

Stress Case Scenario

Drought Hydroelectric Conditions and Diablo Canyon Nuclear Generation Plant Retires

- Developed to identify a worst-case emissions scenario. Assumptions still under discussion.
- Based on Preliminary High Demand Scenario - California Energy Commission Preliminary CED 2015-2026 with Modifications:
 - High Economic and Demographic Growth
 - Lower Electricity Rates
 - Lower self-generation impacts
 - Strong climate change impacts and
 - More electrification
- Annual growth from 2013–2026 for the CED 2015 Preliminary High Demand Case is 1.45 percent

Stress Case Scenario (continued)

- CED 2014 Low AAEE Forecast (17,980 GWh by 2026)
- 33% RPS continues through forecast period (89,711 GWh in 2026)
- GHG Allowance Price Projection (\$25/ton in 2026)
- Natural Gas Price \$3.79 per Thousand Cubic Feet at Malin, Oregon in 2026 (2014 Real Value)
- Ratio of 2013 actual to average 2000-2013 hydro generation (~32% decrease in annual hydro generation)
- License Expires in 2025 for both units at Diablo Canyon Nuclear Generating Station
- Generate 2030 results by extrapolating average annual growth rate between 2025-2026 simulation results

Transportation Electrification

- Transportation electrification is primarily driven by growth in the light duty vehicle sector
- In the mid and high energy demand cases Plug-in Electric Vehicles (PEV) will exceed the PEVs in the ARB's Zero Emission Vehicles (ZEV) most likely scenario, to 2026
- In the low energy demand case, PEV demand falls below the ARB's ZEV most likely scenario after 2022
- Accordingly, IEPR-based results bracket the "most likely" scenario.

Drivers & Assumptions: ZEV

- ZEV vehicle prices converge with gasoline vehicle prices in 2030, in the high demand case, and in 2050 in the mid demand case
- In the low demand case, ZEV vehicle price increments, over gasoline vehicles, remains the same to 2026
- “ARB’s ZEV regulation compliance scenarios do not consider vehicle prices explicitly, but instead project possible vehicle technology sales that result in compliance with the regulation”
- Consumer preferences for ZEV vehicles continue to increase over time, in the mid and high energy demand cases
- Current Federal and state purchase incentives remain in place to 2026
- ARB ZEV regulations apply to automakers offering vehicles for sale in California market

Clean Power Plan Forecast

- Uses the CEC PLEXOS model of the power grid to forecast the generation and emissions of included units.
- Included units are removed from the model based on known shutdown/retirement dates or based on unit age (40+ year old units are assumed to retire).
- On-site consumption of generation (excluded by PLEXOS) is added using CEC 2014 generation and PLEXOS emission factors.
- Useful Thermal Output (UTO), cogeneration heat not used for generation, is included using EIA 2014 data and Mandatory Reporting Regulation (MRR) emission factors.
- Finally, the few units missing from PLEXOS but included in the CPP are added in based on EIA 2014 data & MRR EFs.

Initial Results

- Staff continue to review model run results.
- Initial results for both mid and stress cases confirm CA compliance in 2030 with CPP. CA emissions appear to be well below (~10 or more million short tons (MST)) below federal targets for some plausible policy cases, and compliance is maintained even in the stress case.
- Note that final 2030 target – now ~48.4 MST according to EPA -- will increase from EPA target as affected EGU list grows. Calculations are based on expanded EGU list.
- Stress case results in 2030 indicate emissions of ~48-49 MST.
- Mid-case results in 2030 indicate emissions of ~26-29 MST.
- Further results will be released as appropriate.

Leakage Demonstration

- US EPA generally requires state plans to address potential for emissions “leakage” to new sources. (40 CFR 60.5790).
- California covers new and existing sources under the Cap-and-Trade Regulation, so all units face the same state-level price signals for emissions.
- Economic implication is that there is no incentive for leakage.
- Other options identified by EPA include a “new source complement” or allocation methodologies.

Next Steps and Areas for Comment

- Modeling and analysis will continue in 2016.
- Stakeholder feedback sought on issues including:
 - Appropriate scenarios, sensitivities, and assumptions for the CPP demonstration
 - Components of stress and policy cases
 - Role of SB 350 and other post-2020 policies in demonstrations
 - Contents of leakage demonstration (and any other tools needed to address market dynamics)
 - Sensitivities and analyses to address regional issues