Workshop on Proposed Reference System Plan for the CPUC's 2017/2018 Integrated Resource Planning (IRP) Process

September 25 - 26, 2017

DAY 1: I. INTRODUCTION

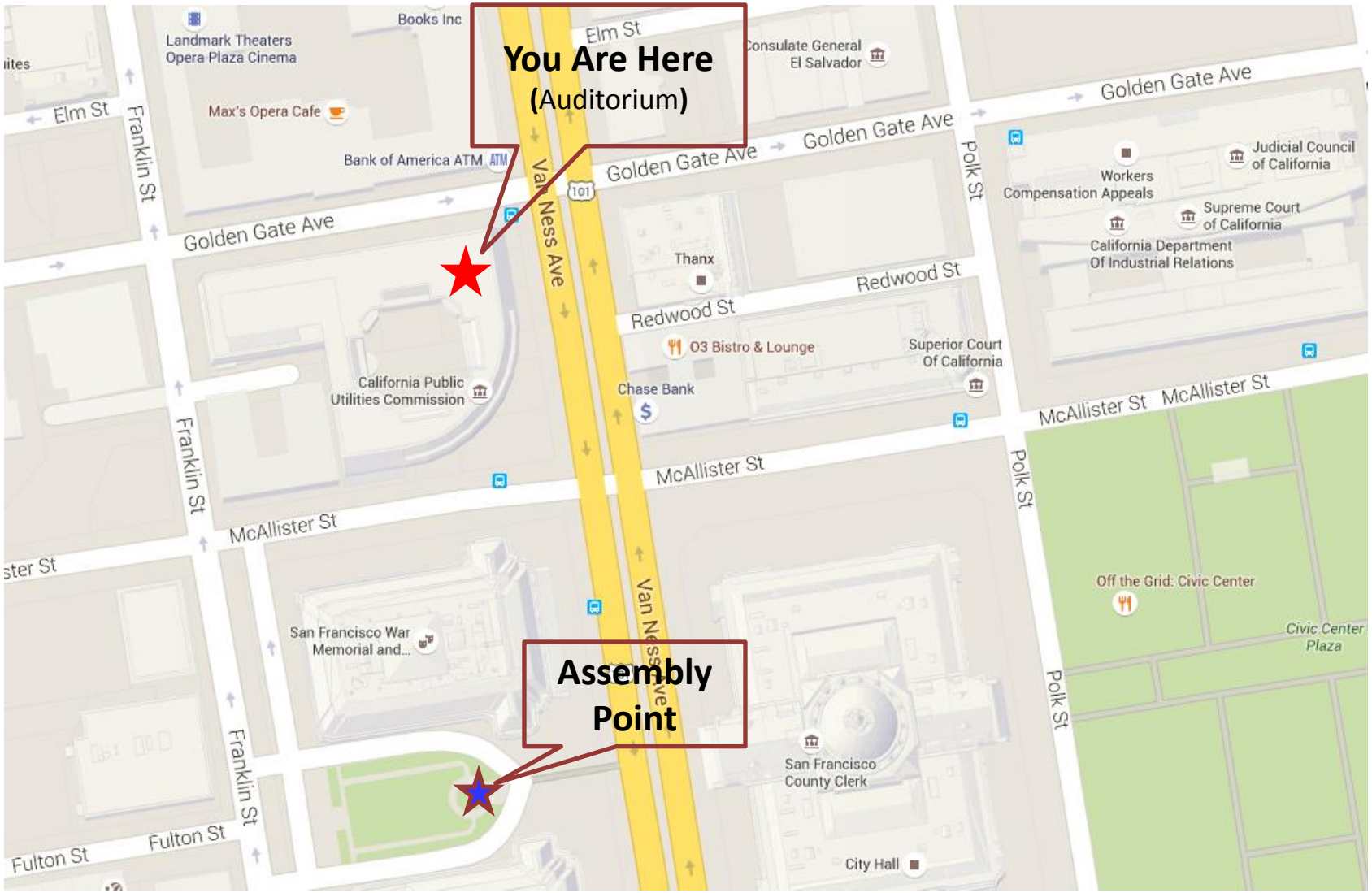
Introduction

- Housekeeping
  - Staff introductions
  - Informal workshop, not on the record
  - Safety information and logistics
- Opening Remarks by Commissioner Randolph
- Workshop purpose and agenda
- Review IRP proceeding schedule for 2017-18

Safety and Emergency Information

- In the event of an emergency, please proceed out the exits.
- We have four exits: Two in the rear and one on either side of the speakers.
- In the event that we do need to evacuate the building:
  - Our assembly point is the Memorial Court just north of the Opera House.
  - **For the Rear Exits:** Head out through the courtyard, and down the front steps. Continue south on Van Ness Ave, and continue toward the Memorial Court.
  - **For the Side Exits:** Go out of the exits and you will be on Golden Gate Avenue. Proceed west to Franklin Street. Turn south onto Franklin Street, and continue toward the Memorial Court.

Evacuation Map



Day 1 Call-in Information (9/25)

WebEx: https://van.webex.com/van/j.php?MTID=m2b80a59a44cf2ad7de678a56ff567c6c

Meeting number: 742 757 160

Meeting password: !Energy1

Call-in: 1-866-830-2902

Passcode: 2453758

- Remote callers will be placed on listen-only mode by default. Please submit questions via the WebEx chat.
- We will pause periodically to take questions and also have dedicated Q&A at the end of each presentation.
- Please state your name and organization when asking a question.

Day 2 Call-in Information (9/26)

WebEx: https://van.webex.com/van/j.php?MTID=mfc22fa1b1ffb069e9ec78632c6e7fc75

Meeting number: 741 791 262

Meeting password: !Energy1

Call-in: 1-866-830-2902

Passcode: 2453758

- Remote callers will be placed in listen-only mode by default. Please submit questions via the WebEx chat.
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Other Information

Wi-Fi Access

- login: guest
- password: cpuc83117

IRP Website

- http://www.cpuc.ca.gov/irp/
- All staff work products are available for download

Restrooms

Out the Auditorium doors and down the far end of the hallway.

Purpose of Workshop

- Workshop purpose:
  - To present the Proposed Reference System Plan, Recommended Commission Policy Actions, LSE IRP Filing Requirements, and IRP Production Cost Modeling Guidelines, available at: http://cpuc.ca.gov/irp/proposedrsp/
  - To allow parties to ask clarifying questions and provide preliminary feedback on the results
  - Staff will be focusing on pre-selected slides from the deck circulated on September 19th, but parties may ask questions about any slides.
- Out of scope:
  - How to cure deficiencies identified in an LSE IRP plan
  - Cost allocation associated with any authorized IRP procurement

Agenda Overview: Day 1

I.	Introduction	10:00 – 10:30
II.	Proposed Reference System Plan	10:30 – 12:00
	LUNCH	12:00 – 1:00
III.	CAISO's Transmission Planning Process and IRP	1:00 – 2:15
IV.	Production Cost Modeling for IRP System Plans	2:20 – 3:30
V.	General Q&A	3:30 – 4:00

- Staff will be focusing on pre-selected slides from the deck circulated on September 19th when presenting Section II (Proposed Reference System Plan)
- This slide deck will be used for the remainder of the Day 1 presentations (i.e., Section I, III, and IV).
- Clarifying questions and feedback are encouraged following each agenda item in Sections II – IV

Agenda Overview: Day 2

I.	Overview of Day 2	10:00 – 10:15
II.	Recommended Commission Policy Actions	10:15 – 11:45
	LUNCH	11:45 – 12:45
III.	Recommended Commission Policy Actions	12:45 – 1:45
IV.	Path to Future All-Resource Planning	1:45 – 3:45
V.	General Q&A	3:45 – 4:00

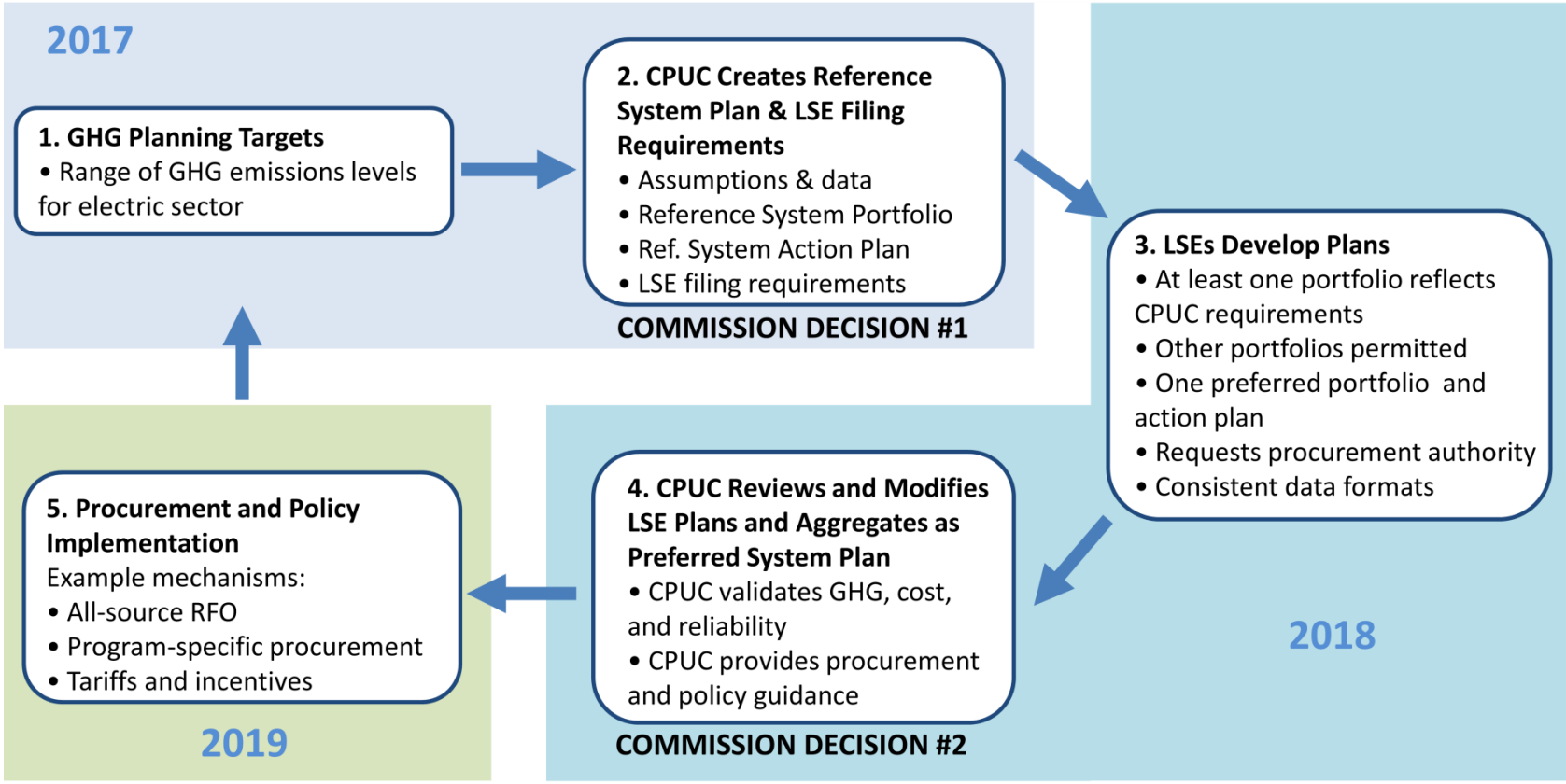
- This slide deck will be used for all Day 2 presentations
- Clarifying questions and feedback are encouraged following each agenda item in Sections II – IV

Schedule of Upcoming Proceeding Activities

Activity	Expected Date
ALJ ruling issues Proposed Reference System Plan	Sept. 19, 2017
Two-day workshop on Proposed Reference System Plan	Sept. 25-26, 2017
Comments due on Proposed Reference System Plan Ruling	Oct. 26, 2017
All-party meeting with Commissioners	Nov. 2, 2017
Reply comments due on Proposed Ref. System Plan Ruling	Nov. 9, 2017
CPUC issues comprehensive IRP Proposed Decision	End of 2017
CPUC transmits guidance to CAISO and CEC for TPP and IEPR purposes for 2018	Early 2018
LSEs file individual Integrated Resource Plans	Q2 of 2018
CPUC adopts or modifies LSE Plans and establishes the Preferred System Plan	End of 2018
CPUC transmits guidance to CAISO and CEC for TPP and IEPR purposes for 2019	Early 2019

REVIEW PROPOSED TWO-YEAR IRP PROCESS AND PROCEEDING SCHEDULE

Proposed Two-Year IRP Process



Role of the Reference System Plan within the Proposed IRP 2017-18 Process

1. **Staff recommends a Reference System Plan reflecting**:
   - A statewide GHG Planning Target of 42 MMT for the electric sector
   - A Reference System Portfolio that achieves the GHG Planning Target and is composed of:
     - baseline resources: 1.5X 2015 Mid AAEE, existing DR, existing gas fleet (minus planned retirements and replacements)
     - new resources: utility-scale solar PV + in-state wind + battery storage/shimmy DR
   - A GHG Planning Price of $150/metric ton in 2030
   - Policy actions to ensure that IRP guidance informs other CPUC proceedings and results in adequate resource procurement
2. **CPUC adopts a Reference System Plan**
3. **LSEs file IRPs that reflect the Reference System Plan**
   - Staff expects that LSE plans will be consistent with three key benchmarks or will provide a justification for any deviation:
     - GHG Planning Price: $150/metric ton in 2030
     - Resources in Reference System Portfolio
     - GHG Emissions Benchmark for individual LSEs
4. **Staff aggregates LSE plans to validate reliability, GHG emissions, and costs**
5. **CPUC decides whether to authorize procurement based on approved, aggregated LSE plans (the Preferred System Plan)**
6. **CPUC considers how to use IRP results to inform other resource-specific proceeding activities**

Contents of Reference System Plan

- The Reference System Plan includes four key recommendations:
  - A GHG Planning Target to use for the electric sector in IRP that is consistent with 40% statewide reductions by 2030
  - A Reference System Portfolio – a single portfolio of incremental resources that represents a least-cost, least-risk pathway to achieving the recommended GHG planning target
  - A GHG Planning Price that represents the marginal cost of GHG abatement associated with the Reference System Portfolio and that will enable the CPUC and load-serving entities to consistently value both demand and supply-side resources
  - Near-term Commission policy actions to ensure that the results from IRP modeling inform other CPUC proceedings and lead to the development or procurement of adequate resources

DAY 1: II. PROPOSED REFERENCE SYSTEM PLAN

* For this section staff will be using pre-selected slides from the “Proposed Reference System Plan” deck circulated on September 19th and available as Attachment A on the following page: http://cpuc.ca.gov/irp/proposedrsp/

DAY 1: III. RELATIONSHIP BETWEEN IRP AND CAISO'S TRANSMISSION PLANNING

HOW CAISO'S TRANSMISSION PLANNING PROCESS (TPP) USES POLICY-PREFERRED PORTFOLIOS

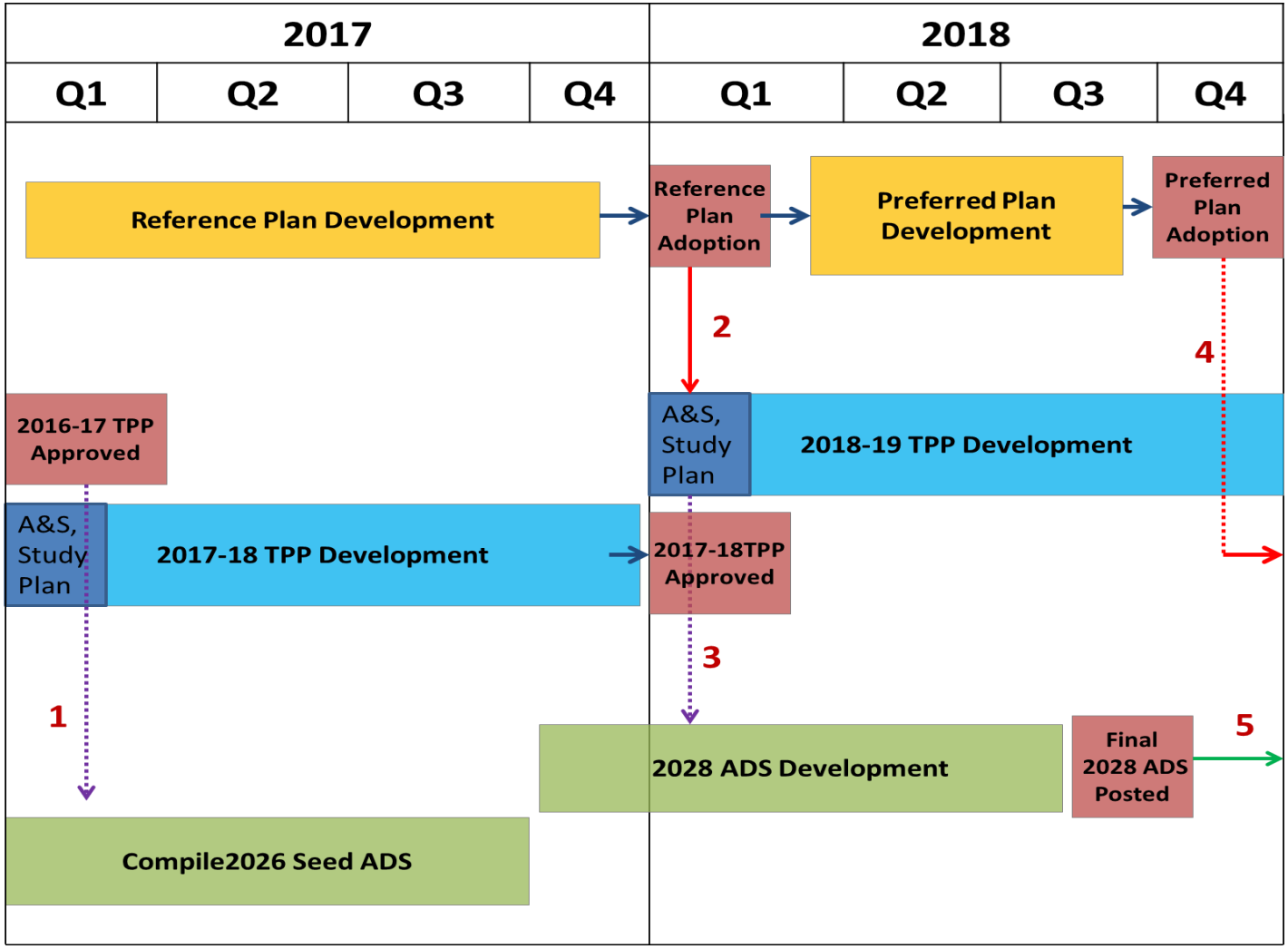
* Refer to CAISO presentation

OVERVIEW OF CPUC'S PROPOSAL FOR ALIGNING IRP, TPP, AND THE ANCHOR DATA SET

Overview

- Process alignment between the CPUC's IRP, the CAISO's TPP, and the Western Electric Coordination Council (WECC)'s Anchor Data Set (ADS) is key to maximizing the collective value of infrastructure planning, and optimizing future decision-making.
- CPUC Staff proposes the following diagram as an initial implementation path to ensure that each agency's process utilizes each other's most up-to-date planning data and inputs.

CPUC IRP, CAISO TPP, WECC ADS: Process Alignment Proposal



Note: Diagram footnotes can be found on slide 23

Footnotes for Process Alignment Proposal

1. Planning Data Supplied to the 2026 “Seed” ADS, based on the 2026 Common Case
2. Reference System Plan data supplied to the CAISO for use in the 2018-19 TPP
3. Updated information from the CAISO (including 2018 Reference System Plan) supplied to the 2028 ADS Development Process
4. Updates from the Preferred Plan supplied to the 2019-2020 TPP, which could include out-of-state generation procurement
5. The Finalized 2028 ADS could align with the data input window for the 2019-2020 CAISO TPP

Note:

- Future work-flow process on subsequent ADS development is TBD
- Development of post-2018 workflow processes to be created by the new ADS Task Force

IRP-TPP-ADS Process Alignment Questions

- Will the CAISO use the Unified Planning Assumptions/Study Plan document, which may use the Default case from the CPUC's 2018 Reference System Plan, to inform the 2028 ADS development process?
- How will the final 2017-2018 TPP be used as an input to the 2028 ADS? How will this align with the Default case in the 2018 Reference System Plan?
- Would the CAISO update its inputs from the ADS into the TPP every other year, (and vice versa), given differences in process workflow schedules?

PAST, PRESENT, AND FUTURE: ROLE OF THE "ASSUMPTIONS & SCENARIOS" DOCUMENT

Overview of Assumptions & Scenarios Documentation

- LTPP (predecessor to IRP) proceeding has historically used the A&S document to:
  - Memorialize common set of assumptions and modeling methodologies
  - Identify resource portfolios to be used in the CAISO 's TPP
- A&S Document has been issued annually and has historically included:
  - Planning scenarios
  - Assumptions
  - Modeling guidance
- 2018 - Transition year for A&S
  - Planning scenarios will be transmitted through Reference System Plan Decision
  - Assumptions and modeling guidance will be divided among:
    - Reference System Plan
    - IRP Production Cost Modeling (PCM) documentation – new document
    - 2018 IRP Assumptions Guide (AG) – new document
- 2019 - AG and PCM documentation will be merged into one document called the IRP/RA Unified Inputs document

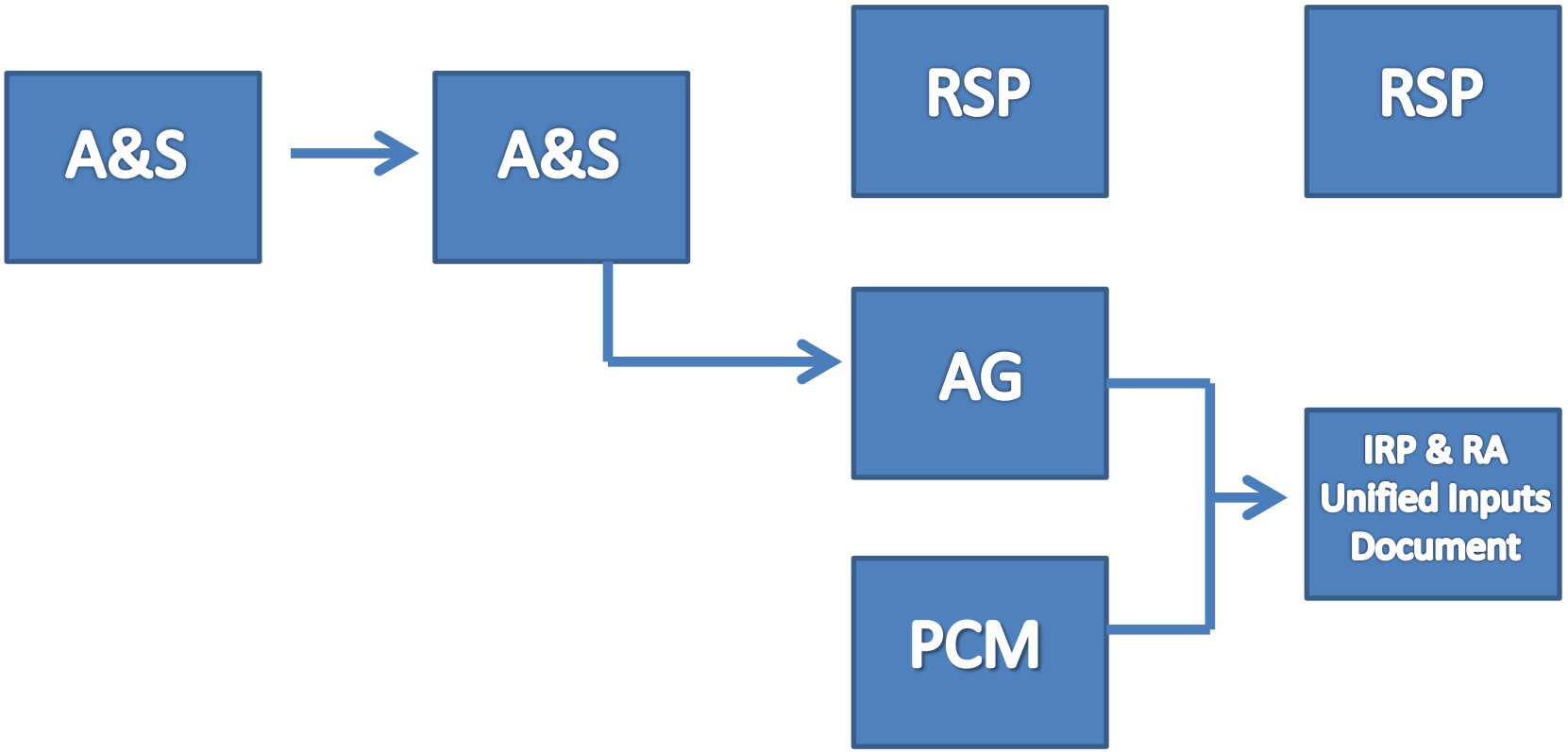
Summary of 2018 IRP Assumptions Documentation

- Reference System Plan (RSP)
  - RESOLVE Inputs and Assumptions
  - RESOLVE User Interface
- Production Cost Modeling guidance (PCM)
  - Modeling Scope and Conventions Guidance*
  - SERVM's representation of the RSP assumptions
- 2018 Assumptions Guide (AG)
  - Assumptions not provided in RSP or PCM guidance
  - Modeling assumptions and guidance specific to power flow modeling

* See Production Cost Modeling Staff Proposal

Assumptions Documentation in Past and Future Cycles

2016	2017	2018	2019



IRP/TPP Planning Scenarios: Process and Scenario Recommendations

- Historically, CPUC's TPP scenario recommendations have been transmitted to the CAISO via a CPUC/CEC joint letter, i.e., not adopted via CPUC decision
- Proposal for 2017 and beyond – TPP scenario recommendations will be approved via CPUC Decision adopting Reference System Plan and transmitted to CAISO via CPUC/CEC Transmittal Letter
- Draft 2017 Reference System Plan recommends the following for the CAISO's 2018/2019 TPP:
  - CAISO's TPP policy-driven studies use the Reference System Plan portfolio (42MMT scenario)
  - CAISO's TPP reliability base case studies use the Default portfolio, which reflects all existing policies including 50% RPS

DAY 1: IV. PRODUCTION COST MODELING FOR IRP SYSTEM PLANS

Outline

- IRP production cost modeling objectives
- IRP Production Cost Modeling Process Proposal
- How production cost modeling fits in the IRP process
- Planning Reserve Margin
- Key PCM issues to consider

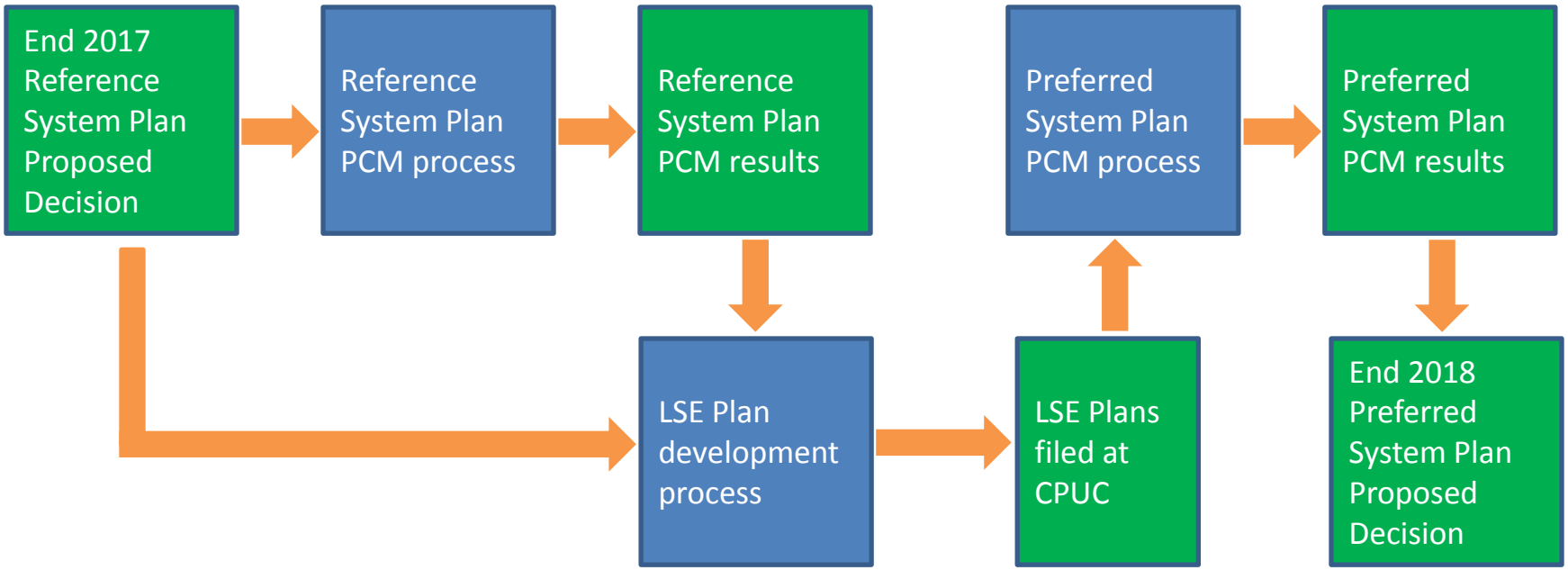
IRP Production Cost Modeling Objectives

- Evaluate Reference and Preferred System portfolios with higher operational detail and wider distribution of conditions
  - Measure and report probabilistic reliability level, emissions, renewable generation, curtailment, production cost, etc.
  - Verify satisfaction of Planning Reserve Margin (PRM) requirement
    - Includes calculating average portfolio Effective Load Carrying Capability (ELCC) values as component of reserve margin calculation
  - Calculate marginal ELCC values for utility-scale solar and wind
    - Primarily to guide LSEs' IRP plan development
    - Alternatively use marginal ELCC values extracted directly from the RESOLVE model in this IRP cycle

IRP Production Cost Modeling Process Proposal

- Production cost modeling process for current and future IRP cycles
  - Uses the Strategic Energy Risk Valuation Model (SERVM)
  - Refine over time and merge with Sep 2016 Ruling directing production cost modeling requirements
- Guide for parties conducting modeling to inform IRP
  - Guidance intended to be complete enough to enable comparison between results from different parties/different models
  - Requires a report that details SERVM's representation of the Reference System Plan developed with RESOLVE – tabular format
  - Specifies modeling scope, conventions, and steps
- Guide to facilitate comparison and alignment with other similar analytic processes, e.g. Resource Adequacy
  - Develop a unified inputs document for RA and IRP SERVM modeling

How Production Cost Modeling (PCM) Fits in the IRP Process



Blue = Analytical/modeling process
Green = Major deliverable

PRM is the Current Reliability Standard

- CPUC's adopted reliability standard is a minimum 15% reserve margin – the Planning Reserve Margin
  - Falling short of the PRM will be the basis for determining whether any system reliability-driven additional procurement is necessary

- Probabilistic reliability modeling is useful in characterizing system reliability relative to a target reliability level
  - Used to calculate ELCC values which are a component of reserve margin calculations
  - Can quantify the effective capacity (MW) needed to calibrate the system being studied to a target reliability level
  - A shortage of effective capacity may be found, but this will not determine procurement

Reserve Margin Calculations

- Reserve margin is the extent to which effective capacity exceeds expected peak demand
  - Typically ratio of Net Qualifying Capacity to average annual peak

- Calculation proposed for IRP to verify meeting PRM

Component	Counting convention
Peak demand	IEPR 1-in-2 annual peak consumption forecast adjusted for load-modifier impacts but excluding BTM PV impact
Existing non-wind, non-solar	Use current Net Qualifying Capacity values
New non-wind, non-solar	Use same conventions as the RESOLVE model
Wind and solar (including BTM PV), existing and new	Calculate the average portfolio ELCC of these resources combined. Discount this value by the ratio of fully-deliverable capacity to total capacity.

Key PCM Issues to Consider

1. Given the accelerated 2017-2018 IRP schedule:
   - How important is it to model with both the 2016 IEPR Update and the 2017 IEPR?
   - Which years must be modeled (proposal recommends 2022 and 2030)?
   - Should any modeling steps be eliminated? Are any steps missing?
2. Proposing to model BTM PV as supply (with associated ELCC), and AAEE as load-modifier (no ELCC and counted on demand side of reserve margin calculation). Is this sufficient for IRP system plan review purposes?
3. Proposing to calculate marginal ELCCs for utility-scale solar and wind. Is the proposed size, location, and technology type granularity sufficient for IRP purposes of guiding LSE plan development?
4. Proposing to produce only annual ELCC values. Are monthly ELCCs required for IRP system plan review and/or to guide LSE plan development?

DAY 1: V. GENERAL Q&A

DAY 2: I. OVERVIEW OF DAY 2

* Please refer back to slides 3 – 15 of this slide deck

DAY 2: II. RECOMMENDED COMMISSION POLICY ACTIONS #1-3

Recommended Commission Policy Actions

- **Purpose of Recommended Policy Actions**
  - Ensure that LSEs develop or procure the incremental resources that may be needed as part of the 2017-2018 IRP Reference System Portfolio
- **Basis for Recommendations**
  - Staff have identified five conclusions based on IRP modeling that may require discrete policy actions by CPUC
  - Actions are intended to be undertaken by the CPUC, in tandem with other stakeholders where indicated
  - Actions correspond to conclusions, implications, and action items contained in the following section, “Path to Future All-Resource Planning”
  - Slides that follow summarize the conclusions and proposed policy actions

1. RENEWABLE PROCUREMENT

Discussion of Stimulation of Renewable Energy Procurement

- Conclusion: 42 MMT case indicates that significant renewable procurement would be optimal, potentially in the short-term
- Policy Action: CPUC should evaluate whether it is reasonable to revise renewable energy targets to achieve the portfolios indicated in the IRP Reference and Preferred System Plans

Renewable Energy Targets: Questions for Discussion

- Ruling Question #21: Should the Commission raise the RPS compliance requirement for 2030 and/or intervening years for all LSEs?
  - If so, to what percentage?
  - If so, in this proceeding or as a recommendation to be considered in the RPS rulemaking (or another venue: please specify)?
- Ruling Question #22: Should the Commission require additional renewable procurement outside of the RPS program?
  - Why or why not?
  - If so, how?
  - If so, at what level?
  - If so, from whom?

2. OUT-OF-STATE WIND RESOURCES

Discussion of OOS Wind Resources

- Conclusion: Out-of-state wind resources might be part of the optimal portfolio, but existing transmission may be insufficient to deliver the optimal quantity of OOS wind into CA
- Policy Action: CPUC to coordinate with CAISO to convene intensive, rapid study of out-of-state (OOS) wind generation and transmission costs and procurement options
  - Option 1: Transmit policy-preferred portfolio reflecting one or more approaches to serving CA load with OOS wind to CAISO's Transmission Planning Process
  - Option 2: Conduct study under the aegis of a broader regional western transmission planning process

OOS Wind: Questions for Discussion

- Ruling Question #23: Should the Commission initiate activities with the CAISO or others to investigate further development of out-of-state wind?
  - Why or why not?
  - If so, what specific steps should be taken?
  - Should out-of-state wind be included in a special study or as part as a policy-driven scenario for TPP? Why or why not?

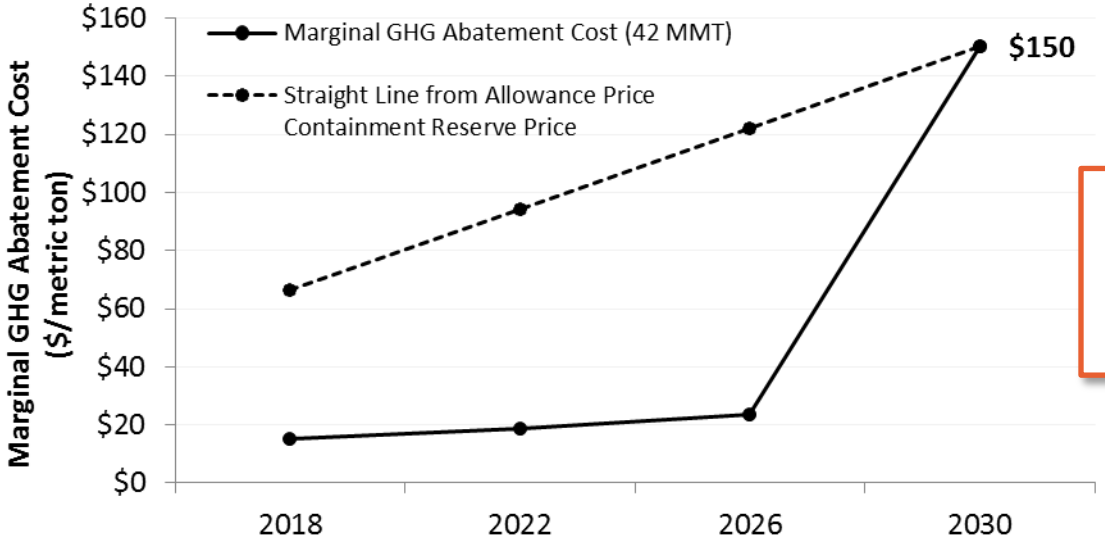
3. GHG PLANNING PRICE USE IN OTHER PROCEEDINGS

Use of the GHG Planning Price in Other Proceedings

- Conclusion: IRP has the ability to produce marginal abatement prices that reflect the system-wide marginal resource abatement cost associated with achieving certain targets, such as GHG or RPS targets
- Policy Action: IRP should adopt marginal abatement prices that can be used by other CPUC proceedings, including the Integrated Distributed Energy Resource (IDER) proceeding

GHG Planning Price

- **Recommended GHG Planning Price for IRP 2017-18: $150/MT in 2030**
  - Represents the CAISO system-wide marginal GHG abatement cost associated with achieving the 42 MMT planning target for the electric sector
  - The GHG Planning Price is an outcome of RESOLVE modeling, which constrains GHG emissions at the system level on an annual basis
  - LSEs would use the GHG Planning Price to develop their own portfolios and benchmark against resources in the Reference System Portfolio and an LSE-specific GHG Emissions Benchmark



Staff proposes using a straight line from the current GHG allowance price containment reserve price (~$66/metric ton) to the 2030 GHG Planning Price value

GHG Planning Price in Other Proceedings: Questions for Discussion

- Ruling Question #24: Should the Commission utilize the GHG Planning Price as an input to the IDER avoided cost calculator?
  - Why or why not?
  - Do you have specific recommendations for the appropriate methodology for use of the GHG Planning Price in IDER or other demand-side resource proceedings/activities?

DAY 2: III. RECOMMENDED COMMISSION POLICY ACTIONS #4-5

4. NATURAL GAS FLEET IMPACTS

Discussion of Natural Gas Fleet Impacts

- Conclusion: A certain subset of existing gas plants may provide value to the system in 2030, though which plants or plant attributes provide value in 2030 is still unclear
- Policy Action: CPUC should coordinate with CAISO to engage in a detailed study in order to:
  - Identify attributes of the existing generation fleet that will provide value in the future
  - Continue to explore multi-year RA planning horizons and their impacts

Questions for consideration

- Ruling Question #26: Should the Commission initiate activities with the CAISO or others to analyze the type and viability of the natural gas fleet?
  - What activities should be undertaken and why?
- Identify attributes of the existing generation fleet that will provide value in the future:
  - Low minimum generation level?
  - Fast ramping ability?
  - Location-specific benefits?
- What kinds of analytical activities are needed to better understand the types and quantities of gas resources that would best serve future grid needs?

5. COMMON RESOURCE VALUATION METHODOLOGY

Development of a Common Resource Valuation Methodology (CRVM)

- Conclusion: Effective IRP planning requires a clear link to procurement activity, which can potentially be provided via a consistent valuation methodology applied in both planning and procurement processes and across multiple resource areas
- Policy Action: CPUC and stakeholders will work to develop a CRVM to ensure that the costs and benefits used in IRP planning are reflected in bid evaluation and program funding authorizations across resource types

CRVM: Outline of CPUC Staff Proposal

- Develop CRVM staff proposal for public comment in Q1 2018
  - Resource areas: EE, DR, BTM PV, RPS, storage, EVs
  - Proceedings: IDER, DRP, RA, IRP
- Phased approach: Resource areas to be assessed for incorporation into CRVM to be sequenced by likelihood of near-term procurement
- Two types of alignment:
  - Vertical: Alignment of the resource attributes valued in IRP with those valued in procurement
  - Horizontal: Alignment of the attributes used for valuing resources across all procurement processes, allowing “apples to apples” comparisons from resource to resource (e.g., RPS vs. EE)

CRVM: Questions for Discussion

- Ruling Question #25: If the Commission were to engage in development of a CRVM:
  - What resource areas should be prioritized for incorporation into the CRVM?
  - Do you have specific recommendations for the appropriate structure of a CRVM? Include examples from other jurisdictions where possible.
  - What would be the appropriate application of such a method?

DAY 2: IV. PATH TO FUTURE ALL-RESOURCE PLANNING

Path to Future All-Resource Planning: Explanation of Proposal Outline

- Each resource area has been analyzed using the standardized outline below:
  - **Conclusions**: Derived from the preliminary RESOLVE modeling results
  - **Implications**: Policy considerations for specific resource areas given the IRP modeling results
  - **Action Items:** Next steps for resource areas to develop a further factual record given the new policy considerations

Path to Future All-Resource Planning: Expected Purpose, Use, and Outcome

- **Purpose**: The Commission aims to optimize additional resources such as energy efficiency, demand response, and electric vehicles in future IRP cycles.
  - To do so requires developing policy ideas and building a record in resource proceedings so that resource-specific assumptions and policies can be weighed by the appropriate assigned Commissioner, Administrative Law Judge, and parties.
- **Plan:** Staff will build on party comments on these Conclusions, Implications, and Action Items to develop next steps in coordination with resource proceedings.
- **Outcome:** Upcoming scoping memos in specific resource proceedings will set out actions, timelines, and deliverables to build the required record.

Path to Future All-Resource Planning: Expected Benefits

- IRP process will be able to optimize more demand-side resources starting in the 2019-20 IRP cycle
- IRP process continues to comply with statutory mandate to identify a diverse and balanced portfolio of resources needed to meet California's electricity needs
- IRP process continues to place downward pressure on costs to ratepayers by using assumptions and policies that draw on prior IRP results
- Ensure that planning guidance developed in IRP flows into DAC-related proceedings and results in actions consistent with statutory guidelines

1. ENERGY EFFICIENCY

Energy Efficiency (1 of 2)

Conclusions:

- Future value of incremental energy efficiency depends on the magnitude of the GHG Planning Target
- Inputs used in current IRP analysis may understate EE costs, thus potentially resulting in overstated benefits
- Shape and magnitude of avoided costs change dramatically in a carbon-constrained world

Implications:

- Further effort necessary to examine feasibility of EE resource optimization in future IRP modeling
- Alignment of EE rolling portfolio cycle, IRP cycles, and other processes may be beneficial
- EE resources may require updated price signals to ensure future program development that benefits the grid

Energy Efficiency (2 of 2)

Action Items:

- Refine workplan for determining whether EE Potential & Goals process can be integrated with IRP Reference Plan development in 2019
  - July 2017: Scoping of consultant work
  - November 2017: Navigant completes post-processing of current EE P&G in order to study feasibility of EE optimization in the future
  - Early 2018: EE Staff whitepaper addressing feasibility and potential means of EE optimization, mailed for comment in EE proceeding
- Perform gap assessment on whether EE rolling portfolio cycle and IRP cycle can be aligned
- Examine opportunities for alignment with other connected processes such as IEPR forecast and SB 350 targets
- Assess potential impacts of new price signals that may originate from IRP and EE providers' ability to respond to those signals

2. BEHIND-THE-METER PV

Behind-the-Meter PV (1 of 2)

Conclusions:

- Increasing quantities of BTM PV increase total resource cost across all scenarios, with significant portion of costs being borne by customer generation owners
- While rooftop solar and utility-scale solar have a similar operational impact on GHG emissions, the total resource cost of rooftop solar is higher than utility-scale solar because of economies of scale and resource quality
- Location-specific distribution and certain transmission deferral benefits not considered in RESOLVE

Implications:

- CPUC NEM Successor Tariff proceeding should consider IRP modeling results when designing future NEM tariffs.
- CPUC should define a consistent means of valuing BTM PV resources across proceedings.
- NEM Successor Tariff proceeding would benefit from location-specific values generated by DRP

Behind-the-Meter PV (2 of 2)

Action Items:

- Improve valuation methodology for BTM PV resources in IRP:
  - Consider appropriateness of using the Total Resource Cost (TRC) test vs. other demand-side cost-effectiveness tests
    - TRC test currently used in 2017-18 IRP modeling
  - Consider the appropriate procedural venue (IRP or NEM) to determine which valuation methodology to use.
- Establish coordination work plan with CEC on rollout of ZNE Building standards, if adopted, and related implications for BTM PV
- Establish coordination work plan for alignment with DRP and NEM Successor Tariff Revisit

3. DEMAND RESPONSE

Demand Response (1 of 3)

Conclusions:

- "Shed" DR resources do demonstrate value at the local level and in a sensitivity that assumes high gas generation retirements
- Additional "shed" DR resources beyond those included in the baseline do not demonstrate value at system level
- At higher levels of GHG constraints, advanced "shift" demand response offers a cost-effective option to increase flexibility of the electric system
- "Shimmy" DR resources could meet some portion (up to 300 MW) of the need for short-duration storage services provided by battery storage, at lower cost

Demand Response (2 of 3)

Implications:

- "Shed" DR not a cost effective incremental system resource but could be in local areas; requires further study
- At more stringent GHG constraints, "Shift" DR resources represent a cost-effective means of reaching GHG emissions targets, assuming those resources materialize in the time horizon studied and at the costs assumed in the LBNL DR Potential Study
- "Shimmy" DR resources require further development
- Potential uncertainty regarding the procurement trajectory over the IRP time horizon should be considered in planning and targets for different DR resource types

Demand Response (3 of 3)

Action Items:

- Develop a transition plan that can address gaps that RESOLVE does not model
- Maintain and/or build resources so they will be in place to meet long-term needs
- DR proceeding should evaluate how IRP results should affect DR targets and program budgets post-2022.
- Refine work plan for determining whether EE Potential & Goals and DR potential study processes can be integrated with IRP Reference Plan development in 2019
- Continue to pursue steps to make “shift” and “shimmy” DR resources a reality
- Determine how current DR cost-effectiveness regime can integrated with a common resource valuation methodology developed in IRP in close coordination with IDER proceeding

4. DISTRIBUTION RESOURCES PLAN

Distribution Resources Plan (1 of 3)

Conclusions

There are two major interaction areas between IRP and DRP:

- Grid integration costs and benefits of DERs at system level need to be calculated
  - RESOLVE does not currently account for grid integration costs and benefits of DERs
  - DRP future refinements to the locational net benefit analysis (LNBA) include calculation of net DER integration costs at the Distribution Planning Area level, but calculation of a system level costs/benefits is not currently in scope of LNBA working group
- Transparent and consistent DER growth forecasts are needed for both IRP and DRP
  - IRP needs a clear set of planning assumptions in order to run scenarios on the impact of policy levers on each DER
  - DRP staff is coordinating CEC on development of DER growth scenarios, and ensuring the process will meet IRP needs
  - Currently discussing what adjustments may be needed to the IEPR demand forecast process to meet IRP and DRP needs

Distribution Resources Plan (2 of 3)

Implications:

- DRP and IRP comprise a feedback loop: DER growth depends on the cost-effectiveness of DER relative to other GHG free resources, which depends on costs of grid integration of DERs, which in turn depends on DER growth
- This feedback loop makes the assessment of DER growth and cost effectiveness complex, and by necessity an iterative process
  - DRP will not inform the 2017-2018 IRP planning cycle or vice versa, but results will be for the following cycle
  - IRP guidance from the optimized portfolio is expected to flow through to policy revisions in CPUC resource proceedings, and then the IEPR forecast, before becoming new DRP DER growth scenarios
- New analysis that pulls together results of LNBA in order to understand impacts at a system level may be needed

Distribution Resources Plan (3 of 3)

Action Items:

- DRP to develop a plan for determining system level grid integration costs/benefits
- DRP to work with CEC to define planning assumptions for DER growth
- DRP staff to determine how optimization of DERs in future IRP cycles will impact DER growth forecasts
- DRP to identify which DERs are driving specific grid needs, so that grid planning can adjust to changing market adoption rates

5. ELECTRIC VEHICLES

Electric Vehicles (1 of 3)

Conclusions:

- In the 42 MMT and 30 MMT Cases, flexible EV charging reduces the amount of renewable generation and energy storage selected to meet GHG Planning Target
- Financial benefit of flexible charging grows with increasing penetrations of renewables (or increasingly stringent GHG targets)

Electric Vehicles (2 of 3)

Implications:

- The CPUC should prioritize investments in EV charging infrastructure that facilitates charging flexibility, as it contributes to renewables integration and reduces total system costs
- The CPUC should ensure that rates are designed to encourage EV charging behavior that is responsive to grid conditions and flexibility needs
- The CPUC should use IRP modeling results to inform EV program investment decisions during the next round of EV applications (and in the current round, to the extent possible)
- To determine how much CPUC should invest in EV programs and incentives, a better understanding is needed of:
  - The load impact of managed EV charging in comparison to unmanaged EV charging
  - The bill impacts of existing and future programs
  - Relationship between charges "at the pump" and electricity bill charges on total household bills
  - Willingness of customers to bear higher rates in short-term
  - The level of EV adoption at which rate decreases begin to occur

Electric Vehicles (3 of 3)

Action Items:

- Coordinate with CEC and CARB to further refine state forecasts for EVs
- Investigate opportunities to electrify the transportation sector to take advantage of the GHG and air emissions benefits associated with an increasingly clean electric grid and provide benefits to disadvantaged communities

6. RENEWABLE ENERGY RESOURCES

Renewables (1 of 3)

Conclusions:

- Significant renewable energy resource procurement is required in the 42 MMT and 30 MMT cases
  - Utility-scale solar and wind resources are required in significant quantities
  - Geothermal is only required in high-GHG constrained futures
  - Biomass is likely not needed prior to 2030
- Expiry date of ITC/PTC may have effect on optimal timing for renewable energy resource procurement
- Curtailment is a cost-effective solution for grid integration

Renewables (2 of 3)

Implications:

- CPUC and stakeholders should evaluate the feasibility of large amounts of renewable energy procurement over a short timeline and whether RPS is an appropriate mechanism for that procurement
- ITC/PTC expiry dates may drive timing of decision-making and procurement
- RPS and IRP proceedings would benefit from a high degree of alignment

Renewables (3 of 3)

Action Items: (need to adj bullet size)

- Evaluate how the IRP Reference and Preferred System Plans should inform the RPS procurement targets in the RPS proceeding
- Reform the RPS Least Cost Best Fit (LCBF) methodology prior to a potential 2018 RPS RFO, as part of IRP's development of a Common Resource Valuation Methodology (CRVM)
- Assess the procurement, project permitting/construction, and interconnection issues associated with accelerating renewable energy procurement to capture expiring ITC and PTC tax credits
- Require IOUs to include analysis in their respective 2018 RPS Procurement Plans that examines the trade-off between ITC expiration and the potential decline in future resource costs

DAY 2: V. GENERAL Q&A

IDER BACK-UP SLIDES

IDER Proceeding Status (1 of 2)
R.14-10-003

- Staff Proposal on Cost-Effectiveness Evaluation (issued February 2017):
  - Proposes new cost-effectiveness tests – a modified Total Resource Cost (mTRC) test, modified Program Administrator Cost (mPAC) test, and a Societal Cost Test (SCT)
  - mTRC and mPAC consist of the existing TRC and PAC tests with the addition of a greenhouse gas (GHG) adder
  - SCT consists of the existing TRC test with three additional components: GHG adder, air quality adder, and social discount rate (3% real proposed)

IDER Proceeding Status (2 of 2)
R.14-10-003

- D.17-08-022: IDER Decision Adopting Interim Greenhouse Gas Adder
  - Temporarily adopts GHG Adder (until May 2018 w/ one year deferral option)
    - Adopts cap and trade APCR ("ceiling") prices as a GHG adder in the Avoided Cost Calculator
  - Does not state whether the Interim GHG Adder represents the social cost of carbon or a carbon abatement cost.
  - Implicitly replaces TRC and PAC (at least temporarily) with mTRC and mPAC
  - Used to set EE goals in R1311005; proposed decision on August 28 agenda