DOCKETED	
Docket Number:	21-ESR-01
Project Title:	Energy System Reliability
TN #:	249905
Document Title:	Presentation - SB 846 Load Shift Goal - Lead Commissioner Workshop
Description:	Presentation slides from SB 846 Load Shift Goal Workshop
Filer:	Cynthia Rogers
Organization:	California Energy Commission
Submitter Role:	Commission Staff
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Docketed Date:	4/28/2023

SB 846 Load Shift Goal Lead Commissioner Workshop

April 19, 2023

Housekeeping

- This is a remote workshop and is being recorded. The recording will be available at CEC Docket 21-ESR-01 a few days after the workshop.

- You can participate in this workshop through Zoom -
  - For participants using the Zoom computer platform, please use the “raise hand” or Q&A feature to ask questions.
  - For telephone participants – please press *9 to raise your hand and press *6 to mute/unmute.

Housekeeping (part 2)

- The docket for this workshop proceeding is CEC Docket No. 21-ESR-01.
- Public Comments are due 5:00 pm on or before May 3, 2023.
- Documents and presentations for this workshop are available at CEC Docket No. 21-ESR-01.

April 19, 2023 9:30 a.m. – 12:30 p.m.

Remote via Zoom

Welcome - *Cynthia Rogers, CEC* (5 minutes)

Opening Comments from the Dais (20 minutes)

Vice Chair Siva Gunda, CEC

Advisor to Commissioner McAllister, David Johnson, CEC

President Alice Reynolds, CPUC

Commissioner John Reynolds, CPUC

Commissioner Karen Douglas, CPUC

Vice President, Anna McKenna, California ISO

Introduction & Context within SB 846 and Demand Flexibility – *David Erne, CEC* (20 minutes)

April 19, 2023 9:30 a.m. – 12:30 p.m. (part 2)

Remote via Zoom

Goal Setting Framework & Demand Flexibility Analysis – *Ingrid Neumann, CEC* (30 minutes)

Dais Discussion (20 minutes)

Q&A: Brian Samuelson, CEC (Zoom) (5 minutes)

Proposed Goal & Policy Recommendations – *Erik Lyon, CEC* (20 minutes)

Daniel Buch, CPUC (10 minutes)

Cristy Sanada, California ISO (10 minutes)

Dais Discussion (20 minutes)

Q&A: Brian Samuelson, CEC (Zoom) (5 minutes)

Public Comments (5 minutes)

Closing Remarks & Adjourn (5 minutes)

Opening Comments from the Dais

Introduction & Context within SB 846 and Demand Flexibility

David Erne, Deputy Director, Energy Assessments Division

CEC has Multiple Responsibilities in Reliability and Clean Energy

Assembly Bill 205

- Strategic Reliability Reserve Fund
  - Distributed Electricity Assets Program
  - Demand Side Grid Support Program
  - Certification of DWR SRR Facilities
- Opt-In Permitting
- Long-Duration Energy Storage
- Summer 2022 Reliability Report

Assembly Bill 209

- Planning Reserve Margin
- Climate Innovation Program
- Clean Energy Programs
- Offshore Wind Infrastructure

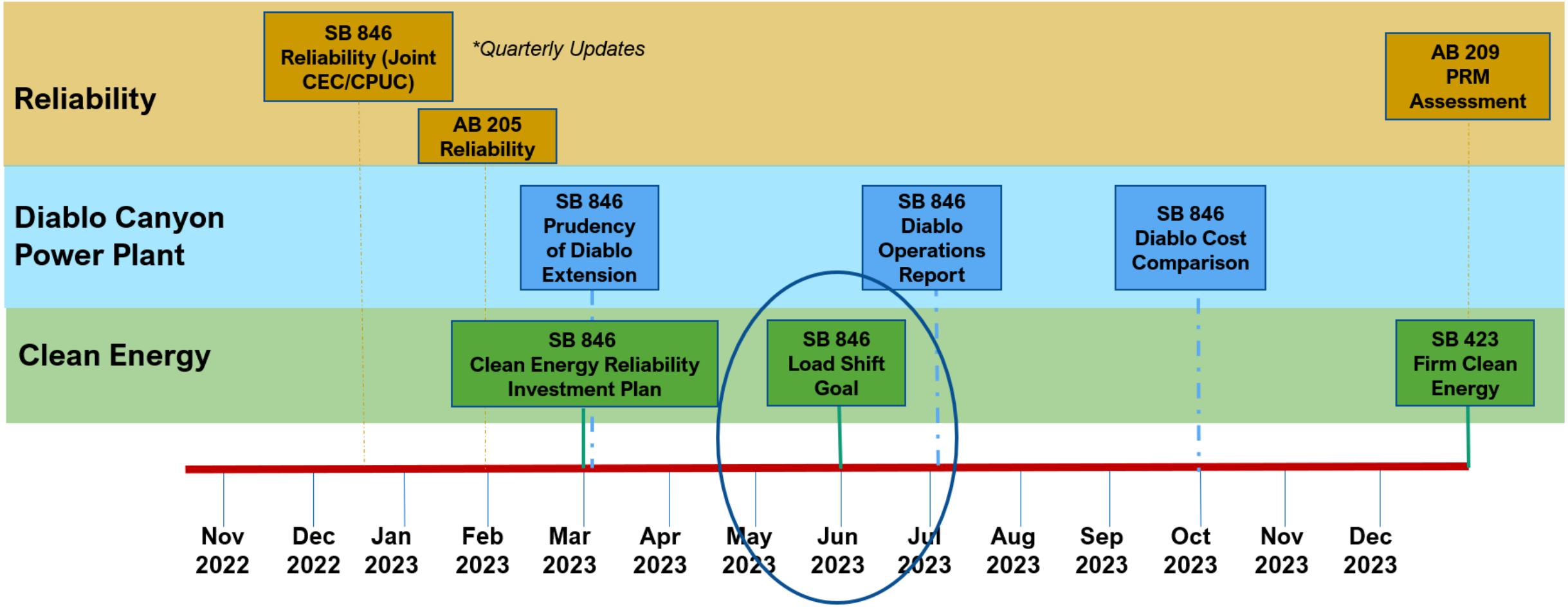
Senate Bill 846

- Reliability Planning Assessment
- Clean Energy Reliability Investment Plan (CERIP)
- Determination on the Need for Extension of Diablo Canyon
- Report on Diablo Canyon Operations
- Load Shift Goal and Policies
- Cost Comparison of Diablo Canyon
- Reevaluating Cost Effectiveness of Diablo Canyon

Senate Bill 423

- Report on Firm, Zero-carbon Resources

Analytical Report Timelines



Three Reliability Challenges

- **Planning Processes**
  - Improve ability to account for climate change-induced weather variability
  - Ensure timely and sufficient procurement across all jurisdictions
  - Improve processes associated with interconnection and permitting

- **Scaling Resources**
  - Expand diversity of resources
    - Demand-side (e.g., more demand flexibility)
    - Supply-side (e.g., long-lead resources)

- **Extreme Events**
  - Augment Strategic Reliability Reserve

State Processes Authorize Major Procurements

- **CPUC Integrated Resource Planning authorizes procurement**
  - Unprecedent 11.5 GWs authorized in 2021
  - Added 4,000 MWs in 2023

- **CPUC, CEC, & CAISO continually assess the reliability**
- Preliminarily analysis – 2023 & 2024 levels of procurement meet a 1-in-10 LOLE
  - Agencies continuing to improve
    - Evaluating climate impacts on demand and supply
    - Taking active steps to ensure timely and appropriate levels of procurement

Challenges Remain to Timely Deployment of Authorized Resources

- Success requires record resource build rates, which are impacted by:
  - Supply chain vulnerabilities
  - Interconnection and permitting delays
  - Increasing prices and competition for equipment
- Uncertainties in availability of existing resources
  - Hydro
  - West-wide tight RA market

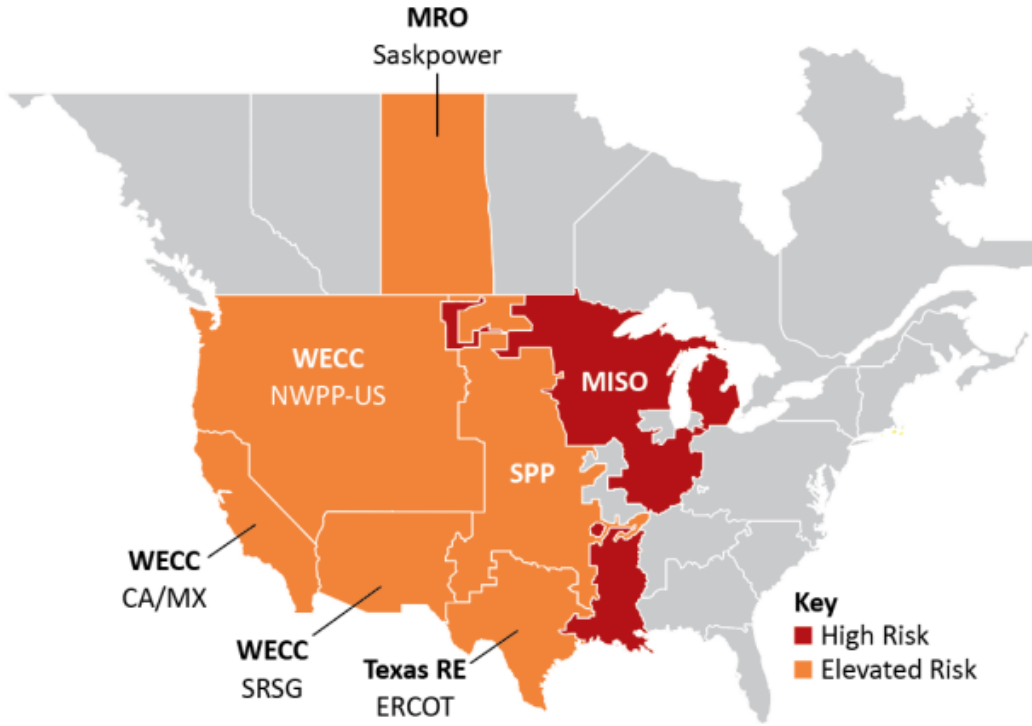
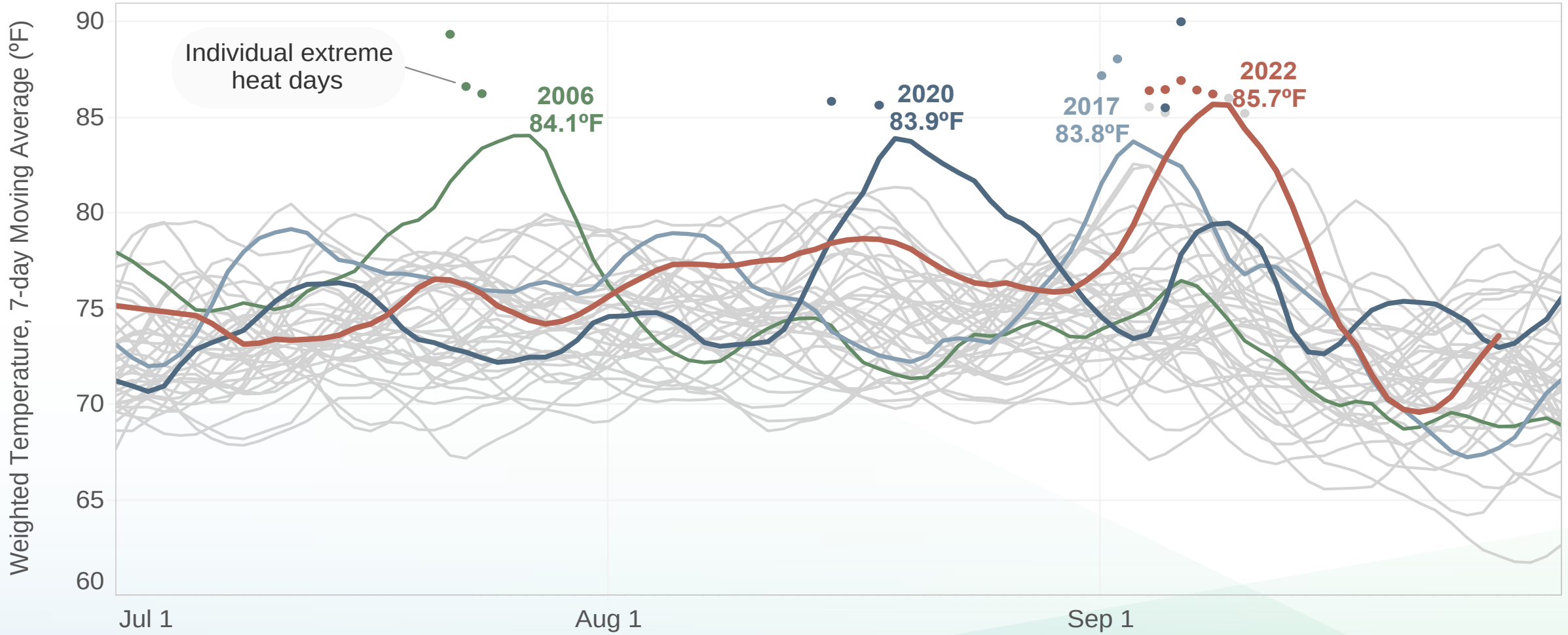


Figure 1: Summer Reliability Risk Area Summary

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in above-normal conditions
Low	Sufficient operating reserves expected

Source: NERC 2022 Summer Reliability Assessment

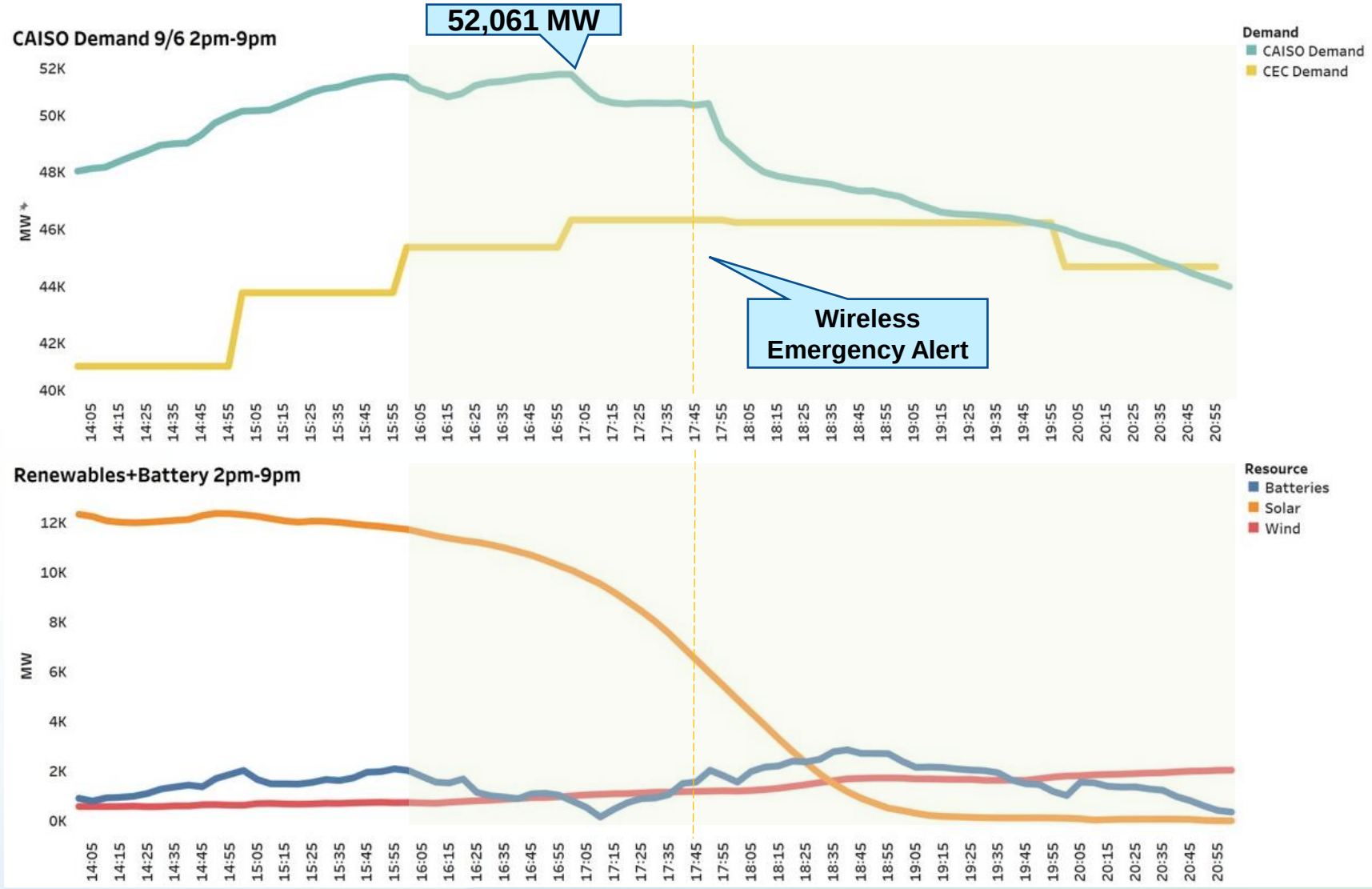
September 2022 Heat Wave



Composite Statewide Temperature 7-day Moving Average, Summers 1985–2022

Source: CEC Staff Analysis

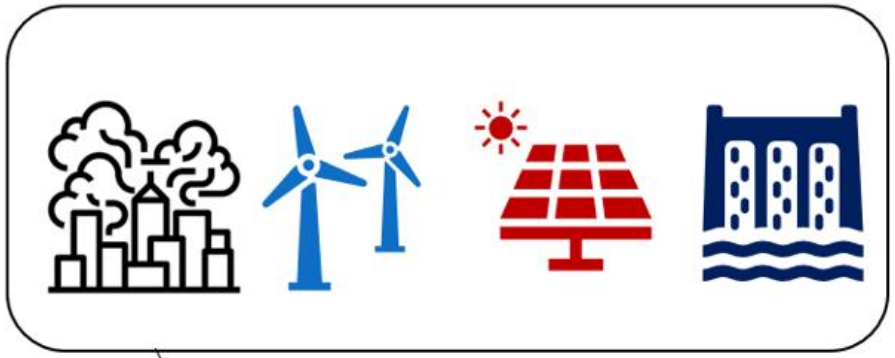
September 6 Demand and Generation



SB 846 Load Shift Goal Requirement

- Adopt a goal for load shifting to reduce net peak electrical demand
  - In consultation with CAISO and CPUC
- Adjust this target in each biennial IEPR
- Consider findings of the 2020 Lawrence Berkeley National Laboratory report on the Shift Resource through 2030 and other relevant research
- Recommend policies to increase demand response and load shifting that do not increase greenhouse gas emissions or increase electric rates.

CA Load Flexibility Ecosystem



CEC - Load Management Standards (LMS)
CPUC - California Flexible Unified Signal for Energy (CalFUSE)

Market Informed Demand Automation Server (MIDAS)

Automation Service Providers

Flexible Demand Appliance Standards (FDAS)

Proposed Clean Energy Reliability Investment Plan Funding Initiatives

Enabling Investments

- Transmission Planning
- Community Engagement
- Standup Central Procurement Function
- Interconnection/Permitting

Scaling Demand-side Resources

- Examples
  - Demand Flexibility
  - Clean Distributed Generation
  - Vehicle-grid Integration & Vehicle to Building
  - Innovation Grants

Augmenting for Extreme Events

- Augment Demand-side Grid Support & Distributed Energy Backup Assets Programs

Scaling Supply-side Resources

- Scale Technologies
- Expand Long-duration Storage
- Cost-share Grants

Proposed Funding by Priority

Funding Priority	Proposed Funding			
	23/24	24/25	25/26	Total
Enabling Investments	$57	$5	$5	$67
Scaling Demand-side Resources	$0	$175	$270	$445
Scaling Supply-side Resources	$0	$150	$150	$300
Augmenting for Extreme Events	$33	$50	$50	$133
Administration	$10	$20	$25	$55M
Total	**$100**	**$400**	**$500**	**$1,000M**

Upcoming Reliability Activities

- **2023 Integrated Energy Policy Report**
  - Addressing interconnection issues
  - Initial workshops in May

- **May Reliability Workshop**

1. Goal Setting Framework

Ingrid Neumann, PhD
Decarbonization Principal, AEAB-Energy Assessments Division

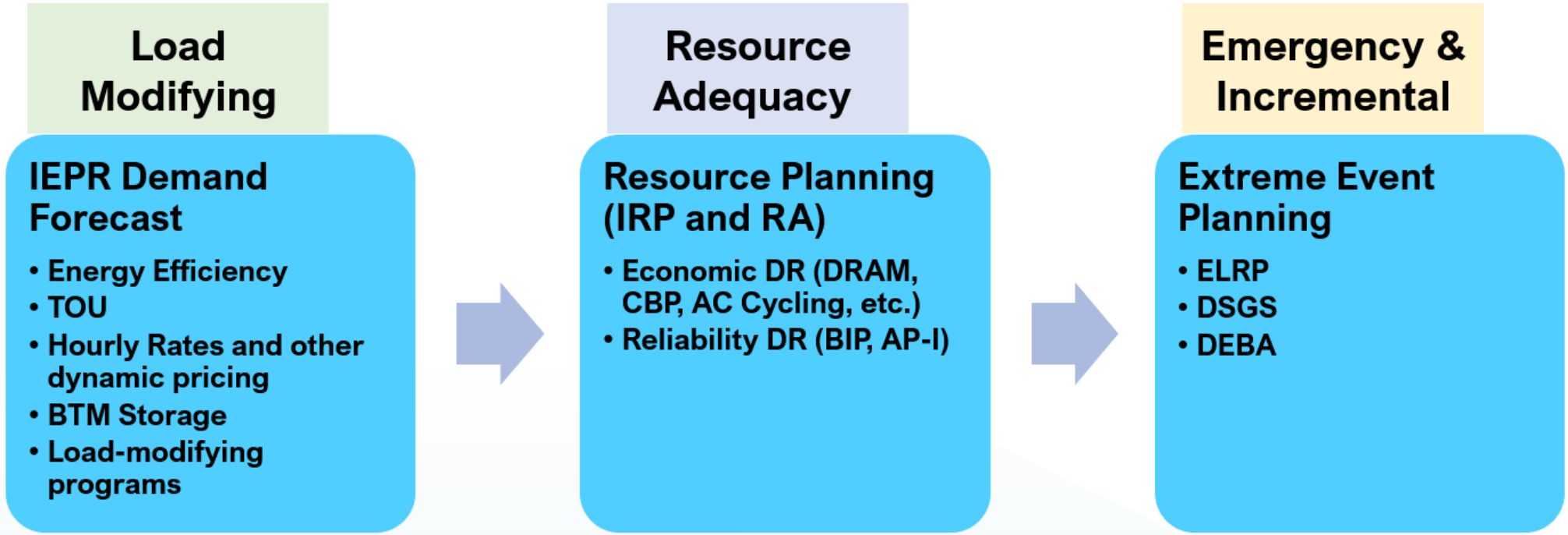
Statewide Goal for 2030

The purpose of which is to drive efforts and advance the policy recommendations under concurrent development.

- Goal will be updated every odd year (2025, 2027, etc.)
- Analysis will extend to 2050

Consider GW of capacity that can be shifted away from "System Net Peak hours"

Demand Side Resources Across Planning Processes



Demand Flexibility Categories

Core Planning

Category	Intervention
Load Modifying	TOU Rates
	Dynamic Pricing
	Programs Optimizing Load
Resource Adequacy	Economic Supply-side DR (PDR)
	Reliability Supply-Side DR (RDRR)
Emergency & Incremental	Emergency-Only Programs
	Back-Up Generators

Demand Flexibility Categories (part 2)

Current status

Core Planning

Category	Intervention	2022 Estimate
Load Modifying	TOU Rates	1,200 MW
	Dynamic Pricing	30 MW
	Programs Optimizing Load	7 MW
Resource Adequacy	Economic Supply-side DR (PDR)	825 MW
	Reliability Supply-Side DR (RDRR)	740 MW
Emergency & Incremental	Emergency-Only Programs (ELRP, DSGS)	800 MW
	Back-Up Generators*	375 MW*
Total (nearest hundred)		**3,600 MW**

**Back-up generators are part of the emergency framework but are not considered true load flexibility. This capacity is not included in load flexibility totals.*

2. Demand Flexibility Analysis

Definitions and Key Assumptions

For an analysis of the possible…

Definitions

Consider GW of capacity that can be shifted away from “System Net Peak hours”

“System Net Peak hours” = top 100 net hours annually

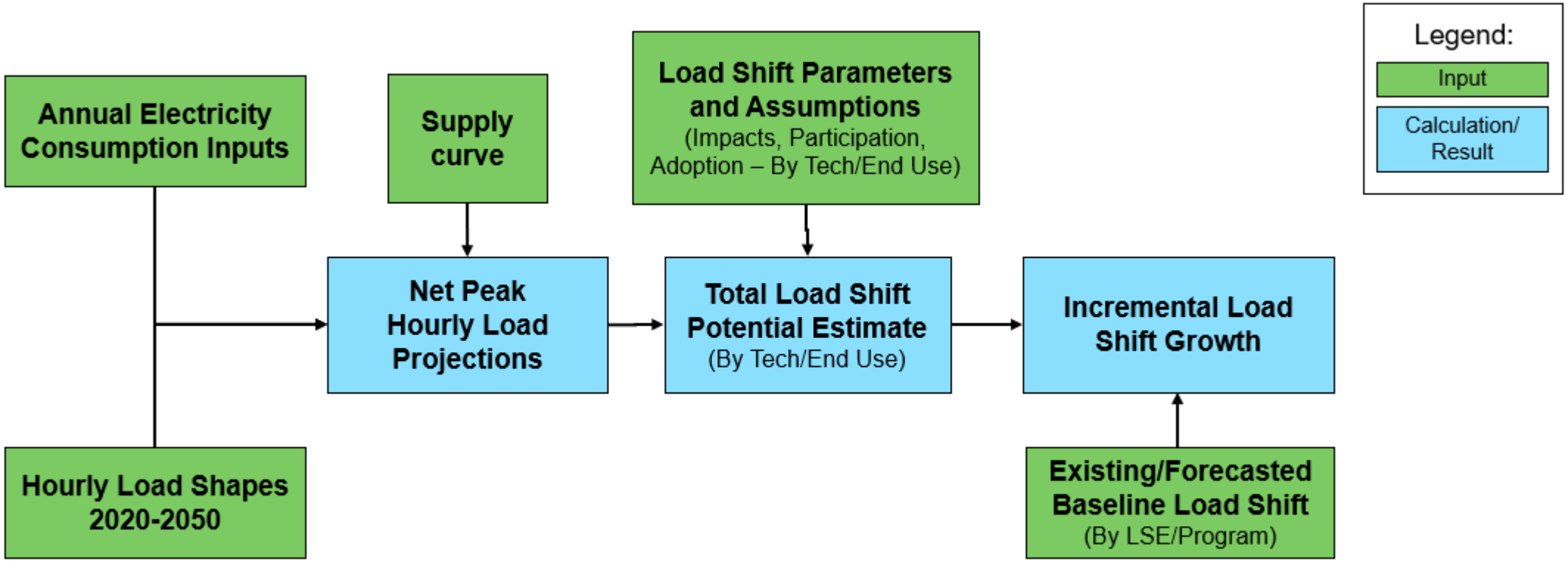
Gross 8760 = Baseline Consumption modified by Transportation and Building Electrification as well as Building EE

Net 8760 = Gross 8760 adjusted by BTM Storage and PV, as well as Utility Scale Wind and Solar Generation

Load Shift Flowchart

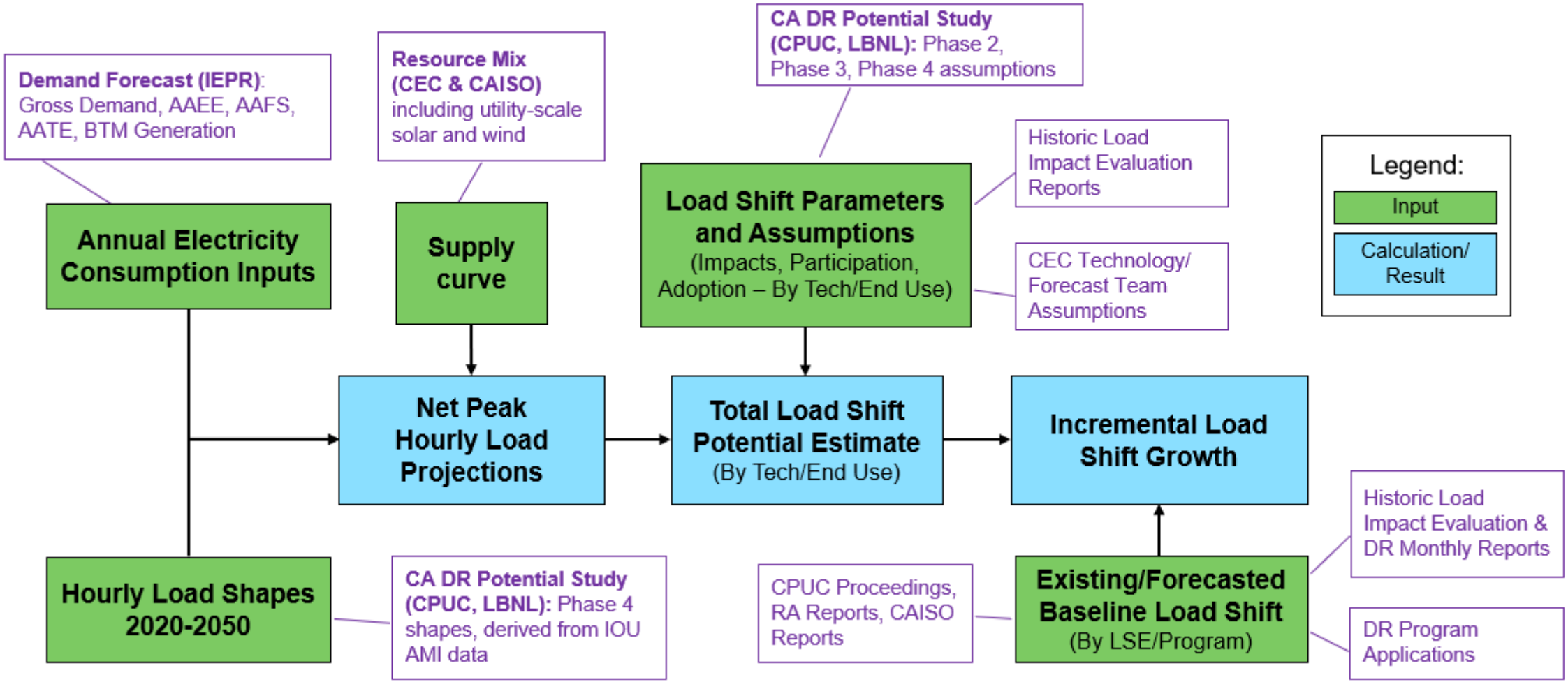
Goal: Estimate Future Load Shift Potential

- Demand Flexibility Tool enables forecasting of statewide load shift potential
- Granularity: Forecast Zone/Utility, Sector, Size, Building Type, End Use



Load Shift Flowchart

Data Sources "Key Assumptions"



End-Use and Enabling Technology Combinations for Load Flexibility

Demand Options: Result in modifications to net peak	
End-Use & Enabling Technology Combinations for DR or DF	Electric Vehicle Managed Charging (V1G)
	Electric Vehicle to Build/Home/Grid (V2X)
	HVAC Control (Smart Thermostats/EMS)
	Appliance Load Control
	Water Heating Control
	Light Control
	Commercial Refrigeration Control
	Industrial Process Load Control
	Water/Wastewater Treatment & Pumping Control
	Agricultural Pumping Interruptions

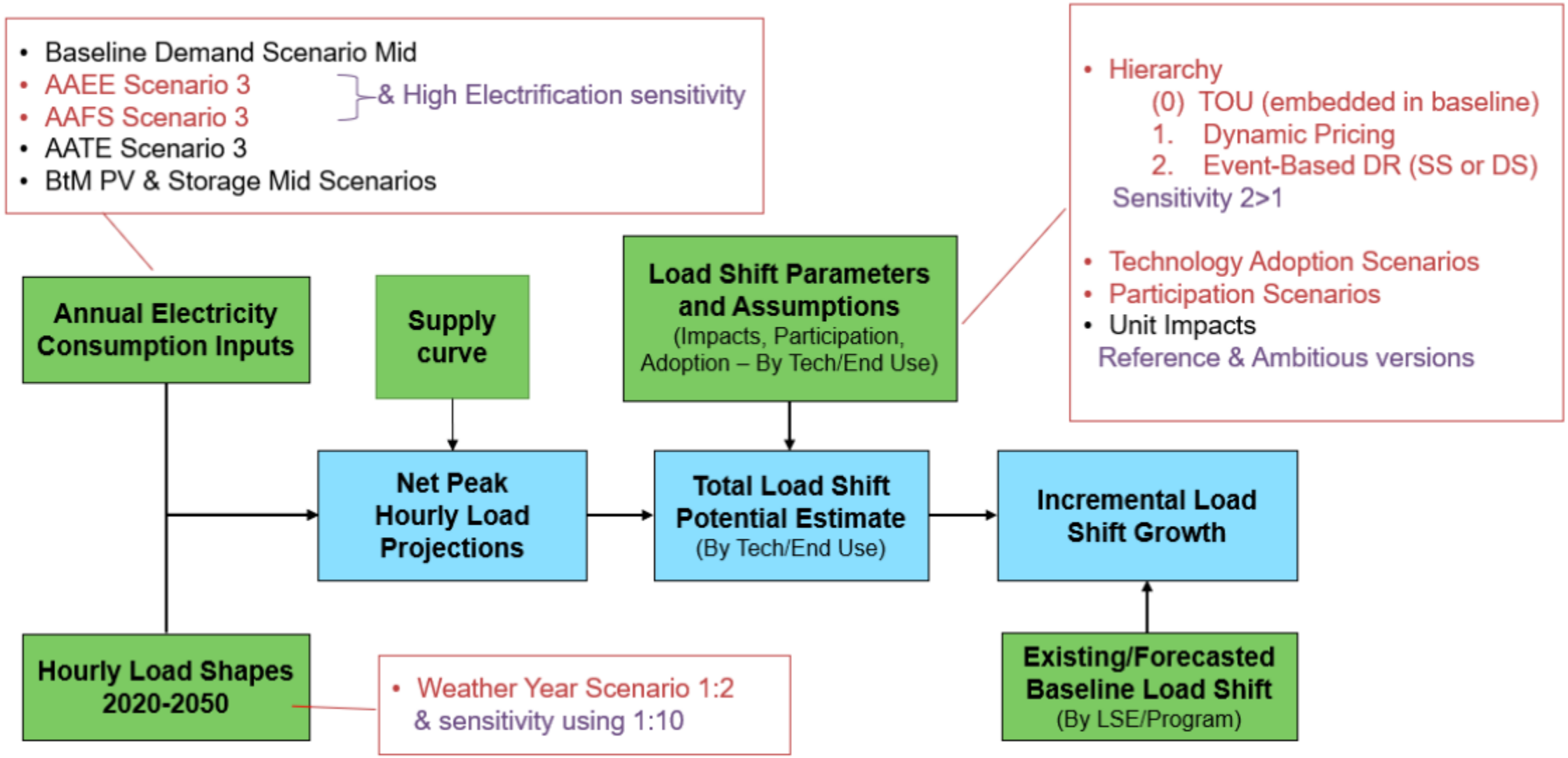
Updated with LBNL/CPUC Phase 4 DR Technology Assumptions

3. Demand Flexibility Analysis

Scenario Design & Results

Several possibilities to explore what values may be achievable…

Scenario Analysis Levers



Scenarios run

Scenarios & Sensitivities		Reference	Reference Demand & High DR	High Electrification	High Electrification & High DR	Reference LBNL Hierarchy	Reference 1:10 weather year
Electricity Demand	Energy Efficiency Fuel Substitution/BE Transportation Electrification	**2022 Planning Scenario**	**2022 Planning Scenario**	**2022 Local Reliability Scenario**	**2022 Local Reliability Scenario**	**2022 Planning Scenario**	**2022 Planning Scenario**
Weather		1 in 2	1 in 2	1 in 2	1 in 2	1 in 2	**1 in 10**
DR Hierarchy		1>2	1>2	1>2	1>2	**2>1**	1>2
DR Potential	Control Strategy Eligibility, Technology Adoption Scenarios, Participation Scenarios	**LBNL Phase 4 assumptions**	**ambitious**	**LBNL Phase 4 assumptions**	**ambitious**	LBNL Phase 4 assumptions	LBNL Phase 4 assumptions

Participation (Event-based DR)

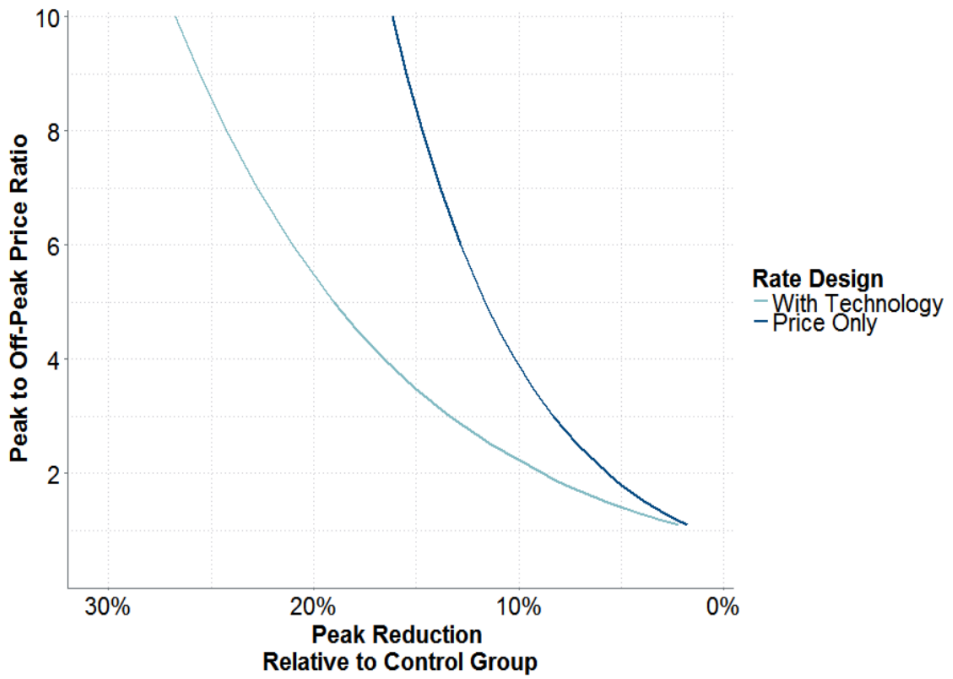
- Aligned participation inputs with LBNL Phase 4 Study
  - worked with LBNL to obtain their aggregate enrollment fractions corresponding to “achievable” participation fractions associated with procurement price at/below avoided cost
- **Reference DR case:** used LBNL aggregate enrollment fractions for 2030 achievable potential
- **Ambitious DR case:** used 20% higher enrollment fractions than Reference

Dynamic Pricing & Enabling Technology Impacts

Brattle Group Dynamic Pricing "Arc of Price Responsiveness"

- Price response impact
  - Without enabling technology: 9% of peak reduction
  - With enabling technology: 16% of peak reduction
- **Reference DR case "early adopters":**
- Propose assumption of 25% enrollment
  - propose assumption of 25% non-enabled vs. 75% tech-enabled
- **Ambitious DR case "everyone else":**
  - Propose assumption of 80% enrollment
  - propose assumption of 50% non-enabled vs. 50% tech-enabled

Figure 14: The Arc of Price Responsiveness



The Arc of Price Responsiveness Source

Results of Scenario Runs @ meter

Net Peak Summary (@ meter)						
	Reference	**Reference Demand & High DR**	**High Electrification**	**High Electrification & High DR**	**Reference LBNL Hierarchy**	**Reference 1:10 weather year**
Gross System (GW)	47.19	47.19	49.77	49.77	47.19	46.27
BtM Solar (GW)	0.30	0.30	0.41	0.41	0.30	0.15
FtM Renewables (GW)	4.76	4.76	4.88	4.88	4.76	4.52
Net System (GW)	42.13	42.13	44.48	44.48	42.13	41.59

Impacts as % of peak						
	Reference	**Reference Demand & High DR**	**High Electrification**	**High Electrification & High DR**	**Reference LBNL Hierarchy**	**Reference 1:10 weather year**
% of Net System	12.2%	19.2%	11.8%	18.8%	12.2%	12.1%
% of Gross System	10.9%	17.1%	10.6%	16.8%	10.9%	10.9%

Net Peak Hour of Day						
Impacts	**Reference**	**Reference Demand & High DR**	**High Electrification**	**High Electrification & High DR**	**Reference LBNL Hierarchy**	**Reference 1:10 weather year**
Total DF Impacts (GW)	**5.12**	**8.09**	**5.26**	**8.38**	**5.12**	**5.03**
Dynamic Pricing (GW)	**1.35**	**3.82**	**1.43**	**4.06**	**1.23**	**1.31**
Event-Based Non-Export (GW)	2.88	3.21	2.92	3.27	2.98	2.81
Event-Based Export (GW)	0.90	1.05	0.90	1.05	0.91	0.90
Event Based (less RDRR & exports)	**2.13**	**2.46**	**2.17**	**2.52**	**2.23**	**2.06**

Results of Scenario Runs
Net Peak Hour of Day

Net Peak Hour Of day						
Count: Net System Hour of Day	**Reference**	**Reference Demand & High DR**	**High Electrification**	**High Electrification & High DR**	**Reference LBNL Hierarchy**	**Reference 1:10 weather year**
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	8	8	11	11	8	3
19	33	33	34	34	33	30
20	32	32	31	31	32	38
21	26	26	23	23	26	28
22	1	1	1	1	1	1
23	0	0	0	0	0	0
24	0	0	0	0	0	0
Total	100	100	100	100	100	100

Results of Scenario Runs

Impacts	Reference	Reference Demand & High DR	High Electrification	High Electrification & High DR	Reference LBNL Hierarchy	Reference 1.10 weather year
Total DF Impacts (GW)	**5.12**	**8.09**	**5.26**	**8.38**	**5.12**	**5.03**
Dynamic Pricing (GW)	**1.35**	**3.82**	**1.43**	**4.06**	**1.23**	**1.31**
Event-Based Non-Export (GW)	2.88	3.21	2.92	3.27	2.98	2.81
Event-Based Export (GW)	0.9	1.05	0.9	1.05	0.91	0.09
Event based (less RDRR & exports)	**2.13**	**2.46**	**2.17**	**2.52**	**2.23**	**2.06**

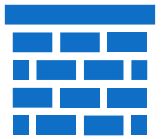
- Dynamic Pricing: ranges from 1400 to 4100 MW
- Event Based DR (less RDRR & export): ranges from 2100 to 2500 MW

4. Proposed Load Shift Goal

Erik Lyon

Advisor to Vice Chair Gunda

Opportunity and Need



- **Dynamic pricing and event-based programs** have significant demand flex growth potential
  - Much of this opportunity is currently captured in traditional planning processes and programs
  - Some of this opportunity might be only available to support emergency conditions

Potential need for **several thousand MW of emergency resources** beyond standard 1-in-10 LOLE planning in 2030

- Additional modeling scenarios could estimate incremental demand flexibility to support emergency conditions under extreme weather
- How much of a long-term strategic reliability reserve be carried? How much should come from demand flexibility?

Proposed Goal Range

Core Planning

Category	Intervention	2022 Estimate	Goal Setting Potential
Load Modifying	TOU Rates	1,200 MW	**3,000 – 4,000 MW**
	Dynamic Pricing	30 MW	
	Programs Optimizing Load	7 MW	
Resource Adequacy	Economic Supply-side DR (PDR)	825 MW	**3,350 – 4,050 MW**
	Reliability Supply-Side DR (RDRR)	740 MW	
Emergency & Incremental	Emergency-Only Programs	800 MW	
	Back-Up Generators*	375 MW*	
Total (nearest hundred)		**3,600 MW**	**6,400 – 8100 MW**

*Diesel Back-up generators are part of the current emergency framework but are not considered true load flexibility. This capacity is not included in load flexibility totals.

5. Load Shift Goal Policy Recommendations

Load-Modifying (1)

Support hourly and other dynamic pricing
CalFUSE

Encourage alternative rate and program designs that incentivize load shifting

Provide incentives for load shifting technologies paired with dynamic rates

Load-Modifying (2)

Deploy information infrastructure to support load shifting

Adopt standards to enable appliance operations to be shifted, scheduled, or curtailed

Complete deployment of advanced metering infrastructure (AMI) to support load shifting

Resource Adequacy (1)

- Adopt an incentive-based capacity valuation approach for supply-side DR
- Explore a centralized, competitive DR procurement process
- Include an adder on wholesale market revenue for supply-side DR

Resource Adequacy (2)

Reform availability rules and resource requirements for DR resources participating in RA

Conduct an evaluation, measurement, & verification study of supply-side DR load impacts

- CEC interval meter database

Emergency & Incremental

- Pilot approaches to compensate DR providers for incremental capacity delivered under extreme heat or other critical conditions
- Pilot a pathway for behind-the-meter energy storage to support decarbonization and reliability of the electric grid in emergency & incremental programs
- Pilot short-duration load shifting resources in emergency & incremental load flexibility programs
- Periodically reassess the role of emergency resources in demand-side, RA, and emergency planning processes

CPUC and CAISO Comments

Dan Buch | Electric Rates, Customer Generation, and Demand Response Branch Program Manager, CPUC Energy Division

Cristy Sanada | California Regulatory Affairs Manager, CAISO

Public Comments

Public Comments

Zoom:

- Please use the “raise hand” feature

Telephone:

- Press *9 to raise your hand
- Press *6 to mute/unmute your phone line. You may also use the mute feature on your phone.

Zoom/phone participants, when called upon:

- Your microphone will be opened
- Unmute your line
- State your name for the record and your organizational affiliation (if any) and begin commenting

3-Minute Timer

Closing Remarks from the Dais