Slice of Day Recap Workshop

Together, Building
a Better California

Objectives and CPUC Principles

PG&E Objectives for Recap Workshop

- Present full slice-of-day proposal
- Highlight areas that still require further development

Principles as directed by the CPUC in D.21-07-014 issued on July 15, 2021:

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

Menu of Framework Options

Proposal Component	Potential Options	
Slice Structure	1 Hour (24 slices), 4 Hours (6 slices), 12 Hours (2 slices)	
Seasons	2 Seasons, 3 Seasons, 4 Seasons, 12 Seasons	
Showings	Seasonal, Monthly	
Resource Counting	**Solar/Wind:** ELCC*, Exceedance, ELNR	**Hydro**: Existing, ELCC*, alt. exceedance
	Thermal: Pmax, Ambient Derates, UCAP	**DR**: LIP, ELCC*, LIP-informed ELCC*
	Storage: Pmax, ELCC*, exceedance, UCAP	**Imports**: Contracted amount (non-specific)
	Hybrid: Existing, numerous others	**Non-dispatchable**: Existing, exceedance
	Single NQC, Multiple NQC, Resource-dependent	
Charging Requirement	Yes, No	
MCC Buckets	Yes, No, Cap on use-limited resources	
Load Forecast	1 in 2, 1 in 5, 1 in 10	
	Gross Load, Net Load	
	Max hourly values, worst day values	
LSE Allocation	Existing applied to slice, top-down, bottom-up, shaped by customer class	
PRM	15% , 17.5%, LOLE Determined	
Unbundling	**Slices**: Yes, No	**Requirements**: Yes, No

*Note: ELCC has additional consideration of whether it is average or incremental

PG&E Recommendation

PG&E recommends supporting a 24 Slice framework

Proposal Component	Potential Options	
Slice Structure	1 Hour (24 slices)	
Seasons	12 Seasons	
Showings	Seasonal, Monthly	
Resource Counting	**Solar/Wind:** Exceedance	**Hydro**: Existing
	Thermal: Pmax w/ Ambient Derates	**DR**: LIP-informed ELCC
	Storage: Pmax	**Imports**: Contracted amount (non-specific)
	Hybrid: Existing w/ exceedance for excess	**Non-dispatchable**: Existing
	Resource-dependent	
Charging Requirement	Yes	
MCC Buckets	No, but cap on DR	
Load Forecast	1 in 2	
	Gross Load	
	Max hourly values	
LSE Allocation	Existing applied to slice	
PRM	LOLE Determined	
Unbundling	**Slices**: No	**Requirements**: No

Framework Structure: Slices

Component	PG&E Recommendation
Slice Structure	1 Hour (24 Slices)

Framework Structure Rationale

- **Slice Structure**
  - Large variation in renewable generation and load if slices are greater than an hour
  - Hourly framework eliminates "over-procurement" inherent in multi-hour slices
  - Simplifies resource counting by avoiding slice "mismatch" for storage, imports, and DR
  - Obviates the net vs. gross issue
  - More durable framework, as there is a reduced need to redefine slices in the future
  - SCE tool demonstrated 24-hour showings to be administratively workable

Framework Structure: Seasons and Showings

Component	PG&E Recommendation
Seasons	12
Showings	Annual + Monthly or Seasonal

Framework Structure Rationale

- **Seasons**
  - Months vary widely, monthly granularity helps maintain efficiency gains of hourly structure
  - Even in months that are similar at system level problems arise:
    - They are likely to change over time as renewable penetration increases (under a net framework)
    - Individual LSE loads are likely to differ from the system and therefore may not benefit from the same synergies at the system level
- **Showings**
  - Showings can be done on a monthly or seasonal basis
  - Seasonal showings would reduce administrative burden, but new resources may not be counted for several months
  - Additional development needed: PG&E suggests further discussing showing question in the Multi-Year Workshop

Resource Counting: Solar, Wind, Dispatchable

Component	PG&E Recommendation
Resource Counting	**Solar/Wind:** Exceedance **Dispatchable:** PMax w/ Ambient Derates

Resource Counting Rationale

- **Solar/Wind**
  - ELCC is problematic at hourly level
  - Exceedance is less administratively burdensome and more accurately reflects hourly generation profile
  - Exceedance facilitates easier bucketing of resources (e.g. by technology type, geography)
  - ELCC could still be performed in IRP to inform needed resource mix (and potentially as a calibration factor for exceedance level, per solar party recommendation)
  - Additional Development Needed: exact methodology for determining exceedance level; Solar Parties / PG&E both presented promising starts for how to determine the appropriate level

- **Dispatchable**
  - Pmax with ambient derates accounts for some performance issues
    - A UCAP-type framework could be further refined and implemented later
  - Use of historical derate data can present an accurate estimation of QC value
  - Energy-limited: Limits required to be observed in hours shown

Resource Counting: Storage

Component	PG&E Recommendation
Resource Counting	**Storage**: Pmax subject to interconnection

Resource Counting Rationale

- Reflective of resource Pmax and energy storage capacity
- Pmax allows for full output to be counted, subject to interconnection limits

Other details

- LSEs will be required to show sufficient capacity to charge storage in other slices
- Additional resource parameters will need to be reported to the CPUC:
  - Energy capacity
  - Round-trip efficiency
  - Discharge limits
  - Interconnection limit
  - Daily cycle limits
- Multiple cycles per day should be allowed if contract language allows for this

Resource Counting: Hybrid, Hydro, Imports

Component	PG&E Recommendation
Resource Counting	**Hybrid:** Existing w/ Exceedance for excess **Hydro:** Exceedance **Imports:** Resource specific, contract amount

Resource Counting Rationale

- **Hybrid**
  - Maintaining existing methodology and applying exceedance to excess energy captures storage component while crediting excess energy in the same way as standalone resources
  - It's also administratively simple, as it doesn't require major methodology changes
- **Hydro**
  - Recently adopted exceedance methodology gives more weight to poor hydro years and can be adapted to an hourly framework easily
- **Imports**
  - Resource specific imports can use updated counting rules to accurately reflect RA value
  - Non-resource specific imports counted at contract values, subject to RA requirements that resources be at least 4 hours

Resource Counting: Non-Dispatchable and DR

Component	PG&E Recommendation
Resource Counting	**Non-Dispatchable:** Existing methodology **Demand Response:** ELCC/LIP

Resource Counting Rationale

- **Non-Dispatchable**
  - Current NQC methodology can be adapted to hourly

- **Demand Response**
  - Defer to CEC process to align with ongoing workshop process
    - The RA Reform initiative lacks the bandwidth to study DR counting methodology changes independent of CEC process and still meet the goal to have a reform framework implemented by 2024
  - Multi-day reliability could be addressed by maintaining a DR cap (details TBD)

Resource Counting: Values

Component	PG&E Recommendation
Multiple NQC Values	Variable

Details

- Values would be captured in a table with 24 entries per month x 12 months
- This would facilitate:
  - Capturing values for variable resources that likely have different values in every hour
  - Static resources that wouldn't vary by hour (value would be the same in each cell of the table)

MCC Buckets Recommendation

Component	PG&E Recommendation
MCC Buckets	Remove all buckets except for potentially a cap on DR

MCC Buckets Rationale

- 24 slice framework obviates the need for the MCC buckets
- Multi-day reliability events could present a problem for DR, either through program call limitations or customer fatigue
- Applying a cap on demand response (level and application TBD) could ensure the system does not rely too much on DR to meet needs during prolonged reliability events

Requirements Recommendation

Component	PG&E Recommendation
Hourly Requirements	Based on the forecasted maximum value in each hour in each month from the IEPR CAISO-level hourly load forecast
Load Forecast	Gross Load, 1 in 2

Requirements Rationale

- **Hourly Requirements**
  - Using max hourly value in each month will ensure that no unexpected reliability events occur due to failure to properly use forecast data in setting requirements
- **Load Forecast**
  - Gross load:
    - Reduces showing complexity associated with net load
    - Facilitates renewable transactions
  - 1 in 2 is consistent across other proceedings and presents the greatest likelihood of implementation by 2024

PRM Recommendation

Component	PG&E Recommendation
PRM	LOLE Determined

PRM Rationale

- LOLE analysis is critical to selecting a PRM that will ensure a reliable system

Process

- Level of reliability should be determined by the CPUC
- Other framework elements should be determined before a PRM is determined
- Regular updates should be included to address uncertainties associated with the changing resource mix
- The PRM should be the primary tool for addressing future changes as it allows for the other framework elements to remain consistent and avoid disruption of markets

Unbundling Recommendation

Component	PG&E Recommendation
Unbundling of Slices	No
Unbundling of Requirements	No

Unbundling Rationale

- **Slices**
  - Allowing slices to be unbundled would create a complex, difficult to track system
  - Greater penetration of storage will diminish need for unbundling
    - Storage becomes a modular resource that can fill gaps
  - Existing tools like swaps can still be utilized to address load and resource imbalances, albeit at less granular levels
  - Slice-of-day is an improvement over the existing system, which requires the building of resources in prescribed hours, even if those hours don't match an LSE's load
- **Requirements**
  - Similar issues to those identified above
  - In addition:
    - Presents existential question of what it means to serve load
    - Includes additional administrative complexity that is unlikely to be resolved in time for a 2024 implementation
    - Raises questions of whether other attributes should be included (e.g. emissions, RPS)

Allocation Recommendation

Component	PG&E Recommendation
Allocation	Existing applied to slice

Allocation Rationale

- Existing CEC process is easily adaptable to a slice of day structure
- CEC already produces and allocates requirements for gross load and has indicated a willingness to investigate a similar process at the slice level
- Allows for greater matching of load and supply shapes to meet individual LSE requirements