Chase Sun, Principal Engineer, PG&E (2:15 PM):

- Chase’s presentation provided an update on CPUC Rule 21 & IEEE-1547 Revisions

Approach of the current version of Rule 21 and IEEE 1547

- The current version of Rule 21 is designed to simplify interconnection of DERs where system impact is likely to be low and penetration is low
- The current approach allows DERs to rely on the wider grid for support (eg. voltage, frequency, and generation)

Standard revisions

- Revisions are being driven by the need to adapt standards for higher DER penetrations. Additionally, revisions will seek to leverage inverter capabilities to improve DER integration
- IEEE 1547: 1547 revisions will add language around developing interfaces to allow interoperability between DERs and the grid
  - Additionally, new voltage and frequency ride-through requirements are under development. Voltage ride-through is proposed to be mandatory
  - DERs will be required to be capable of both injecting and absorbing reactive power
- While the timeline is not certain, the IEEE 1547 revisions may be finalized in early- to mid-2018.

Erica McConnell, Attorney representing IREC (2:45 PM):

- Erica provided an update on California’s integrated capacity analysis (ICA) working group
- CPUC guidance defined ICA as analysis that “quantifies the capability of the system to integrate DER within thermal ratings, protection system limits and power quality and safety standards of existing equipment.” IOUs post information from ICA analysis as hosting capacity maps.
- ICA is used both for interconnection - evaluating the additional capacity of DERs that could be connected on a feeder - as well as for system planning.
- Two different ICA methodologies were tested: streamlined and iterative.
The streamlined approach is less computationally-intensive, but it is not granular enough to be used to technically evaluate interconnection.

The iterative approach is more granular and provides a better representation of power flow, and as a result can be more helpful in evaluating the feasibility of new interconnection requests. It does require more computational time, though.

The working group adopted the iterative approach

- SCE’s hosting capacity map can be found at the following link: https://www.arcgis.com/home/webmap/viewer.html?webmap=e62dфа24128b4329bfc8b27c4526f6b7
- Erica discussed next steps for the ICA working group and future deployment of the ICA methodology
  - The working group will continue to refine the ICA methodology and build upon the planning use case

Sahm White, Director of Policy and Economic Analysis at the Clean Coalition (3:00 PM):

- Sahm provided an update on California’s Locational Net Benefits Assessment (LBNA) working group
- Notes that interconnection policies should favor high-value locations and configurations. A 2012 report by SCE indicates that targeting interconnection to these high-value areas can generate significant savings for ratepayers.
  - LNBA focuses on quantifying where DERs have significant locational value

LBNA tool

- The LNBA tool calculates the costs and benefits of a DER resource at a particular location
- The tool assesses benefits related to
  - Distribution investment deferral value
  - Location avoided costs
  - Distribution capacity services (eg. voltage support, reliability)

LNBA tool use cases

- Heat map indicating areas on distribution system of high LNBA value for DERs
• Use tool to identify areas where potential capacity deferral value is high, which could be used to prioritize DER investment in certain locations

Potential benefits
• Notes that $80 billion of incremental transmission investments could be made over the next 20 years, so strategic DER siting that can help defer or avoid this investment could generate significant savings.

Erica McConnell, Attorney representing IREC (3:30 PM, this item was switch on the agenda with the following talk):

• Erica’s presentation discussed issues concerning interconnection cost certainty
• There is often uncertainty around the interconnection costs a customer will incur when connecting a system
• There are a number of issues around interconnection costs
  o Timing: when in the process does a customer know whether they may be responsible for upgrade costs?
  o Accuracy: how accurate are cost estimates? Is there significant variance between estimates and actual cost?
  o Reasonableness: if a customer is responsible for upgrades, is it fair/reasonable that they would have to bear those costs?
  o Certainty: how much certainty does a customer have around the costs they are likely to incur when they interconnect a system?
• Other interconnection cost-related issues include
  o Administrative fees charged to the customer
  o Transparency and clarity of costs assigned to a customer for interconnection
  o Fairness around who bears the responsibility for costs exceeding estimates
• Providing more accurate cost estimates is more costly (eg. California’s cost envelope requires an additional fee)

Potential methods of addressing cost certainty issues
• Pre-application reports were discussed as a potential tool to reduce uncertainty around potential costs
  o Pre-application reports are a mechanism for customers to get information about the local system where a potential project
would be interconnected and can be used to assess the likelihood that upgrades would be required. Hosting capacity maps can also be used by customers for a similar purpose.

- Cost guides (which have been implemented in California) can provide customers with itemized information on the costs of certain upgrades
- Cost envelopes require that a customer’s cost responsibility for upgrades does not exceed the utility’s estimate by more than a certain percentage (CA’s cost envelope is 25%)
- Cost caps for certain projects, such as a fixed application fee for smaller systems or net metering participants
- Tracking and reporting of interconnection cost estimates and actual interconnection costs could improve the understanding and transparency of where cost overruns occur
  - Xcel Minnesota is required to report variances between estimated and actual costs

Lori Bird and Kristen Ardani, NREL; David Manning, WIEB (4:00 PM, this item was switch on the agenda with the following talk):

- Note that as this research is preliminary, only a high-level overview of the topics discussed is provided

**Barriers**

- Lori outlined preliminary results from interviews with developers and utilities discussing perceived barriers to distributed solar interconnection
- Lori noted four categories that interconnection barriers typically fall into
  - Uncertainty: factors that contribute to uncertainty around requirements for interconnection or make it more challenging to evaluate the likelihood that upgrades will be required; lack of transparency in application review status
  - Delay: factors that lengthen review and approval time can lead to poor customer experiences, create additional wait times for customers and developers, and potentially hurt project economics
  - Cost: factors that contribute for increased interconnection costs for utilities, customers, and/or developers
  - Process: what procedural barriers exist
Western state and utility research
- David provided an overview of interconnection practices research
- He discussed state interconnection policies across the Western states
- He discussed application review and approval tracks and how the thresholds for the different tracks vary from state-to-state
- He discussed the technical screens used for fast track review in Western states
- He also discussed state policy and utility practices around customer service
  - This included a discussion of application fees, pre-application reports, and state timeline requirements

Emerging issues
- Lori presented preliminary research on emerging interconnection issues the issues discussed included
  - PV plus storage interconnection
  - Cost (eg. fixed interconnection costs or the use of a cost envelope)
  - Process automation (eg. application and screen automation)
  - Cost allocation (who bears the costs of an upgrade)

Cost data
- Kristen presented preliminary data collected on the actual costs of performing upgrades