Maine’s CHP Interconnection Standards: Lessons and Best Practices

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Overview

• Maine: context for a case study
• Typical CHP applications in Maine
• Maine’s approach to overcoming barriers to CHP
• Connecting CHP projects to the grid
• Lessons for other states
Maine: context for a case study
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- 70% of Maine homes rely primarily on oil for heat
- Natural gas supply and distribution limited
- Low population density across much of state
Maine: context for a case study

• Like rest of New England, Maine electric generation is heavily dependent on natural gas
  – 49% natural gas
  – 1% oil
Maine: context for a case study

• In 2011, renewables provided 50% of Maine's net electricity generation
  – 25% hydroelectricity
  – 21% wood
  – 4.5% wind
• Maine is a net exporter of electricity
• Electricity prices lowest in New England
Maine: context for a case study

- Manufacturing remains strong
- Industrial activity = 10.6% of Maine’s total gross state product
- Industry is the largest energy consuming sector: 34% of energy consumed in 2010
- Industrial processes demand steam and heat

Strong Opportunities for Cogeneration
CHP in Maine

- 30 CHP facilities as of 2011:
  - 24 boiler/steam turbines
  - 3 combustion turbines
  - 2 micro-turbine
  - 1 reciprocating engine

- Total capacity of 1,130 MW
Examples of CHP in Maine

- Paper mill: 250 MW cogeneration, including 190 MW gas-turbine generator with HRSG
- Naval shipyard: 10 MW natural gas combustion turbine
- Waste-to-energy facility: 5 MW boiler/steam turbine
- Hospital: 4.6 MW natural gas combustion turbine
- College: 600 kW oil-fired boiler/steam turbine
CHP in Maine

- 15 pulp and paper
- 7 wood products
- 2 colleges and universities
- Automotive services
- Health care
- Military
- Solid waste
- YMCA
- Private household

Photo courtesy SMRT Inc.
How to encourage CHP?

• Easier interconnection process
• Standardization
• Net metering
• Energy efficiency grants
Connecting CHP to the grid

• Questions:
  – Who regulates interconnection to the grid?
  – How can interconnection policy overcome barriers?

• FERC regulates generator interconnection on transmission lines
• FERC does not generally regulate interconnection to local distribution systems
• Small generators likely to interconnect to utilities’ distribution system, subject to state jurisdiction
Overcoming CHP barriers in Maine

- Maine has allowed net metering since early 1980s
- Interest in late 2000s in enhancing CHP, renewables, distributed generation
- 2008 legislative resolve: PUC to study creating statewide standards for small generator interconnection
- 2009 PUC report recommended standardized statewide interconnection procedures
Why standardize?

• Increase the efficiency of the interconnection process = lower costs
• Encourage increased use of CHP, distributed generation, renewables
• Improve business environment for the companies that sell and install small generation systems
• More customer choice with respect to equipment and the professionals who will install it
• Enhanced safety
How to standardize?

- Maine PUC considered 3 models:
  - FERC SGIP
  - Interstate Renewable Energy Council (IREC) model standards
  - Mid-Atlantic Demand Resources Institute’s (MADRI) model standards
How to standardize?

• 2 utilities already used SGIP

• Utilities argued SGIP + net metering was sufficient

• Utilities argued PUC should focus on safety, not helping CHP businesses

• PUC said it could do both
PUC chose IREC model

- 2 utilities already used SGIP, so transition to similar IREC model easier
- IREC model had lower fees, lower initial cost burden to consumers seeking interconnection
- No external disconnect switch needed for inverter-based systems <10 kW meeting IEEE and UL standards

IREC Model = Lowest Cost Approach
Maine’s interconnection standards

General technical screening criteria

Four levels of specific standards

Additional protections
General screening criteria examples

• Safety and reliability
• Limits on how the existing + interconnecting generation can load the distribution circuit
• Generator cannot exceed the capacity of the customer's existing electrical service
• Customer cannot require utility to upgrade its system to accommodate generator
Four-level system

• Level 1: inverter-based generators <10 kW
• Level 2: generators <2 MW
• Level 3: non-exporting generators <10 MW
• Level 4: all other generators not subject to FERC jurisdiction
Four-level system

• Fee for Level 1 = $50
• All other levels = $50 + $1/kW
• Fast-tracked timelines
  – Level 1 example:
    – Customer submits application
    – Utility has 5 days to deem application complete
    – +10 days to notify customer of screen passage
    – +5 days to send Level 1 interconnection agreement
Additional protections

- Utility must designate a single point of contact for application process
- Presumption that meeting screens means project complies with technical requirements
- Utility can’t require a customer-generator to:
  - install additional controls (e.g. utility accessible disconnect switch)
  - perform or pay for additional tests
  - purchase additional liability insurance
Net metering and grants

• All utilities must offer net energy billing
• Facilities up to 660 kW eligible
• Fuel cells, tidal power, solar, geothermal, hydroelectric, biomass, generators fueled by municipal solid waste in conjunction with recycling, and eligible CHP systems
• Efficiency requirements for CHP
  – micro-CHP 30kW and below must achieve combined electrical and thermal efficiency of 80% or greater
  – micro-CHP 31kW to 660 kW must achieve combined efficiency of 65% or greater
• Grant funding available
Lessons for other states

• “Social infrastructure” matters
• CHP works best with steam/heat demand located near generation sites
• Customer and stakeholder advocacy for better interconnection standards essential
• Legislative interest in encouraging CHP via interconnection reform
• Regulatory interest in standardizing process
• Net metering and grants help
Questions?

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