LMOP Workshop: Financial Considerations for Developing LFGE Projects

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LANDFILL METHANE OUTREACH PROGRAM

Presentation Overview

- Revenue Sources
- Project Costs
- Financial Analysis
- Recommendations

Revenue Sources

- Electric projects
  - Sale of electricity (2.5 - 7 cents/kWh)
  - Premium pricing for renewables through RPS/RPG or voluntary green power markets
    - Renewable Energy Credits (RECs)
  - Tax credits & incentives - Private and Public Sectors
  - Typical LFG Electricity Project Structure
- Direct-use projects
  - Sale of LFG ($/MMBtu)
  - Typical Direct Use Project Structure
- Additional Potential Sources
  - Greenhouse gas emissions trading
  - Energy cost savings

Revenue – Electrical Sales

- Refers to the sale of electricity for energy, capacity and ancillary services. Typical mechanisms:
  - Sell to local utility at a regulated buy-back rate (typically range from 2.5 to 7 cents/kwh).
  - Sell to wholesale electricity market (if in a deregulated region).
  - Sell to third party qualified buyer.
  - Self generation (or net metering) Electricity used to offset on-site load – electricity that doesn't have to be purchased from the utility.

Revenue – LFG Sales

- LFG sales to an end-user are the primary source of revenue for direct-use projects
- LFG price is often indexed to the price of natural gas – typically around $2 to $4/MMBtu
  - Fluctuates significantly based on contractual arrangement)
- Price paid by end-user for LFG must provide a cost savings that outweigh energy equipment modifications (boilers, heaters, kilns, etc.)

Premium Pricing for Renewable Energy…

- Premium pricing available for renewable energy sources:
  - Renewable Portfolio Standard
  - Renewable Portfolio Goal
  - Voluntary green pricing program
- Provide additional revenue above available market or regulated electricity rate

DSIRE™

Database of State Incentives for Renewables & Efficiency

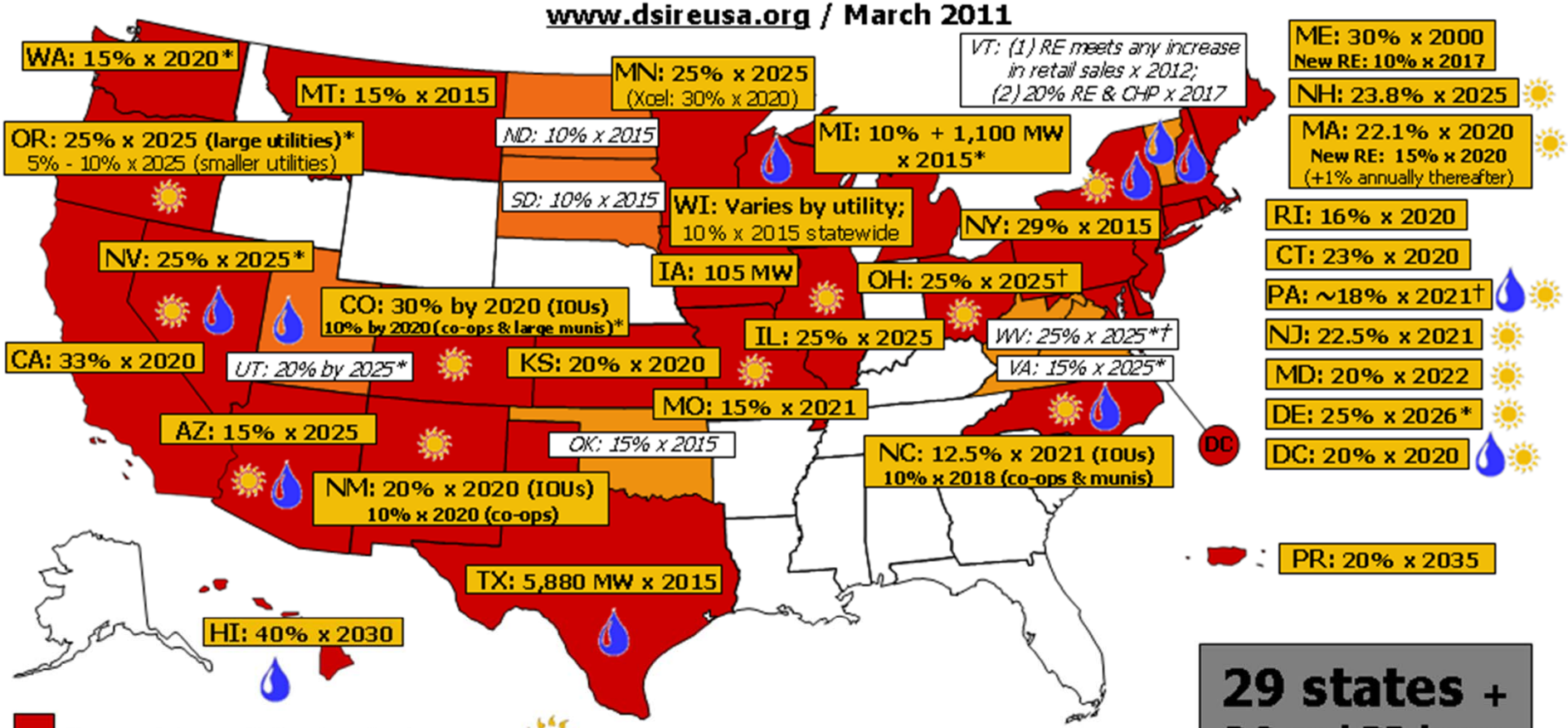
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

IREC Interstate Renewable Energy Council

North Carolina Solar Center

RPS Policies

www.dsireusa.org / March 2011



Renewable portfolio standard

Renewable portfolio goal

Solar water heating eligible

Minimum solar or customer-sited requirement

* Extra credit for solar or customer-sited renewables

† Includes non-renewable alternative resources

29 states + DC and PR have an RPS

(7 states have goals)

Renewable Energy Credits

- Renewable Energy Credits:
  - Sold by electricity generators to utilities, “munis” or coops to meet state RPS in compliance markets
  - Sold to consumers/industries seeking reduce their environmental footprint or encourage renewable energy production. Typically sold through voluntary markets.
  - Offered in 1 Mwh units
  - Require verification so that the renewable attributes of the electricity are not being sold more than once
  - Also involves significant record-keeping

Greenhouse Gas Credits

- Compliance greenhouse gas programs:
  - Rapidly growing, expanding market – will become dominant
  - Led by CCAR & RGGI
- Voluntary greenhouse gas programs
  - Very active – where most of the greenhouse gas trading activity occurs
  - Players include CAR and VCS

Private Sector Incentives

- Section 45 Production Tax Credit
- Section 48 Investment Tax Credit
- Department of Treasury 1603 Grant Program
- DOE Loan Guarantees

Public Sector Incentives

- New CREBs
- Qualified Energy Conservation Bonds
- Municipal finance

Project Costs

- Infrastructure
- Operations
- Administrative

Infrastructure Costs

- Gas collection system
  - Account for future expansions if landfill is still in operation
- Blower/flare
- Utilization equipment
  - Engine, turbine
  - Pipeline
  - Treatment
- Monitoring equipment

Operational Costs

- Scheduled Maintenance
  - Landfill gas analyses at each well
  - Balancing of collection system
  - Leachate removal?
  - Blower/flare lubrication and maintenance
  - Utilization system maintenance
  - Monitoring system maintenance
- Unscheduled Maintenance
  - Component failures
  - Impacts of nature
  - Conflict with landfill operations (e.g., truck runs over wellhead)

Administrative Costs

- Permitting and local zoning
- Political issues
- Legal/ownership issues
- Emission reduction projects
  - Project Design Documents or Application
  - Validation and verification
- Utilization projects
  - Contracts

Typical Electric Project Components & Costs

- 3 MW engine project for 15 years:
  - Installed engine and gas treatment skids
    - Installed capital cost = ~$5.15 million
      - Gas compression & treatment and engine and generator = ~$4.89 million
      - Interconnect = ~$255,000 (approximate – many variables at play)
  - Annual operation & maintenance
    - Cost = ~$526,000/year

Typical Direct-Use Project Components & Costs

800 scfm, 5-mi pipeline, 15-yr project:

- Total capital cost = ~$2.5 million
  - Gas compression & treatment = ~$768,000
  - Pipeline = ~$330,000/mile
  - (Plus end-of-pipe combustion equipment retrofits, if needed)
- Annual operation & maintenance cost = ~$129,000/year

Financial Analyses

- Establish cost and revenue projections
- Create cash flow model
- Consideration of project options
- Develop business plan

Cost and Revenue Projections

- Estimated landfill gas recovery
- Projected revenue
  - Emission reductions
  - Energy
  - Applicable project incentives
    - Tax credits
    - Grants
- Projected costs
  - Infrastructure
  - Operations
  - Administrative

Estimating LFG Recovery

- Project revenue and cost projections must be based on reliable LFG recovery estimates
- LFG recovery projections will set energy production and/or emission reductions
- These estimates must be developed by experienced professional engineers
  - Significant potential for error in estimates (model input assumptions, data, data interpretation, model calibration)
- Financial models based on unrealistic LFG recovery estimates will lead to failed expectations

Cash Flow Model

- Costs and revenues should be calculated and compared on a year by year basis over the expected life of the project.
- Calculations to include:
  - Project performance over time
  - Escalation of project expenses and energy prices
  - Financing costs
  - Tax considerations

Consideration of Project Options

- Develop cash flow model for all reasonable project options
- Compare results to determine best project option
  - Annual cash flows
  - Net present value
  - Debt coverage
  - Rate of Return

Consideration of Non-Price Factors

- Accuracy of project assumptions
  - Performance
  - Reliability of major components
  - Environmental
- Public support/opposition to project
- Utility's (electricity or NG) receptiveness to renewable projects

Project Financing

- Typically, landfill gas projects require financing to develop project infrastructure
- You need demonstrate project financial performance and risk
- Detailed project cash flow analyses and supporting assumptions are critical

Recommendations

- For Landfill Owners
  - Be realistic – there is a lot of risk in these projects for the investor - they are not gold mines!
  - Simplify and speed up procurement processes
  - Help your investor implement the project in any way you can – don't be an impediment
  - The sooner the investor makes money – the sooner you will!

Recommendations

- For Investors
  - Pay attention to details and assumptions
  - Be realistic about project costs, revenues, and schedules
  - Run financial sensitivity scenarios to determine project boundaries
  - Avoid deals that are overly complex

Recommendations

- Scrutinize LFG recovery projections
- Work with reputable construction and engineering firms
- Obtain written quotes for costs
- Include price and schedule contingencies
- Compare multiple sources of financing

Summary

- Revenue sources can include the sale of LFG, energy and emission reductions from the projects (carbon credits)
- State and federal incentives are in place to support LFG projects.
- Different types of project costs include capital, operational and administrative.