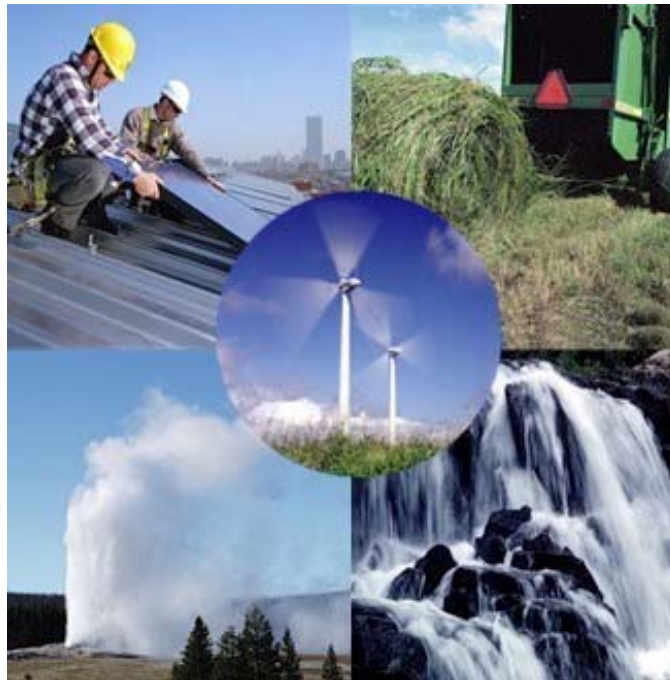


# Planning for Future Electricity Needs



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# Discussion Topics

- Background
- Renewables
- Green House Gasses
- Once-through Cooling
- Hybrid Market Structure
- Challenges and Opportunities

# SCE's Service Territory

- On an average day SCE provides power to:
  - More than 13 million people
  - 180 cities in 50,000 square miles of service area, encompassing 11 counties in central, coastal and Southern California
  - Commercial industrial and nonprofit customers, including:
    - 5,000 large businesses
    - 280,000 small businesses
- **2007 Sales:**
  - 97.7BkWh
  - 23,303 MW

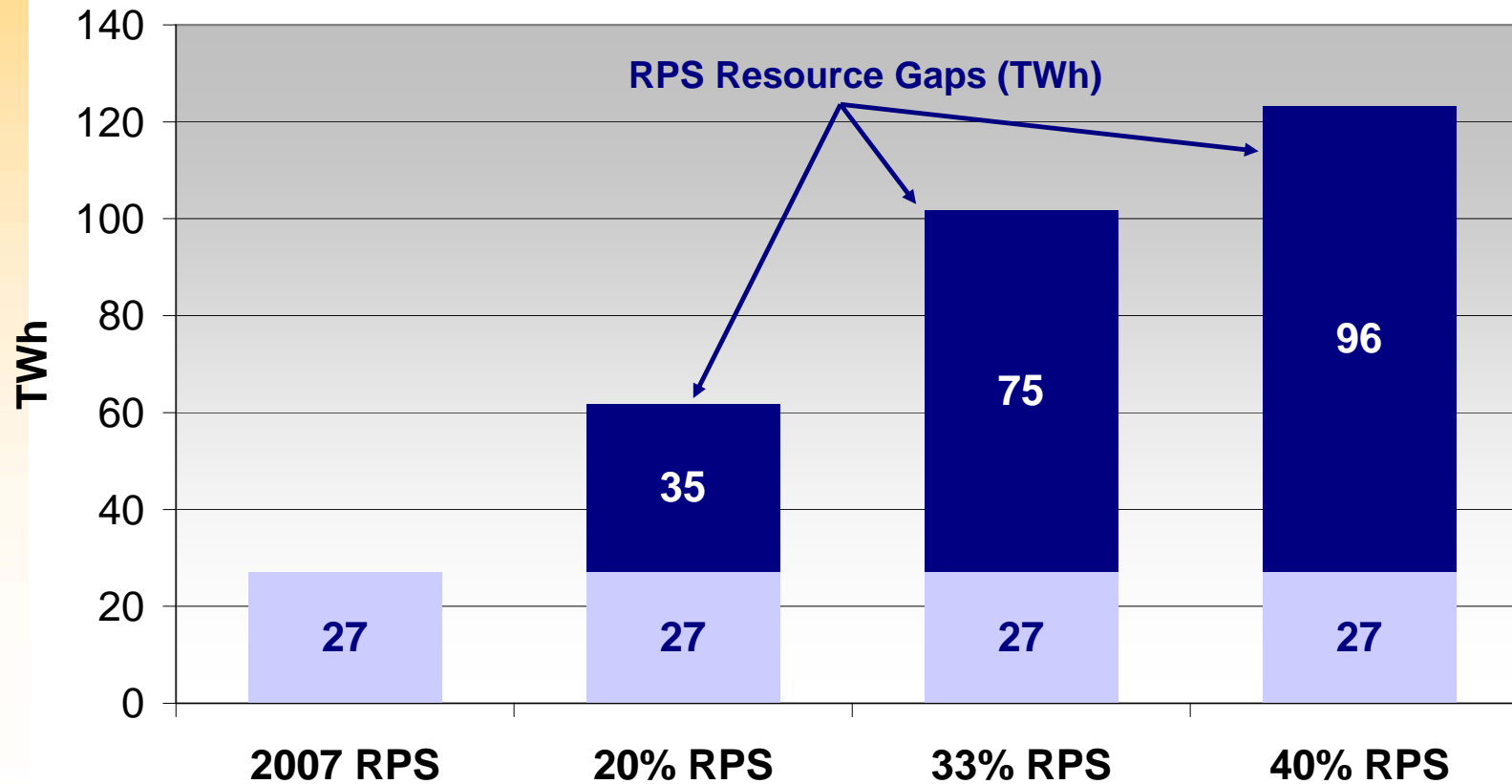


# Key Policies Impacting Generation Planning

- Renewable Portfolio Standards
  - 20%, 33%?
- Green House Gas Reductions
  - AB32
  - Cap and Trade?
- Once-through Cooling
  - 23,910 MW of OTC plants in CA
  - 48,615 MW CAISO Peak Load
  - Will be a significant issue over time, even if due only to normal retirements of older, coastal steam plants
- Hybrid Market Structure
  - How do power plants get built?

# The Renewables Gap is Large

- At 20% RPS, CA's need is larger than total use of 28 other states
- At 33% RPS, CA's need would be the 10<sup>th</sup> largest state by electricity use
- CA currently consumes 2 "Wyoming's" of renewables



# So What's the Plan for Renewables?

- CPUC has a 33% renewables group currently studying the issues, including generation, transmission, and renewable energy credits (RECs)
- CAISO is currently studying resource needs and system operability
- Utilities are in a constant RFO mode searching for the most cost-effective renewables contracts that meet RPS requirements
- Utilities are reviewing self build strategies and proposing projects as appropriate

# Variability is a Significant Issue

## Requirements for Integration of Renewables

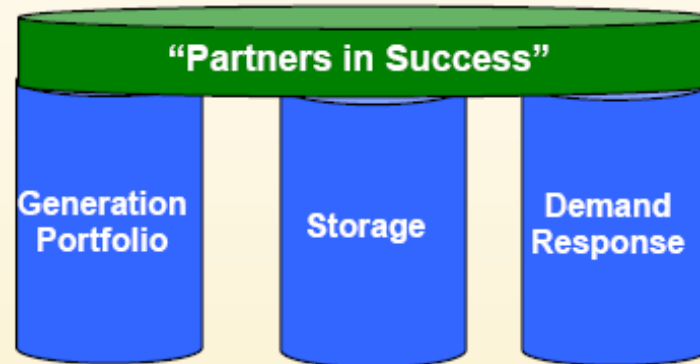


Wind Generation



Solar Generation

### Resources Required for Renewables Integration



Hydro Generation

Quick Start Units  
Fast Ramping  
Wider Operating Range (lower  $P_{min}$ )  
Regulation capability

Shift Energy from off-peak to on-peak  
Mitigate Over Generation  
Voltage Support  
Regulation capability

Price sensitive load  
Responsive to ISO dispatches  
Frequency Responsive  
Responsive to Wind Generation Production

# Hedging for GHG Unknowns

- CA's AB32 reduces GHG to 1990 by 2020
- Governor has an 80% reduction by 2050 Executive Order
- SB1368 – the CCGT standard – already limits incremental CA GHGs
- New federal administration is reviewing its options
  - Carbon Tax?
  - Cap and Trade?
  - National RPS?

# SCE's CHPG Feasibility Project

- Clean Hydrogen Power Generation – coal gasification with maximum shift to hydrogen, electricity production via IGCC, and sequestration of liquid CO<sub>2</sub>
  - Coal with CCS, Nuclear and Geothermal make up the significant low-carbon baseload options
- CPUC support of nearly \$50M for technical and sequestration feasibility of CHPG
- DOE Phase III support of \$65M for sequestration feasibility
- Recent request for additional DOE Round 3 funding of \$45M for technical and sequestration feasibility (\$200M total request)
- Current area of interest includes SW WY, UT, W CO, N AZ based on shared geologic sequestration target
- The Southwest Carbon Partnership is our partner in CCS activity
  - CHPG is reviewing sites in UT
  - SWP is also working with PacifiCorp and hopes to do testing near the Jim Bridger plant site in WY

# The Future of Once-through Cooling

- San Onofre and Diablo Canyon nuclear units are both once-through cooled and provide 4,390MW (9% of CAISO load) and about 19% of the state's energy via a low GHG source
- Other coastal units are typically old steamers that run at low efficiency and capacity factor, and provide system stability via inertia, and can be used for balancing intermittent renewable resources
- Approximately 20,000 other MW of other OTC plants that are at some level of risk in the intermediate term, and have low probability of repowering in the long term
- Orderly replacement with resources (peakers and storage) that support increased intermittency is a likely scenario

# The California Hybrid Market

- The CPUC has a strong policy preference for acquisition of new power via competitive market contracts
  - Requires functional credit markets for IPPs
  - Has debt equivalence and can have capitalized lease impacts on utilities
- Construction of new steel is particularly problematic, especially in the case of retail competition
  - A retail provider with short term contracts is unlikely to be a counterparty for a 10 or 20 year contract required to build new merchant plants
- High capital cost baseload plants will be particularly challenging given their typical 30-40 year life and need for back-to-back contracts in a retail competition environment
- Utilities like SCE continue to be good actors, working closely with the CPUC to investigate technologies such as CHPG, propose renewable projects where reasonable, and by providing backstop plants such as our recent emergency construction of peakers in the LA basin area
- CPUC is currently investigating a capacity market that may help mitigate some of these issues

# Some Challenges and Opportunities

- Renewable Energy Credits (RECs)
  - A thoughtfully designed REC system could reduce the cost of RPS compliance and provide opportunities for energy rich areas
- Transmission
  - Planning, permitting, ownership, financing, construction
- Generation Mix
  - Achieving the least-cost overall generation mix is always complex, especially in a hybrid market
- Low GHG Generation
  - Currently, RPS doesn't recognize low GHG power sources such as fossil with CCS, large hydro or nuclear
- System Stability
  - Intermittent resources require a different operating regime and resources

