Workshop on Greenhouse Gas Uncertainty Assessment for Long-Term Procurement Planning

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CPUC Workshop
Rulemaking.08-02-007
Long-term Procurement Plans
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Topics

Purpose of this Long Term Procurement Planning Rulemaking

- Rulemaking.08-02-007 is intended to:
  - Refine the technical practices used to develop action plans for the LTPP 10-year time horizon,
  - Consider procedural matters and “fine-tuning” of the policies, practices and procedures underlying the LTPPs.
- Its primary purpose is “to serve as the Commission’s forum to integrate all procurement policies and related programs.”

LTPP Procedural Matters and Fine-tuning Issues

- Standardized resource planning practices, assumptions and analytic techniques
- Interim standards and practices to evaluate the uncertain costs of future greenhouse gas (GHG) regulations — principal subject of this workshop
- Methodologies to quantify energy efficiency (EE), firm capacity from demand-side resources, and system versus bundled resource need.

Additional LTPP Issues cont'd

- Adjustments to the bid evaluation process,
- Impacts of CAISO's market redesign and technology update (MRTU),
- Guideposts and requirements imposed by the Energy Action Plan II (EAP II).
- Need for IRP analyses beyond the 10-year horizon of the procurement action plan
  - to avoid "crowding out" preferred resources,
  - to reduce potential stranded costs.

Procurement-related Dockets to Be Integrated in R.08-02-007

Docket	Proceeding Number(s)
1. Procurement	R.06-02-013 and its successor
2. Climate Change/Emissions Performance Standard	R.06-04-009
3. Energy Efficiency	R.06-04-010 and its successor
4. Demand Response and Advanced Metering	A.05-06-006 et al., R.07-01-041 and its successor
5. Dynamic Pricing	A.06-03-005
6. Renewable Portfolio Standard	R.06-02-012, R.06-05-027 and successors
7. Avoided Cost and Qualifying Facility Pricing	R.04-04-025
8. Distributed Generation	R.06-03-004 and its successor

Procurement-related Dockets to Be Integrated in R.08-02-007 cont'd

9. Transmission and Renewable Energy Transmission	**I.05-09-005 and its successor**
10. Confidentiality	**R.05-06-040**
11. Direct Access	**R.07-05-025 and its successor**
12. Community Choice Aggregation	**R.03-10-003 and its successor**
13. Resource Adequacy Requirements	**R.05-12-013 and its successor**
14. Planning Reserve Margin	**Forthcoming rulemaking per Nov. 19, 2007 ACR of R.05-12-013**
15. Liquefied Natural Gas	**R.07-11-001**
16. Other procurement-related Rulemakings not yet issued	

Four Guiding Principles of the Commission's LTPP Program

- Ensuring reliability,
- Ensuring the lowest reasonable rates by encouraging the development of functional competitive markets (or other market structures),
- Adhering to the EAP loading order, and
- Anticipating AB 32 constraints on IOU electricity portfolios.

Issues for Discussion

How to Incorporate the GHG Elephant in the Room into LTPP

Integration With Related Proceedings

- How should detailed assumptions and analyses from other proceedings be incorporated into
  - Generic statewide scenarios suitable for LTPP?
  - Individual utility scenarios for evaluation of potential procurement plans?
  - Devising long-run target capacity mixes outside of the 10-year LTPP planning horizon.

Integration With Related Proceedings

- Which dockets will develop the most meaningful assumptions, scenarios and analyses for a focused assessment of GHG uncertainties?
  - CEC's 2009 IEPR
  - CPUC: Phase 2 of R.06-04-009 to Implement the Commission's Procurement Incentive Framework and to Examine the Integration of Greenhouse Gas Emissions Standards into Procurement Policies.
- What information is important and what is non-essential for developing each LTPP? How should this information be developed, transferred and applied?

Standard Practices for LTPP

- How many primary statewide/global scenarios will enable an adequate assessment of GHG and other critical uncertainties? (3 + 2 scenarios): Low GHG prices, BAU1/Expected Case, and High GHG prices, a worst-case "perfect storm" scenario, and a BAU2/alternate base case.
- What critical market drivers, risks and uncertainties are most important? To Be Determined
- What outcome measures/results are most important? Total costs, GHG emissions, allowance prices & compliance costs, electric loads and prices, natural gas and coal use, fuel prices, stability/volatility of all prices, resource mix, energy system reliability & risks.

Measures for Assessing GHG Uncertainties and Comparing LTPP

- Total costs under different scenarios,
- Energy and allowance price ranges (may be input),
- Price stability/volatility (may not be output from some planning models),
- Energy system reliability/resource diversity,
- Environmental compliance/sustainability,
- Potential risks of market/regulatory failures,
- Ability of selected plan to satisfy regulatory mandates and other constraints,
- Ability of selected plan to avoid worst-case risks.

Standard Practices for LTPP

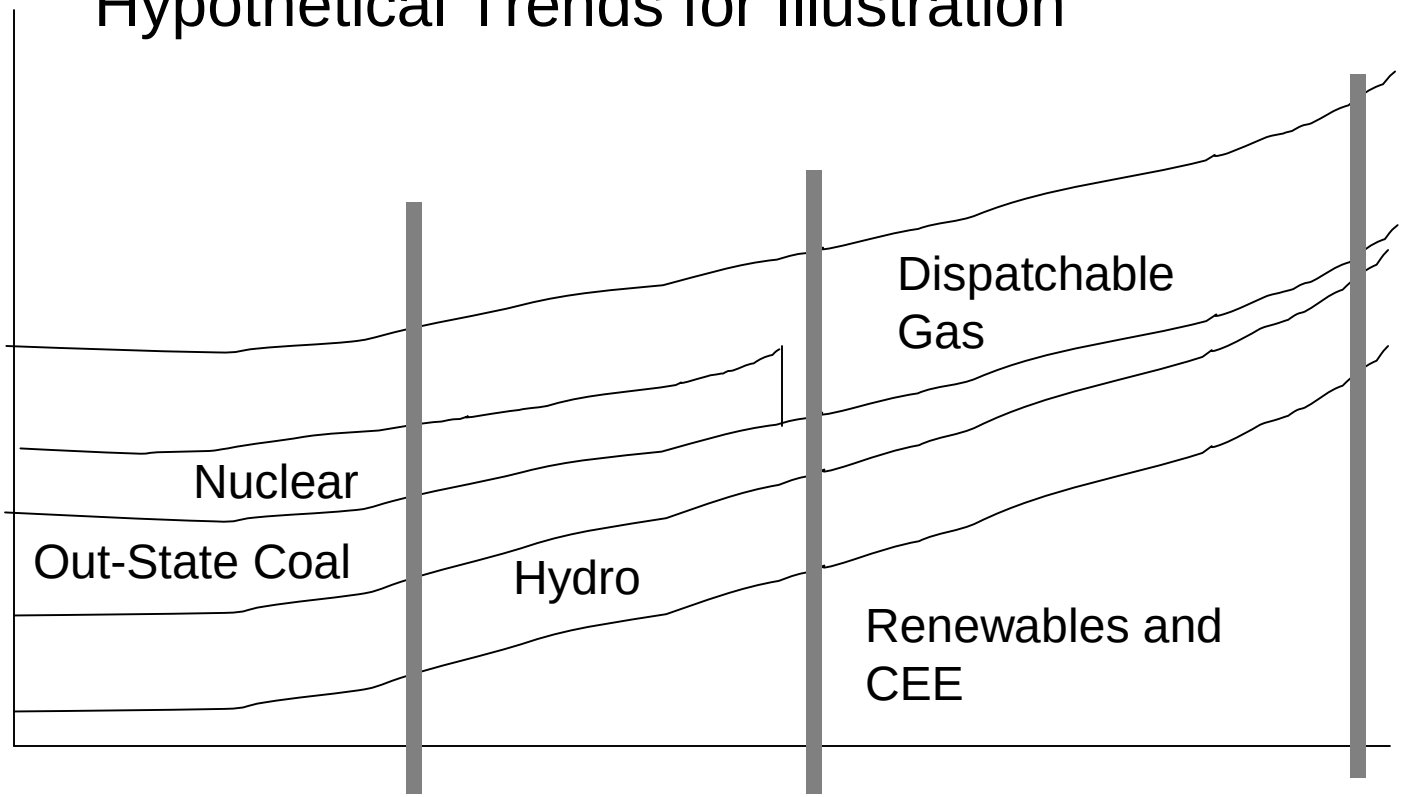
- What time horizons are necessary for LTPP evaluation? 2018-2020, 2030, 2050 at different levels of detail?
- What common methodologies and models should be applied to achieve comparability and consistency among plans?
- What latitude should utilities have in analyzing risks and uncertainties of greater importance to each of them?

Time Frame for LTPP

- Least Cost Planning will need to seek a resource mix that will change optimally over time. In principle, this would require:
  - Limited or no stranding of existing resources,
  - Adequate dispatchable resources, as more non-dispatchable renewable resources are added,
  - Time for transmission expansions to enable more renewable resources, and
  - No significant increases in natural gas usage for GHG compliance to avoid gas price spikes and major infrastructure expansion problems.
- A long-term look is required to ensure the resource mix at the the end of the LTPP period in twenty years (~2030) can reasonably transition to a resource mix with significantly more renewable, demand-side and energy efficiency resources that are sufficient to reach 2050 goals.

Evolution of the Resource Mix

Hypothetical Trends for Illustration



Example Greenhouse Gas Risk Factors Affecting LTPP

- Technology Development and Deployment:
  - Time frame and costs (e.g., breakthrough in solar PV or widespread carbon capture) could significantly affect the need and prices for GHG allowances. Time lines working both forward and backward are needed for scenario development and comparison.
  - Appropriate resource mix and transmission essential to meet GHG caps and maintain sufficient dispatchability, reliability and risk avoidance.
  - Retirement, capacity addition and R,D&D decisions will require delicate balancing to meet all constraints, including GHG caps.

Example GHG Risk Factors cont'd

- Variations in requirements for allowances:
  - Hydro availability, higher summer temperatures and changed seasonal run-off patterns could result in significant annual variations in requirements for allowances.
  - Compliance period: 3 years or longer?
  - Will banking and borrowing be allowed?
  - Role, quantities and prices of offsets?
  - Penalties and safety valves?

Example GHG Risk Factors cont'd

- Financing of new facilities:
  - Will lenders require that generation facilities acquire GHG allowances upfront for the expected life of the facilities?
  - Will allowances be allocated or auctioned?
- Recovery of costs:
  - Will LSEs be allowed to recover costs for allowances (or emission fees/taxes) through a balancing account? If cost recovery is uncertain, the financing costs for LSEs would be adversely impacted.

Example GHG Risk Factors cont'd

- Development of cap-and-trade market:
  - Cap level, offsets and technologies are key drivers.
  - Will a liquid allowance market enabling LSEs to hedge their risks be developed? What obligations will ratepayers incur, if it does not develop?
- Regulatory uncertainties:
  - How will the regulation of GHG emissions at a regional or national level differ, and how would overlaps affect the environmental integrity, allocations and costs for allowances?
- Nuclear power:
  - The approval and operation of new nuclear power plants would reduce demand and prices for GHG allowances.

Overarching Issues

- How to define, simplify and integrate a limited number of scenarios that will stress test the robustness of LTPPs and portfolios.
  - Need to specify and apply results of scenario and risk analyses performed in other dockets.
- How to categorize and compare the distributions of costs and risks associated with exogenous conditions and key drivers.
  - How to assure that correlations and worst-case ("perfect storm") scenarios are accounted for.
  - How to satisfy current requirements and constraints, while maintaining flexibility to make future decisions.

Responses to Workshop Questions

An unlicensed summary with
apologies for mischaracterization

Responses to Workshop Overview Questions

	QUESTION	CEERT	DRA	GPI	NRDC and UCS
1	Is it necessary to separately analyze details of potential GHG regulatory regimes (cap-and-trade or carbon tax) as risk factors in the LTPPs, or is it reasonable to assume that, whatever the details, carbon risk will be reflected in the carbon price (GHG allowance or carbon tax)?	Does not have a position on method of regulation. Supports pricing pollution. Must assume cost of GHG regulations can be captured by a carbon price. Still formulating position on the calculation and application of a carbon price but offers the following observations: • LTPP scenarios can provide analyses of procurement costs, • Not reasonable to assume the carbon risk can be fully captured in scenarios regardless of regulatory regime.	Not necessary to analyze details of potential regimes as risk factors. However, carbon price may not be the same under different regimes.	Appears that cap-and-trade will be adopted but it is not clear how allowances will be allocated and distributed. If allowances are sold, price is appropriate. If allowances are distributed free of charge, questionable whether price can be used.	
a.	If carbon price is all that matters, what range of prices is reasonable to analyze in the LTPPs and by what method should this range be established?		DRA retained Synapse to develop prices. First year 2013 prices $10-30/ton (2007 $). Projection for 2030 in range of $23-68 per ton (2007 $).	Should use price of $30/ton (current EU price) or $35/ton as average price and a range of $20-50/ton for LTPP.	Utilities should use a broad range of prices. Prices have been analyzed by EIA, EPA, EPRI, MIT, Synapse and McKinsey.

Responses to Workshop Overview Questions cont'd

	QUESTION	PG&E	SCE	SDG&E	Synapse
1	Is it necessary to separately analyze details of potential GHG regulatory regimes (cap-and-trade or carbon tax) as risk factors in the LTPPs, or is it reasonable to assume that, whatever the details, carbon risk will be reflected in the carbon price (GHG allowance or carbon tax)?	Carbon price and quantity are the only two dimensions that should be used to assess GHG uncertainty at this time. A detailed analysis of regulatory regimes is not necessary.	To the extent there are rules (e.g., RPS obligation for LSEs), it may be necessary to consider implications via scenarios. In well-designed market, prices will reflect risk without need to specify regulatory regime. Otherwise, LTPP will have to consider risk factors.		
a.	If carbon price is all that matters, what range of prices is reasonable to analyze in the LTPPs and by what method should this range be established?	A reference case based on the price currently embedded in the forward price of electricity. High and intermediate prices based on the marginal alternative available to reduce carbon emissions.	Current opportunities at $11/ton. Supply curve studies suggest values of around $30/ton in the longer term. Elements such as market size, etc., will have impact on prices.		Developed CO_2 price forecasts, in the spring of 2007, from a low of $10.23 to a high of $37.11 (levelized over the years 2013-2030 in 2007 $). These forecasts need to be re-examined.

Responses to Workshop Overview Questions cont'd

QUESTION		CEERT	DRA	GPI	NRDC and UCS
b.	If carbon price is all that matters, what are the potential correlations between carbon price and other planning variables (*e.g.*, load growth and natural gas prices), and should these be considered in developing minimum planning scenarios for LTPPs?		Will be impacts on coal and natural gas prices but there is little evidence of a strong correlation, except perhaps when CO_2 price is very high. Should make energy efficiency more attractive, decreasing load growth.	Enormously complicated question, probably best addressed through macroeconomic modeling.	
2.	If carbon price is alone insufficient to guide appropriate analyses, what other variables are important and what options exist for assessing them?		Carbon price is probably sufficient for electric resource selection.	Most fundamental variable that needs to be considered is sector-level emissions of GHG.	

Responses to Workshop Overview Questions cont'd

	QUESTION	PG&E	SCE	SDG&E	Synapse
b.	If carbon price is all that matters, what are the potential correlations between carbon price and other planning variables (*e.g.*, load growth and natural gas prices), and should these be considered in developing minimum planning scenarios for LTPPs?	The established range of carbon prices should be embedded in the electricity prices used to value alternative procurement plans when designing scenarios for the LTPP proceeding.	Impacts on load growth, load factors, natural gas prices and coal prices should be considered. Should also consider implications of potential once-through cooling regulations, transmission development etc.	Impacts on load from energy efficiency and electrification in other sectors, mandates with regard to portfolio composition, choices of generation resources based on projected costs should be considered.	
2.	If carbon price is alone insufficient to guide appropriate analyses, what other variables are important and what options exist for assessing them?	LTPP scenarios should account for the interaction between carbon prices and natural gas and electricity prices, and for the impact of customer demand.	With a well-designed market, cost of carbon should be sufficient to guide analysis. Otherwise, the volatility of prices, etc. needs to be considered.	Will also be necessary to assess the impact of mandatory regulations, such as a 33 % RPS.	

Responses to Workshop Overview Questions cont'd

QUESTION		CEERT	DRA	GPI	NRDC and UCS
3.	Given that state policy with respect to GHG emissions extends beyond the ten-year LTPP planning horizon, what sorts of longer-run analyses are appropriate and do they belong in the Commission's LTPP proceeding or the CEC's IEPR proceeding?		Should conduct longer run analyses for all long-lived generators. Analysis is better suited to LTPPP than IPER.	Investment decisions have implications well beyond 10 years. Utilities should be instructed to project out to 2050 the GHG emission commitments they have.	The 2010 LTPPs should consider the state's 2050 GHG emission reduction goals.

Responses to Workshop Overview Questions cont'd

QUESTION		PG&E	SCE	SDG&E	Synapse
3.	Given that state policy with respect to GHG emissions extends beyond the ten-year LTPP planning horizon, what sorts of longer-run analyses are appropriate and do they belong in the Commission's LTPP proceeding or the CEC's IEPR proceeding?	LTPP analysis should not be extended beyond the current 10-year planning horizon.	Near-term options for GHG compliance are relatively expensive. Less expensive options have long lead times. Longer term analysis will be necessary to address implications of near-term actions.	Longer-run analyses of GHG emissions beyond the LTPP planning horizon should remain in the GHG proceeding until it is closed.	

High Level Summary of Parties' Positions on Overview Questions

- Question 1 (Risk reflected in carbon price):
  - Yes, with some qualifications and need to understand key drivers of each price range.
- Question 1a (Range of carbon prices):
  - Use prices from Synapse analysis (needs to be updated), other studies, marginal costs of alternatives to reduce carbon emissions, current opportunities (e.g., EUA and CDM prices).

Positions on Overview Questions cont'd

- Question 1b (Correlations with other variables):
  - Energy efficiency; load growth and load factors; electric, coal and natural gas prices; implications for transmission; electrification in other sectors.
- Question 2 (Other important variables and their assessment):
  - Include volatility of prices, RPS and interaction of carbon price with other fuel prices.

Positions on Overview Questions cont'd

- Question 3 (Planning horizon):
  - Longer than 10 years is needed to assess investment decisions and long-lived assets.
  - Should consider state's 2050 GHG reduction goals.
  - Detailed longer-term analyses should remain in GHG proceeding.

Next Steps

Panels/Moderated Discussions?

Tasks and Work Groups?

About Van Horn Consulting

Energy & Environmental Markets, Technologies, Regulations, Contracts & Business Strategies

Van Horn Consulting (VHC)

- Founded in 1987, VHC provides expert assessments of energy and environmental markets, contracts, tariffs, technologies and regulations to support business decisions, strategic plans, litigation and regulatory compliance.
- VHC
  - Is serving as an Independent Evaluator for San Diego Gas & Electric's Requests for Offers, new and renegotiated power contracts,
  - Prepared a 20-year Electrical Master Plan for the Port of Long Beach,
  - Helped the City of Huntington Beach increase the assessed valuation of the Huntington Beach Power Plant,
  - Led a 3-day seminar on integrated assessment for GHG and R&D evaluation for EPA's Air Pollution Prevention and Control Division.
  - Advises on market design, power contracts, R&D for new technologies, regulatory compliance and business strategies.

VHC Senior Consultants

- **Michael Katz, M.S., P.E.,** Senior Consultant, has over 25 years experience in electric and natural gas markets, risk management, strategic planning and operations of physical assets. As PG&E's Vice President, California Gas Transmission (CGT) from 2000 to 2004, he led a department with $400 million in revenue and 500 people. Earlier, he led PG&E's Power Generation Department and served as Director of Generation Portfolio Management and of Power Generation Business Planning, after holding various positions in Electric Resources Planning.
- **Edward Remedios, Ph.D.,** Senior Consultant, formerly worked for Chevron Research Company and for Pacific Gas & Electric Company (PG&E). While at PG&E, Ed coordinated PG&E's long-range planning and was the head of the Economics and Forecasting Department with responsibilities for economic and sales forecasts and project evaluations. Since 1993, Ed has provided consulting services to electric and gas utilities and other clients.
- **Andrew Van Horn, Ph.D.,** Managing Director, has 30 years experience evaluating competitive market interactions, contracts and regulations in *electricity, natural gas, coal and emissions markets*. He developed EPRI's first Integrated Resource Planning model, provided the price for the first SO_2 allowance trade in 1992, and analyzed both 1977 and 1990 Clean Air Act Amendments. He has testified about power, fuel and emissions contracts, price forecasts, economic valuation and damages, resource planning, tariff design and impacts of regulations.

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