Legal & Regulatory Incentives for Waste Heat-to-Power Development

What’s available, and what’s needed?

Presented by
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Topics

- What’s law got to do with it?
- What *is* waste heat-to-power?
- Selling the power
- Using the power
- Conclusions
- Next steps
What’s law got to do with it?

- Energy remains pervasively regulated
- Policy, law & regulation tilt the scales toward resources that are -
  - clean
  - efficient
  - renewable
  - diverse
- Familiar resources have a head start, active constituents, & effective incentives
  - building efficiency
  - established renewables
    (e.g., wind, solar, geothermal, & biomass)
  - typical cogeneration
- Waste heat resources remain under most policymakers’ radar
What’s law got to do with it?

“Federal, state and local governments have yet to recognize the vast thermal energy potential . . .

“Unfortunately, policy makers and energy developers are mostly unaware of waste heat. Its potential for development is poorly understood . . .

“Examining regulatory and legislative policies, there is little attention being paid to this recurring potential energy resource. *First and foremost, policy must be developed to value recycling this resource.*”

Source: Thermally Activated Technology Roadmap, USDOE/EERE, May 2003
What’s law got to do with it?

Sensible legal & regulatory policy can –

- *expand markets* for electricity from waste heat
- *raise awareness* & promote consideration & adoption of waste heat options
- *improve economics* of waste heat through grants, loans, rebates, tax benefits, etc.
- *reduce regulatory barriers* to waste heat conversion & use
- *reduce transactional barriers & cost* of waste heat projects
- *encourage efficient & sustainable resource use*
What is waste heat-to-power?

◆ The bad news: unfamiliarity breeds confusion – where does waste heat-to-power fit?

◆ The good news: everywhere!

  - ‘Conservation’ – CA*, OR, MT
  - ‘Efficiency’ – OH, OR
  - ‘Renewable’ – CA*, CO, FL, OR, VT, WA
  - ‘Waste’ – PURPA, NV, OR, WA
  - ‘Alternative energy’ – IL, MT

  * California Pollution Control Financing Authority
Selling Power
Generated from Waste Heat

◆ Facilities producing electricity from waste heat may qualify for PURPA benefits, including:
  ■ interconnection with serving utility
  ■ selling wholesale power to serving utility at its ‘avoided cost’
  ■ transmission through serving utility for purchase by another
  ■ non-discriminatory backup service from utility

  ■ significantly change qualifying facility (QF) criteria
  ■ eliminate utility power purchase & sale obligations in some cases
  ■ narrow regulatory exemptions previously available to QFs

◆ Will these changes impact waste heat-to-power?
Selling Power
Generated by Qualifying Cogenerators

‘Qualifying cogeneration facility’

- Operating & efficiency standards unchanged
  - Topping cycle: 5% useful thermal output; 42.5% (or 45%) efficiency
  - Bottoming cycle: no operating standard; 45% efficiency (if gas or oil used for supplemental firing; otherwise none)

- Ownership restrictions eliminated: utilities can own

- Stricter requirements for thermal use by new facilities
Selling Power
Generated by Qualifying Cogenerators

‘Qualifying cogeneration facility’ – con’t

- Thermal use requirements for new facilities
  - these apply if a new QF plans PURPA sales to a utility
  - thermal must be used in a ‘productive & beneficial manner’
    - presumed so for existing thermal hosts
  - electrical, thermal, chemical and mechanical output must be ‘fundamentally used for industrial, commercial, or institutional purposes, and not fundamentally for sale to an electric utility’
    - ‘safe harbor’ for facilities using 50% of total energy output for these purposes
    - where less than 50% is used, FERC may still find requirement met
    - ‘most bottoming cycle facilities will readily satisfy requirement’
    - new cogen facilities 5 MW or less exempt
Selling Power
Generated by Qualifying Small Power Producers

◆ ‘Qualifying small power production facility’

- Eligible energy sources include solar, wind, geothermal, biomass, some hydro – and ‘waste’
  - ‘waste’ includes ‘residual heat’ & ‘heat from exothermic reactions’
  - so: waste heat can be a ‘small power production’ source

- Ownership restrictions eliminated: utilities can own

- No operating or efficiency standards

- 80 MW limit at a single site
Selling Power
Generated by Cogen or Small Power QFs

**Utilities no longer required to purchase QF power or sell to QFs under some conditions**

FERC is now proposing:

- **No purchase** obligation if FERC finds a sufficiently competitive market for QF power, i.e. –
  - QF has ‘non-discriminatory access’ to –
    - independent, auction-based markets for short-term energy,
      & wholesale markets for short- & long-term energy & capacity
    - RTO/ISO interconnection & transmission services with FERC-approved ‘open access’ tariffs, in non-auction-based markets
    - other wholesale markets of ‘comparable competitive quality’

- **No sales** obligation if FERC finds –
  - others willing & able to sell & deliver electricity to QF
  - State law doesn’t require utility to sell electricity in its territory
Selling Power
Generated by Cogen or Small Power QFs

- FERC proposes to end mandatory purchase & sale for utilities in much of the East & Midwest

- Case-by-case determinations for utilities elsewhere (including California)
Using Power
Generated from Waste Heat

- Selling waste heat-generated power at wholesale under PURPA is still viable, but more complex & uncertain now

- Selling power under other wholesale regimes, such as renewable portfolio & green pricing programs, can benefit some projects
  - e.g., Nevada RPS ‘qualified energy recovery’ for –
    - exhaust heat from engines or manufacturing or industrial processes, or
    - pressure reduction in pipelines
    - but *not* from electricity generation

- Selling waste heat-generated power to others at retail still confronts daunting regulatory obstacles

- So – using the power onsite often makes sense, & may be able to benefit from other available incentives
Using Power
Generated from Waste Heat

- Two promising incentives for onsite use are –
  - *Net metering programs*
  - *Demand response programs*

- Many state laws & PUC rules require these, & many utilities offer them

- Lots of variation– here’s a quick summary ...
Using Power Generated from Waste Heat

**Net metering programs**

- Utilities normally buy power at wholesale, & sell to customers at retail
- Net metering allows self-generators to offset their excess production (otherwise valued at *wholesale*) against their *retail* purchases
- Self-executing – minimizes transaction costs for customers & utilities
- States limit eligible system size
  - range: 10kW – 2 MW
  - typical: 25 kW – 100kW
- States define eligible resource types & customers
Using Power Generated from Waste Heat

Net Metering Rules

State-wide net metering for all utility types
State-wide net metering for certain utility types (e.g., IOUs only)
Net metering offered by one or more individual utilities

#s indicate system size limit (kW); in some cases limits are different for residential and commercial as shown

Net metering is available in 40 states + D.C.
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- State net metering programs - eligible resources

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Using Power Generated from Waste Heat

**Demand Response Programs**

- Encourage customers to reduce energy use during system peaks in exchange for lower electricity bills

- 2 basic program types
  - *Load response* – for reliability; utility directly controls customer load or notifies customer to curtail or interrupt load; sometimes mandatory
  - *Price response* – customers respond to market signals; typically voluntary. Programs can include, e.g.:
    - day-ahead bidding
    - time-of-use rates
    - real-time pricing
Using Power Generated from Waste Heat

❖ State demand response programs
Using Power Generated from Waste Heat

- California demand response programs (partial)
Conclusions

- Law & regulation haven’t yet focused closely on waste heat-to-power policy or incentives.
- Waste heat-to-power doesn’t fit exclusively into a single favored resource category – but actually fits in many.
- Incentives designed for other purposes can benefit waste heat projects, whether they sell the power or use it onsite.
- Developing coherent, consistent & defensible regulatory policy, tailored to waste heat attributes, is essential to level the playing field & encourage development.
Useful Next Steps

- Develop a coherent policy rationale for treatment of waste heat-to-power
- Develop model legislation & regulatory approach to enhance certainty for providers & customers