California Energy Commission

2008 Integrated Energy Policy Report Update
Joint Committee Workshop

Achieving Higher Levels of Renewables in California's Electricity System

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August 21, 2008

Webcast Info

Call-In Number: 1-888-566-5914
Passcode: IEPR
Call Leader: Suzanne Korosec

Agenda

- Summary of staff workshops/ party comments
- Panel discussion on joint POU/IOU transmission projects
- Presentation by PG&E
- Public comment

July 21 Workshop

- Summarized existing studies
- Resource mixes
- Contract delay/cancellation
- Price impacts
- Operational/physical changes
- Natural gas impacts
- Environmental concerns

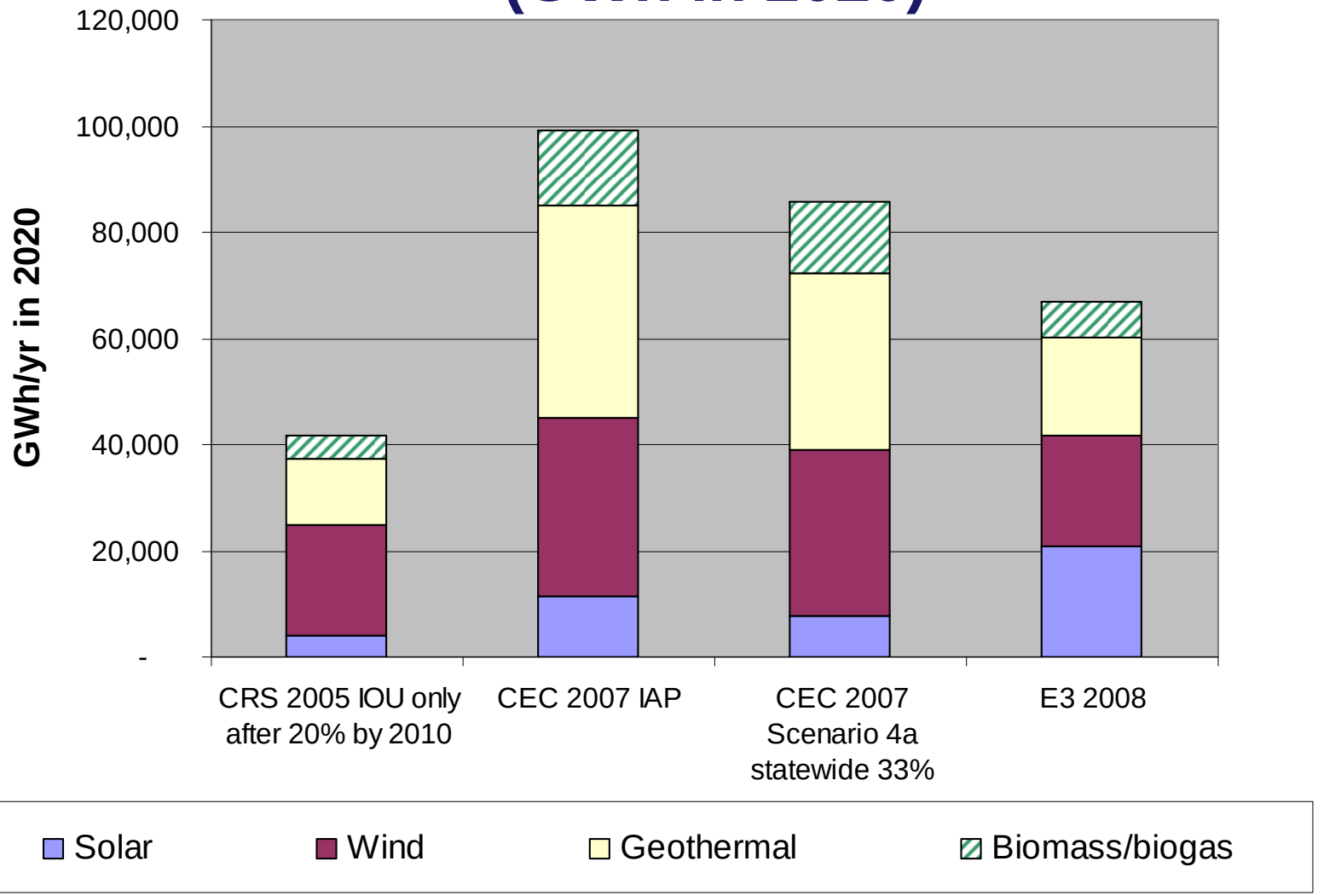
What is 33 Percent Target?

- 33% of retail sales, statewide
- 102,000 GWhs, based on latest CEC demand forecast
- Capacity needed depends on resource mix

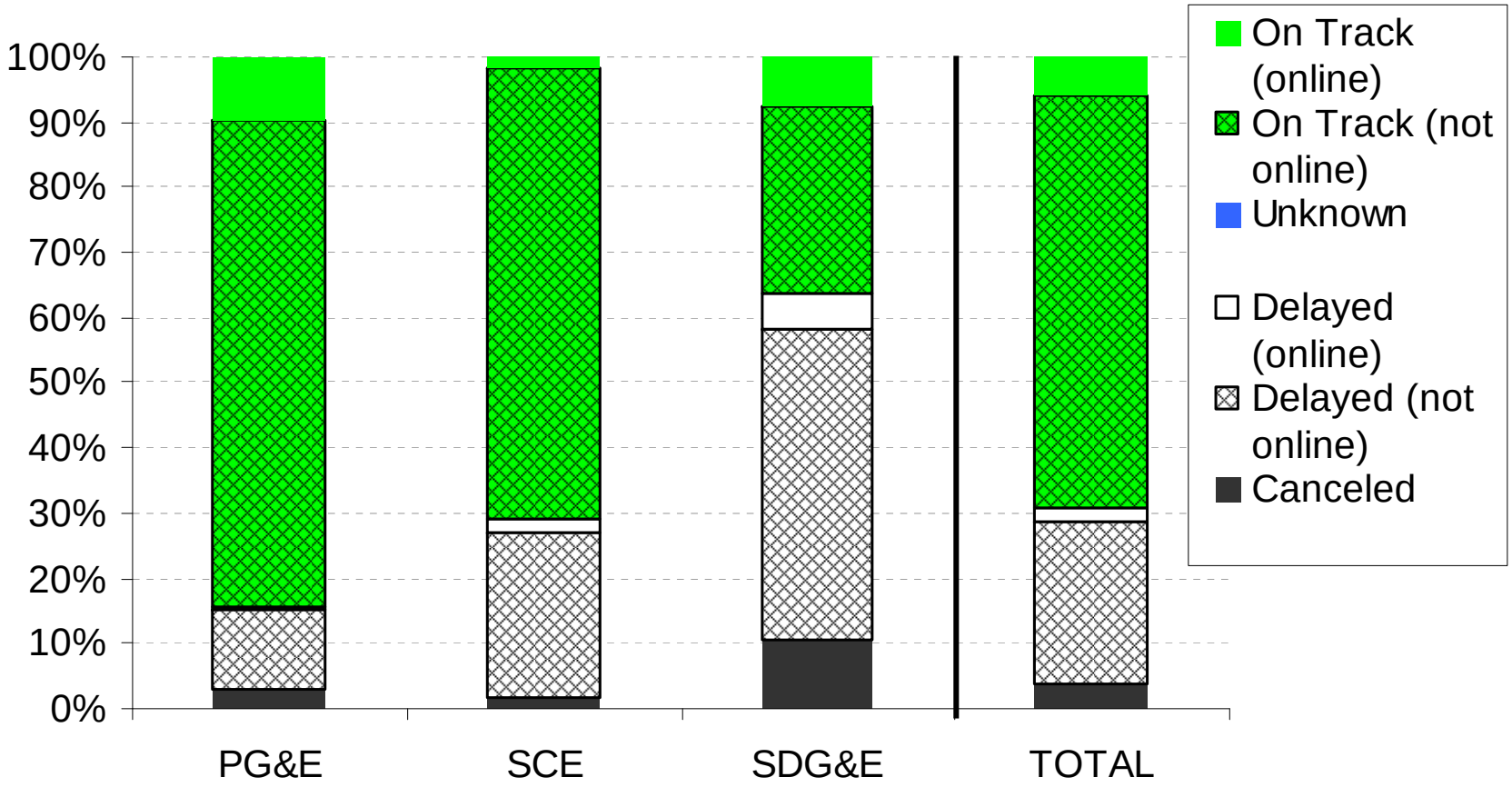
Existing Studies

- CEC Scenario Analyses Project
- CEC Intermittency Analysis Project
- CRS Report for CPUC on achieving 33% target
- E3 GHG modeling

Resource Mix Scenarios by Technology (GWh in 2020)

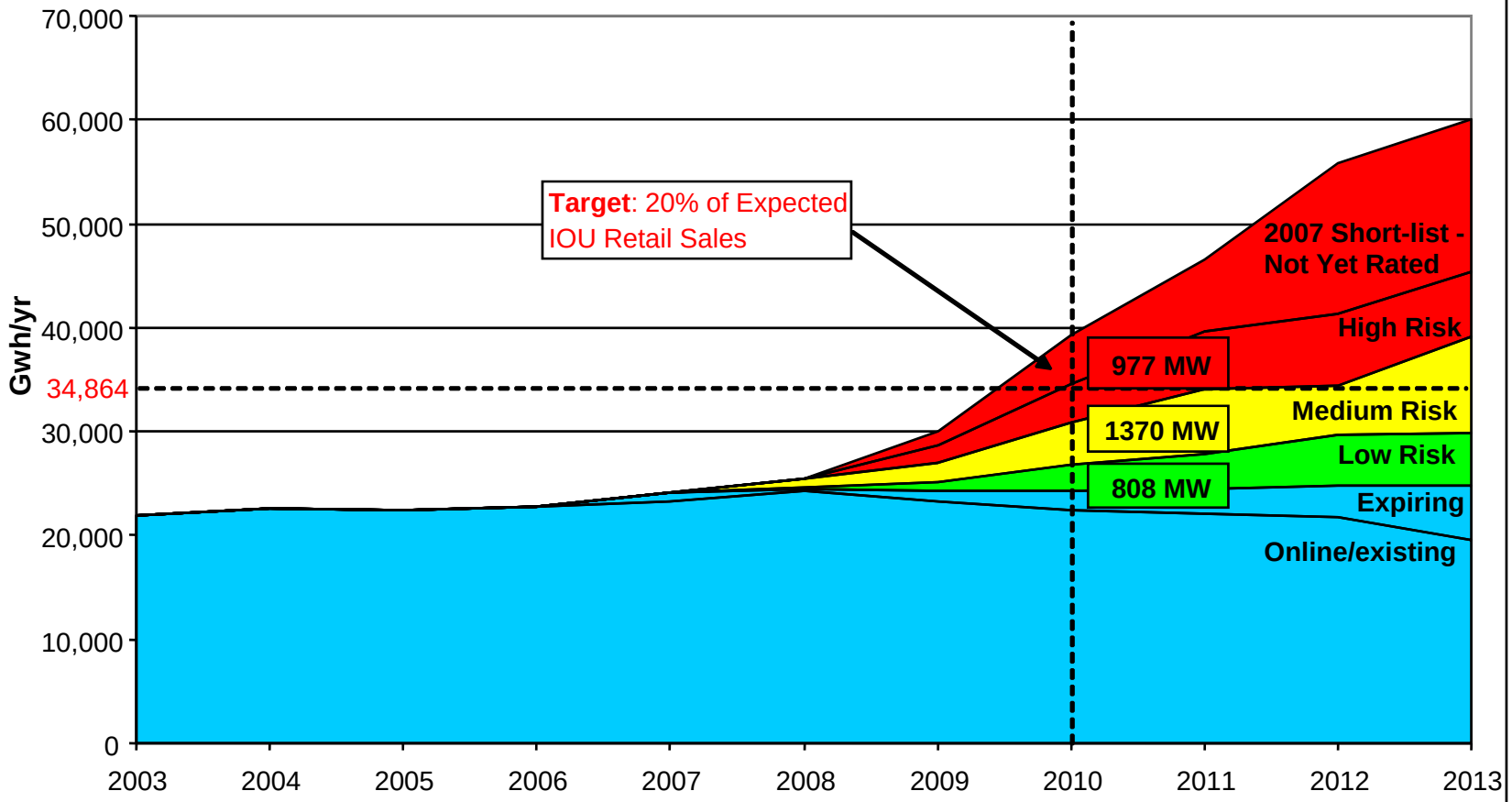


Contract Status for IOU Contracts Signed Since 2002 (by minimum MW)



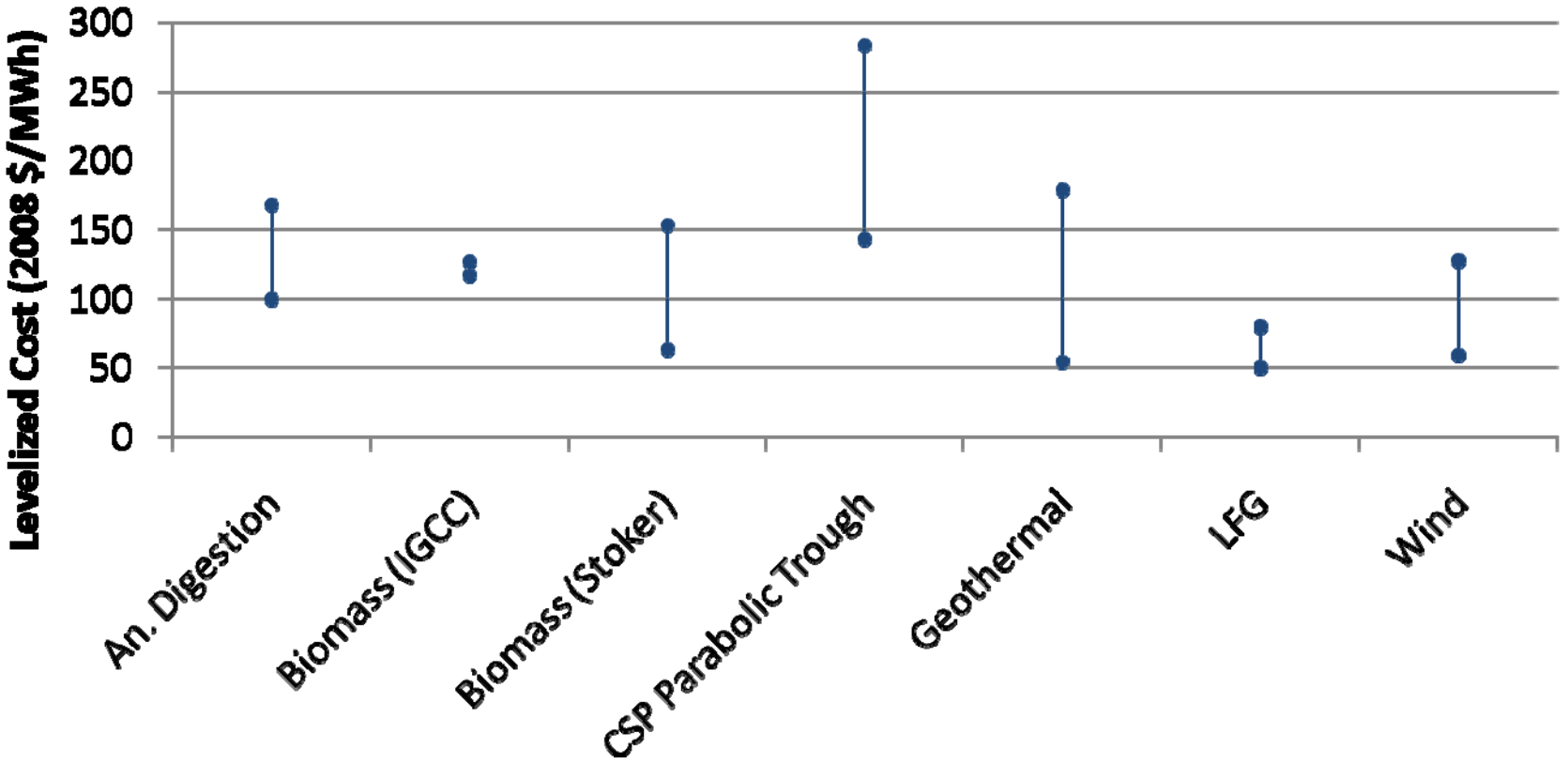
Source: California Energy Commission, Database of IOU Contracts for Renewable Generation, July 2008 update, www.energy.ca.gov/portfolio/IOU_CONTRACT_DATABASE.XLS.

IOU Expected RPS Generation and Risk



Source: CPUC, April 2008, Renewables Portfolio Standard Quarterly Report

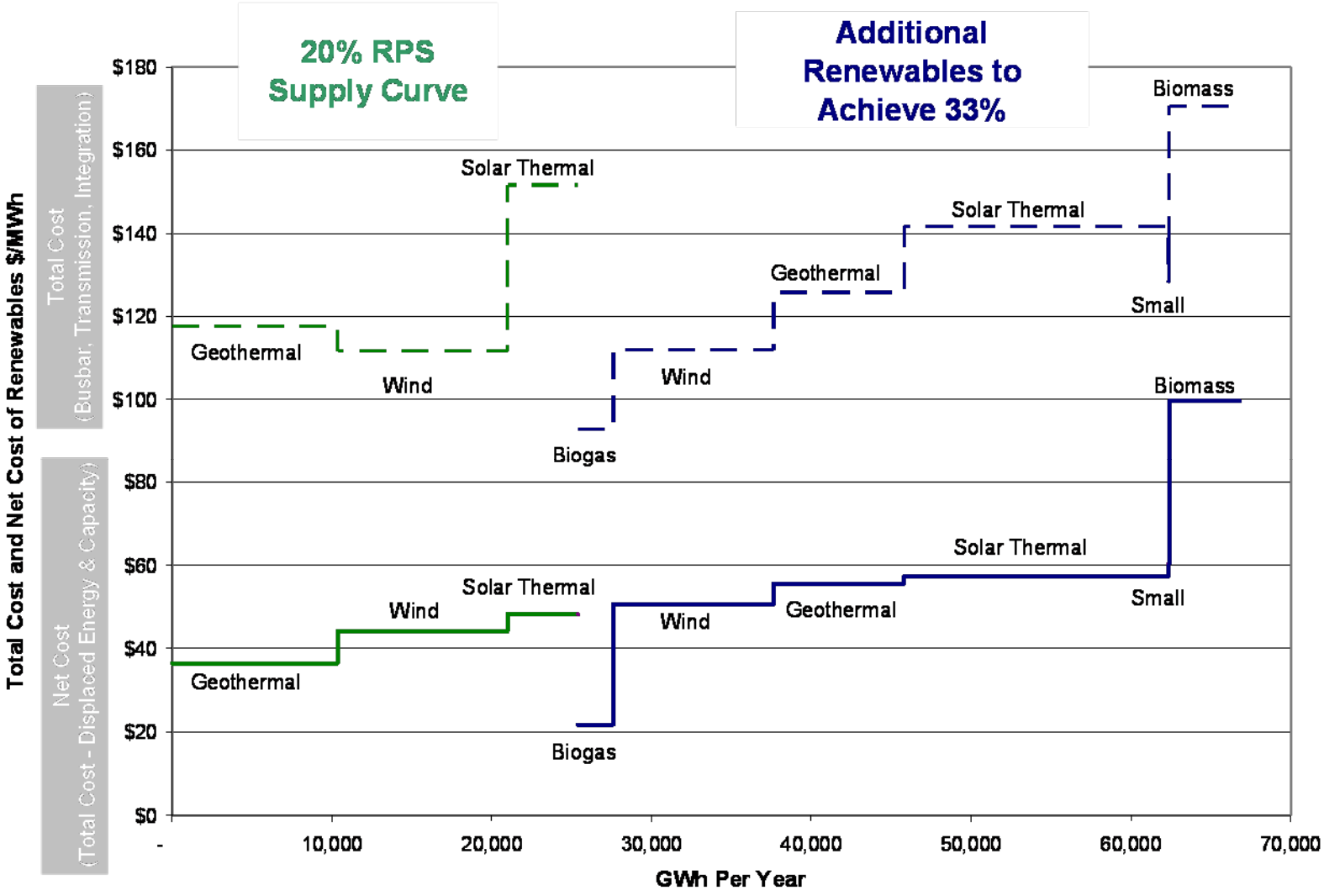
Levelized Costs in Studies on 33 Percent Renewable by 2020 Target



Data Sources: [1] California Energy Commission, 2005, *Strategic Value Analysis* [cost data reports]; [2] California Energy Commission, Dec 2007, *Comparative Costs of California Central Station Electricity Generation Technologies*, Final Staff Report; [3] California Energy Commission, 2008 (forthcoming), *Scenario Analyses of California's Electricity System: Final Results for the 2007 Integrated Energy Policy Report*, Final Staff Report; [4] CPUC, Nov 2005, *Achieving a 33% Renewable Energy Target,* by CRS for the CPUC; [5] E3, 2008 (forthcoming), *CPUC GHG Modeling*; [6] RETI Coordinating Committee, March 2008, *Renewable Energy Transmission Initiative Phase 1A Draft Report*; [7] US Department of Energy, EERE, May 2008, *20% Wind Energy by 2030 Increasing Wind Energy's Contribution to U.S. Electricity Supply*.

Note: Anaerobic Digestion data from [2] and [6]; Biogas data from [2] and [5]; Biomass data from [2], [3], [5], and [6]; Concentrating Solar Power and Geothermal data from [1], [2], [3], [4], [5], [6]; Landfill Gas data from [1], [2], [4], [5], [6]; and Wind data from [1], [2], [3], [4], [5], [6], and [7].

E3 Supply Curves of 20% & 33% RPS



Panel Discussion 1

- Scenario Analysis Project
- Resource Adequacy
- CRS Report
- IAP Report
- E3 Modeling Tool

Panelist Comments

- Dr. Jan Hamrin, CRS
- Dr. Yen-Nakafuji, LLNL
- David Hawkins, CAISO
- Jaclyn Marks, CPUC

Panel Discussion 2

- Physical and operational changes needed
- Potential impacts on natural demand, supply, price
- Environmental concerns

Written Comments

- California Municipal Utilities Association
- Pacific Gas & Electric
- Southern California Edison
- San Diego Gas & Electric
- Green Power Institute
- Alliance for Responsible Energy Policy

July 31 Workshop

- Emerging technologies to help integrate renewables

Staff Presentations

- Phasor technologies
- Demand response
- Grid stabilization
- Energy storage
- Renewable technologies to meet thermal needs
- PIER collaboratives

CPUC Presentation

- Emerging Renewable Resource Program
- 2-year pilot focusing on technologies not yet commercialized
- Fills gap in RPS program

AWS Truewind Presentation

- State-of-the art forecasts
- Data quality issues
- Forecast systems in U.S.
- Potential value of day-ahead forecasts

Solar Millennium LLC

- Integrating thermal storage with CSP
- Improves economics of solar thermal plants
- Increases availability and plant capacity
- Molten salt proven technology
- Market pull from many utilities

Electric Power Research Institute - Storage

- Energy storage
- 3 economic categories
- Look at aggregate benefits
- Smoothing benefits

California Institute for Energy and Environment

- Transmission system not designed for intermittents
- Three broad objectives:
  - Physical access
  - Accommodate unique behavior
  - Increase carrying capacity
- Don’t rely on “build” solutions
- Smart grid needed for maximum renewables

Oak Creek Energy Systems

- Integration concerns overblown
- Rethink planning and operating practices
- Focus on ramping/load following
- Use diverse renewables to complement each other
- Energy storage best solution, but still in development phase

Electric Power Research Institute DG

- Ultra high efficient systems emerging
- Fossil DG integrated with storage
- DG storage provides grid support
- Enhance solar benefits by adding DG

Sun Edison

- Community scale PV
- Establish community solar parks
  - Pass benefits to customers via solar tariff
  - Significant interest from renters, multi-tenant housing, or those unable to site solar on homes
- Barriers
  - Lack of CCA
  - Direct access prohibition
  - Need for new tariffs/utility billing systems

California Wind Energy Collaborative

- Wind at community and building/industrial scale
- 2500 residential scale turbines in U.S.
- US sales $56 million, outside US $61 million
- System costs steady, economics improved by net metering and incentives
- Can reduce electricity needs, costs, and emissions
- Barriers: local ordinances, permitting fees, equipment certification

July 23 Workshop

- Transmission issues
- Impacts of 33% renewables
- Environmental concerns

2007 Recommendations

- Roadmap for renewables
- Participate in RETI and integrate results into the next IEPR and Strategic Plan
- Leverage CEC authority
- Resolve issues with CAISO queue
- Coordinate generation procurement and transmission CPCN processes
- CERTS should continue to address ways to remove renewables integration barriers.

Current Transmission Initiatives

- Renewable Energy Transmission Initiative (RETI)
- WECC TEPPC 2008 Study Plan
- WGA Western Renewable Energy Zones
- CAISO Interconnection Queue Reform
- CEC Transmission Corridor Designation
- CPUC Transmission Investigation I.08-03-010/Rulemaking R.08-03-009

Supporting Initiatives

- DOE Solar Energy Development PEIS
- Energy Commission renewable power plant siting cases
- PIER Transmission Research Program
- CPUC rulemakings on implementing RPS program, integrating and refining procurement policies
- POU and IOU initiatives

CERTS/Electric Power Group

- Integrate 30,000 MW of renewables in next 20+ years
- Scoping study focused on LA Basin as funnel point for 20,000 MW
- Conclusions:
  - Need to triple transmission gateway capacity
  - Local generation shutdown increases gateway need
  - Need to expand links between regions
  - Need local network reinforcements
  - Need additional regulation and ramping

CAISO

- Study identified six 500 kV lines to enable 33% goal to be met
  1. Construct new 500 kV substation and loop into existing Southwest Powerlink
  2. Expand Midpoint Substation and construct a third Midpoint-Devers and new Devers-Mira Loma (or Valley) 500 kV line
  3. Upgrade WECC Path 42 (SCE-IID) and/or construct new 500 kV line connecting additional potential Salton Sea geothermal resources to Devers

CAISO

4. Construct PG&E's Central California Clean Energy Transmission Project connection of wind resources in the Kern County area
5. Convert Pisgah-Lugo 230 kV lines to 500 kV double-circuit OR develop a 500 kV DC line and add a new fourth Lugo-Rancho Vista (or Mira Loma) 500 kV line
6. Construct a new 500 kV line to Kramer Junction and Lugo Substation

Panel Discussions

Utility/Agency Perspective

- LADWP
- IID
- CMUA
- PG&E
- SCE
- SDG&E
- CAISO
- CPUC
- BLM
- CEC

Stakeholder Perspective

- NRDC
- Oak Creek Energy Systems
- BrightSource
- Geothermal Energy Association
- League of Women Voters
- US Air Force
- CA State Assoc. of Counties
- DRA

Moderated Session

- What are critical links among initiatives?
- What are critical next steps to ensure success?
- How can we streamline initiatives?

Written Comments

- Alliance for Responsible Energy Policy
- Imperial Irrigation District
- Pacific Gas & Electric
- California Wind Energy Association/Large-scale Solar Association
- Jon Seehafer
- Joint municipal utility (CMUA, IID, LADWP, SMUD)

BREAK

Roundtable Discussion