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Siting Renewable Energy on Contaminated Land
MA DEP Clean Energy Workshop

1 MW Haverhill, MA

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Agenda

- Interconnection Issues
- Power Sales Background
- Building on MGP Sites
- Q&A

1 MW Sutton, MA

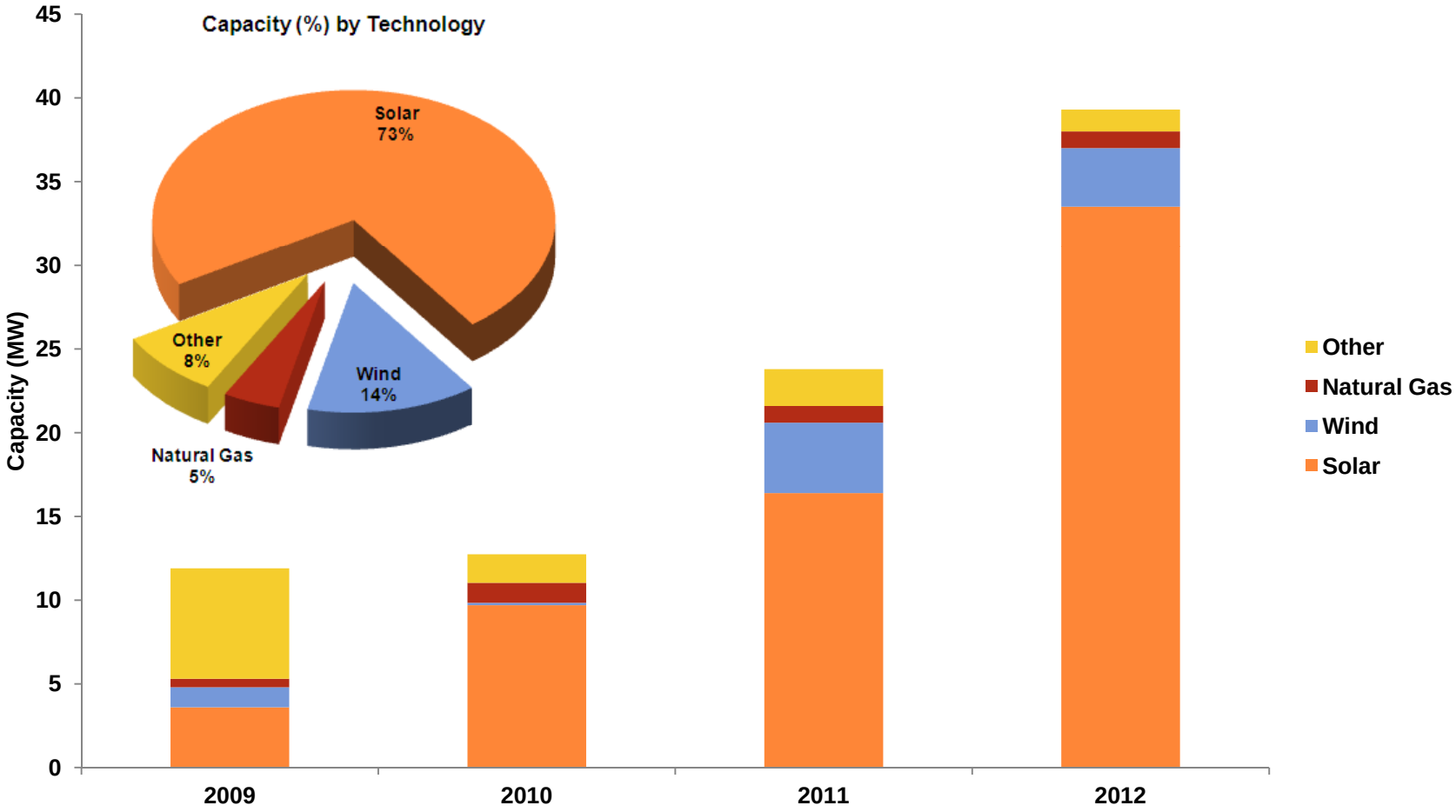
National Grid's Solar Projects

- Six Sites
  - Everett: 605 kW - MGP
  - Haverhill: 1,016 kW - MGP
  - Revere: 750 kW -MGP
  - Sutton: 983 kW - rooftop
  - Waltham: 225 kW - rooftop
  - Dorchester: 1,250kW – MGP, see below

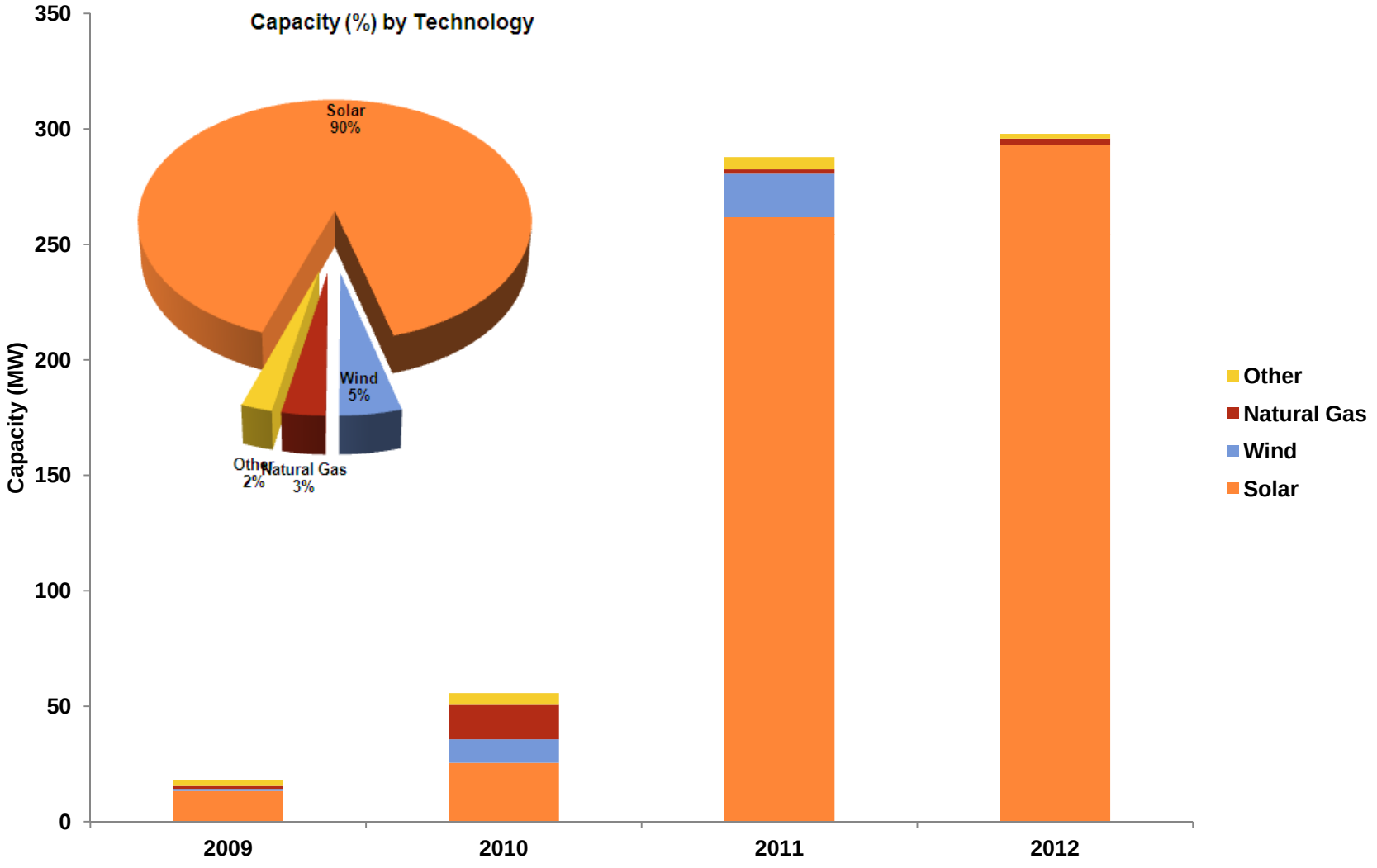
Total PV Capacity: 4,829 kW
Total Production to Date: 7,722 MWh

Revere
Pre-construction

Connected Capacity (MW) by Technology by year and total (Jan 2009-September 2012)



Applications Submitted (MW) by Technology by year and totals (Jan 2009-September 2012)



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Interconnection to the Utility

- Generators can connect at various voltage levels based on:
  - Aggregate rating of generation system
  - Type of distribution system located nearby and characteristics of the system
- Interconnecting customer is responsible for costs of all studies and upgrades to the electric distribution system
- Interconnection voltage levels:
  - Transmission – usually =>69 kV (bulk power)
  - Distribution – 13 kV, 23kV, 34 kV
  - Secondary voltages – 120/240 single phase,

    120/208 three phase, 277/480 three phase
- Early research can help determine the makeup of local transmission or distribution:
  - Three-phase power nearby?
  - Voltage level of local distribution? (e.g. 4 kV feeder can limit connection)
  - Any red flags from the local utility? (e.g. other DG already on line or tail end of feeder, etc.)

Interconnection Example

- Interconnecting Customer (IC) applies to install 1.5 MW wind turbine and has well designed relay protection system and proposed settings
- Initial review determines that an Impact Study is required
- IC signs Impact Study Agreement and pays for study
- Impact Study is completed and required EPS modifications and costs are communicated to Interconnecting Customer along with any changes needed to protection system
- Interconnection Agreement (IA) sent to Interconnecting Customer for signature
- Interconnecting Customer pays for EPS modifications
- Company builds system modifications, registers asset, etc.
- Interconnecting Customer signs IA, builds facility, submits required insurance and relay test report.
- Company conducts witness test and authorizes interconnection

Rules of Thumb

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- If aggregate generation on a feeder is over 15% of peak feeder load, there may be special reviews required.
- The feeder voltage will impact the size of generator that can be safely interconnected at the distribution level. Currently for PV, a maximum of 3 MWs is allowed on a 13 kV feeder.
- If the generator will sell on the market and has to apply through ISO-NE, the process may take longer than the standard time frames.
- Generators over 10 KW are most likely going to be three-phase. Make sure that the customer has three-phase service available. If a line extension is required, it is at the customer's expense.
- Some things of note on various things that must happen between the time an application is received and a system can go on line:
  - During initial analysis and various studies, there is usually an exchange of information which takes time. Customer and contractor's quick response to any utility questions is vital.
  - System modifications can take some time, especially if specialty equipment must be ordered. Lead times for substation equipment can be 4-6 months and can only be ordered after detailed design is completed (design can also take a number of months).
  - ISO-NE Reliability Council review and asset registration for larger units which will export power.

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Sale of Excess Power in MA

- Payment streams
  - Net-metering up to 2 MWs for solar, wind, farm sited projects, and anaerobic digestion: (~8 to 13¢ per excess kWh)
    - Virtual net-metering – transfer of credits earned at one customer account to one or more other customer accounts in same load zone
  - If not eligible for net-metering, treated as a qualifying facility (QF) under PURPA
    - Utilities pass through hourly clearing price at the ISO-NE (3-4¢ per excess kWh)
  - Renewable Energy Credits (RECs) (~ 6¢ per generated kWh) and Solar Renewable Energy Credits (SRECs) (~ 20 - 50¢ per generated kWh) paid for up to 6 MWs per property
  - Federal and State tax credits

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Project Financing

- PPA (purchase power agreement)
  - These are provided by developers to finance large projects
- Net-metering PPA
  - Under net-metering, developers have to transfer credits to monetize the value to either private or governmental customers
  - Customer then pays the developer back either through a flat price per kWh, or a percentage of credit

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Building on a MGP Site

- MGP sites are typically fairly large and dirty compared to the average disposal site in MA and can be located near wetlands
  - Additional permitting beyond the Wetlands Protection Act may be necessary (e.g., Ch. 91) and can significantly delay the project
  - Consider existing or planned deed restrictions and how that will affect the layout of the site and/or any construction activities
- Understanding the extent and magnitude of contamination prior to design is important as there will be lots of subsurface disturbance with utility trenches, the PV module mounting (a.k.a. racking) system, transformer pads, inverter pads, and other equipment pads
  - Racking/mounting system is either driven (piles), augured ("fence post") or ballasted (concrete blocks - precast or poured in place). Each can pose a challenge when dealing with contaminated soil or fill depending upon the site specific conditions
  - Selection of mounting system can be greatly influenced by presence of contamination on site, the amount of fill on site and the number and location of former building foundations or other subsurface obstructions on site

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Building on a MGP Site

- Plan on stockpiling contaminated soil as part of the site lay-down area design
- Plan for dust and odor control with detailed documentation
- Consider sequencing work such that the majority of contaminated soil handling is done prior to mobilizing “non-40 hr Trained” contractors that are necessary (e.g., electricians)
  - Establish and enforce site control (exclusion zone, contamination reduction zone and support zone) when necessary
  - Clearly demark restricted areas for non-trained personnel on site
  - Provide basic Health and Safety Briefing and Tailgate meetings for all workers on site.
  - Ensure clean travel ways are present for equipment deliveries (there are lots of trucks bringing racking systems, electrical equipment, confrere, and PV modules to site that need to drive in, unload, turnaround and drive out without tracking mud (clean and dirty) to the streets

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Building on a MGP Site

- Storm Water Pollution Prevention Plan (SWPPP) will likely be required, these are excellent reminders for the contractor to control off site migration of mud and dust while controlling erosion
- Stockpiles must be taken seriously by all site contractors
  - Covering them daily is likely required by LSP in Release Abatement Measures (RAM) plan and is a best management practice. Ensuring that happens is difficult and clear lines of responsibility for this task must be established
  - Plan ahead and stay ahead of disposal so that delays will not be blamed on that huge soil pile you are waiting for analytical on
- Daily documentation of site activities, with respect to potential contamination issues, may never be important, but when it is, it's invaluable
  - Make sure LSP or representative is included in weekly update meetings and is involved in scheduling and 2 week look ahead

Challenges & Lessons Learned

Challenges

- Permitting process with the cities and towns
- Know the interconnection process
- Coordinating project work with numerous agencies and special interest groups, e.g. Neighborhood Associations, EPA, Boston Redevelopment Authority, neighboring Fire Departments, etc.
- Security - fencing

Lessons Learned

- Understand the importance of proper preparation and planning necessary to educate and inform municipal authorities and special interest groups
- Ensure necessary approvals are received to construct panels on sites with existing company operations
- Complete project description and meeting the interconnection requirements are essential.

Questions

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