RAP® Energy solutions for a changing world

Planning Processes and Approaches in Vertically-Integrated US Utilities

Presented by John Shenot

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The Regulatory Assistance Project (RAP)®

Introduction

- The Regulatory Assistance Project (RAP) is a global NGO providing technical and policy assistance to government officials and agency staff on energy and environmental issues. RAP Principals and senior staff are all former regulators, government officials or senior policy advisors, and RAP's work is funded exclusively by foundations and government agencies. RAP has worked in more than 20 nations and 50 provinces and states. (www.raponline.org)

- John Shenot is a Senior Associate at RAP. He previously served 3 years as policy advisor to the Public Service Commission of Wisconsin and 15 years with the Wisconsin Department of Natural Resources as an air pollution regulator and electric utility specialist.

Typical Planning Approach

- Most common approach is 10- to 20-year Integrated Resource Plan (IRP)
- State utility regulators issue an order (or rules) dictating the planning process and any goals or principles that must be met
- Utility develops the IRP with input from others and review by regulators
- IRP periodically updated (2-3 years, e.g.)

Treatment/Status of Utility IRP

- IRP is submitted to state utility regulators
  - Sometimes “approved”
  - Sometimes “acknowledged” or “accepted”
- IRP includes near-term action plan
- Actions NOT pre-approved by regulators!
  - Usually reviewed for prudency after the fact, but actions in the IRP will generally be found to be prudent so long as the assumptions used in developing the IRP remain reasonable

What Works Well

- "Compliance"
- Fair consideration of energy efficiency on a par with supply resources leads to least-cost and least-risk solutions
- Public participation at front-end, not just reviewing a draft final plan, leads to buy-in
- Transparency (data & documents online) prevents mistakes and minimizes bias

What Doesn't Work So Well

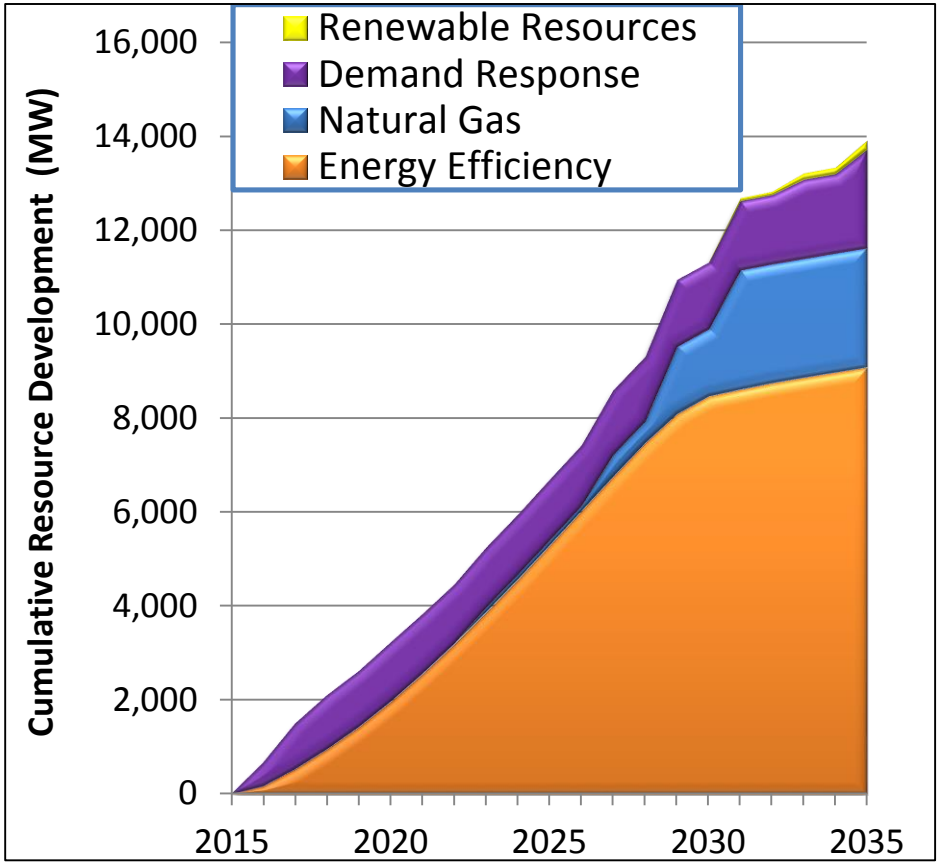
- "Vision"
- Process is usually utility-focused
  - Bias toward major utility investments on which profits can be made
- Minimal consideration of demand response and distributed generation
- Usually little consideration of issues at the distribution system level

How is Planning Evolving in the US?

- Better Consideration of EE and DR
- Increased Attention to “Net Demand” and “the Duck Curve”
- Centrality of Air Pollution/Climate Issues
- Water Scarcity Concerns

Better Consideration of EE and DR: Example 1

SEVENTH NORTHWEST POWER PLAN



Better Consideration of EE and DR: Example 2

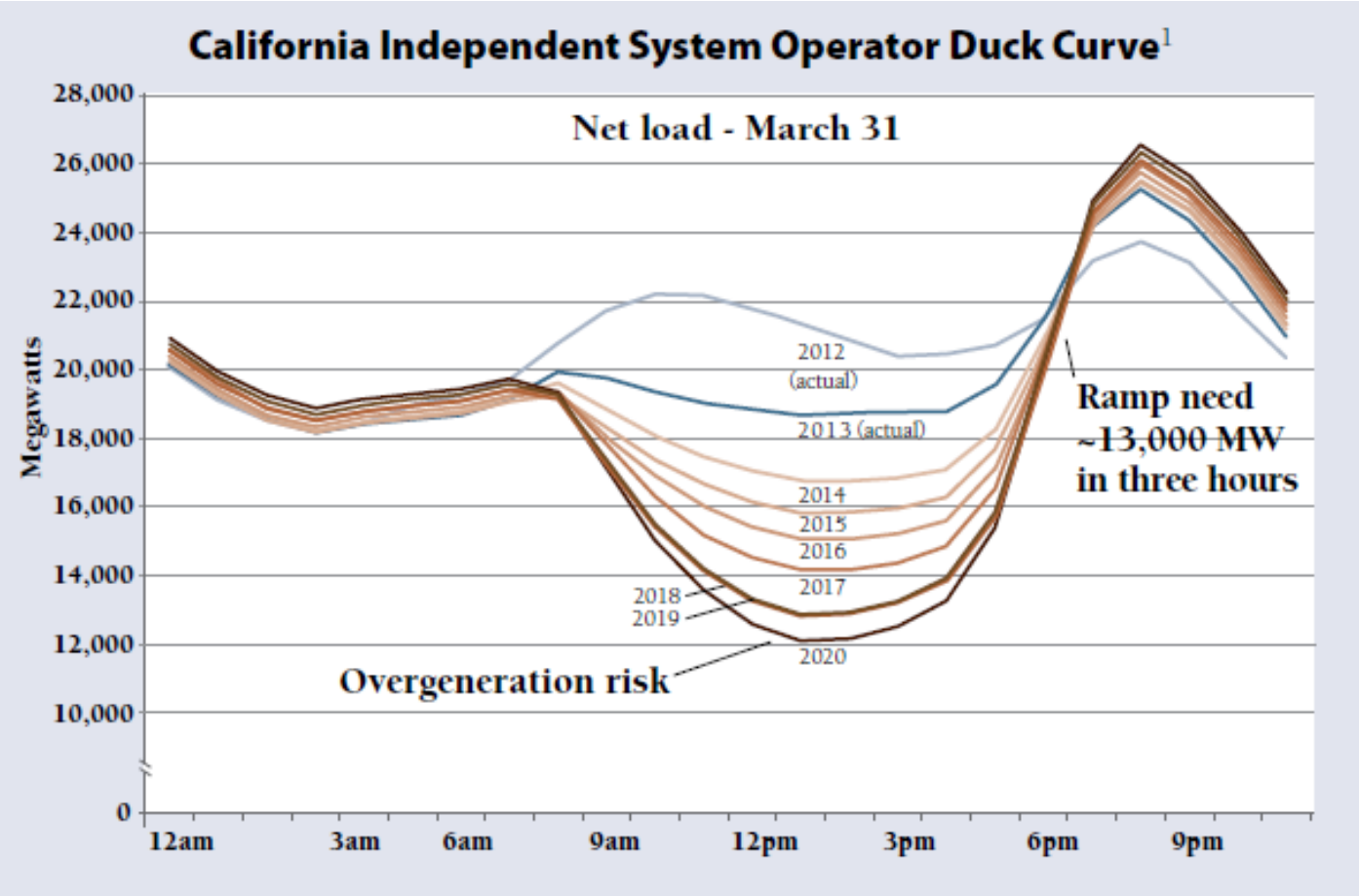





Hydro	Nuclear	Renewables	EEDR	Gas	Coal
4,200 MW conventional 1,600 MW pumped storage	6,700 MW	1,500 MW wind 120 MW solar/biomass	1,300 MW avoided capacity	5,500 MW CT and diesels 4,500 MW CC	12,400 MW

TENNESSEE VALLEY AUTHORITY

Net Demand and the Duck Curve



Teaching the Duck to Fly

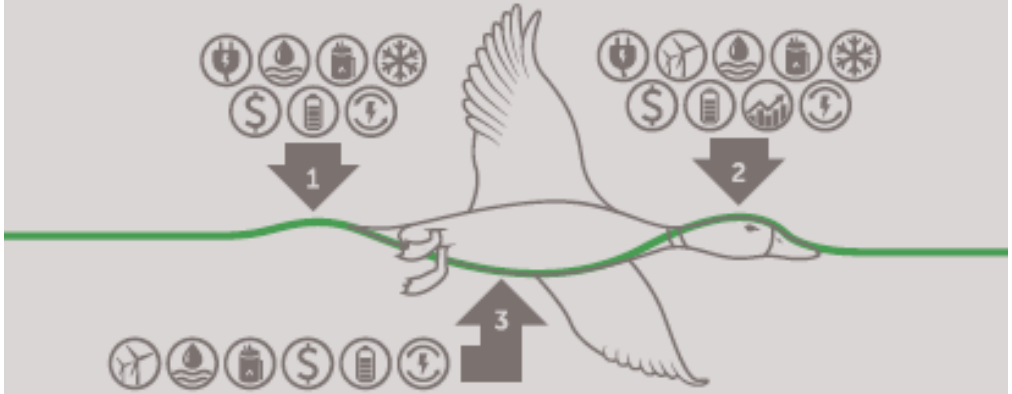
Duck Sitting in Water

Duck in Flight

http://www.raponline.org/document/download/id/7956

Teaching the "Duck" to Fly:

10 strategies to control generation, manage demand, & flatten the Duck Curve



Targeted Efficiency
Focus energy efficiency measures to provide savings in key hours of system stress.⇩⇩

Peak-Oriented Renewables
Add renewables with favorable hourly production. Modify the dispatch protocol for existing hydro with multi-hour "pondage."⇩⇧

Manage Water Pumping
Run pumps during periods of low load or high solar output, curtailing during ramping hours.⇩⇩⇧

Control Electric Water Heaters
Increase usage during night & mid-day hours, & decrease during peak demand periods.⇩⇩⇧

Ice Storage for Commercial AC
Convert commercial AC to ice or chilled-water storage operated during non-ramping hours.⇩⇩

Rate Design
Focus pricing on crucial hours. Replace flat rates & demand charge rate forms with time-of-use rates. Avoid high fixed charges.⇩⇩⇧

Targeted Electric Storage
Deploy storage to reduce need for transmission & distribution, & to enable intermittent renewables.⇩⇩⇧

Demand Response
Deploy demand response programs that shave load during critical hours on severe stress days.⇩

Inter-Regional Power Exchange
Import power from & export power to other regions with different peaking periods.⇩⇩⇧

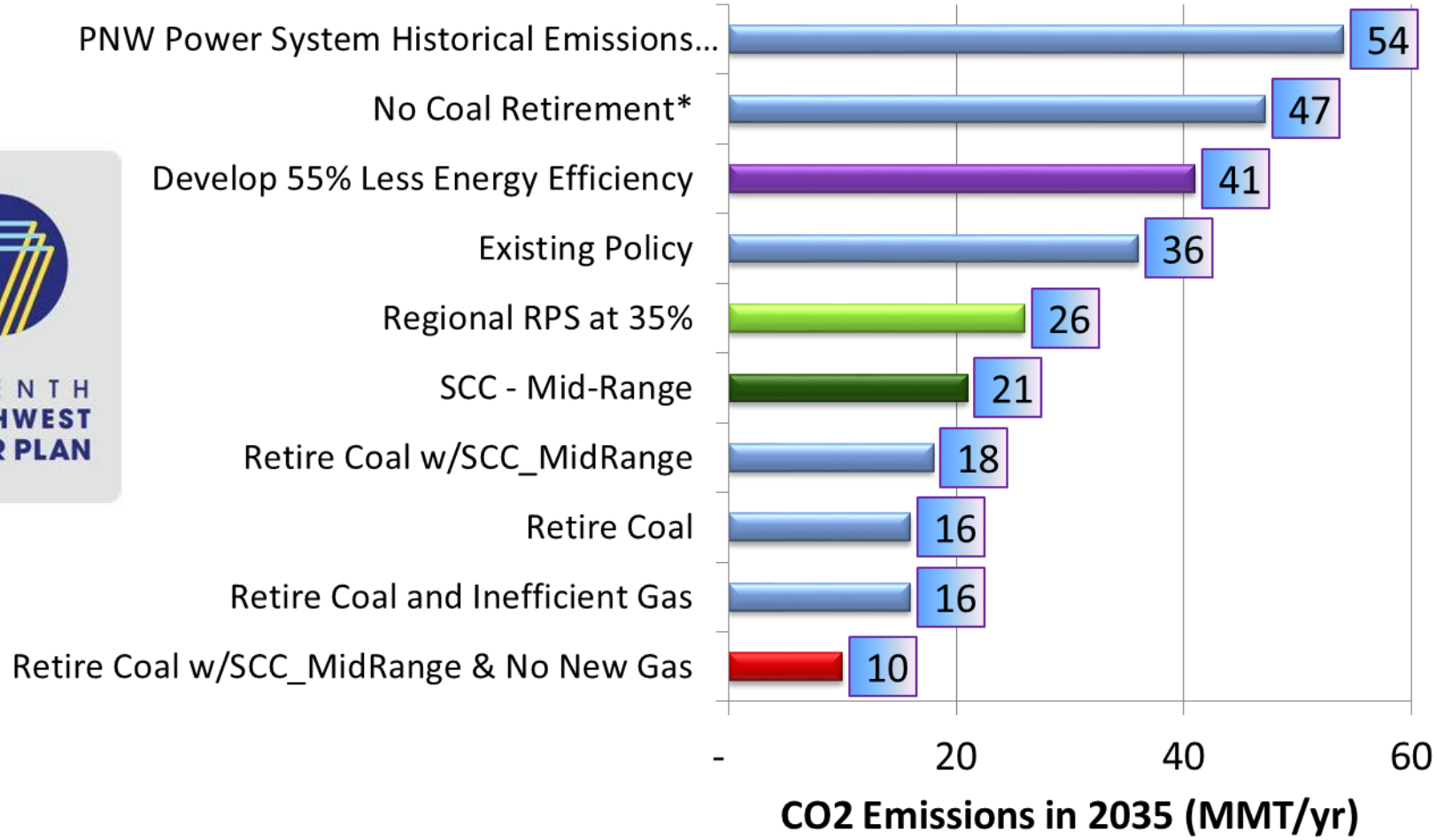
Retire Inflexible Generating Plants
Replace older fossil & nuclear plants with a mix of renewables, flexible resources, & storage.

Air Pollution and Greenhouse Gas Assessments are Now Routine: Example

Example:

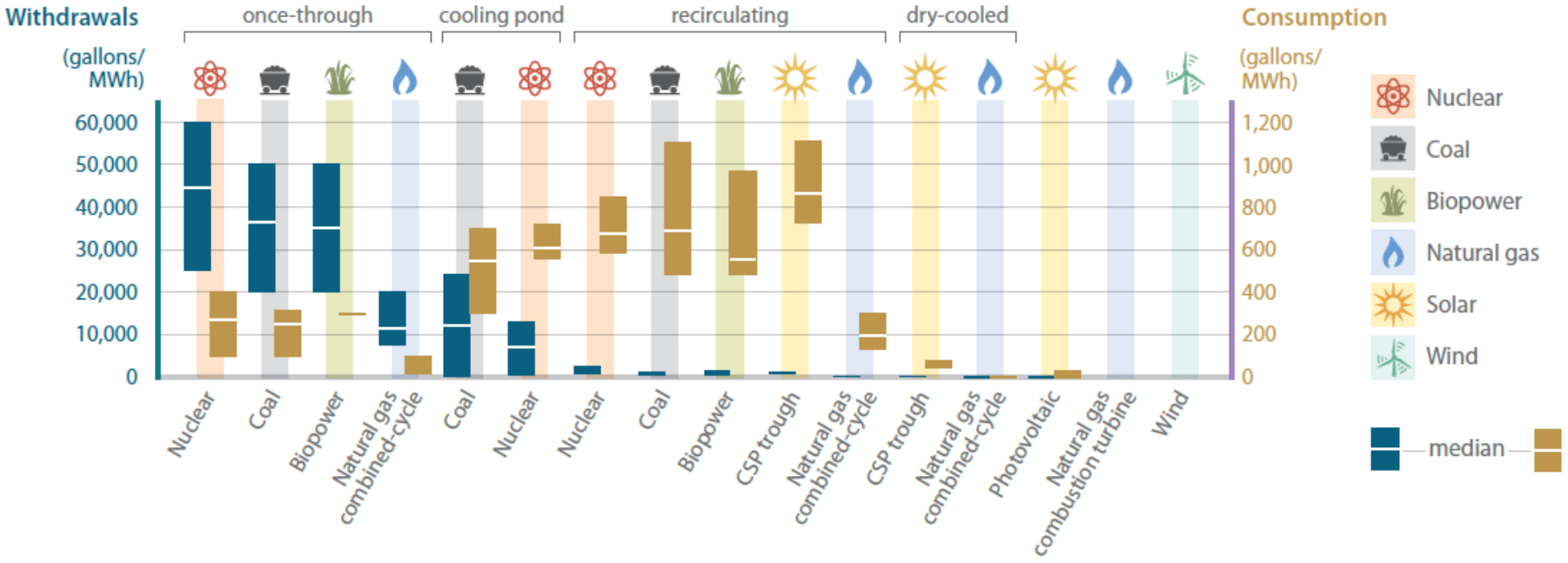
- IRP tested over two dozen different scenarios, including:
  - Social Cost of Carbon (SCC)
  - Retire Coal
  - Retire Coal and Inefficient Gas
  - Retire Coal & Impose SCC
  - Retire Coal & Impose SCC & No New Gas

Annual Regional Power System CO2 Emissions in 2035 by Scenario



SEVENTH NORTHWEST POWER PLAN

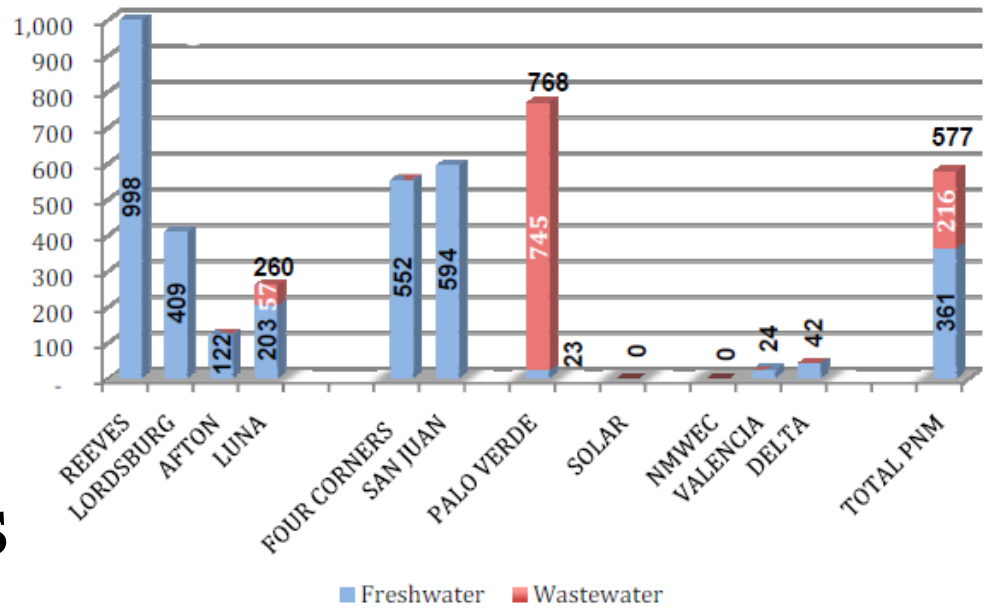
Water Scarcity Concerns



Source: Union of Concerned Scientists, *Freshwater Use by U.S. Power Plants* (2011)

Water Scarcity Concerns: Example from Public Service New Mexico

- IRP assessed water needs (Gal/MW) of existing and potential future power plants
- Tested sensitivity of IRP cost results to drought



On the Cutting Edge in California

- Distribution Resource Plans (DRPs)
  - Evaluation of distributed energy resource (DERs) potential and impacts on the system
- "Integrated Capacity Analysis"
  - ability of grid to accommodate more DER
- "Integrated DER Assessment"
  - How to value & procure portfolios of DERs
- "Locational Net Benefits Analysis"

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power sector. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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