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CEC Demand Scenarios Project

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History

- CEC Assessments Division has periodically undertaken projects using a scenario approach rather than a forecasting approach.

- Like most such projects, these efforts have addressed a speculative topic striving to achieve insights rather than being the basis for resource procurement decision-making.

- Not infrequently, these efforts have also utilized a consultant to perform much of the analysis rather than developing CEC staff skills and capabilities.

What is Different Now?

- California policymakers are generally in agreement that massive reductions in GHG emissions are needed by mid-century.
- Since GHG emissions are largely a result of burning carbon-based fuels, a major reduction in GHG emissions means a large shift from high carbon fuels to low- or no-carbon energy forms.
- Although GHG emission inventories reveal that most GHG emissions result from final end-user energy consumption, substantial energy is used extracting, transforming, transmitting, and distributing energy to end-users.
- Understanding energy demand and the pattern of change from one energy form to another is critical to assuring reliability for each energy form.

Demand Scenarios Project

- CEC management has directed EAD staff to develop an ongoing demand scenarios assessment capability within EAD
- The scope includes:
  - Developing demand scenarios
  - Assessing these in both final demand and supply-side dimensions
  - Developing key insights
  - Communicating results to sister agencies and stakeholders
  - Adapting methods through time in response to sister agency needs
- This capability will develop a product each biennial IEPR cycle, and may become adopted similar to demand forecasts

Focus for 2021 IEPR

- Develop and assess scenarios stressing a high electrification theme

- Adapt/create modeling capabilities that can assess scenario consequences:
  - Through time out to 2050
  - Annual time interval, but hourly 8760 load impacts needed for electric generation sector assessments
  - Geographically disaggregated to planning area and/or major utility
  - Address all significant energy fuel types
  - Compute GHG consequences

- Build off of existing demand forecasting models, ancillary projections tools developed for AAEE and AB 3232 fuel substitution assessments and rely on E3's PATHWAYS model for other sectors/fuels

Our Aspiration

- Develop and assess scenarios explicitly quantifying impacts of programs, standards, and policies impacting energy demand by, and GHG emissions from, selected customer sectors

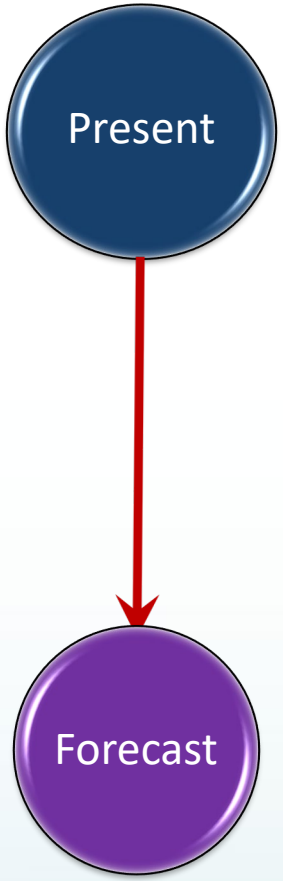
- Understand what existing programs, standards, and policies are expected to achieve, and compare these results to our goals

- Contribute to thoughtful development of additional policy initiatives to “close the gap”

Forecasts Vs Scenarios

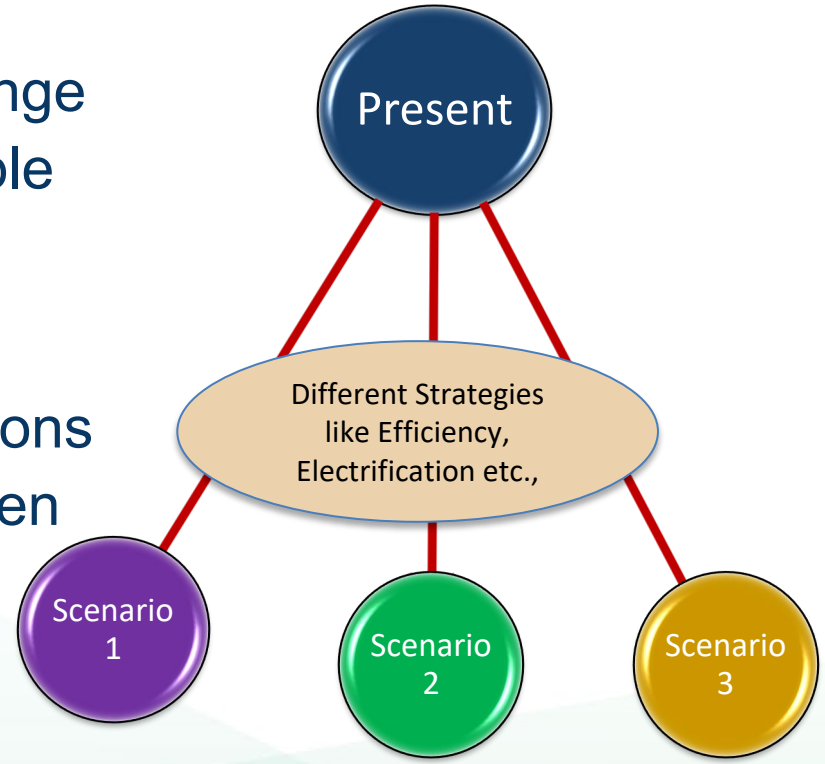
Forecasts

- Forecasting attempts to predict a likely future.
- Forecast includes factors such as economic/ demographic projections, impacts of market policies, and trends.



Scenarios

- Scenarios look at a range of potential and possible futures.
- Scenarios help to understand the deviations and divergence between each possible future.



CEC Demand Scenarios Overview

- **Purpose:** Scenarios enable more comprehensive examination of demand-side fuel shifts, supply-side consequences of demand changes.
- **Time Horizon:** Our Scenarios will extend to 2050.
- **Scope:** Our Scenarios will reflect a full set of fuel types.
- **Number:** Three primary Scenarios which enable a more complete assessment of uncertainties.
- **Methods:** Using managed mid demand forecast and load modifier projection tools for this analysis.

CEC Demand Scenario Process

- Demand Scenarios Process will focus on the high degrees of electrification.
- We produce alternative demand projections using combinations of energy efficiency and fuel substitution programs to modify baseline demand forecast.
- The outputs of this process is modified energy consumption projections and corresponding GHG emissions by sector.

Why are Demand Scenario Assessments Needed?

- Clear need for objective, independent information that convey a range of solution sets that can achieve California's energy and GHG emission reduction goals.

- Provides a sense of how easy or difficult it may be for each sector to achieve those goals.

- Provides insights into where incentives or programs need to be targeted.

Proposed Scenario Types

- **Reference Scenario by IEPR Vintage**
  - This is a business-as-usual scenario using the same core assumptions as the CEC adopted, managed Mid-Mid demand forecast through 2035.
  - Beyond 2035, this Scenario assumes continuation of the same set of standards, programs, and policies reflected in the CEC adopted managed demand forecast with the same degree of compliance.
- **Policy/Compliance Scenario**
  - Serve as sensitivities to Reference Scenario by testing varying degrees of compliance with the same set of standards, programs, and policies, or aspirational policies not yet enacted.
- **Mitigation Scenario**
  - Adds additional standards, programs, policies and what-if assumptions with impacts beyond those already included in the Policy/Compliance Scenario.
  - Reflects incremental impacts (e.g., cost and GHG emissions) relative to the previous Scenarios.

Scenario Framework For 2021 IEPR

Sectors	Inputs		Electricity	Natural Gas	Traditional Fuels In Transportation	Traditional Fuels Outside Transportation
Residential/Commercial	Baseline Forecast		2021 IEPR Mid Residential/ Commercial Forecast		N/A	PATHWAYS Variables
	Energy Efficiency Impacts		AAEE /AAFS Programmatic Tool		N/A	
	Fuel Substitution	Programmatic Impacts	AAEE /AAFS Programmatic Tool		N/A	
		Speculative Impacts	FSSAT		N/A	
Transportation	Baseline Forecast		2021 IEPR Mid Transportation Forecast			N/A
Other Sectors (Industrial, O&G, Agriculture, Petroleum Refining, TCU)	PATHWAYS Model		PATHWAYS Variables		N/A	PATHWAYS Variables

Preliminary Reference Scenario Design

Sectors	Inputs		Electricity	Natural Gas	Traditional Fuels In Transportation	Traditional Fuels Outside Transportation
Residential/Commercial	Baseline Forecast		2021 IEPR Mid Residential/ Commercial Forecast	2021 IEPR Mid Residential/ Commercial Forecast	N/A	PATHWAYS Variables
	AAEE (Programmatic Contributions From EE/FS Tool)		Mid- Mid Business-As-Usual BAU (Scenario 3)		N/A	PATHWAYS Variables
	AAFS	Programmatic Contributions From EE/FS Tool	Mid- Mid Business-As-Usual BAU (Scenario 3)		N/A	PATHWAYS Variables
		Speculative FSSAT Contribution	None		N/A	
Transportation	Baseline Forecast		2021 IEPR Mid Transportation Forecast	2021 IEPR Mid Transportation Forecast	2021 IEPR Mid Transportation Forecast	N/A
Other Sectors (Industrial, O&G, Agriculture, Petroleum Refining, TCU)	PATHWAYS Model		PATHWAYS Variables	PATHWAYS Variables	N/A	PATHWAYS Variables

Preliminary High Electrification Policy/Compliance Scenario Design

Sectors	Inputs		Electricity	Natural Gas	Traditional Fuels In Transportation	Traditional Fuels Outside Transportation
Residential/Commercial	Baseline Forecast		2021 IEPR Mid Residential/ Commercial Forecast	2021 IEPR Mid Residential/ Commercial Forecast	N/A	PATHWAYS Variables
	AAEE (Programmatic Contributions From EE/FS Tool)		Mid-High or Very High (Scenario 4 or 5)	Mid -High or Very High (Scenario 4 or 5)	N/A	PATHWAYS Variables
	AAFS	Programmatic Contributions from EE/FS tool	Mid -High or Very High (Scenario 4 or 5)		N/A	PATHWAYS Variables
		Speculative FSSAT Contribution	TBD (Add more speculative but possibly achievable NC, ROB, RET FS % based on programs proposed and pending development)		N/A	
Transportation	Baseline Forecast		2021 IEPR Mid Transportation Forecast	2021 IEPR Mid Transportation Forecast	2021 IEPR Mid Transportation Forecast	N/A
	CARB State SIP Strategy (ACC II for LDV, ACF for MD-HD)		Incremental Impacts Beyond Reference Scenario	Incremental Impacts Beyond Reference Scenario	Incremental Impacts Beyond Reference Scenario	
Other Sectors (Industrial, O&G, Agriculture, Petroleum Refining, TCU)	PATHWAYS Model		PATHWAYS Variables	PATHWAYS Variables	N/A	PATHWAYS Variables

Preliminary High Electrification Mitigation Scenario Design

Sectors	Inputs		Electricity	Natural Gas	Traditional Fuels In Transportation	Traditional Fuels Outside Transportation
Residential/Commercial	Baseline Forecast		2021 IEPR Mid Residential/ Commercial Forecast	2021 IEPR Mid Residential/ Commercial Forecast	N/A	PATHWAYS Variables
	AAEE (Programmatic Contributions From EE/FS Tool)		Mid - High Plus (Scenario 6)	Mid -High (Scenario 4)	N/A	PATHWAYS Variables
	AAFS	Programmatic Contributions From EE/FS Tool	Mid -High Plus (Scenario 6)		N/A	PATHWAYS Variables
		Speculative FSSAT Contribution	TBD		N/A	
Transportation	Baseline Forecast		2021 IEPR Transportation Forecast	2021 IEPR Transportation Forecast	2021 IEPR Transportation Forecast	N/A
	CARB Mobile Source Strategy (Default Case)		Incremental Requirements Beyond Policy/Compliance Scenario	Incremental Requirements Beyond Policy/Compliance Scenario	Incremental Requirements Beyond Policy/Compliance Scenario	
Other Sectors (Industrial, O&G, Agriculture, Petroleum Refining, TCU)	PATHWAYS Model		PATHWAYS Variables	PATHWAYS Variables	N/A	PATHWAYS Variables

IEPR Timeline (Demand Scenarios)

- September 15th: Demand Scenarios Project Overview & Framework DAWG
- December 2nd: IEPR Commissioner workshop on Demand Scenarios Project Overview & Framework
- March 2022: IEPR Commissioner workshop on Demand Scenarios Inputs, Assumptions & Results

Questions?