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DRAFT STAFF PAPER

Proposed Guideline Topics for Publicly Owned Utilities' Integrated Resource Plans

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Edmund G. Brown Jr., Governor

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ABSTRACT

The California Energy Commission plans to develop guidelines for submitting information, data, and reports needed to support the review of the publicly owned utilities' integrated resource plans in accordance with Senate Bill 350 (De León, Chapter 547, Statutes of 2015). The *Proposed Guideline Topics for Publicly Owned Utilities' Integrated Resource Plans* describes the preliminary framework of the guidelines and solicits stakeholder input on staff's proposal.

This document will inform the development of guidelines for use by publicly owned electric utilities when preparing, adopting, and submitting integrated resource plans. Staff proposes that guidelines include suggested and required integrated resource plan contents, provide requirements for submitting integrated resource plans to the Energy Commission for review and comment, and describe the process for correcting deficiencies in an integrated resource plan.

Keywords: Integrated resource plan, POU, Renewables Portfolio Standard, RPS, forecast, demand, guidelines, energy efficiency, transportation electrification, demand response, greenhouse gas, GHG, emissions, system reliability, integration, local reliability, energy storage, distributed generation, publicly owned utility

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EXECUTIVE SUMMARY

Background

On October 7, 2015, Governor Edmund G. Brown Jr. signed Senate Bill 350 (De León, Chapter 547, Statutes of 2015) into law, requiring qualifying publicly owned utilities (POUs) to adopt integrated resource plans (IRPs) at least once every five years. IRPs are comprehensive electricity system planning documents intended to ensure that POUs lay out the resource needs, policy goals, physical and operational constraints, and general priorities or proposed resource choices of an electric utility, including customer-side preferred resources like rooftop solar. To expedite this review, SB 350 allows the California Energy Commission to adopt guidelines that will prescribe a process for developing, submitting, and reviewing IRPs. This Energy Commission staff paper lays out the initial framework of the guidelines. Interested parties are encouraged to comment on this proposal and respond to outstanding questions and issues.

POUs use IRPs to plan for resource acquisitions to meet energy demand reliably and cost-effectively. IRPs are long-term planning documents intended to inform utility owners, ratepayers, and board members of the planning strategy for achieving high-level policy goals. Under SB 350, IRPs will also inform state policy makers of strategies and plans of POUs to achieve California's renewable procurement, energy efficiency goals, and vehicle electrification under various planning scenarios. In addition, when combined with information from the IRPs of load-serving entities submitted to the California Public Utilities Commission (CPUC), these plans will allow state policy makers to track progress in meeting the state's electricity sector greenhouse gas (GHG) emission reduction target.

Energy Commission staff developed the following guiding principles for use in drafting IRP guidelines.

- IRP guidelines and reporting requirements should be coordinated as much as possible with other POU reporting requirements. This coordination includes aligning data collection requirements consistent with the schedule of the *Integrated Energy Policy Report*.
- Aggregated IRPs, when submitted to the Energy Commission and the CPUC, should inform policy makers on the possible evolution of the state's resource portfolio for long-term energy policy and planning efforts.
- POUs should have the flexibility to develop their plans in a manner that accounts for local planning goals and challenges, differences in the structure of POUs, and progress in achieving state mandated procurement and GHG reduction goals.

Integrated Resource Plan Submission and Review

Energy Commission staff has determined that 16 POUs meet the SB 350 threshold requirement to adopt IRPs by January 1, 2019. Staff proposes that POUs update, adopt, and submit IRP updates every four years to coincide with other similar reporting requirements. In preparing IRPs, staff proposes that all supporting analysis be undertaken within 24 months prior to the POU board adopting an IRP. Furthermore, staff proposes that submittal of IRPs and all supporting documents would be due to the Energy Commission through an electronic filing by January 31, 2019, with updates filed every four years thereafter.

As required by SB 350, Energy Commission staff will review IRPs for completeness and check for any inconsistencies and missing analyses. The Energy Commission will develop recommendations to correct deficiencies discovered in the IRPs and notify POUs. Energy Commission staff may request additional information if required data or analyses are needed.

Data Reporting Requirements

SB 350 requires that POUs develop IRPs to plan for and procure various demand-side and supply-side resources to meet the state's GHG emission reduction, energy efficiency and renewable energy targets. Staff proposes that data reporting of POU demand and supply be standardized using the following four tables.

1. Capacity Resource Accounting Table: A detailed estimate of the POU's annual peak capacity demand in each year and the contribution of each energy resource (capacity) in the POU's portfolio to meet that demand.
2. Energy Balance Accounting Table: A detailed estimate of the POU's annual total energy demand and yearly estimates for energy supply from various resources.
3. Renewables Portfolio Standard (RPS) Compliance Accounting Table: A detailed summary of a POU resource plan that meets the RPS requirements. SB 350 establishes an RPS requirement that 50 percent of electricity retail sales be served by renewable energy resources by 2030.
4. GHG Emissions Accounting Table. Annual GHG emissions associated with each resource in the POU's portfolio to show if the resource plan is in line with the GHG emission reduction goals of SB 350.

Integrated Resource Plan Content

In addition to the information provided in the accounting tables above, several other related issues will need to be addressed in the IRP. These include system reliability and renewable energy integration, local reliability, energy storage, and distributed resources, such as rooftop photovoltaic and wind. Under SB 350, IRPs must also address transportation electrification, energy efficiency, and demand response. Staff proposes that programmatic effects be enumerated in the standardized format with other energy

and capacity resources. In addition, supplemental description of these programs and the related effects will be needed to enable staff review of IRPs.

As part of this planning, assumptions about the future will be needed to assess future energy supply and demand. Staff proposes several standardized input assumptions that will enable collection of IRP results and comparison with other California utilities. These input assumptions include forecasted GHG emission costs, impacts to GHGs and electrical loads per electric vehicle deployed, and electricity GHG emissions intensity.

Staff proposes that at least one planning scenario in IRPs that achieves state energy policy goals be required, as well as any other legal requirement and resource adequacy standard through the forecast period of 2019 to 2030 inclusive. This planning scenario must achieve POU-specific GHG reduction targets and have 50 percent of retail energy sales from renewable resources by 2030 as required under Senate Bill 32 (SB 32, Pavley, Chapter 249, Statutes of 2016) and SB 350, respectively.

In addition, SB 350 requires IRPs to address how localized air pollutants and GHG emissions have been minimized with a priority given to disadvantaged communities. Staff proposes that results from this analysis be provided in a narrative form with referenced data submitted as needed.

Introduction

This document will inform and guide the California Energy Commission's development of guidelines for use by publicly owned electric utilities (POU) when preparing, adopting, and submitting integrated resource plans (IRPs). Energy Commission staff proposes that guidelines include suggested and required IRP contents, provide requirements for submitting IRPs to the Energy Commission for review and comment, and describe the process for correcting an IRP's deficiencies.

Text boxes have been inserted into the document to indicate specific issues upon which staff seeks comment. In addition, parties are encouraged to address outstanding issues listed in the closing section, as well as topics of interest or concern.

Statutory Background

California energy and climate policy call for an aggressive transition from fossil fuels to renewable energy resources, more energy-efficient homes and businesses, alternative transportation fuels, and other programs and measures designed to dramatically reduce greenhouse gas (GHG) emissions in the state. To reduce GHG emissions, Senate Bill 350 (De León, Chapter 547, Statutes of 2015) was signed into law, codifying Governor Edmund G. Brown Jr.'s goals for 50 percent renewable energy and doubling of energy efficiency savings in buildings and retail end uses by 2030. In September 2016, Governor Brown signed Senate Bill 32 (Pavley, Chapter 249, Statutes of 2016) into law requiring the state to reduce GHG emissions 40 percent below 1990 levels by 2030.

SB 350 requires the California Air Resources Board (ARB) to establish, in coordination with the California Public Utilities Commission (CPUC) and the Energy Commission, GHG emission reduction targets for POUs and load-serving entities (LSEs) that reflect the electricity sectors' percentage in achieving the 2030 economywide GHG reduction goal. In addition, SB 350 requires POUs and LSEs to develop IRPs to allow for a more cohesive examination of how the different policies and mandates can fit together to achieve the most cost-effective and efficient GHG reductions for the state. POUs generally use IRPs to inform their governing authority, customers, and other interested parties of the potential investments and actions necessary to provide reliable service at the lowest cost, while satisfying regulatory mandates and customer preferences.

Furthermore, SB 350 requires that IRPs address procurement for renewable energy, energy efficiency, demand response, energy storage, transportation electrification, diversified resources, and resource adequacy. The plans will provide a means for the Energy Commission to assess and report to the Governor and Legislature, as part of the *Integrated Energy Policy Report* (*IEPR*), how POUs intend to use their future demand- and supply-side resources to align with the requirements and policy goals outlined in SB 350. IRPs will also serve as the primary tool for implementing GHG reduction

measures to achieve 2030 GHG reduction targets in the electricity sector. By aggregating across POU IRPs, the Energy Commission will be able to track POU progress in meeting the GHG reduction target for the electricity sector, as well as statewide energy efficiency and renewable goals.

SB 350 also requires the Energy Commission provide periodic updates regarding barriers to and efforts in support of deploying energy efficiency, distributed generation, and transportation electrification in disadvantaged communities. IRPs submitted by POUs are expected to be a primary source of information regarding existing and proposed programs and measures intended to develop these resources.

The Energy Commission completed the first barriers report called for in SB350 in the 2016 report *Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities*. This report, which was required by Senate Bill 535 (De León, Chapter 830, Statutes of 2012), adopts the California Environmental Protection Agency's (Cal/EPA) designation of disadvantaged communities. Cal/EPA identifies this group based on geographic, socioeconomic, public health, and environmental hazard criteria using a tool that assesses all census tracts in California to identify the areas disproportionately burdened by and vulnerable to multiple sources of pollution.[1] Staff proposes that POUs use this definition and resource to identify disadvantaged communities in their IRPs.

Energy Commission Authority

SB 350 requires that California POUs with an average annual load of more than 700 gigawatt-hours (GWh) between 2013 – 2015 are required to adopt (1) an IRP by January 1, 2019, and (2) a process for updating the plan at least once every five years. There are 16 California POUs fitting the average annual load. In addition, SB 350 requires the Energy Commission to review POU IRPs to ensure they:

- Meet the 2030 ARB-established GHG emissions reduction targets for the electricity sector and each POU.
- Procure at least 50 percent eligible renewable energy resources by 2030.
- Enhance the distribution systems and demand-side energy management.
- Address the procurement of:
    - Energy efficiency and demand response resources under California Public Utilities Code (PUC Section) 9615.
    - Energy storage requirements.
    - Transportation electrification.

1 See more at http://www.calepa.ca.gov/EnvJustice/GHGInvest.

- Resource adequacy requirements established under PUC Section 9620.
- Ensure system and local reliability.

The Energy Commission may also make recommendations for correcting deficiencies within the plans. PUC Section 9622 (b) states the "Energy Commission shall review the integrated resource plans and plan updates. If the Energy Commission determines an integrated resource plan or plan update is inconsistent with the requirements of PUC Section 9621, the Energy Commission shall provide recommendations to correct the deficiencies."

As previously discussed, under PUC Section 9622 (c), the Energy Commission may adopt guidelines to govern the submission of information, data, and reports needed to support the Energy Commission's review of the utility's IRP. Public Resources Code (PRC) Section 25320 provides the Energy Commission with broad authority to request necessary data for developing policy reports and analyses in the IEPR. In addition, PRC Section 25320 (a) (2) encourages the Energy Commission to align data collection consistent with the schedule of the *IEPR* and eliminate unneeded and duplicative reporting requirements.

Guiding Principles

Energy Commission staff is considering the following guiding principles:

- IRP guidelines and reporting requirements should be coordinated as much as possible with requirements by the Energy Commission and other public agencies to avoid duplication. This coordination includes aligning data collection requirements consistent with the schedule of the *IEPR*, the Renewables Portfolio Standard (RPS), and the leveraging other existing reporting requirements.
- When aggregated, IRPs submitted to the Energy Commission and CPUC should inform policy makers as to the possible evolution of the state's resource portfolio and assist in statewide long-term energy policy and planning.
- POUs should have the flexibility to develop their plans in a manner that realizes local planning goals, allows for differences in the structure of POUs, responds to local challenges, and enables entities to successfully achieve state-mandated procurement and GHG reduction goals.

Next Steps

Energy Commission staff will hold a workshop in the first quarter of 2017 to discuss issues raised in this paper and will use stakeholder comments on the paper in developing draft guidelines. In the interim, staff will develop a process for reviewing POU IRPs. This process will be made available for public comment in the draft POU IRP guidelines.

Energy Commission staff proposes to release draft POU IRP guidelines late in the first quarter of 2017 and hold a workshop in the second quarter of 2017 to solicit additional stakeholder comments on draft guidelines. Staff anticipates that final guidelines will be presented to the Energy Commission for adoption in summer of 2017.

The remainder of this staff paper is organized by topic area as follows.

- Topic 1 addresses developing and reviewing IRPs, including issues related to confidentiality, planning horizon, and timing of analysis.
- Topic 2 outlines the data reporting requirements and formats for POU demand and supply resources.
- Topic 3 describes information needs related to system reliability and renewable energy integrations, local reliability, energy storage, and distributed generation.
- Topic 4 describes information needs related to demand–side resources, including energy efficiency, transportation electrification, and demand response.
- Topic 5 discusses other IRP content including standardized input assumptions, required scenarios, GHG emission and cost assumptions, as well as some outstanding issues.

TOPIC 1:
Integrated Resource Plan Development and Review

SB 350 requires that, on or before January 1, 2019, the governing board of a POU that is subject to IRP requirements adopts an IRP and a process for updating the plan at least once every five years. SB 350 also directs the Energy Commission to review IRPs submitted by POUs. The Energy Commission proposes the following process for developing and reviewing POU IRPs to be established through guidelines.

Adoption of an Integrated Resource Plan Process

Each POU or designee is responsible for developing and adopting an IRP. The final IRP and updates submitted to the Energy Commission shall include a discussion of the process used, including reference to a governing authority decision, ruling, finding or resolution, and a schedule for routine updates. This can be provided by referencing the action in the first IRP submitted, in a separate document accompanying IRPs, or notice of publication.

Submitting Integrated Resource Plans to the Energy Commission

Staff proposes that POUs submit the IRPs and supporting documents to the Energy Commission no later than January 31, 2019, through electronic filing. Staff also proposes that responses to requests for additional information from POUs be satisfied within 30 calendar days of issuance.

The guidelines will include protocols for requesting time extensions, responding to requests for additional information, and electronically submitting IRPs and supporting documents. They will also include protocols for the Energy Commission staff to request additional data and information deemed necessary to expedite review of IRPs.

Confidentiality

It is possible that the POU may be required to provide confidential data and information to the Energy Commission as part of the IRP process.

POUs may, under the California Code of Regulations, Title 20 (§2501–2511), request confidential designation of such data and information from the Executive Director of the Energy Commission. The guidelines will contain protocols for requesting confidential treatment of data and information where necessary, that reflect these sections of the confidentiality regulations. Staff proposes using a similar process to that

included in *Appendix A* of *Forms and Instructions for Submitting Electricity Resource Plans: Prepared in Support of the 2017 Integrated Energy Policy Report*.[2]

Under this proposal, guidelines will contain details regarding the Energy Commission staff review of IRPs, including:

- Methods Energy Commission staff will use to determine that the IRP contains all the required components and allows a review to be conducted.
- Notification to POUs regarding staff determination of completeness.
- Energy Commission staff requirements for issuing and satisfying requests for additional information.
- Expected timeline for completing the review.
- Opportunities to formally comment on the review.

The staff expects to develop details of a proposal or proposals for the review of IRPs to be included in draft guidelines for discussion and comment prior to adopting final guidelines in the next few months.

Timing of Analyses, Modeling, and Updates

SB 350 requires IRPs be adopted on or before January 1, 2019, and "be updated at least once every five years." Staff proposes that IRPs be developed and submitted to the Energy Commission once every four years to coincide with other related state-mandated reporting requirements as discussed below.

The four-year time frame is based on these factors:

- Many POUs already meet or exceed the four-year frequency. Eleven of the affected POUs already develop IRP-type documents more frequently.
- The Legislature intends for IRPs to inform policy makers about POU planning. Having a quadrennial reporting framework will coincide with the *IEPR*, which is the Energy Commission's primary report to the Governor and the Legislature.
- The proposal allows for the coordination with other POU statutory reporting requirements, such as biennial resource plans (IEPR Electricity Resource Plans Forms and Instructions)[3] and quadrennial energy efficiency potential studies.
- If filed every five years, three IRPs would be developed prior to 2030; the final plan would be adopted by January 1, 2029. Under the staff proposal, IRPs would

2 http://www.energy.ca.gov/business_meetings/2016_packets/2016-12-14/Item_12_ElectricityResourcePlans.pdf.

3 For example, see Hingtgen, John, and David Vidaver. 2016. *Forms and Instructions for Submitting Electricity Resource Plans: Prepared in Support of the 2017 Integrated Energy Policy Report*. California Energy Commission. Publication Number: CEC-200-2016-013-SF.

be adopted by January 1 in 2019, 2023, and 2027. This schedule will give POU governing boards more time to implement results from their third IRP, which may include adjusting procurement decisions to achieve 2030 GHG reduction targets.

- PRC Section 25320 (a)(2) encourages the Energy Commission to align data collection consistent with the schedule of the IEPR and eliminate unneeded and duplicative reporting requirements.

Irrespective of the interval of updates, and despite efforts to coordinate reporting, IRP reporting requirements will overlap to some extent with other Energy Commission regulations. To minimize overlapping reporting requirements, staff proposes to combine these data requests during years when IRPs are due; see **Table 1** for examples.

Table 1: Comparison of Select POU Reporting Requirements

Reporting Requirement	Dates Due	Coordinates With 4-Year IRP	Coordinates With a 5-Year IRP
IEPR Biennial Resource Plans	May 1 Biennially Odd years	All Years	2019 and 2029
Section 9505 Energy Efficiency Potential Study	March 15 of 2017, 2021, 2025	All Years (precedes IRP by 2 years)	2017 only. Analysis too old in 2024 and 2029
PUC Section 9506 Energy Storage Procurement Report	January 1, 2017, and January 1, 2021	All years	2017 only

Source: Energy Commission staff.

One example of this potential for duplication, where the submission date may be an issue, is with the IEPR Electricity Resource Plans, which are due to the Energy Commission biennially. There is the possibility that existing reporting requirements include the past year's historical data. For many POUs, these data are not available until April of the following year.

Staff proposes that the supporting analyses for IRPs be completed within the 24 months prior to adoption of IRPs to ensure policy makers have assessments that incorporate recent mandates, changes in market conditions and infrastructure, and other circumstances that can affect resource procurement. Utilities should indicate where prior analysis remains relevant and retains value to avoid duplication in effort.

Planning Horizon

Because GHG emission reduction targets and requirements associated with the RPS extend to 2030, staff proposes that utilities develop IRPs that extend through 2030. Moreover, staff proposes that the planning horizon begin with the year IRPs are due to the Energy Commission. For example, the first plan is due to the Energy Commission on

January 31, 2019. The proposed minimum planning horizon is January 1, 2019, through December 31, 2030, inclusive.

Utilities are encouraged to undertake and present analysis that addresses the post-2030 period and staff expects that many will choose to do so.

Staff may require that the planning horizon be extended beyond 2030 to a yet-to-be-determined date in subsequent years. For example, staff is likely to request that IRPs submitted in 2023 have a planning horizon of 2035 or beyond.

Questions for discussion and comment:

1. Is it appropriate to require that supporting analysis for IRPs be undertaken in the 24 months prior to adopting an IRP? Is there an alternative time frame that is more appropriate?
2. Are there select areas of analysis that should be exempt from meeting this 24-month requirement because of the analysis is not time-dependent?
3. What constitutes an IRP update?
4. SB 350 requires updates "at least once every five years."
    a. Is it appropriate to require IRPs be adopted and submitted to the Energy Commission every four years to consolidate and leverage other similar requirements?
    b. Are there existing reporting requirements that could potentially be combined with the IRP?
5. Stakeholders have requested an optional "informal review" process of an IRP by the Energy Commission prior to an official submittal.
    a. What are the benefits or concerns of including an optional informal process in the guidelines?
    b. What questions, issues, or practices should this informal process address?
    c. What is the scope of the review?
6. Staff requests public input on the following options to address this as well as other potentially duplicative reporting requirements. Below are some options that staff is considering:
    a. Two submission dates:
        i. Adopted IRPs would be due to the Energy Commission by January 31.
        ii. Data forms would be due April 30.
    b. Delay IRP due date until April 30.
    c. Require that the POUs submit their IRPs by January 31 and Electricity Resource Plans by May.

TOPIC 2:
Data Reporting

Standardized Reporting Formats

Staff proposes that the following tables on POU demand and supply be included in IRPs and provided in electronic (spreadsheet) form. Staff intends that these tables replace other reporting requirements such as IEPR Electricity Resource Plans that are submitted to the Energy Commission during the years in which IRPs are due. Each table would require projected annual values through 2030.

- *Capacity Resources Accounting Table (CRAT).*
    - The POU's annual peak capacity requirements in megawatts (MW) and the contribution of existing and future resources to meeting them.
- *Energy Balance Accounting Table (EBAT).*
    - The POU's annual energy in (GWh) needs and the amount procured from each resource in the portfolio.
- *RPS Compliance Table.*
    - How the POU projects compliance with the state's RPS.
- *GHG Emissions Accounting Table.*
    - The POU's projected annual GHG emissions (in million metric tons of carbon dioxide equivalent (mt CO_2e) attributed to each generation resource in the POU's portfolio.

Staff anticipates standardized forms and instructions will be included as part of draft guidelines for discussion and comment prior to adopting final guidelines. The following discusses data and information associated with each of the accounting tables.

Capacity Resource Accounting Table

The CRAT would provide a detailed estimate of the POU's annual peak capacity need in each year and the contribution of each resource in the POU's portfolio to meeting that need. It would be similar to the Form S-1 filed in the IEPR Electricity Resource Plans.

Peak Capacity Requirements

Staff proposes the IRP to provide the following items in the CRAT:

- Peak demand under 1-in-2 weather conditions, including losses (net energy for load)
- Assumed additional achievable energy efficiency (AAEE) savings on peak
- Peak impact of event-triggered demand response programs

- Nameplate capacity and peak impact of customer-side rooftop solar
- Peak-hour customer-side rooftop solar generation
- Peak-hour electric vehicle loads
- Planning reserve requirement (MW) and a brief description of how it is determined
- Firm sales obligations

Staff proposes that the demand forecast, as represented in the CRAT and EBAT tables, be decomposed to quantify the impact of demand-side resources, including energy efficiency, demand response, and transportation electrification, discussed under Topic 4.

POUs should also indicate the assumed impact of customer-side or behind-the-meter solar generation. Although the nameplate capacity of customer-side rooftop solar and the associated projected output at the time of the utility's peak are not included in estimates of capacity needs, this information is needed to understand the assumptions that the POU has made about distributed generation and the related impact on the POU's capacity and energy needs.

The supply resources should be divided into existing and planned (under development) resources. Planned resources may include projects under development and unknown "generic" resources that may be needed as indicated or suggested in the POU's IRP. Both the nameplate capacity of the resource and the related peak dependable capacity value should be indicated, as well as the generation fuel used by each supply resource. The relationship assumed between nameplate and dependable capacity should be transparent or, if necessary, explained in notes appended to the table.

Energy Balance Accounting Table

Like the Form S-2 filed in the Energy Commission's biennial IEPR proceeding, the EBAT will provide a detailed estimate of the POU's annual (through 2030) energy needs. The table adjusts total energy demand by accounting for any contributions from AAEE and customer generation. The EBAT also lists yearly estimates for energy from supply resources, including utility-owned generation, bilateral contracts, and spot market/short-term purchases. Included in the table are:

- Forecasted retail sales.
- Transmission and distribution losses, unaccounted-for energy, and other adjustments.
- AAEE savings.
- Estimated customer-side rooftop solar generation.
- Electric vehicle electricity consumption.

- Firm sales obligations.
- Spot market/short-term purchases and sales.

Staff proposes that IPRs discuss, quantitatively where possible, any drivers of demand that have heretofore not had a significant impact on demand but are assumed to have one over the planning horizon. These may include, but are not limited to:

- Price-sensitive demand response (such as new time-of-use rates) and the associated impact on capacity needs.
- Other customer-side generation (for example, new cogeneration or existing cogeneration returning to POU service).
- Other transportation electrification.
- Industrial and other electrification.
- Climate change impacts.

Renewables Portfolio Standard Compliance Accounting Table

SB 350 extended California's RPS to require utilities to procure renewable energy for 50 percent of their retail sales by 2030. Under SB 350, IRPs must describe the procurement of resources that achieve the RPS target by 2030. The RPS Compliance Accounting Table is proposed to be a standardized reporting table that identifies the specific generator that contributes to RPS compliance in each year, the fuel source, and expected annual energy generation.

Utilities will be encouraged to discuss the challenges and obstacles they face in meeting the RPS in IRPs. In other sections of this document, they are asked to discuss renewable integration issues, including needs for reserves and flexible capacity; potential constraints on and effects of renewable portfolio development, such as overgeneration; and transmission needs.

Greenhouse Gas Emissions Accounting Table

Staff proposes that GHG emissions be reported in a transparent and consistent manner that promotes aggregation and analysis by the Energy Commission. Staff proposes that the utilities report estimates in a "GHG Emissions Accounting Table" that assigns the emission intensity expressed in units of metric tons of carbon dioxide (CO_2) equivalent per megawatt-hour (mt CO_2e/MWh) to each generator in its portfolio. This can then be multiplied by the values reported in the EBAT to arrive at annual GHG emissions for each resource and total amount of GHG emissions for utilities' portfolio.

The GHG emissions totals in the IRP do not represent allowance obligations but the emissions associated with the utility's portfolio. Nevertheless, staff proposes that IRP-provided estimates of GHG emissions are consistent with the values reported to (and by) the ARB under California's Regulation for the Mandatory Reporting of Greenhouse Gas

Emissions. Staff proposes to provide emissions intensities for existing generation resources for POU use, as well as guidance for developing emissions intensities for generic resources. In instances where POUs have more granular data, staff proposes that they be allowed to develop emissions estimates for generating units that they own.

Staff proposes that IRPs contain projections of market purchases and sales for POUs expecting to buy and sell in short-term and spot markets. Staff proposes that all unspecified market purchased energy that cannot be traced back to a specific generation source be assigned an emission intensity of 0.428 mt CO_2e/MWh, consistent with the value used by ARB for imports of unspecified power from out of state.

In addition to projections for 2019–2030, the EBAT and the GHG Emissions Accounting Table should include historical values to establish baseline values for portfolio GHG emissions. Given the 2019 filing date, 2017 values should be available for inclusion. The *2019 IEPR* proceeding will provide 2018 data; filings with the Energy Commission under AB 1110 in June 2020 are expected to provide 2019 data. Staff is seeking input as to how historical portfolio GHG emission data can be filed annually going forward to eliminate duplication of effort and minimize the burden of reporting.

Staff may develop additional guidance for emissions intensity associated with energy purchased from selected portfolios, if needed, consistent with the estimates developed by ARB.

7. What additional guidance or data will POUs need to consistently model and present GHG emissions associated with energy purchased from selected portfolios?

TOPIC 3:
Reliability, Storage, and Distributed Generation

In addition to the data reported on the accounting tables discussed in the previous section, information about several subtopics, including system reliability and renewable integration, local reliability, energy storage, and distributed generation, will need to be addressed in IRPs.

System Reliability and Renewable Integration

SB 350 requires that IRPs address "system reliability needs." These include dependable capacity to reliably meet peak load and resource flexibility to meet ramping needs. The CRAT is intended to provide transparent estimates of the dependable peak capacity needed each year to ensure resource adequacy.

Assessments of electricity sector performance under a 50 percent RPS indicate that expected solar generation (on both sides of the meter) may result in periods of marked overgeneration[4] and result in the need to (a) minimize the output from other generation resources at midday and then (b) increase the output from these resources to meet early evening loads. Staff proposes the POUs address their expectations about overgeneration. Staff would like input from the parties on exactly what data and/or information is most meaningful in understanding the impact of overgeneration.

Staff is proposing that IRPs include itemized resources procured to meet additional ramping, flexible capacity, and energy needs arising from the POUs' renewables portfolios in 2030. These resources should include existing and planned, utility-owned and contracted, known and generic resources (whose procurement is suggested by integrated resource planning), and unspecified capacity (assumed to be procured under short-term flexible resource adequacy contract[5] solely to meet flexibility needs). These resources may also include multihour storage. See the Energy Storage section below in this topic.

Staff does not propose to prescribe the specific analysis to be presented to illustrate flexibility needs and how they might be met. A net load diagram (known to some as a "duck curve") that indicates representative spring and summer ramping needs in 2030

4 Over-generation describes a condition in which loads and must-run requirements for generators combine to create a surplus of energy from the utility's portfolio that cannot be absorbed elsewhere in the system (for example, it cannot be sold to other utilities as they are facing the same problem).

5 A flexible resource adequacy contract obligates a generator to obey balancing authority direction regarding generating and changing levels of output over a range and rate (MW/min) specified in the contract.

(and, if indicated, an interim year) and how both midday trough and evening peak needs are met is suggested as suitable.

8. How should flexibility needs be presented and discussed in the IRP?
9. Overgeneration may present a problem for utility portfolios whose loads are met with a large share of solar energy. How should potential over-generation be quantified and addressed in the IRP?

Staff proposes that IRPs should also discuss and quantify surplus energy arising from a combination of high solar (and/or wind) output and low loads/high must-run requirements and indicate what is assumed about the disposal of this energy either through curtailment, sale to other entities, or storage. Again, staff does not prescribe the specific analysis to be performed to illustrate or quantify overgeneration. Typical quantities of overgeneration in each midday hour in selected months would illustrate the contribution of the utility portfolio to overgeneration in total and inform an accompanying discussion of the potential role of storage.

Local Reliability

Many utilities serve transmission-constrained areas where loads can only be reliably served if there is sufficient local, "dispatchable" generation capacity that provides operating reserves and associated energy under high-load conditions. In some cases, this need for local, "dispatchable" generation capacity constitutes a constraint on a utility's efforts to reduce reliance on natural gas-fired generation.

Staff proposes that POUs in the California Independent System Operator footprint provide forecast estimates of their annual local resource adequacy capacity requirements and how they might meet them in 2030. Staff proposes that POUs in other California balancing authority areas discuss local capacity needs arising from transmission constraints and how they might meet them in 2030. (This may include reliance on unspecified resources under local resource adequacy capacity contracts.) The impact of must-run, local reliability constraints on the ability to reduce generation from natural gas-fired resources and associated GHG emissions should also be discussed. Staff proposes that IRPs also discuss the impacts, if any, of transmission upgrades being considered that would reduce local capacity needs or associated must-run energy.

Energy Storage

SB 350 (PUC Section 9621 [c] [1] [B]) requires that IRPs address procurement for "energy storage requirements pursuant to [Chapter 7.7 of the PUC]." For the POUs, these requirements include consideration of targets for cost-effective energy storage and the adoption thereof by October 1, 2014, and reconsideration not less than once every three years. The POUs have considered targets for the end of 2016 and 2020, with

four utilities adopting them. The remaining utilities cited the absence of a need for storage or the unavailability of cost-effective storage as reasons for failing to adopt a target. POUs are required to reevaluate 2020 targets for energy storage no later than October 1, 2017.

Energy Commission staff expects that RPS-compliant 2030 portfolios will contain large amounts of utility solar energy, in addition to distributed solar generation. The resulting overgeneration necessarily calls for a consideration of multihour storage as a resource to be added to the utility portfolio. Accordingly, staff proposes IRPs discuss the potential role and value of bulk energy storage in the POU resource portfolio through 2030. This value can stem from avoiding curtailment of renewable generation, meeting ramping needs with energy from lower-emitting resources, or otherwise reducing the dispatch of higher-emitting generation. Staff encourages the POUs to develop a common set of assumptions regarding the cost and operating characteristics of battery storage and to use it to inform this discussion.

Distributed Generation

POU integrated resource planning requires assumptions about deploying distributed generation over the planning horizon, as it affects the POU's net energy requirements, capacity and ramping needs, obligations under the RPS, and other factors.

Staff proposes the Capacity Accounting and Energy Balance tables contain annual estimates of nameplate customer-side capacity, the related peak capacity value, and annual energy output as part of the demand forecast. Resources interconnected at the distribution level but providing wholesale energy (that is, under a feed-in tariff) should be treated as supply resources.

Staff also proposes that IRPs discuss and quantify the assumed deployment of customer-side solar with storage, the impact on the customer generation profile, and the hour in which the daily (net) peak occurs in the summer.

IRPs should note any assumed, significant additions or retirements of other self-generation or combined heat and power (for example, industrial cogeneration). If significant in total, the annual peak capacity and energy values should be a line item in the CRAT and EBAT.

Staff proposes that IRPs identify and discuss any operational requirements or policies in place or being considered for integrating customer-side solar capacity, including smart inverter requirements, tariff options, net-energy-metering or successor tariffs, and upgrades to the distribution system.

IRPs should also describe any POU program or measure designed to encourage the deployment of distributed generation in disadvantaged communities, including any programs for which income-related eligibility requirements have been or will be established.

10. Is the ARB's emissions intensity of 0.428 mt CO_2e/MWh appropriate for spot market purchases and/or energy from unspecified sources under long-term contract? If not, how should a new value be determined?
11. Should staff develop emissions intensities for generic natural gas-fired resources or should this be left to the POUs? For other generic generation resources?
12. Staff would like input from the parties on exactly what data and/or information is most meaningful in understanding the impact of overgeneration.
13. How should potential risks to reliability and resource adequacy caused by climate change be considered in the IRPs?

TOPIC 4:
Demand-Side Resources

Demand Forecast

IRPs should include an annual demand forecast that reflects the expected growth in electricity demand given assumed economic conditions and demographic changes, as well as the portfolio of demand-side resources that the POU expects to deploy. The elements of the demand forecast that appear in the standardized tables have already been identified in Topic 2, Data Reporting. In addition to the standardized data formats, the IRPs should contain additional information and discussion of the demand forecast, as well as the following topics specified in SB 350 including transportation electrification, energy efficiency, and demand response.

Transportation Electrification

Transportation electrification is a key component of a set of measures needed to reach the state's long-term GHG emission reduction goals. SB 350 requires that IRPs "address procurement for" transportation electrification. Furthermore, Executive Order B-16-12 (2012, Governor Brown) directs state agencies to accelerate the market for zero-emission vehicles in California.

In late 2017, the Energy Commission expects to issue a forecast of light-duty plug-in electric vehicles deployment through 2030 as part of the *2017 IEPR* Transportation Energy Demand Forecast. POUs should use this forecast as part of their planning.

Energy Commission staff proposes that IRPs contain discussions about the following:

- Annual estimates of:
    - The number and type of electric zero-emission vehicles deployed in each POU service territory through 2030, the associated electrical load, and transportation-sector GHG emissions reductions.
    - The incremental GHG emissions associated with meeting electric vehicle load and a description of how this value was calculated, including a discussion of the charging profile assumed and any tariff(s) designed to influence that profile.
    - Other transportation electrification deemed significant by the POU, including, but not limited to, medium- and heavy-duty vehicle electrification, public transit, rail, port, and other goods movement electrification, and associated GHG emissions savings.
- Significant POU investments, incentives, or other programs, existing or planned, which promote electrification in the transportation sector and the expected impacts on GHG emissions and electricity demand; identifying those that

promote transportation electrification in disadvantaged communities. The barriers and solutions that are included in the plan, if any.

- How the utility will prioritize investments to promote electrification in all transportation sectors relevant to its service territory (for example, medium- and heavy-duty vehicles, ports, freight, public transit, and so forth). How would the utility propose to align incentives and programs with state grants and incentives?
- The utility plans for customer education and outreach that informs customers about programs, tariffs, and other opportunities to advance their knowledge of transportation electrification.
- The utility plans, if any, for coordination with large facilities within its service territory, such as ports, airports, or warehouses.
- How the IRP is consistent with statewide goals and policies, such as Executive Order B-16-2012 that set a target for 1.5 million zero-emission vehicles on the road by 2025. Utilities should consult resources such as the *2016 ZEV Action Plan*, and the *California Sustainable Freight Plan* to align their transportation electrification efforts with state objectives.
- If and how local publicly owned utilities are coordinating their transportation electrification investments, incentives, and other programs with other distributed energy resource (distributed generation, small-scale storage, demand response, energy efficiency) planning.

GHG analysis for IRPs must enable separate accounting of both the GHG emissions reductions in the transportation sector resulting from electrification, and the generation required to serve the incremental load. This is necessary so that emissions and net emissions savings resulting from transportation electrification can be tracked and credited to the electricity sector GHG Emissions Accounting Table. (See Topic 3.)

Energy Commission, CPUC, and ARB staffs are collaborating to develop a standardized tool to estimate annual GHG emission reductions (on the transportation side) and electricity consumption per light-duty plug-in electric vehicle deployed. POUs will be able to modify assumptions related to fleet composition and, thus, the proposed values.

Energy Efficiency

The POU should embed the effects of “committed” energy efficiency in its demand forecast. Consistent with California Energy Demand Forecasts, “committed” initiatives include utility and public agency programs, codes and standards, and legislation and ordinances having final authorization, firm funding, and a design that can be readily translated into characteristics capable of being evaluated and used to estimate future impacts. In addition, committed impacts include price and other market effects not directly related to a specific initiative.

Regarding AAEE, SB 350 requires that the POUs submit IRPs that address procurement of energy efficiency under PUC Section 9615, which states that the POU, "in procuring energy to serve the load of its retail end-use customers, shall first acquire all available energy efficiency . . . resources that are cost effective, reliable, and feasible."

The IRPs should identify utility programs and measures (and associated impacts) that are assumed cost-effective, reliable, and feasible over the planning horizon. The annual impact of these programs in total on utility capacity and energy needs should be provided in the Capacity Resource Accounting and Energy Balance Accounting tables. The impact of programs and measures (or classes of programs and measures) should be presented in tabular form; staff seeks comment on the information that this table should contain and the degree of granularity that is both feasible and useful.

PUC Section 9505(b) requires that POUs develop annual targets for energy efficiency savings and demand reduction over a 10-year period by March 15, 2017. In satisfying IRP filing requirements related to uncommitted energy efficiency programs and measures and the related impact, IRPs may refer to, or rely on, filings with the Energy Commission under PUC Section 9505(b), or studies commissioned to estimate future potential savings. Where these filings or studies do not provide savings estimates through 2030, the method by which the estimates are extrapolated to 2030 should be explained in the IRP.

Staff proposes that IRP contain a discussion of the relationship between (a) AAEE savings assumed in the IRP, (b) the target established by the POU under PUC Section 9505, and (c) estimates of market, economic, and technically achievable energy efficiency savings from the study or studies used to establish the target.

SB 350 requires the Energy Commission to coordinate with POUs and the CPUC in the establishment of annual statewide energy efficiency and demand reduction targets through January 1, 2030. These statewide targets are to be based on a doubling of the mid-case estimate of AAEE savings, as contained in the *California Energy Demand Updated Forecast, 2015-2025*, extended to 2030. Furthermore, SB 350 amended PUC Section 9505 to require that the targets set by the POUs on March 15, 2017, be "consistent with" the annual targets set by the Energy Commission, The implications of this for IRPs are discussed in the Outstanding Issues section of this document.

Demand Response

SB 350 requires that IRPs address procurement of demand response (DR) resources under existing PUC Section 9615, which requires the POU, "in procuring energy to serve the load of its retail end-use customers, shall first acquire all available ... demand reduction resources that are cost effective, reliable, and feasible."

As presented in the CRAT (see Section on Topic 3), the demand forecast should contain a line item for the peak capacity value (in total) of event-triggered demand response

programs. Staff proposes that IRPs also contain a brief narrative or table describing each existing and anticipated DR program and the expected peak impact.

Staff assumes that the impact of price-sensitive DR programs and measures will be embedded in the demand forecast as presented in the *Capacity Resource Accounting Table*. POUs are encouraged to present and discuss the expected quantitative impacts of planned price-sensitive DR measures that are proposed or considered for future implementation (for example, time-of-use rates).

13. Should POUs be required to use forecasts consistent with the Energy Commission's annual demand forecast or use their own forecast?
14. The Energy Commission's demand forecast incorporated effects of climate change for both energy consumption and peak demand. Should any forecast used in IRPs do the same?

TOPIC 5:
Other Integrated Resource Plan Content

IRPs are forward-looking planning documents that require substantial modeling, and, therefore, assumptions must be made regarding the state of the electricity system—both present and future—in terms of demand, supply, and infrastructure. Staff proposes to address the following elements in guidelines, including standardized input assumptions, scenarios, and GHG assumptions. In addition, staff discusses outstanding issues, including GHG targets, energy efficiency targets, and RPS guidelines.

Standardized Input Assumptions

Combining resource plans requires that some standard inputs be defined across the different utilities. In this proposal, Energy Commission staff aims to balance the need for standardization with the uniqueness of POUs' circumstances.

Utility planning must be based on the utility's projections regarding future conditions, expected likelihoods and associated uncertainty, and associated risks. Staff proposes that utilities use standard assumptions regarding:

- Assigned GHG emission costs.
- Light-duty plug-in electric vehicle GHG savings and electrical loads (but not numbers of vehicles deployed).
- Forecast of light-duty plug-in electric vehicles deployment through 2030.
- GHG emissions intensity (metric tons of equivalent carbon dioxide emissions per MWh) (mt CO_2e/MWh) for existing supply resources other than utility-owned generation.
- GHG emission intensity (mt CO_2e/MWh) for traded energy.
- Load forecasts for regions outside the utility service territory.
- Transmission import and export constraints.
- California Independent System Operator Transmission Access Charges.

The sources of standard input assumptions will be specified in the guidelines. Energy Commission staff will compile the data and post it on the Energy Commission website.

14. What input assumptions are appropriate for standardization? Examples might be resource costs and performance characteristics, fuel prices, and demand growth rates.

Required Scenarios

In their IRPs, POUs should consider the risks and uncertainties that may significantly impact their future portfolio of resources. A risk that is significant for one POU may be of little or no concern for another. In addition, integrated resource planning is a time- and staff-intensive process; accordingly, staff is reticent to ask for specific scenario analyses to address risks and uncertainties beyond those that would show how the POU would meet the 2030 GHG targets set forth by SB 350.

The adopted IRP submitted to the Energy Commission must include at least one scenario that achieves a utility-specific target for GHG reductions by 2030, as well as the RPS targets and other legal and regulatory requirements.

Greenhouse Gas Emissions and Allowance Cost Assumptions

Staff proposes that IRPs demonstrate how POUs plan to achieve POU-specific GHG emissions reduction targets. The ARB is working with the Energy Commission and CPUC to develop these targets, which will be established through a separate process. Energy Commission staff proposes that the guidelines allow, by reference, use of POU-specific targets.

Although the utility-specific GHG targets are yet to be set, staff proposes that the guidelines include a common accounting method ensuring POU IRPs consistently report forecasted GHG emissions. IRP GHG emission reduction targets should not be confounded with GHG emissions caps and allowances or other regulatory requirements under the Cap and Trade Program.

Staff proposes that POU IRPs fully account for GHG emissions associated with the POUs' portfolios of resources and for the tradeoffs and interrelationships between programs that reduce load, increase load, or meet load with noncarbon-emitting sources, as well as reduce GHG emissions in other sectors.

For analysis that relies on or considers independent estimates of GHG allowance costs, staff proposes the use of a standardized assumption and will work with the other agencies to develop one. The *2015 IEPR*[6] carbon price projections are being used in the CPUC Long-Term Procurement Planning proceeding; these values range from $15.05 in 2019 to $44.12 in 2030 ($20.13, "mid-case"). Energy Commission staff expects to present (revised) values as part of the *2017 IEPR*.

6 http://www.energy.ca.gov/2015_energypolicy/.

15. Should staff require a standardized assumption for GHG allowance/carbon costs, and if so, what assumption should be used? Which metric should be used, carbon cost or GHG allowance?
16. Are there possible unintended consequences of various methods for setting the value or cost of GHG emissions?
17. Should a high GHG allowance/carbon cost sensitivity be required? If so, how should cost be established?

Outstanding Issues

There are several outstanding IRP-related issues that will be addressed in parallel in other proceedings, unlike questions raised previously in this paper. If resolution of the following issues cannot be achieved before IRP analyses are needed, Energy Commission staff will consider developing conditional guidance consistent with SB 350 and other legal requirements for use in the first IRP.

Greenhouse Gas Emissions Targets

SB 350 calls on the ARB to establish, in coordination with the CPUC and Energy Commission, GHG reduction targets for the electricity sector and for each POU as previously discussed.

The ARB plans to issue the *2030 Target Scoping Plan* in 2017, which may establish a range of GHG emission reductions for the electricity sector. The next step will be translating these into planning target ranges for individual utilities. These planning targets are necessary constraints for electricity system and portfolio expansion modeling tools. Energy Commission guidelines will provide details regarding the use of these targets. However, the method to develop them will be decided separately from the IRP guidelines. Depending on the timing of target development, the Energy Commission staff may propose interim targets that could be used by POUs in the IRPs.

Energy Efficiency Targets

SB 350 requires that the Energy Commission, in coordination with the POUs and the CPUC, must establish annual statewide energy efficiency and demand reduction targets based on a doubling of the mid-case estimate of AAEE, as contained in the *California Energy Demand Updated Forecast*, 2015–2025, extended to 2030. It also requires that 10-year energy efficiency savings targets developed by the POUs be "consistent with" the target or targets developed by the Energy Commission.

The Energy Commission has released a paper intended to provide a process and policy framework for establishing energy efficiency targets required by SB 350 and to solicit

stakeholder feedback on this framework.[7] The paper also outlines a series of workshops to be held. A statewide target for savings is expected to be adopted in November 2017; it has yet to be determined whether the Energy Commission will allocate savings to each utility.

Energy efficiency savings equal to a doubling of AAEE are greater than those of utility programs and measures that are cost-effective, reliable, and feasible. As such, SB 350 does not require that POUs develop an IRP that assumes a doubling of AAEE. The IRP should, however, discuss the magnitude of the savings assumed by the utility compared to any savings targets, statewide or utility-specific, that are developed by the Energy Commission.

Fifty Percent Renewables Portfolio Standard Guidebook and Publicly Owned Utility Renewables Portfolio Standard Regulations

To implement SB 350, the Energy Commission is updating the *RPS Eligibility Guidebook* and the *Enforcement Procedures for the Renewables Portfolio Standard for Local Publicly owned Electric Utilities* to reflect the new provisions of SB 350, including the establishment of a 50 percent RPS by 2030. The formal rulemaking to update the RPS POU enforcement regulation is anticipated to commence the second quarter of 2017.

7 2017 Staff Paper, *Framework for Establishing the Senate Bill 350 Energy Efficiency Savings Doubling Targets*, available at http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-06/TN215437_20170118T160001_Framework_for_Establishing_the_Senate_Bill_350_Energy_Efficienc.pdf.

ACRONYMS

Acronym/Abbreviation	Term
AAEE	Additional Achievable Energy Efficiency
ARB	California Air Resources Board
Cal/EPA	California Environmental Protection Agency
California ISO	California Independent System Operator
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CPUC	California Public Utilities Commission
DR	Demand response
EI	Energy intensity
GHG	Greenhouse gas
GWh	Gigawatt-hour
IEPR	*Integrated Energy Policy Report*
IRP	Integrated Resource Plan
LD PEV	Light-duty plug-in electric vehicle
LSE	Load-serving entity
mt	Metric Ton
MW	Megawatt
POU or POEU	Publicly owned (electric) utility
PRC	Public Resources Code
PUC	Public Utilities Code
RPS	Renewables Portfolio Standard
SB	Senate Bill