Future of RA – Need Determination & Allocation

PG&E

November 17, 2021 – Needs Determination Workshop 1

Safety Orientation

Earthquake

Know the safest places to duck, cover, and hold, such as under sturdy desks and tables.

Fire

Know your exits, escape routes, and evacuation plan. If safe to do so, use your compliant fire extinguisher. Exit the house and call 911.

Active Shooter

Get out, hide out, take out, and call 911.

Medical Emergency

Know who can perform first aid and CPR. Call 911 if you're alone or share your location with the call leader to send help. If you have an AED, ensure you and others in your household know where it's located and how to use it.

Psychological Safety

- ✓ We care for each other.
- ✓ Look out for one another.
- ✓ Create a safe space for all.
- ✓ Welcome new ideas from everyone.
- ✓ Practice self-care.

Ergonomics

- ✓ Practice ***30/30*** (every 30 minutes, move & stretch for 30 seconds).
- ✓ Ensure proper ergonomics.

Emergency Planning

- ✓ Create/update a personal emergency preparedness plan.

COVID-19

- ✓ Wash hands frequently
- ✓ Wear a mask when required
- ✓ Get vaccinated if you are able to
- ✓ Follow current CAL-OSHA regulations and local county health orders.
- ✓ Visit COVID-19 employee site for latest updates and tips.

CPUC Principles

1. Balance a Reliable Electrical Grid with Minimizing Costs to Customers

2. Balance Addressing Hourly Energy Sufficiency with Advancing Environmental Goals

3. Balance Granularity in Meeting Hourly Needs with Simplicity and Transactability

4. Implementable in the Near-Term (2024)

5. To be Durable and Adaptable to a Changing Electric Grid

PG&E's Key Objectives for Need Determination & Allocation

- **Over/Under-Procurement Risk**: Balance a reliable electrical grid with minimizing costs to customers
- **Administrative Complexity**: The final framework should be implementable with a reasonable level of administrative effort.
- **Fair Cost-Attribution**: The approach should allocate requirements to LSEs that are reflective of the costs the LSE imposes on the system.
- **Alignment Across Proceedings**: Consider compatibility with existing Commission planning goals and programs, such as the IRP and RPS proceedings.

Putting It All Together

Key Elements for Final Framework

- **Season and Slice Structure**
  - Trade-offs discussed in prior workshops
  - 24-slice / monthly structure most closely matches load
  - Seasons / slices greater than 1 month / 1 hour create additional cushion
    - Loss of load analysis needed to determine if this results in a more reliable system

- **Resource Counting**
  - Trade-offs discussed in prior workshops (e.g. exceedance, ambient derates, etc.)
  - How solar and wind are accounted for (e.g. gross v. net) partially dependent on final structure

- **Setting Requirements and LSE Allocation**
  - Load forecast: 1 in 2, 1 in 5, 1 in 10
  - How the load forecast is applied (e.g. max monthly value, worst day)
  - Requirement allocation currently done through a hybrid top-down
  - Other options include bottom up; choice is partly dependent on final framework

- **Planning Reserve Margin**
  - Currently accounts for operating reserves, outages, demand variability
  - Does it need to expand for resource variability?

Factors for Consideration for Need Determination

	Reliability Level >>> More Conservative/Higher Reliability/More Insurance >>>			Notes/Relationships
Structure	**24-slice / monthly**	**4-hour slice / net load**	**4-hour slice / gross load / seasonal**	Assumes cushion from 4-hour slice framework yields more reliable system; needs to be tested as part of LOLE modeling
Resource Counting	**←----------50%** **←----------Not included** **←--------Not Included**	**Exceedance** **UCAP** **Ambient Derates**	**75% ----------→** **Included --------→** **Included -------→**	If a higher exceedance, UCAP, ambient derates are used, a lower PRM could be appropriate
Load Forecast	**1-in-2**	**1-in-5**	**1-in-10**	
PRM	**PRM <15%** (after accounting for lower forced outage rates due to UCAP)	**PRM 15%** (if UCAP not adopted, existing demand variability, and no resource variability)	**PRM >15%** (if UCAP not adopted, existing or greater demand variability, and resource variability)	The PRM does not currently account for variations in resource counting rules

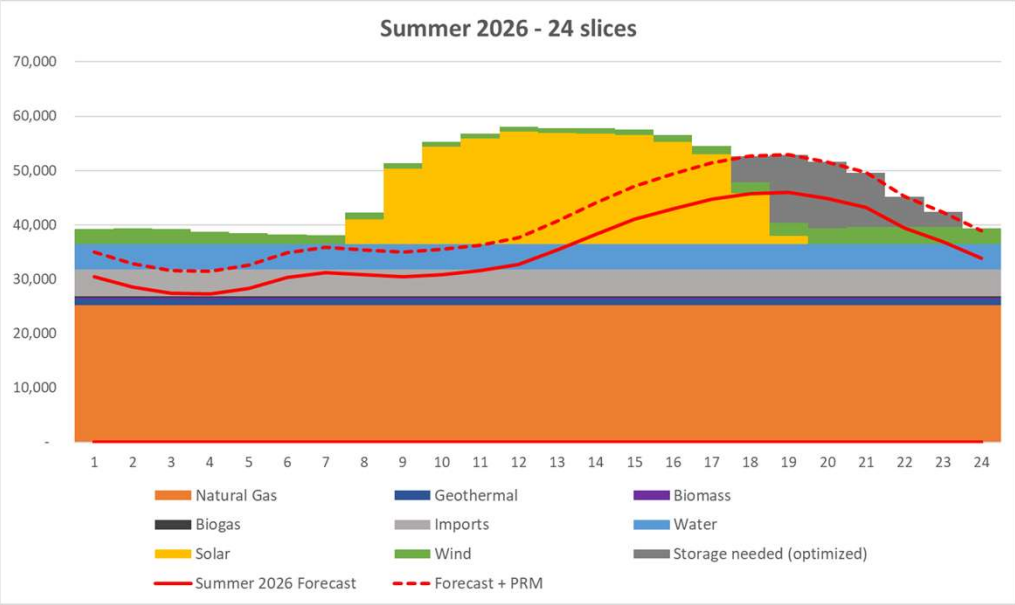
Factors for Consideration

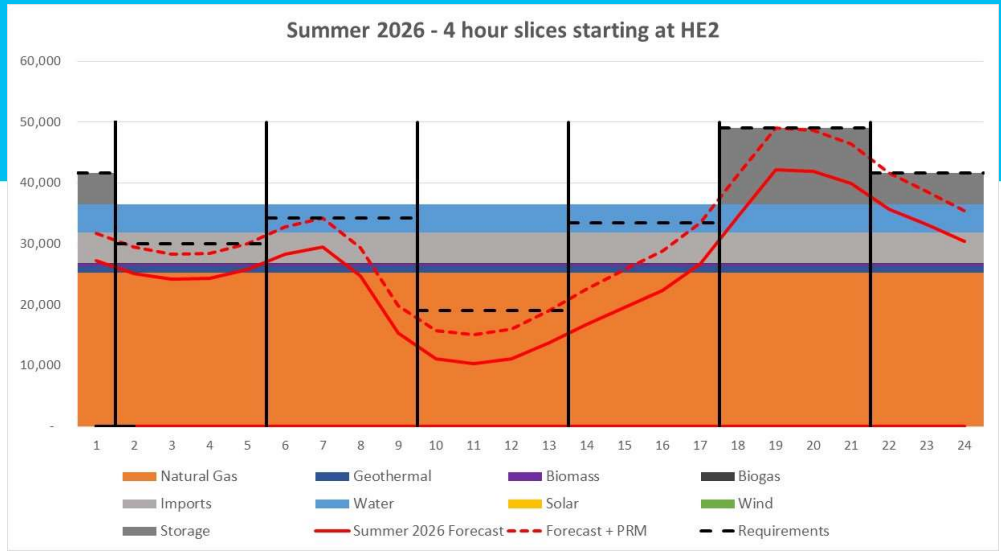
- **Interaction**: While each of the factors mentioned can be chosen independently, they interact to determine system reliability
- **Balancing Approaches**: If stakeholders determine there is a benefit to a more/less conservative approach to one factor, this can be balanced with another
- **Distribution of Costs/Benefits**: While a more reliable system will have a higher cost overall, the choice of which levers to pull impact the distribution of these costs and benefits
- **PRM Flexibility**: After decisions have been made on forecast and resource counting, the PRM may offer the most flexible lever for reaching desired reliability

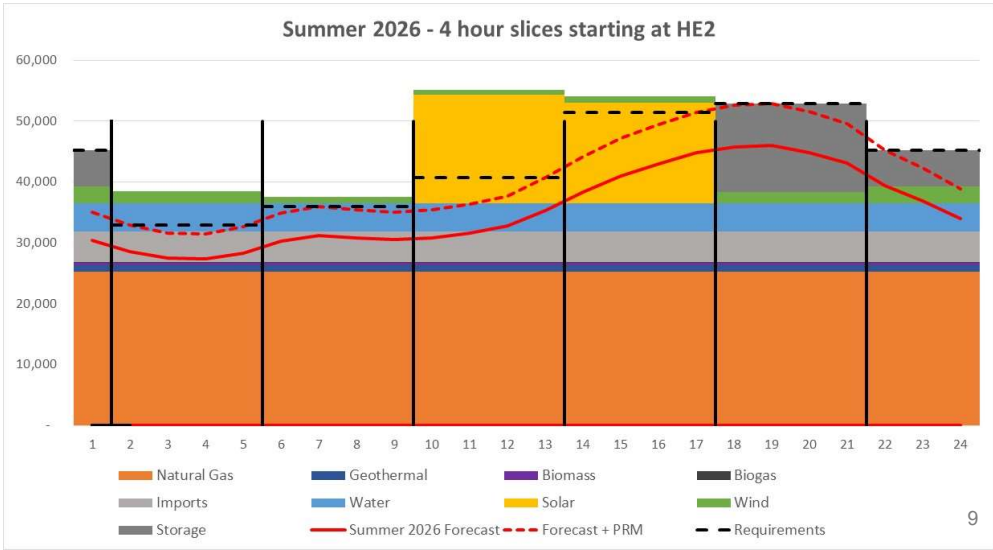
Structure (RECAP)

Options:

- 24-slice
- 4-hour net load
- 4-hour gross load







Resource Counting (RECAP)

- Resource counting impact to reliability:
  - Use-limited resource approach (e.g. ELCC, exceedance)
  - Use-limited resource level (e.g. exceedance 50% - 75%)
  - Dispatchable resource treatment (e.g. UCAP, ambient derates)
  - Implementation of the rules in the slice-of-day structure (e.g. use of minimum value of a resource during a slice)

- More generous counting rules (i.e. lower exceedance values) would result in a less reliable system that would need to be addressed in the load forecast or PRM

- Less generous counting rules (i.e. higher exceedance values, use of UCAP) would result in a more reliable system that could result in less conservative approaches in the forecast or PRM

Conclusions

Factors:

- RA Structure
- Resource Counting
- Load Forecast

+

- Planning Reserve Margin

+

- IRP Coordination

Desired Level of Reliability

IRP Coordination

- Effectiveness of Slice of Day relies on coordination with the IRP
- Target reliability level (LOLE) and portfolio of resources should be determined in the IRP, then inform RA requirements
- Consistency between common inputs (i.e. load forecast, resource availability and performance, etc.) between IRP and System RA will support more cohesive procurement
- If IRP and System RA are not aligned:
  - System shortages or excesses will become apparent too late
  - Emergency procurement to address shortages or CAISO intervention to address excesses (e.g. RMRs to retain specific plants) yields potential reliability events and/or high customer costs
  - Coordination of the two proceedings should prevent such scenarios

Forecast / Need Determination

CEC IEPR Forecast Overview

- IEPR forecast produced in odd years, with minor updates performed in even years
- In IEPR year, a preliminary forecast is released in the spring, differences are reconciled with utility forecasts, with a final adopted in the winter
- Used in IRP, TPP, RA, RPS, EE Planning
- Low, Mid and High Scenarios are produced, all based on a 1 in 2
  - Hourly forecast produced for mid-case, 1 in 2 forecast

Slice-of-Day Considerations

- **Forecast Changes**:
  - Our understanding is that shifting to something more conservative (e.g. 1 in 5 or 1 in 10) is possible without excessive administrative burden at the CEC
  - However, such a move would require coordination across multiple proceedings (e.g. RA, IRP, RPS, TPP)
  - Any change to the forecast could impact the required PRM
    - It may be prudent to decide on the forecast after doing loss of load analysis

- **Changes for Slice-of-Day**:
  - Existing approach aligns on the coincident gross peak
  - Under a slice-of-day, such a process would be needed for each slice

Need Determination

- PG&E proposed (in workshop #2) using the maximum hourly values (in a month or season) from the IEPR CAISO-level hourly load forecast as the basis for establishing requirements in a future framework
  - This is similar to how requirements are currently established, but on a more granular level
  - It avoids potential issues in future years when the grid has evolved and more times of the day are at risk of insufficient capacity

- PG&E has also used the highest value in each season / slice to set the requirements for that season / slice
  - This is to ensure that the load in peak hours in each season / slice is met

PRM Overview

History of the PRM

- The Planning Reserve Margin was introduced in 2006 as a tool to ensure reliability

- The PRM was set at 15% in response to reliability studies showing it provided LOLE of 1 day in 50 years (D.04-01-050)
  - 6% operating reserve
  - 7.5% outages
  - 1.5% demand variability

- Recent PRM Activity
  - The Summer Reliability OIR raised the PRM to an implied 17.5%
  - CEC Summer Stack Analysis used 22.5%

Planning Reserve Margin

- Example Updated PRM:
  - 6% Operating Reserve (ancillary services)
  - 5-9% Outage Rate (if UCAP not adopted*)
  - 1.5-9% Demand Variability
  - X% Resource Variability

7.5% - 24%+

- Benefits of Using PRM to Address Uncertainty
  - Can be more easily updated to reflect changing conditions
  - Addition of a resource uncertainty component could better reflect current status of shifting supply portfolio

- Should PRM vary by season/slice?

*If UCAP methodology is chosen, the outage component of the PRM should be reexamined

Allocation

Current Top-Down (Hybrid) Approach

- System load based on CEC forecast is used to determine overall system gross peak requirement
- CEC receives and aggregates hourly LSE forecasts
- CEC reconciles coincident peak differences between IEPR system peak and aggregate LSE forecasts
- Requirements are allocated to LSEs based on each LSE's peak-load ratio share

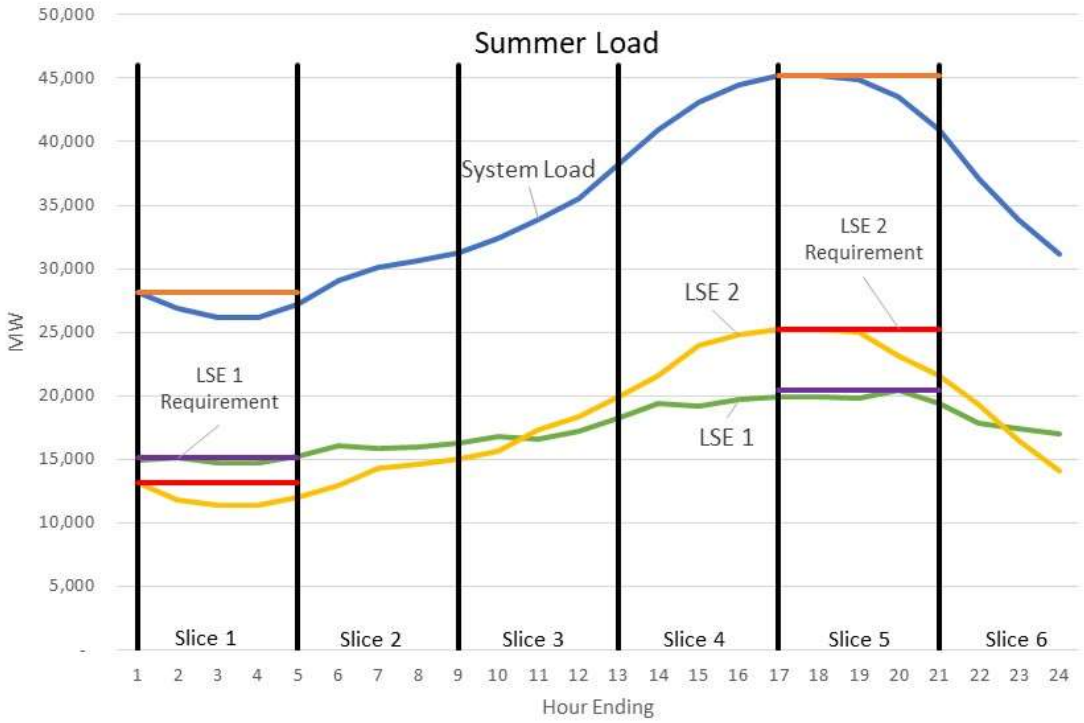
There's no current consideration of unique LSE load shapes for non-peak hours

Modified Approach for Slice-of-Day

- Slice-of-day introduces need to perform similar process in each season/slice
  - Many more hours with a 24 slice / monthly framework
- CEC would need to replicate current process that is used for coincident peak for these other hours (if structure is on a gross basis)
- This is more burdensome than current approach, but would follow the same existing process

Illustrative Example

- In this example, two LSEs each make up 50% of the total energy load share but have different shapes.
- The Modified Top-Down Approach would allocate based on share within each slice.
- LSE 1 would have higher allocation in Slice 1 (purple line).
- LSE 2 would have higher allocations later in the day in Slice 5 (red line).
- If 24 slice approach is adopted, this process would be done on an hourly basis



Net Load Process

- In a net load approach, a parallel accounting process is needed for wind and solar resources
- All wind and solar resources would be aggregated at the system level to develop a top-line net load curve
- Wind and solar resource curves would then be netted off the gross load of the relevant LSE to form a net load for that LSE
- This could be done using different levels of wind and solar aggregation (e.g. individual resource level or aggregated to technology or geographic areas)
- Net load approach would require earlier showing of renewable resources by LSEs so net-load requirements could be calculated to set LSE's RA requirement