DEMAND ANALYSIS WORKING GROUP (DAWG)

Demand Scenarios

Introduction

Anitha Rednam, P.E.

Energy Assessments Division/Demand Analysis Office

September 15, 2021

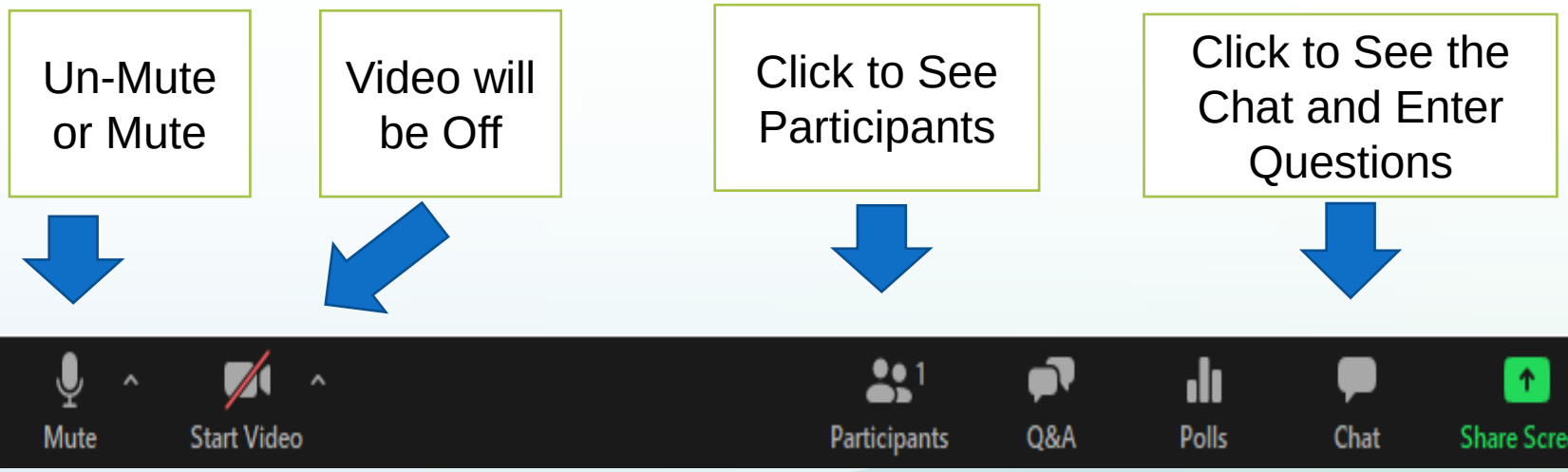
Remote-Only Format

In compliance with Governor Newsom's Executive Orders N-25-20 and N-29-20, and the recommendations from California Department of Public Health, we are utilizing a remote-only format today.

Materials are posted at CEC DAWG webpage

Housekeeping: Zoom Overview

- Everyone will be muted by default
- Questions/Comments
  - Please submit questions in the chat box and we will address them after the presentation during the discussion
  - Please include your name and the slide number
  - We will call on stakeholders by name and unmute them so they may ask a question after the presentation is completed.



Objective Of Today's DAWG Meeting

- Overview of Demand Scenarios Project
- Showcase the new Demand Scenarios Framework being developed for the 2021 IEPR by Demand Analysis Office (DAO) Staff and Consultants.
- The Demand Scenarios Framework focuses on the High Electrification theme for:
  - Reference Scenario
  - Policy - Compliance Scenario
  - Mitigation Scenario
- AAEE, AAFS, Transportation Demand Scenario Development.

IEPR Timeline (Demand Scenarios)

- September 9th: DAWG meeting on AAEE and AAFS Preliminary Scenario Designs
- **Today (September 15th)**: **Demand Scenarios Project Overview & Framework DAWG**
- Late-September: DAWG meeting on AAEE and AAFS – Preliminary Results
- December 16: IEPR Commissioner workshop on Demand Scenarios Inputs, Assumptions & Results

Meeting Agenda

Topic	Time	Facilitator
Introductions	9:30 to 9:40	Anitha Rednam Energy Commission
Rationale For Demand Scenarios	9:40 to 9:55	Mike Jaske Energy Commission
Overview Of Demand Scenarios Project	9:55 to 10:25	Anitha Rednam Energy Commission
Discussion	10:25 to 10:45	All Participants
Break	10:45 to 11:00	--
AAEE & AAFS Scenario Development and Deployment	11:00 to 11:30	Ingrid Neumann Energy Commission
Transportation Demand Scenarios	11:30 to 12:00	Quentin Gee Energy Commission
Wrap-up Discussion & Comments	12:00 to 12:30	All Participants

Rationale for Demand Scenarios
DAWG Meeting

Mike Jaske

September 15, 2021

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 a demand scenarios assessment capability

- 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

- This project will develop a product each biennial IEPR cycle, and may become adopted as are 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

- Understanding what existing programs, standards, and policies are expected to achieve, and comparing these results to our goals, is essential to thoughtful development of additional policy initiatives to “close the gap”

Demand Scenarios Project Overview

Anitha Rednam, P.E.

Energy Assessments Division/Demand Analysis Office

September 15, 2021

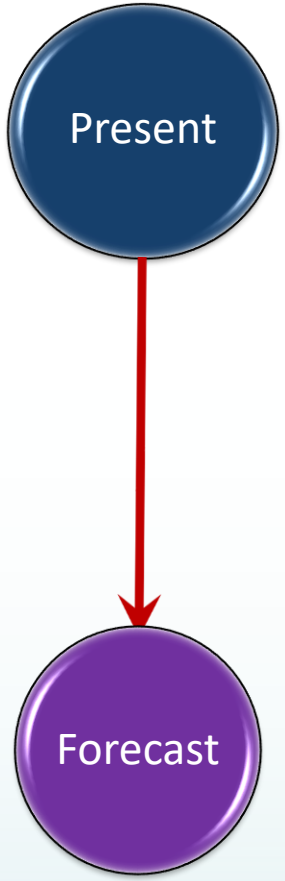
Presentation Outline

- Forecasts Vs Scenarios
- CEC Demand Scenarios Overview
- CEC Demand Scenario Process
- Why are Demand Scenario Assessments needed?
- Goals for Scenario Assessment
- Types of Scenarios
- Scenario Design Process
- Framework

Forecasts Vs Scenarios

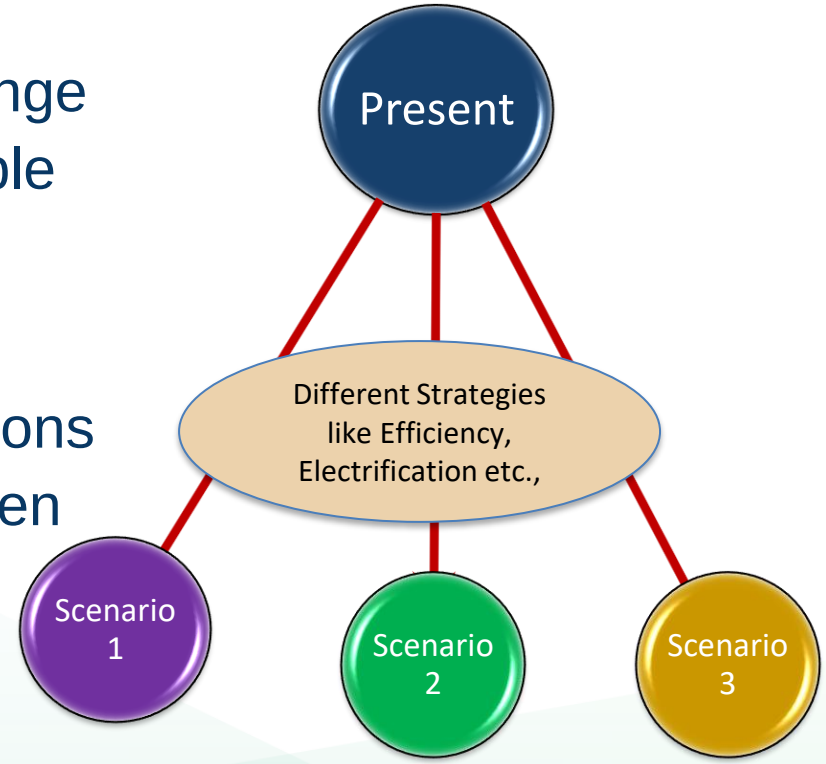
Forecasts

- 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 modified 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.

Our Goals for Demand Scenario Assessment

- Long-term scenario assessment to more explicitly identify energy consequences and GHG emission reductions from existing and near-term policies rather than assumptions required to meet CARB economy-wide goals.

- Demand Scenarios project will develop a product each biennial IEPR cycle, and may become adopted as are demand forecasts.

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.
  - Serves as reference against which Policy/Compliance Scenario and Mitigation Scenarios are assessed.
- **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 Design For 2021 IEPR

- Sectors Assessed By CEC
  - Residential (E& NG)
  - Commercial (E&NG)
  - Transportation (All Fuels)
- Sectors Assessed by E3 (All Fuels)
  - Industrial
  - Agriculture
  - Oil & Gas
  - Petroleum Refining
  - TCU
  - BTM PV
  - BTM CHP
- Outside Scope of Work
  - Load Flexibility
  - Demand Response

Framework for Designing Reference Scenario

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

Framework for Designing Policy/Compliance - High Electrification Scenario

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

Framework for Designing Mitigation – High Electrification Scenario

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)			PATHWAYS Variables
		Speculative FSSAT Contribution	TBD (Add more speculative but technically achievable NC, ROB, RETFS % to meet minimum AB 3232 goals (if not meet in previous scenarios) and/or Res/Com portions of economywide mid-century GHG reduction goals.)		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

Questions?