Renewable Energy Incentives: Investment or Entitlement?

Presentation to the
ENVIRONMENTAL & ENERGY TECHNOLOGY COUNCIL OF MAINE

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Overview

• Some Background
  – Today’s Regulatory Challenge
  – US Energy Subsidies—A Snapshot
  – Utility System Investment Needs
  – The Utility Sector of the Future
  – EPA’s Clean Power Plan

• Two Questions:
  #1: Are you able to talk “Integration?”
  #2: What Constitutes a “Good” DG Tariff?
Some Background
Today’s Regulatory Challenge

Traditional Regulatory Goals

Dramatic Industry Change

Affordable Environmental Compliance

Comprehensive Planning
Some Background
US Energy Subsidies—A Snapshot

• Historical federal commitment to new energy sources was much greater for non-renewable resources
  – During first 15 years of each subsidies’ the federal commitment to oil and gas was 5x greater than to renewable and 10x greater for nuclear than renewables

• Support for RE as an emerging technology pales in comparison to that of oil, gas and nuclear power (inflation adjusted dollars over first 15 years of subsidy life)
  – Nuclear Energy spending 3.3 billion
  – O&G subsidies averaged 1.8 billion
  – Renewable energy average less than 0.4 billion

http://www.naruc.org/meetingpresentations.cfm?178
Snapshot: One Century of Average Annual Energy Subsidies

- O&G, 1918-2009: $4.86 billion
- Nuclear, 1947-1999: $3.50 billion
- Biofuels, 1980-2009: $1.08 billion
- Renewables, 1994-2009: $0.37 billion
Cumulative Historical Federal Subsidies

- $185.38 billion (1947-1999)
- $32.34 billion (1980-2009)
- $5.93 billion (1994-2009)
- $446.96 billion (1918-2009)

Energy solutions for a changing world
Some Background

– Utility System Investment Needs
$1.5 to $2.0 trillion
Total electric industry infrastructure investment needs by 2030.

Natural Gas System Investment, according to DOE

- US natural gas infrastructure
- Half was built between 1940-1960
- **$19.2 Billion** dollars required for upgrades

**Water System Investment Needed**

- **$384 billion** EPA—total drinking water system infrastructure needed by 2030

- Source,
- Treatment Plant,
- Storage,
- T&D

Regulatory Response to Utility System Investment Needed by 2030

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Investment Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>$1.5 - 2.0 trillion</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>$19.2 billion</td>
</tr>
<tr>
<td>Drinking Water</td>
<td>$384 billion</td>
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</tbody>
</table>
Status Quo: What to expect if utilities and ratepayers are left alone to take on this effort

Pressure On:

– Rates and ratepayers;
– Company earnings and balance sheets;
– Regulatory process (more frequent rate cases);
 and
– Elected and appointed officials.

Commissioner Ron Binz, former Chair CO PUC,
2010 NARUC Summer Meetings Sacramento, CA
Some Background
– The Utility Sector of the Future

Q. Where does RE (distributed and utility-scale) fit within these industry trends?

- 34%: EPA should reduce emissions reduction targets and timetable
- 28%: EPA should make emissions reduction targets and timetable more aggressive
- 20%: EPA should lessen emissions reduction targets and timetables
- 19%: EPA should scrap plan entirely

Q. How should the EPA move ahead with its plan to reduce carbon dioxide emissions 30% nationwide by 2030?

Some Background

Clean Power Plan: Building Blocks & Beyond

1. Heat Rate Improvements
2. Redispatch to Gas
3. Renewable and Nuclear Generation
4. Energy Efficiency

Increase Low-GHG Generation

Electric-Sector CHP

Optimize Power Plant Operations

Establish Energy Efficiency Targets (EE, DSM, EERS)
Pursue Behavioral Efficiency Programs
Boost Appliance Standards
Boost Building Codes
Retire Aging Power Plants

Energy solutions for a changing world
There are Many Other Technology & Policy Options

- Optimize Grid Operations
- Reduce Losses in the T&D System
- Foster New Markets for Energy Efficiency
- Adopt Procurement Requirements (“loading order”)
- Encourage Clean Distributed Generation
- Revise Capacity Market Practices
- Adopt Environmental Dispatch
- Improve Utility Resource Planning
- Adopt Cap-and-Invest Programs
- Revise Transmission Pricing and Access Policies

See forthcoming publication from the National Association of Clean Air Agencies (NACAA) in late April
Clean Power Plan

• How Will Renewable Energy Certificates trade in this new regulatory paradigm?
• Will the CPP further promote or hinder the development of RE?
• Subsidies aside, can regulators fully recognize the value of RE?
The Challenge

• Given the current environment:
  – RE developers will need to focus on the value and benefits they bring to the grid and society, and
  – Be prepared to address the issues related to greater adoption of RE into the country’s energy mix.
Two Resources

• Designing DG Tariffs Well – Linville et al, RAP

• Designing Markets to Accommodate Variable Resources: “Teaching the Duck to Fly,” Jim Lazar, RAP
Strategy One: Designing Distributed Generation Tariffs Well


Designing Distributed Generation Tariffs Well

• Improvements in DG economics,
• Increasing consumer preference for clean, distributed resources, and
• A favorable policy environment in many states have combined to produce significant increases in DG adoption in the US.
• Regulators are looking for the well-designed tariff that fairly:
  – Compensates DG adopters for the value they provide to the electric system;
  – Compensates the utility for the grid services it provides, and
  – Charges non-participating consumers for the value of the services they receive.
Sound Decision-Making Benefits All

• For consumers: Keep more $$, quality
• For utilities: Corporate health, purpose
• For investors: Safety, value, expectations
• For employees: Safety and welfare, pride
• For the regulatory process: Confidence
• For society: Key role for power in society

A process that promotes shifting risk rather than managing risk is inherently unstable
Designing DG Tariffs Well: Twelve Points

1. Value is a two-way (or more) street
2. Consider all relevant sources of benefit and cost over the long term
3. Select & implement a valuation method
4. Cross-subsidies may flow either way, e.g.,
Consider: Cross-Subsidies Run Both Ways

• If value of PV < compensation:
  – Other customers subsidize PV customers
  – Under-recovery of utility’s fixed costs
  – Upward pressure on rates (cross subsidy)
  – Reduced utility shareholder returns

• If value of PV > compensation:
  – PV customers subsidize other customers
  – Suppresses PV deployment
5. Extrapolating from extreme situations is misleading
6. Infant industry subsidy tradition
7. Rules matter (e.g. interconnection)
8. Be no more complicated than necessary
Twelve Points

9. Support innovative power sector models
10. Keep incentive decision separate from rate design
11. Keep decoupling decision separate from rate design
12. Consider mechanisms for “have-nots”
Two Resources

• Designing DG Tariffs Well – Linville et al, RAP

• Designing Markets to Accommodate Variable Resources: “Teaching the Duck to Fly,” Jim Lazar, RAP
• Publication: Jim Lazar:

• Webinar:
  http://www.raponline.org/event/teaching-the-duck-to-fly
Trends in resource development are leading toward a growing need for flexible generating capacity starting in 2015.

Net load - March 31

- 2012 (actual)
- 2013 (actual)
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

Ramp need ~13,000 MW in three hours

Over generation risk

Energy solutions
for a changing world
Ten Strategies To Align Loads to Resources (and Resources to Loads) with Illustrative Values

1. Targeted energy efficiency
2. Orient solar panels
3. Use solar thermal with storage.
4. Manage electric water heat
5. Require new large air conditioners to include storage
6. Retire older inflexible power plants
7. Concentrate demand charges into “ramping” hours
8. Deploy energy storage in targeted locations
9. Implement aggressive demand response programs
10. Use inter-regional exchanges of power

Not every strategy will be applicable to every utility.
What Causes This Challenge?

**Variable Loads:** we’ve had those forever.

**Wind:** Variable supply.

**Solar:** Predictably NOT available for late PM peak demand.
Strategy 1: Targeted Energy Efficiency

Focus efforts on EE measures with afternoon peak orientation.

5% of total usage by 2020;

3:1 ratio between on-peak and off-peak savings.

Kitchen lighting is a great example.

A/C is huge.
Strategy 1: Targeted Energy Efficiency

Focus efforts on EE measures with afternoon peak orientation.
Strategy 2: Orient Solar Panels to the West

Fixed-axis solar panels produce a more valuable output if oriented to the West.

100 MW shift out of AM into PM hours, out of ~700 total rooftop solar assumed.
Strategy 2: Orient Solar Panels to the West

![Graph showing energy output over time for different strategies.](image-url)
Strategy 3: Use Solar Thermal In Place of Some Solar PV

Solar thermal energy is more expensive, but can be stored for a few hours at low cost.

Substitute 100 MW of solar thermal for 100 MW of utility-scale PV, out of 1,500 MW of utility-scale solar total assumed.
Strategy 3: Use Solar Thermal In Place of Some Solar PV
Strategy 4: Control Electric Water Heating

Install grid control of electric water heating; Supercharge during low-cost hours.

Illustrative utility has ~12% of state load; assume it can gain control over 5% of the electric water heaters in the state, for 300 MWh of load shifting.
Strategy 4: 
Control Electric Water Heating
How Did We Do?

Pre-Strategy, without Solar/Wind: 73% LF

Pre-Strategy, with Solar/Wind: 63% LF

Post-Strategy, with Solar/Wind: 83% LF

Hourly Ramp: 340 MW vs. 400 today, and 550 w/o strategies
Teaching the Duck to Fly
Recommendations

• Given
  – Today’s Regulatory Challenges;
  – Uncertainty Associated with Energy Subsidies;
  – Utility System Investment Needs;
  – Changes to the Utility Sector; and
  – EPA’s Clean Power Plan

• Identify RE’s Strengths and Benefits
  – Get ahead of the Integration challenge
  – Be prepared to support development of tariffs that recognize the benefits of RE
Thank You!
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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