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Overview of remarks

What – “Siting” defined

Why – What’s “special” about energy facility siting?

Where – The context: New England’s energy infrastructure

How – Best practices

Note:
The fact that this presentation focuses on energy facilities should not be interpreted as a comment on the region not needing substantial investment in and implementation of energy efficiency and other demand-side resources. It does.
The “What”– “Siting” defined
“Siting” – what’s is all about

Private and public activities relating to planning, permitting, approvals for and construction of private energy facilities at particular sites

- Private “siting” activities –
  - Tend to encompass:
    - Site selection processes for a particular technology type of interest to a particular developer (given its own business model)
    - Tends to balance a variety of issues relating to access to needed infrastructure, zoning, neighboring uses, cost, ease of environmental permitting, etc.
“Siting” – what’s is all about

Private and public activities relating to planning, permitting, approvals for and construction of private energy facilities at particular sites

- Public “siting” activities –
  - Tend to encompass:
    - Reviews of facilities under special laws looking at need, cost, environmental impact, public benefit
    - Typically state jurisdiction (omnibus or permit-specific, sometimes preemptive over local approvals)
    - Sometimes federal jurisdiction (preemption and/or backstop)
Underlying assumption of many energy facility siting issues:

The performance of the region’s energy markets depends on the availability of adequate infrastructure.

- Adequate generation capacity.
- Adequate transmission infrastructure.
- Adequate fuel-delivery systems – in particular, for natural gas.
- Adequate systems for “smart” use of the grid.
- Delivery systems for energy efficiency services and installations.

In the US most infrastructure is invested in by private actors:

- Electric and gas utilities.
- Independent project developers (e.g., wind projects, power plants, distributed generation units, LNG terminals, waste-to-energy facilities, etc.)
Key drivers of siting energy projects

Since mid-1990s:

- **New power plants**
  - In New England:
    - Gas-fired combined cycle power plants
    - Cogeneration facilities
    - Renewable resource projects (wind)
    - Distributed generation projects
  - Elsewhere:
    - Traditional coal-fired power plants
    - Coal gasification projects
    - New nuclear projects??

- **Other energy facilities**
  - High voltage electric lines (AC, DC)
  - Interstate gas pipelines
  - LNG facilities
The “Why” – What’s special about energy facility siting?
Considerations in siting energy facilities

Numerous tensions resulting from such things as:

- Localized impacts (typically negative) balanced against broader public interests (some positive, some negative)
- Complex permitting processes
- Regional energy markets v. state siting jurisdiction
- Countervailing policy pushes for different power technologies
- Cases of first impression
- Trade-offs of different kinds of environmental impact
Energy facility siting laws

No “typical” approach across states, technology type

- Many states have siting laws, many do not
- Some states treat energy facilities no differently than siting of other large infrastructure built by private developers (e.g., shopping centers, factories)
- Some states established siting laws after a big controversial fight over a proposed energy facility
- Some states have tied “energy facility siting” laws to the process of land taking for public purpose
- Some states have siting laws for large facilities
Energy facility siting laws

- Federal jurisdiction versus state jurisdiction is idiosyncratic to history of different technologies, e.g.
  - Natural Gas Act – federal preemption over interstate gas pipelines
  - Atomic Energy Act – federal preemption over nuclear reactors
    - “clarified” federal preemption (by FERC) over on-shore LNG terminals
    - Established federal review authority over over-shore LNG terminals to Coast Guard (with ability of state to veto)
    - Established “back-stop” FERC authority over interstate electric transmission lines
# Environmental permitting – e.g., Massachusetts

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<th>Local</th>
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<td>• NPDES Storm water</td>
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The “Where” – New England’s energy infrastructure and systems
New England energy portfolio

New England’s profile:

- virtually no indigenous energy resources.
- at the end of the natural gas pipeline network.
- no oil refineries located in the region.
- 2x dependent on home heating oil as rest of the nation.
- more nuclear and natural gas for power generation
- less coal and hydro
- electricity prices “set” by natural gas (in 85% of hours)

NE is regularly hard hit by stresses on energy supply and delivery infrastructure, wherever they occur in the U.S.
New England’s physical energy infrastructure

We import just about all of our energy supplies.

We have added considerable energy efficiency locally, but we still depend on a complex web of facilities.

* Electric
* Natural Gas
NE has high electricity prices – 2006

2006 Average Retail Electricity Price
All States for All Sectors

NE = 134% US

Source: EIA Form-826.
The U.S. Electric System

The power production supply chain:

- Historically, the electric industry’s “functions” were vertically integrated under one company
  - Generation – produce power
  - Transmission – move it from power plants to local systems
  - Distribution – move it from transmission system to customers

Plus: On-site meters and efficiency equipment
## Current N.E. Power Plants by Vintage & Type

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Additional 2300 MW retrofitted from Gas to dual fuel in past year.
N.E. electricity production (% by fuel – 2005)

* almost 50% gas or oil
Power plant capacity on deck* (as of 12-2006)

* Proposed projects seeking interconnection studies

NE wind resources – the “potential”
Electric delivery infrastructure plans

Numerous projects to enhance north-south and intra-regional delivery (high voltage system)
Gas Transmission Lines
Natural gas flows

Alberta

Canadian Maritimes

Rockies – San Juan

Gulf Coast

EIA, Natural Gas Annual, 2005
Northeast LNG facility proposals: A few will be approved, constructed?

Natural Gas Pipeline Projects Database as of November 15, 2006
Provided by Jim Tobin, Energy Information Agency

Notes: Excludes cancelled and other inactive pipeline proposals. All project locations are approximations.
Source: Information as of November 15, 2006 provided by Jim Tobin, Energy Information Administration.
More about the “Where” –
A few words about the U.S.’s energy infrastructure and systems
Figure 2. Capacity Additions by Year and Fuel (gigawatts)

- Other
- Hydro
- Nuclear
- Oil and Gas
- Coal

EIA outlook 2005-2030: implications for electric capacity additions

Coal-fired Generation: ½ of U.S. Power Output
“Let me turn to the ... 800 pound environmental gorilla which is carbon...”

David Crane, CEO of NRG – September 26, 2006

“... if all the traditional coal plants under development across the U.S. United States are built, we will be adding an incremental 700 million tons of carbon, of CO2 emissions every year, an incremental amount of carbon equal to the total carbon emissions of Spain and France combined.”

David Crane, September 26, 2006
EIA Outlook: U.S. LNG Imports, 1990-2025 (tcf)

Increased LNG outlook due to increased demand and reduced North American supply

Assumes that:
- 2 terminals under construction are completed (TX and LA).
- 1 expansion at existing terminal (MD)
- Plus “more” terminals “to serve the Gulf, S Cal, FL, NE.

Source: EIA, Annual Energy Outlook 2006
The “What” – Challenges for Siting Energy Facilities, and Best Practices for Addressing Them
Energy facility siting realities

Developers will be (and are) proposing energy facilities to meet:

- For them, a business opportunity
- For the “market” or “the public,” to satisfy some need
- For local community, a pain in the neck

The siting process typically is focused on adjudicating these three sets of interests

- Under what circumstances can the private actor get approvals to develop and operate a facility at a particular site?
Energy choices react to fuel market conditions
Some generation choices in 2010 (EPRI)

- Natural Gas Combined Cycle
- Wind at *29% CF v. **42% CF
- Nuclear at *$1700/kW versus **$2500/kW capital cost

Energy facility siting realities

Evolution of siting processes over time:

- Siting was once a largely linear process
  - From planning to permitting to construction to operation
- Siting is now:
  - Increasingly complex
  - Multi-jurisdictional
  - Multi-dimensional
  - Iterative, sometimes even circular
- “Silver bullet” tendencies make it harder to site anything.
Energy Issues resulting from the “friction” of siting challenges

Some problems are region-specific, some national:

- Difficulty in adding any generation besides gas plants – narrowing fuel diversity, exposing consumers to higher price volatility.

- Fights over “cheap” “proven technology” coal plants v. “unproven” advanced technology coal plants, in absence of carbon cap.

- Failure to build transmission projects — at all, or only after lengthy siting battles — that would relieve electricity bottlenecks.

- Problems siting LNG facilities despite the benefits of increased access to overseas sources of natural gas.

- Difficulty in siting of large wind power projects, despite clear CO2-reduction benefits and desire for more renewable power.

- Continued delay in resolving nuclear waste issue; this keeps wastes dispersed and piling up around the U.S.

Challenges – State policies for infrastructure

Need to balance demands of regional markets with state’s interest in protecting local interests. Big challenges include:

- best way to examine “cumulative effects” of new facilities.
- need to include “regional need” as part of “state benefit” review.
- timing of facility reviews consistent with market needs.
- allowing some retail consumers to “see” and be able to respond to wholesale prices.
- assuring that cost-effective demand-side resources have opportunity to advance.
Factors that contribute to successfully permitted projects

- A determination that a project has important merits, particularly when compared to existing technologies and “non build” alternatives
- The ability to demonstrate, and clearly communicate, a project’s broader public benefits
- The use of planning or siting processes that provide for an objective evaluation of a project’s full merits while also effectively addressing local concerns
- Restraint on the part of political leaders in terms of avoiding categorical declarations of opposition to projects before the evidence on the merits unfolds

Best practices: Standards of Review

Attention to determine whether the public benefits exceed the adverse impacts:

- “Public convenience and necessity”: project need
- Regional v. state v. local interests and impacts:
  - Do the broader public interests outweigh local impacts?
  - Ability to obtain state override of local permits/approvals
- Environmental impacts
  - State env’l impact review before other agency actions
  - State-of-the-art benchmark for evaluating project impacts
  - Preparation of cumulative impact statements where clustered facilities are proposed for single geographic region

Best Practices: Process Administration

Public Participation:
- Finding a balance between meaningful participation and streamlining of process:
  - Assistance and Funding Mechanisms
  - Pre-Filing Requirements and Procedures
  - Formal Procedures

Process Administration
- Mechanisms that impose discipline in deadlines:
- "One-Stop Shopping" / Interagency Coordination
- Substantive Content and Consistency of Reviews

Trends and tensions in electric facility siting

Growing frictions among:

- Infrastructure projects to serve regional power markets
  - which span state borders
  - which impose localized impacts
    - e.g.,
    - transmission lines
    - power plants
    - gas pipelines
Facilities that operate in interstate markets

CASE STUDY – Cross Sound Cable

- DC transmission line - underwater
- Crossing of Long Island Sound, connecting CT to Long Island, NY
- Non-utility project, under contract to LIPA
- CT and NY siting approvals – “public benefit,” environmental impact
- Project constructed, ready to operate, 6+ years (?)
- CT legislative moratorium on operations
- DOE emergency authorization to operate (summer 2003, and post Blackout)
Growing frictions among:

- Infrastructure development projects that
  - respond to federal or state policy initiatives
  - stir up local controversies over policy premises and market responses to them
    - e.g.,
    - wind farms
    - gas-fired generators
Facilities with regional/local trade-offs

CASE STUDY – Cape Wind

- Wind farm in Nantucket Sound, off Massachusetts
- Federal waters, to be connected to grid via underwater transmission line in state ocean
- Merchant project, responds to state policy to promote renewable resources ("renewable portfolio standard")
- Federal ACOE permit over wind turbines, MA siting approval over transmission lines
- Need and environmental impacts
- New jurisdiction established in state and federal legislation
Trends and tensions in electric facility siting

Growing frictions among:

- “Case of 1st impression” infrastructure projects
  - Involving new technologies with special features
  - Raising new permitting questions for regulators
    - E.g.,
      - pollution control equipment
      - DC lines
      - ocean infrastructure
      - distributed generation
      - repowerings and brownfield developments
CASE STUDIES – Hubline

- Interstate gas pipeline – Massachusetts Bay
- Part of international pipeline project, to deliver natural gas from Nova Scotia to MA
- Underwater, connecting northern and southern parts of Boston pipeline system
- Permitting – MA Ocean Sanctuary Act, MA MEPA, federal NEPA, local con comm’s – 6 year process
- “public benefits,” “public convenience & necessity,” “water-dependent,” “coastal dependent”, “least damaging feasible alternative”
Trends and tensions in electric facility siting

Growing frictions among:

- Trade-offs of distribution of project impacts
  - cumulative infrastructure impacts on populations and natural resources where projects are densely located, versus
  - protection against sprawl and development in still-natural places
- E.g.,
  - environmental justice considerations
  - comprehensive planning standards for siting projects with different impacts
  - use versus non-use values
Repowering projects -
new impacts at existing facilities

CASE STUDIES – Mystic Station

- Merchant power plant – near Boston, MA
- New gas-fired combined cycle addition (1750 MW) to existing thermal power station (oil and gas, 1000 MW)
- Existing plant – one of “Filthy Five”
- New plant – efficient, low-emissions plant
- State siting and environmental permits
- “Best available control technology” and Air Quality Improvement Plan
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