A Tour of the U.S. Regulatory Landscape

Earthjustice Retreat
Asilomar, CA

Presented by Carl Linvill
Introducing RAP and Carl

• RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP Principals all have extensive utility regulatory experience.
  – Dr. Carl Linvill is Principal with RAP. He has been an academic economist, Commissioner with the NV PUC, and was Energy/Economic Advisor to NV Gov. Kenny Guinn.
Agenda

• The Utility Landscape
  – Governance
  – Regional relationships
  – Jurisdictional oversight
  – National/State Policies

• Inside Utility Proceedings
  – The Resource Plan
  – The Rate Case

• Hot Issues
The Utility Landscape

- Governance
- Regional Relationships
- Jurisdictional Relationships
- National Policy
- State Policy
Governance - ownership

- Investor Owned Utilities
  - Shareholders - profit
- Municipal Utilities/Public Utility Districts
  - Municipal Board – public purpose/cost
- Cooperatives
  - Consumer owners - cost
The Utility Landscape

- Governance
- **Regional Relationships**
- Jurisdictional Relationships
- National Policy
- Federal Oversight
- State Policy
- State Regulation
Regional Relationships - Interconnections

Three Synchronous Interconnections

Regional Relationships - ERCs

U.S. Electric Reliability Councils

Source: North American Electric Reliability Council
Regional Relationships – RTOs/ISOs

Figure 4-6:

Regional Transmission Organizations

Source: FERC www.ferc.gov/industries/electric/indus-act/rto/rto-ma
Regional Relationships – Control Areas

U.S. Control Area Operators

Source: USDOE; http://www.eia.doe.gov/electricity/chg_stru_update/fig8.html
Regional Relationships - States

States With Restructuring Activity As of 2010

Source: www.eia.doe.gov/cneaf/electricity/page/restructuring/restructure_elect.html
The Utility Landscape

- Governance
- Regional Relationships
- Jurisdictional Relationships
- National Policy
- State Policy
Jurisdictional Relationships

• **FERC**
  – Wholesale Markets/RTOs/ISOs
  – Transmission Open Access
  – Transmission Rates
  – NERC

• **NERC**
  – Interconnection Standards
  – Reliability Council Standards
  – Control Area and Utility Compliance
Jurisdictional Relationships

• PUC/PSC
  – Retail Rates
  – Retail Open Access
  – Resource Plans – Long Term (>3 years)
    • T, D, G, g, EE, DR, Storage
    • Build or Buy
  – Procurement (< 3 years)
    • Fuel, purchased power, risk management
  – State policy compliance
Jurisdictional Relationships

• Muni, PUD, Coop
  – Set retail rates
  – Allocate access to preferred resources (Dams)
  – Resource Plans – Long Term & Short
  – Reliability compliance
  – State policy compliance

• Tribes
The Utility Landscape

- Governance
- Regional Relationships
- Jurisdictional Relationships
- National Policy
- State Policy
National Policies

• Reliability
• Wholesale market access
• Transmission access
• Tax credits
• Building codes/Appliance standards
• Siting/permitting federal lands
• Federal procurement
• Environmental regulation
The Utility Landscape

- Governance
- Regional Relationships
- Jurisdictional Relationships
- National Policy
- State Policy
State Policies

• Energy Efficiency Standards (EPS, EERS)
• Renewable Portfolio Standards (RPS, CES)
• Public Benefit Funds
• Building codes/Appliance standards
• Siting/permitting
• State procurement
• Environmental regulation (CO2, others)
RPS Policies

State RPS Requirements

Source: Database of State Incentives for Renewables and Efficiency.
www.dsireusa.org/summarmaps/index.cfm?ee=1&RE=1
Inside Utility Proceedings

- RAP Regulatory Principles
- The Resource Plan
- The Rate Case
RAP Principles

• Promote economic efficiency
• Protect the environment
• Ensure system reliability
• Allocate system benefits fairly among all customers
The Resource Plan

• The Goal
• Demand assessment
• Resource assessment
• Mandatory compliance assessment
• Need assessment
• Net need authorization
The Goal

• Three legged stool
  – Reliability
  – Cost
  – Environmental performance

• Sample goals
  – Achieve reliability at least cost
  – … at least cost/best fit
  – … at least cost/least risk
Demand Assessment

• Demand forecast elements
  – Energy and Peak demand forecast
  – Energy efficiency forecast
  – Distributed generation (passive) forecast

• Net demand forecast
  – Spatial granularity
  – Temporal granularity
Resource Assessment

• Central station resources
  – Owned
  – Procured – IPP, Public Power, utilities
• Distributed resources (active)
• Demand response resources
• Storage
Mandatory Compliance Assessment

- Renewable Portfolio Standard Compliance
- Energy Efficiency Resource Standard Compliance
- Emission Standard Compliance
  - GHG
  - Water use
  - Other?
Need Assessment

• Given demand, supply and mandatory compliance assessments
  – What is the net need for resources?
    • Area wide need (Resource Adequacy)
    • Local/Temporal needs (Peaking, Ramping, Ancillary Services)
Net Need Authorization

• Typically Utility Proposes a Plan:
  – Compliance requirements?
  – Loading Order?
  – Demand side v. supply side?
  – Infrastructure?
  – Build v. buy?

• Commission Approves, Rejects, or Accepts
  – May mandate compliance items
The Rate Case

• Revenue Requirements
• Rate Design
Revenue Requirements

- RR = OE + Tx + RB x ROE
  - OE = Operating expenses like fuel, maintenance, labor, purchased power
  - Tx = Federal, State and Local Taxes
  - RB = Capital like Transmission, Distribution, and Generation investment
  - ROR = Rate of Return on capital
Rate Base

The Rate Base

Total Plant In Service At Original Cost
- Accumulated Provision for Depreciation

= Net Plant in Service
+ Working Capital Allowances
- Accumulated Deferred Taxes
+/- Other Adjustments Approved by the Commission

= Rate Base
## Rate of Return

### Hypothetical Rate of Return Calculation

<table>
<thead>
<tr>
<th></th>
<th>Percentage of Capital Structure</th>
<th>Cost of Capital for Element</th>
<th>Weighted Cost of Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Equity</td>
<td>45 %</td>
<td>10%</td>
<td>4.50%</td>
</tr>
<tr>
<td>+ Preferred Equity</td>
<td>5%</td>
<td>8%</td>
<td>0.40%</td>
</tr>
<tr>
<td>+ Long Term Debt</td>
<td>45%</td>
<td>7%</td>
<td>3.15%</td>
</tr>
<tr>
<td>+ Short Term Debt</td>
<td>5%</td>
<td>5%</td>
<td>0.25%</td>
</tr>
<tr>
<td>= Rate of Return</td>
<td>100%</td>
<td></td>
<td>8.30%</td>
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</tbody>
</table>
Rate Design

• We know how much revenue needs to be recovered

• What rates should we set?
  – By Commercial, Industrial, Residential
  – Customer charge
  – By kWh of use
  – By quantity blocks
  – By KW of demand (contribution to peak need)
  – By Time of Use
Allocation among Classes

• Embedded v. Marginal Cost Assignment
  – By proportion of embedded cost (allocate by proportion of total embedded costs)
  – By proportion of marginal cost (incremental cost causer pays)
# Illustrative Residential Electric Rate Design

<table>
<thead>
<tr>
<th></th>
<th>Flat Rate</th>
<th>Inverted Block Rate</th>
<th>Declining Block Rate</th>
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<tbody>
<tr>
<td><strong>Customer Charge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First 500 kWh</td>
<td>$0.10</td>
<td>$0.05</td>
<td>$0.15</td>
</tr>
<tr>
<td>Over 500 kWh</td>
<td>$0.10</td>
<td>$0.15</td>
<td>$0.05</td>
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<tr>
<td><strong>Customer Bill</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 kWh</td>
<td>$5.00</td>
<td>$5.00</td>
<td>$5.00</td>
</tr>
<tr>
<td>500 kWh</td>
<td>$55.00</td>
<td>$30.00</td>
<td>$80.00</td>
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<tr>
<td>1,000 kWh</td>
<td>$105.00</td>
<td>$105.00</td>
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<tr>
<td>1,500 kWh</td>
<td>$155.00</td>
<td>$180.00</td>
<td>$130.00</td>
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# Illustrative Residential Time of Use Rates

<table>
<thead>
<tr>
<th></th>
<th>Flat Rate</th>
<th>Mild TOU Rate</th>
<th>Steep TOU Rate</th>
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<tbody>
<tr>
<td>Customer Charge</td>
<td>$5.00</td>
<td>$5.00</td>
<td>$5.00</td>
</tr>
<tr>
<td>Nights/Weekends</td>
<td>$0.10</td>
<td>$0.07</td>
<td>$0.05</td>
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<tr>
<td>Mornings / Evenings</td>
<td>$0.10</td>
<td>$0.10</td>
<td>$0.15</td>
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<tr>
<td>Afternoon Peak</td>
<td>$0.10</td>
<td>$0.13</td>
<td>$0.25</td>
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4 Problems with Cost of Service Regulation

• Cost plus regulation - Averch-Johnson Effect
• The Throughput Incentive – more sales means more money
• Regulatory Lag
• Information Asymmetry
Possible Solutions

• Decoupling
• Performance Based Regulation
• Incentives for Preferred policies
• Competitive procurement
• Used and useful prudence reviews
• Integrated resource planning
• Restructuring
Hot Topics

• Replacing retiring coal plants with clean energy
• Net metering tariffs – what’s fair?
• What is FERC Order 1000 for?
• How to keep RE integration cost low
• The full value of EE, DR and DG
• Accounting for cost and risk
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 and natural gas sectors. 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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clinvill@raponline.org
Extra Slides Addressing Cost and Risk
A.C. Pigou
Growth in the PNW: 1960 to 1985

Courteous of Tom Eckman (NWPCC)

<table>
<thead>
<tr>
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<tr>
<td>3,000</td>
<td>53,000</td>
<td>103,000</td>
<td>153,000</td>
<td>203,000</td>
<td>253,000</td>
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Economists REALLY Underestimated Consumer Response to Retail Rate Increases Due to Thermal Plant Costs
Breakdown of Brattle's $2.0 Trillion Investment Requirement

- **Generation**: 47%
- **Transmission**: 15%
- **AMI and EE/DR**: 9%
- **Distribution**: 29%
Capital Expenditures 2001–2011

U.S. SHAREHOLDER-OWNED ELECTRIC UTILITIES

($ Billions)

<table>
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<th>Year</th>
<th>Expenditure ($ Billion)</th>
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<td>2001</td>
<td>57.2</td>
</tr>
<tr>
<td>2002</td>
<td>49.0</td>
</tr>
<tr>
<td>2003</td>
<td>43.0</td>
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<tr>
<td>2004</td>
<td>41.1</td>
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<td>2005</td>
<td>48.4</td>
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<td>2006</td>
<td>59.9</td>
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<tr>
<td>2007</td>
<td>74.1</td>
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<tr>
<td>2008</td>
<td>82.8</td>
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<tr>
<td>2009</td>
<td>77.6</td>
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<tr>
<td>2010</td>
<td>74.2</td>
</tr>
<tr>
<td>2011</td>
<td>79.3</td>
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r = revised

Source: SNL Financial and EEI Finance Department

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Actual and Planned Transmission Investment 2005-2014

($ Millions [Real $2009])

<table>
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<tr>
<th>Year</th>
<th>Actual</th>
<th>Planned*</th>
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<tbody>
<tr>
<td>2005</td>
<td>7,474</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>8,243</td>
<td></td>
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<td>2007</td>
<td>8,481</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>9,038</td>
<td></td>
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<tr>
<td>2009</td>
<td>9,854</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>10,204</td>
<td></td>
</tr>
<tr>
<td>2011p</td>
<td></td>
<td>12,612</td>
</tr>
<tr>
<td>2012p</td>
<td></td>
<td>13,917</td>
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<tr>
<td>2013p</td>
<td></td>
<td>13,688</td>
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<tr>
<td>2014p</td>
<td></td>
<td>13,533</td>
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*p = preliminary
Current (2010) capacity by initial year of operation and fuel type

Gigawatts

Current (2010) U.S. capacity

- Natural gas
- Coal
- Hydro
- Nuclear
- Petroleum
- Wind
- Other

Energy solutions
for a changing world
Challenging Environment

• Challenges faced by utilities
  – Flat load growth
  – Distributed generation
  – Uncertain economy
  – Financial metrics less forgiving than in 1980s
  – **AND**

  Rate of investment >
  Rate of depreciation
  Means **upward rate pressure!**
Examples of Cost and Time Risks of Supply/Demand Resources

• Cost-related
  – Construction
  – Capital
  – Fuel & Operations
  – Management
  – Resources limited
  – Reaction to rates

• Time-related
  – Construction
  – Markets
  – Environment
  – Load
  – Technology
  – Catastrophe
  – Contingencies
  – Government
Indicative Composite Risk

• Scoring of generation risks considers
  – Construction cost
  – Fuel and Operating cost
  – New Regulation
  – Carbon Price
  – Water Constraints
  – Capital Shock
  – Planning