Renewable Energy Financing: The Role of Policy And Economics

Karlynn Cory
Strategic Energy Analysis and Applications Center, NREL

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Overview

• Renewable Energy (RE) Valuation
• Federal and State Incentives
• The role of RECs in financing RE
  – How Policy Impacts RE Valuation
• Financing Challenges
Renewable Project Costs & Revenues

Costs
- Capital Equip., O&M
- Resource Supply/ Uncertainty
- Cost of Money
  - Debt: Interest Rate
  - Equity: ROI

Finance
- Equity &/or Debt

Revenues
- Electricity Sales
- Subsidies/ Incentives
- Attribute Sales (e.g. RECs)
Electric Generation – Cost Comparison

Total Overnight Costs
For Projects Initiated in 2006

Source: EIA’s AEO 2007

Levelized Cost of Energy

Source: OH OCC (2007)
Orig. sources: DOE, MIT, Solar Buzz, NREL
Federal Incentives

• Investment Tax Credit (ITC)
  – 30% for solar and fuel cells* from 1/1/06 through 12/31/08
  – Reverts to 10% (current level for geothermal electric)
• Production Tax Credit (PTC)
  – Based on production in first 10 years of operation
  – 2.0¢/kWh for wind, geothermal, closed-loop biomass
  – 1.0¢/kWh for LFG, open-loop biomass, hydro (including small irrigation), MSW
• Modified Accelerated Cost Recovery System (MACRS)
  – Accelerated depreciation of specific equipment costs
  – Generally, ~90% of equipment costs (not including transmission)
• Every project can use MACRS, but if eligible for both PTC and ITC, the project can only claim one credit

* At least 0.5 kW fuel cell and up to $500 per 0.5 kW

Source: DSIRE
State Incentives

- System Benefit Charge for renewables
  - 17 funds expected to total $6.8 billion between 1998-2017
  - Programs for end-users, developers, industry
- State ITC
- State PTC
- Tax Exemptions (State, County, City)
  - Sales
  - Property
- Net metering and Interconnection
  - Not uniformly applied
  - Important for small, distributed systems

Source: DSIRE (www.dsireusa.org)
State Policy: Renewable Portfolio Standards

25 States + DC

Sources: Union of Concerned Scientists and NREL
State Policy – Specific RPS Provisions
Promote Solar and DG

WA: 2x multiplier for DG
NV: 1% solar by 2015
2.4x multiplier for central PV
2.45x multiplier for distributed PV
AZ: 4.5% customer-sited DG by 2025
(half from customer-sited projects)
NY: 0.1542% customer-sited DG by 2013
NJ: 2.12% solar electric by 2021
PA: 0.5% PV by 2020
MD: 2% solar electric by 2022
CO: 0.8% solar electric by 2020
(half from customer-sited projects)
NC: 0.2% solar by 2018
DE: 2.005% PV by 2019
3x multiplier for PV installed before 2015
DC: 0.386% solar electric by 2021
1.1x multiplier for solar 2007-09
NM: 4% solar electric by 2020, 0.6% DG by 2015

Source: LBNL
REC Tracking Systems

Source: EPA
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REC Market Value Factors

• Compliance vs. voluntary market
• Regional Issues
  – Quality of resource
  – Incremental cost of development above energy market
  – REC supply-demand balance
• Long-term policy stability/uncertainty
• Other market rules/conditions (e.g. price cap)

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<thead>
<tr>
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<th>RECs</th>
<th>Solar RECs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary</td>
<td>$1-7*/MWh</td>
<td>$18-21/MWh</td>
</tr>
<tr>
<td>RPS</td>
<td>$3-22/MWh</td>
<td>$205-265/MWh*</td>
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<tr>
<td>RPS (shortage)</td>
<td>$48-56/MWh</td>
<td>???</td>
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</table>

NJ SREC cap: $711/MWh

Sources: Evolution Markets, NREL, Xcel, NJ Clean Energy Program
* Not counting biomass ** NJ and CO only
High REC Prices are Great…

But are RECs Bankable?
Investors Face Many Risks

1. **Investment risk** is reduced by…
   - A higher return on investment
   - Long-term contracts w/creditworthy entities
   - Tax incentives used to increase project cash flow
   - Risk shared with other investors

2. **Energy resource risk** is key concern
   - How much wind/water/biomass is available?
   - **Biomass concerns**: small suppliers, short-term contracts

3. **Environmental risk** (siting and permitting)

4. **Technology risk** – commercial preferred, not emerging

5. **Portfolio diversity** helps reduce risk
   - Invest in several different geographic regions
   - Long-term contracts with several different off-takers
REC Value for Project Financing

• Ability for electricity revenues and incentives to cover large portion of project costs
• REC financing value can depend on:
  – Ability to secure “favorable” REC contracts/hedges
  – Perspective of investors

• **Equity investors:**
  – Greater appetite for risk
  – Some investing in wind projects without REC contracts,
    • Particularly if there are neighboring/other markets in which to sell RECs (RPS, voluntary)
  – Looks for disparities between REC spot market and long-term REC prices

• **Debt lenders:** generally, unwilling to lend without PPA that covers costs with creditworthy entity
Key Financing Challenges by Renewable Technology

• Wind
  – Investment returns
    • PTC expiration
    • Competing capital resulting in lower IRRs
  – Resource risk
  – O&M costs

• Solar PV
  – Upfront capital costs and resulting investment return
  – ITC expiration

• Biomass
  – Resource risk (unreliable fuel supply)
  – Environmental risks

• Geothermal
  – Resource risk (temperature decline, fouling)
  – Environmental risk (well blowouts)

Adopted from Jerry Peters, TDBanknorth
Conclusions

• Renewable Energy Valuation Depends on:
  – Value of federal and state incentives
  – Resulting incremental cost above regional electricity revenues (if any)
  – Ability to secure attribute/REC revenues to cover incremental cost and desired return
    • Better for RPS eligible technologies
    • Particularly if there is a set-aside (e.g. solar or DG)

• REC Valuation Depends on Investors
  – Debt lenders want REC PPAs with creditworthy entities
  – Equity investor willing to take more risk, for certain tech.

• Financing Challenges are Technology Specific
Thank you for your attention!

Karlynn Cory
Strategic Energy Analysis and Applications Center
National Renewable Energy Laboratory
www.nrel.gov/analysis
1617 Cole Blvd., MS 1533
Golden, CO 80401-3393
P: (303) 384-7464
E: Karlynn_cory@nrel.gov