Solar PV Siting Feasibility: Technical, Regulatory, and Financial

LSPA/MassDEP Workshop
Siting Renewable Energy on Contaminated Land
Wednesday, October 31, 2012 | West Springfield
Wednesday, November 7, 2012 | Boxborough

Thomas M. Potter, Clean Energy Development Coordinator

MassDEP

Clean Energy Results Program (CERP)

- Established Renewable Energy Development Goals for the Bureau of Waste Site Cleanup (BWSC)
- Provides Opportunities for LSP partners
- To develop utility scale renewable energy portfolio standard (RPS) qualifying projects
  - Solar Photovoltaic's
  - Wind

Contaminated Land Development Goal

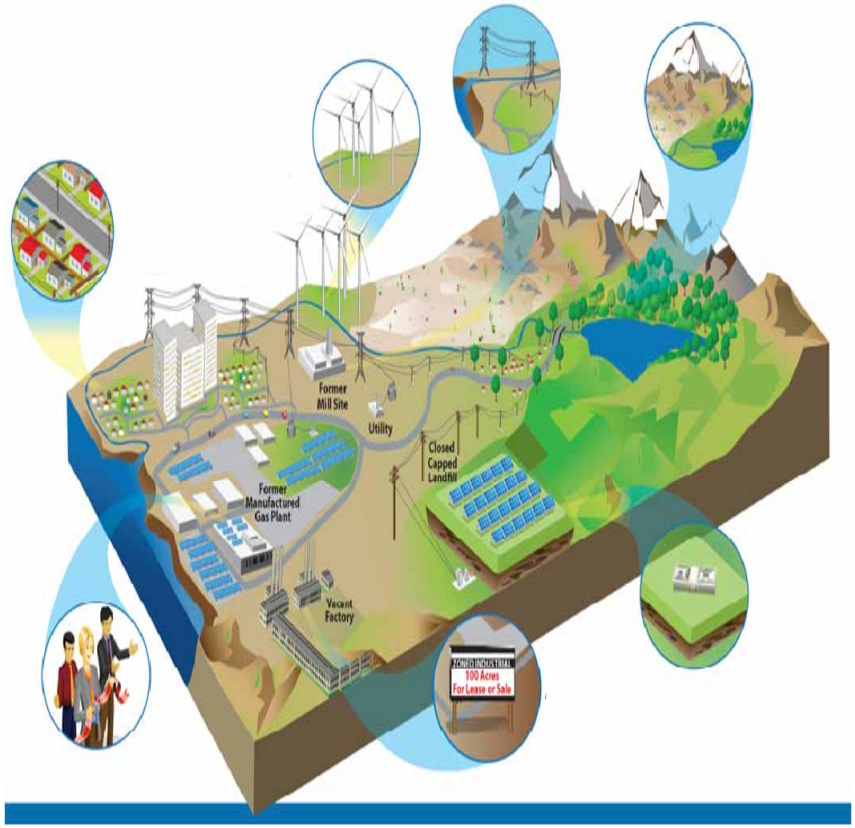
- **50 MW Clean Energy by 2020**
- **Primarily Solar Photovoltaic's (PV)**
- **Locations:**
  - 21e Sites
  - Underused Brownfields
  - Superfund Sites
  - Closed Landfills*
- **Size: 0.5 to 2.0 MWs**

*MassDEP Bureau of Waste Prevention (BWP)

Brockton Brightfields, 425 kW solar PV

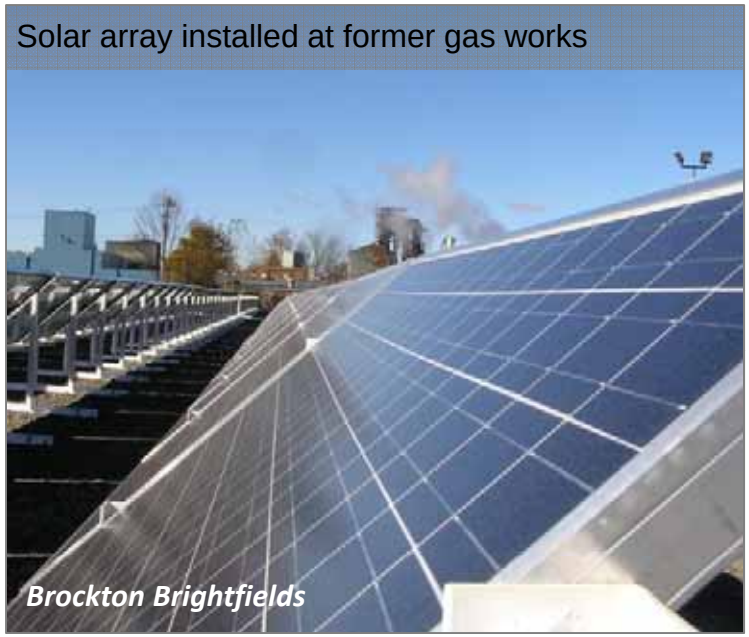
Why Contaminated Land?

- Limited reuse options due to contamination
- Leverage Existing Infrastructure
- Protect Open Space
- Gain Community Support
- Sustainable Development
- Anticipate Reduced Land Costs and Permitting Timelines



USEPA's RE-Powering America's Land Initiative – Advantages Fact Sheet, July 2012

Massachusetts Contaminated Land Installations To Date

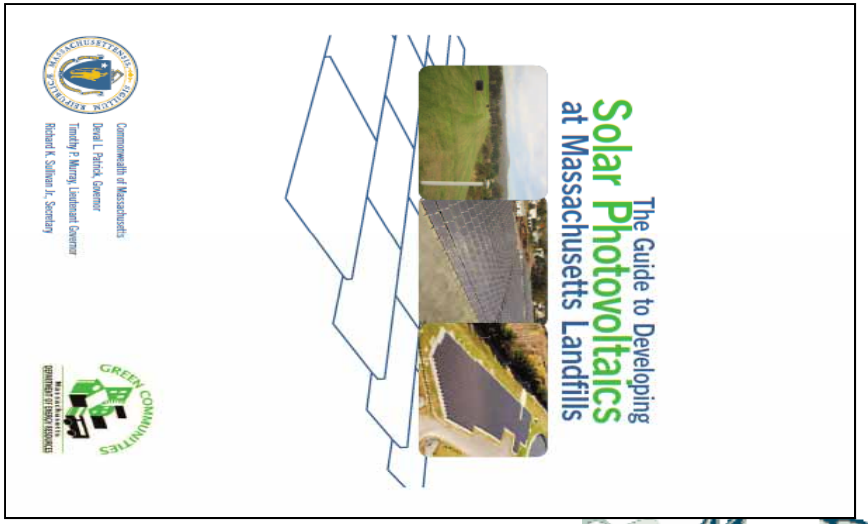


Source: Provided through the U.S. EPA's RE-Powering America's Land Initiative, 2012

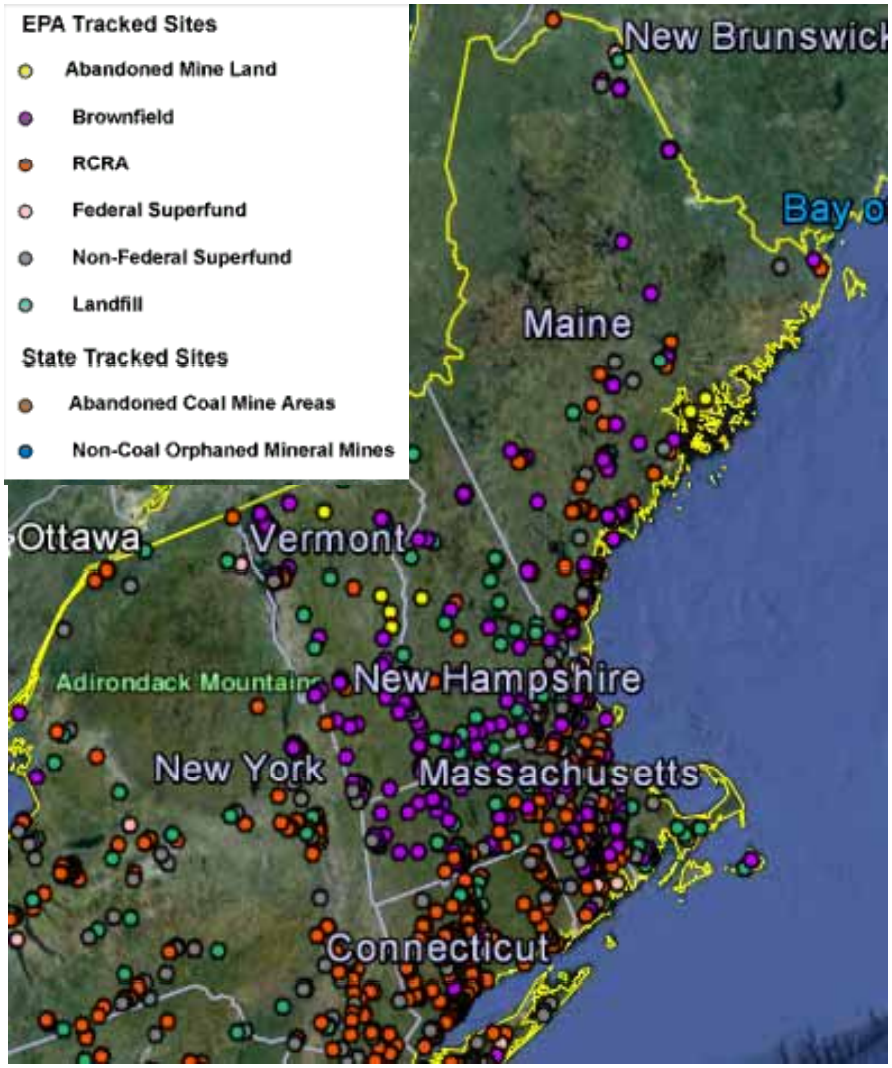
Landfills

- **CLOSED - Ideal for Solar and Wind Projects**
- **Requires: MassDEP Post-Closure Use Permit**
  - Applicants submit permits to MassDEP for review and approval
- **Progress:**
  - 24 PCU Permits Issued
  - 75 megawatts clean energy permitted
  - 6 Projects Operational (14MW's)
- **DOER Solar on Landfill Guide** →

Easthampton Landfill: Photo Courtesy of Borrego Solar Systems, Inc.



USEPA RE-Powering America's Land Initiative: Massachusetts



RE-Powering Installations on Contaminated Lands

		# Sites	Installed Capacity (MW)
1	NY	5	67.1
2	SC	1	20.0
3	WY	1	16.5
4	NJ	7	14.7
5	NV	1	14.2
6	CA	8	12.1
7	**MA**	**9**	**11.4**
8	IL	2	10.9
9	CO	4	5.4
10	PA	1	3.0
	RoUS	17	4.8
		56	180.1

Source: Provided through the U.S. EPA's RE-Powering America's Land Initiative, 2012

Technical Siting Feasibility

1. Review Site Characteristics
2. Conduct Site Inspection
3. Establish Ownership
4. Identify Contamination

MassDEP

Review "Favorable" Site Characteristics

- **"Good" Solar Resource**
  - greater than 3.5 kWh/m2/day
- **MA meets "good" threshold**
- **"Usable acreage"**
  - 2-5 Acres Optimal
  - 5 Acres = 1 Megawatt (MW)
  - "In My Backyard" (IMBY) NREL Solar Estimator (fixed tilt)
  - "PVWatts" NREL – more options
- **Project economics partially driven by overall size.**
  - Larger size = more power, faster payback

Baird & McGuire, Holbrook, 2006

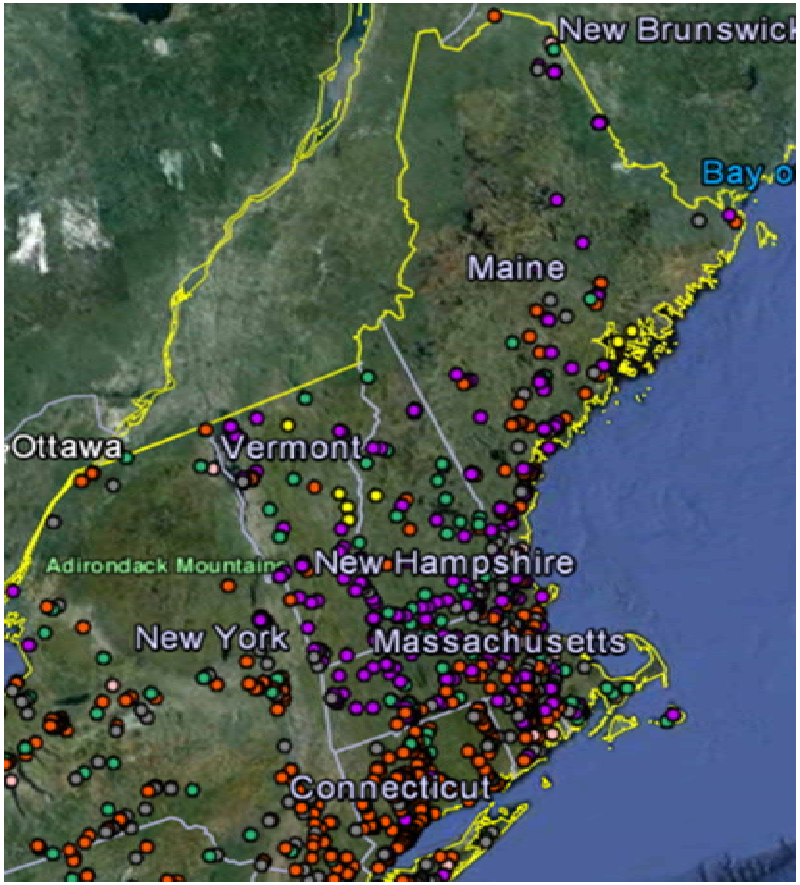
Site Characteristics (cont.)

- **Distance to Electrical Transmission Line**
  - Less than ½ mile optimal
  - Greater than adds cost
  - Favorable characteristic for urban Brownfields
- **Distance to Graded Roads**
  - Less than ½ mile optimal
  - Greater than adds cost
  - Favorable characteristic for urban Brownfields

Baird & McGuire, Holbrook, 2006

USEPA RE-Powering America's Land Initiative

- Launched 2008 to identify potential RE development opportunities
- Mapped over 15 million acres of contaminated land
  - Superfund, RCRA, LUST, Mining, etc.
  - Over 15,000 "Superfund" acres in MA
- Data sets available (download)
  - Solar/wind potential
  - Distance to Power
  - Distance to roads
- http://www.epa.gov/renewableenergyland/



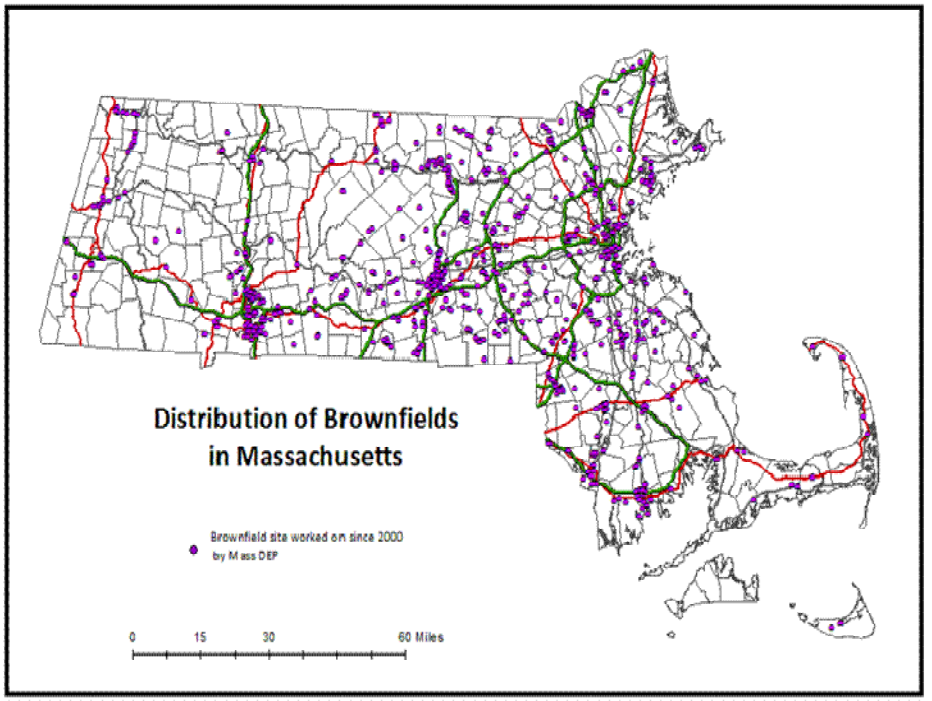
Source: Provided through the U.S. EPA's RE-Powering America's Land Initiative, 2012

MassDEP BWSC
Contaminated Lands Profile List

- **To identify potential RE development opportunities**
- **~ 800 MassDEP "Brownfield" Sites**
  - "Underutilized"
  - "Abandoned"
  - "For Sale/"Lease"
- **EPA "Superfund" Sites in MA (~30)**

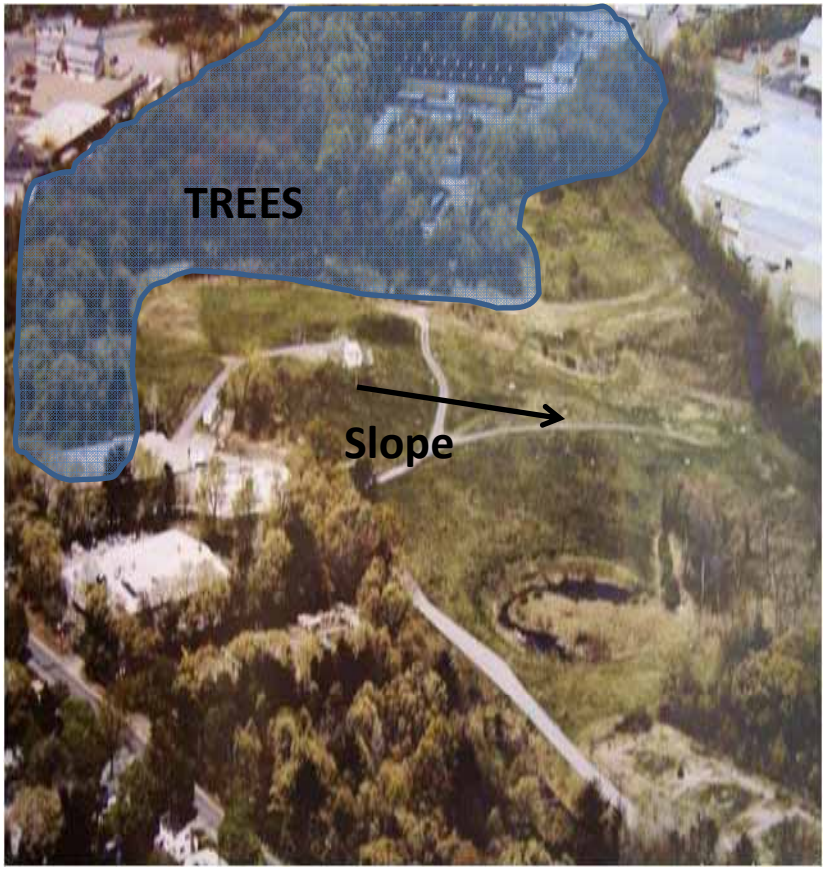
MassDEP BWSC Contaminated Lands Profile List

- 35% are 4 Acres or greater
- Sites up to 700 + Acres
- 30% located within 1 mile or less of utility line
- 85% located within an investor-owned utility region



Conduct Site Inspection

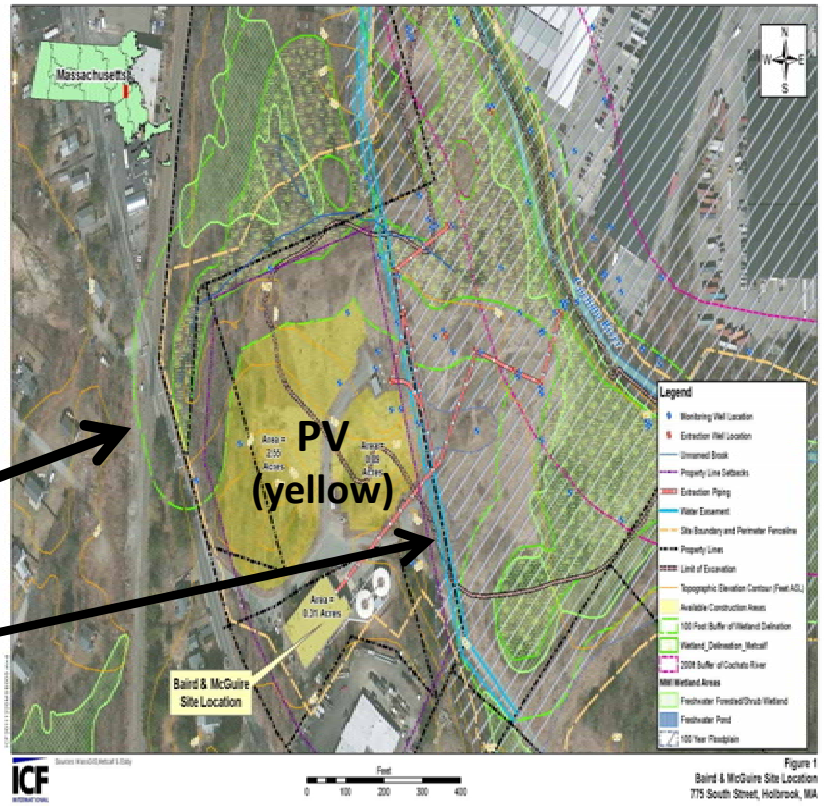
- **South Facing**
  - optimize orientation for true south
- **Usable acreage is "flat to gently sloping"**
  - Less than 6 degree (10% grade)
  - Can be graded
- **Minimal Shading**
  - At least 6 hours per day of sunlight
  - For every foot of tree height, PV should be that distance away
  - Shading analysis is possible using Google Earth "terrain" layer



Baird & McGuire, Holbrook, 2006

Conduct Site Inspection (cont.)

- **Physical Obstacles**
  - Trees
  - Buildings
  - Easements
  - Land Use Restrictions (e.g. AULs)*
- **Environmentally Sensitive Areas**
  - Water
  - Wetlands
  - Flood Plains
  - Critical Habitats



Baird & McGuire, Holbrook, 2012

* To be addressed as separate presentation

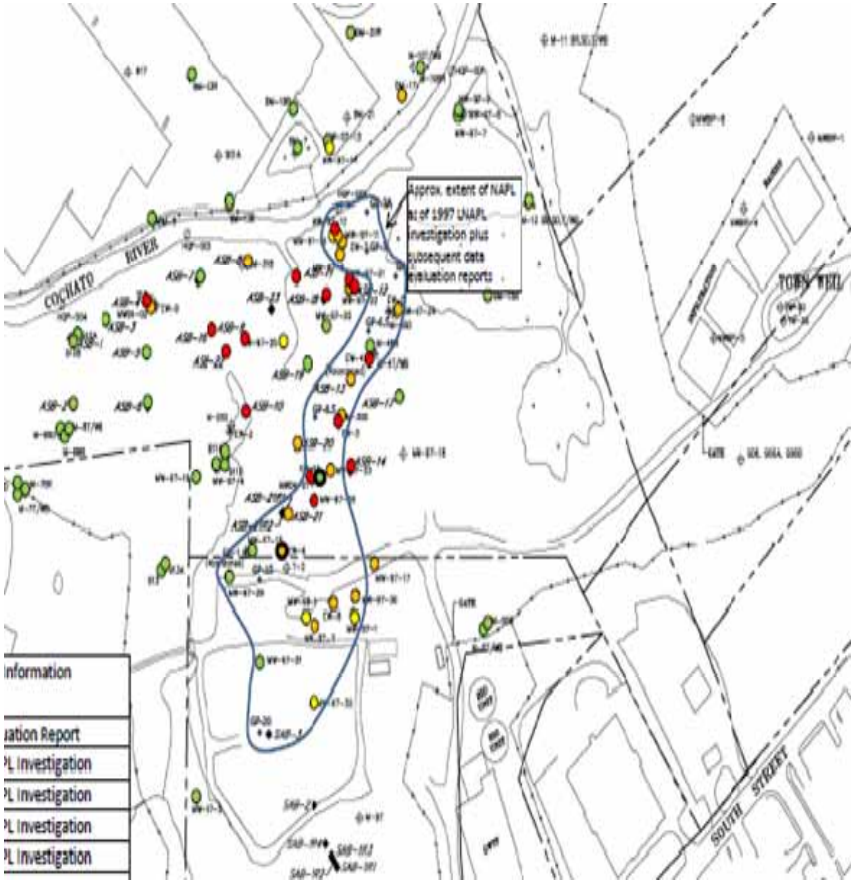
Establish Ownership

- **Who has control of property?**
- **Is the owner interested?**
  - Selling Property
  - Leasing Property
  - Investing In Redevelopment for Renewable Energy
- **Liability Protection***

* To be addressed as separate presentation

Identify Contamination

- **Is contamination present?**
- **Assess the Site**
  - Identify the presence and location of contamination
- **Establish Usable Project Acreage**
  - Cannot compromise the assessment/remedy



Regulatory Feasibility

What are the regulatory requirements?

MassDEP

Massachusetts Waste Site Cleanup Program

- **Privatized Cleanup Program**
  - LSPs Are Decision Makers
  - Allows Efficient Cleanup
- **Flexibility in Assessment/Cleanup Regulations**
  - Only cleanup what's necessary
  - Residential = More
  - Commercial/Industrial = Less
  - Land use controls (AULs), can be used as cleanup strategy components

310 CMR: DEPARTMENT OF ENVIRONMENTAL PROTECTION

310 CMR 40.0000: MASSACHUSETTS CONTINGENCY PLAN

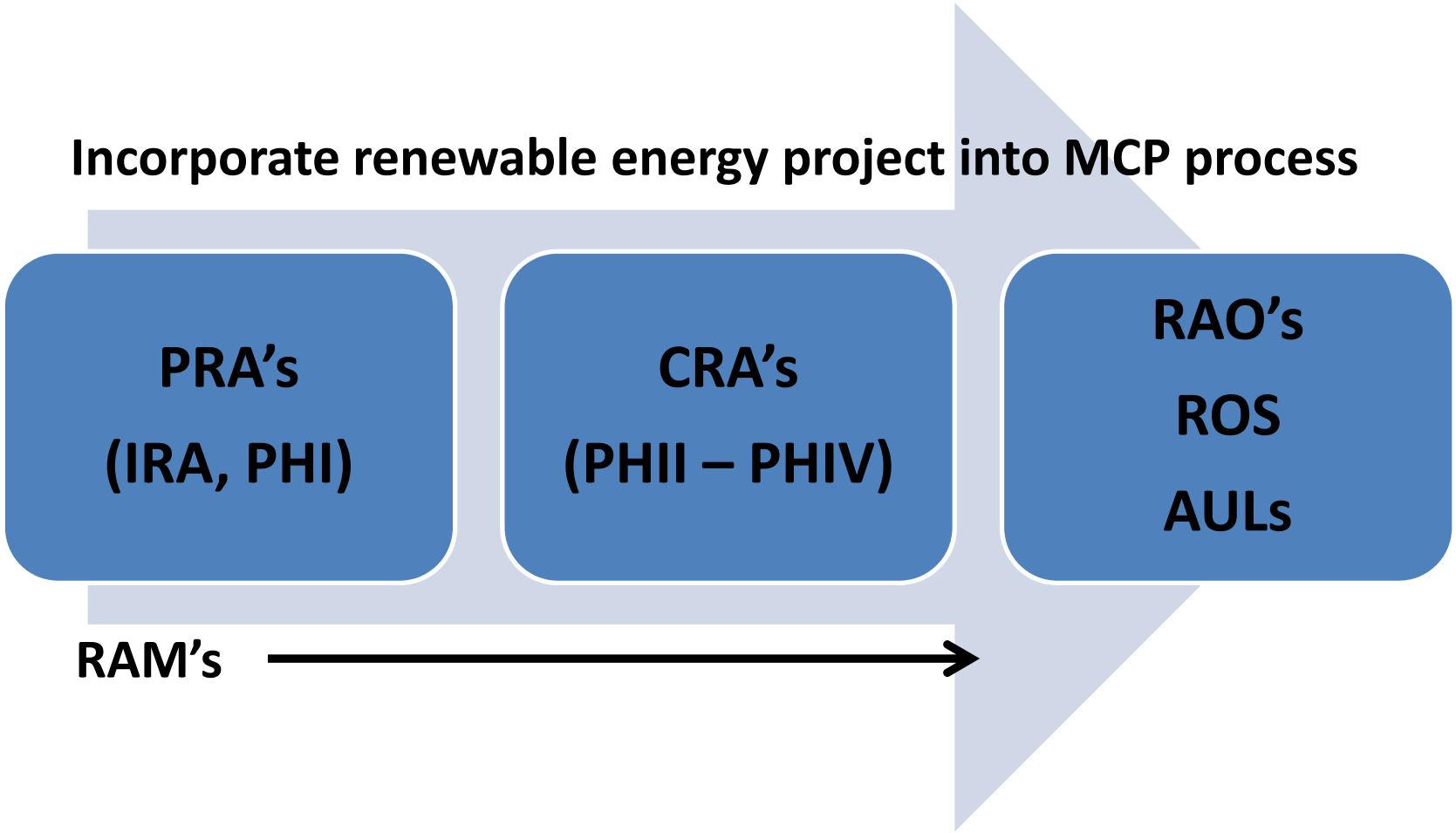
Section

SUBPART A: GENERAL PROVISIONS

40.0001: Authority
40.0002: Purpose
40.0003: Applicability
40.0005: Effective Dates
40.0006: Terminology, Definitions, and Acronyms
40.0007: Rules of Construction
40.0008: Computation of Time Periods and Deadlines
40.0009: Certification of Submittals
40.0010: Effect of Orders and Appeals
40.0011: Confidentiality of Information
40.0013: Presumption of Irreparable Harm
40.0014: Document Retention
40.0015: Content of Waste Site Cleanup Activity Opinions
(40.0016: Laboratory Certification: Reserved)
40.0017: Environmental Sample Collection and Analyses
40.0018: Health and Safety Procedures
40.0019: Violations of Environmental Restrictions
40.0020: Violations of Response Action Outcomes
40.0021: Unlawful Interference with Response Actions
40.0022: Accurate and Timely Submittal of Documents
40.0023: Accurate and Complete Record-Keeping
40.0024: Timely Action and Anticipatory Noncompliance
40.0025: Extensions of Deadlines and Time Periods for Force Majeure
40.0027: Remedial Monitoring Report
40.0028: Well Maintenance and Security
40.0030: Management Procedures for Remediation Waste
40.0031: General Provisions for the Management of Remediation Waste
40.0032: Contaminated Media and Contaminated Debris
40.0033: Uncontainerized Waste
40.0034: Bill of Lading Process
40.0035: Bill of Lading Form
40.0036: Management Requirements for Storing Remediation Waste
40.0040: Management Procedures for Remedial Wastewater and Remedial Additives
40.0041: General Provisions for the management of Remedial Wastewater and/or Remedial Additives
40.0042: Remedial Wastewater Discharges to Surface Water
40.0043: Remedial Wastewater Discharges to Publicly Owned Treatment Works (POTW)
40.0044: Remedial Wastewater Discharges to Non-Publicly Owned Treatment Works
40.0045: Remedial Wastewater Discharges to the Ground Surface or Subsurface and/or Groundwater
40.0046: Application of Remedial Additives
40.0047: Reporting Requirements for Discharges of Remedial Wastewater and Remedial Additives
40.0049: Remedial Air Emissions
40.0050: Appeals of Orders and Permits
40.0051: Appeals Relative to Administrative Penalties
40.0060: Special Project Designation Permits
40.0061: Purpose and Eligibility
40.0062: Procedures for Applying Special Project Designation
40.0063: Approval of Applications for Special Project Designation Permits, and Special Project Designation Permit Modifications, Transfers or Extensions
40.0064: Special Project Designation Conditions
40.0065: Modification of Special Project Designation Permit
40.0066: Transfer of Special Project Designation Permit
40.0067: Extension of Special Project Designation Permit
40.0068: Termination of Special Project Designation Permit
40.0069: Suspension and Revocation of Special Project Designation Permit

SUBPART B: ORGANIZATION AND RESPONSIBILITIES

MCP Permits?


Incorporate renewable energy project into MCP process
PRA's
(IRA, PHI)
CRA's
(PHII – PHIV)
RAO's
ROS
AULs
RAM's

Reasonably Foreseeable Uses

GENERAL REQUIREMENTS FOR CONDUCTING RESPONSE ACTIONS

- **40.0190 (6)** In determining whether a Permanent Solution will achieve a level of No Significant Risk during any foreseeable period of time, the criteria and standards set forth in 310 CMR 40.0900 and any current or reasonably foreseeable uses of the site and the surrounding environment that may be affected by oil and/or hazardous materials at the site or in the surrounding environment shall be considered.
  - **Foreseeable Use = Renewable Energy Installation**
- **40.0921 (1)** The identification of the Human Receptors shall consider the current and reasonably foreseeable uses of the disposal site and the surrounding environment.
  - **Renewable Energy Installation Human Receptors = Construction Workers, Maintenance Workers, Trespassers**

Compatibility of Renewable Energy to Cleanup

RAO = YES	• **Assessed, Remedy Complete, Complete with AUL** • **Assessed, Remedy Ongoing** • (RE will not compromise remedy under construction or operational)
CRA = MAYBE	• **Assessed with Remedy Implementation Plan (RIP)** • (RE design and development can be incorporated into remedy design and implementation)
PRA = NO	•Assessment/No Remedy (consider future PV!) •No Assessment (consider future PV!)

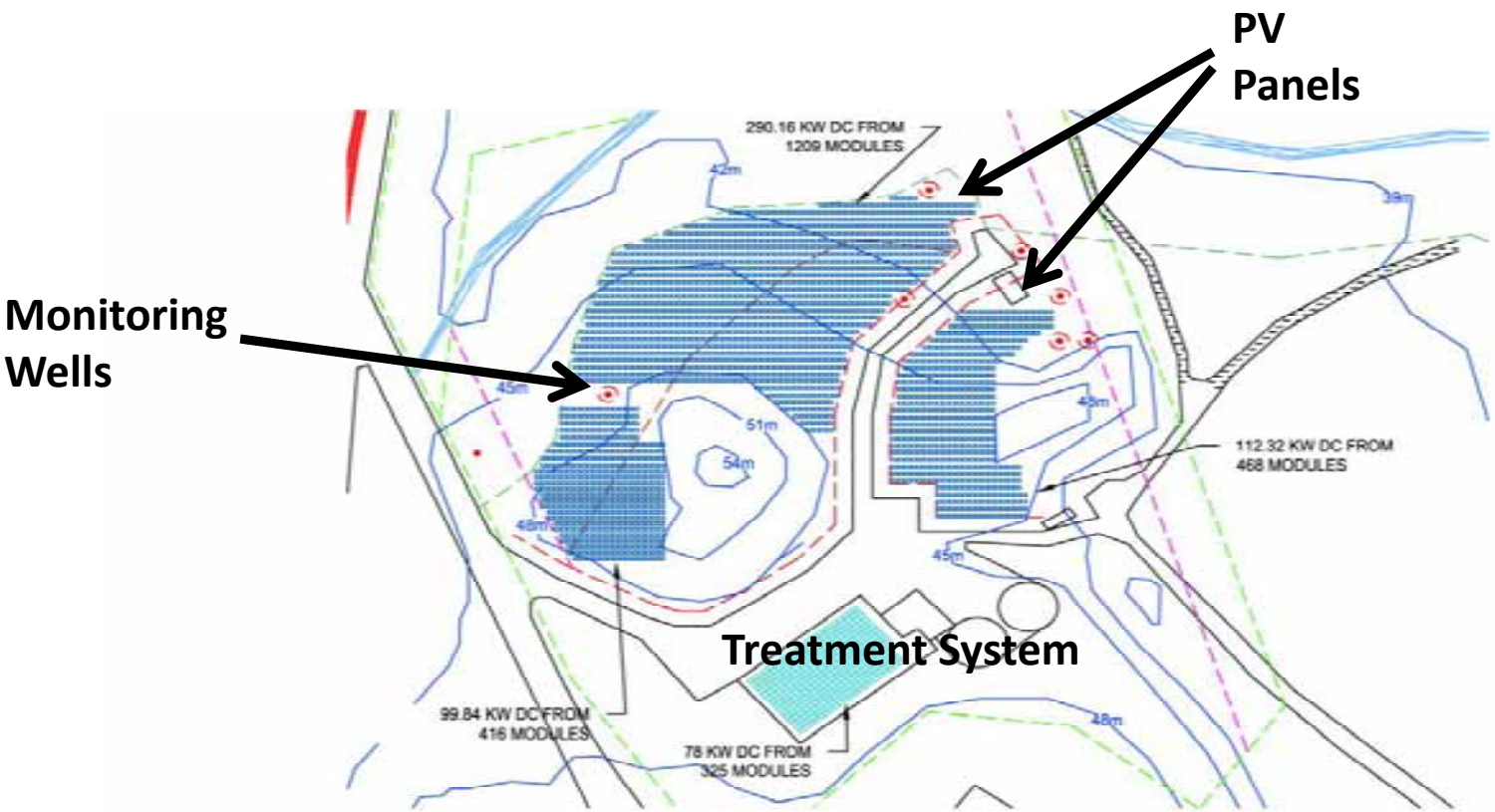
Examples of Compatible Remedial Solutions

- In Situ Bioremediation
- Long-Term Pump & Treat
- Monitored natural Attenuation
- Permeable Reactive barriers
- Soil Vapor Extraction
- Activity & Use Limitation*

*** To Be Addressed in Separate Presentation**

Baird & McGuire, Holbrook, 2006

Example: Long-Term Pump & Treat



Baird & McGuire, Holbrook, Feasibility Study, 2012

Other Permit Considerations

- **Zoning**
  - Is the project zoned for PV? May require a "Special Permit"
- **Interconnection**
  - Review by distribution utility required.
  - Cost of interconnecting falls on project.
- **MEPA**
  - if a proposed renewable energy installation will generate 25 or more megawatts of electricity, or
  - construction will require alteration of one or more acres of bordering vegetated wetland, or
  - ten or more acres of any other wetland area (including land altered to install roads and utilities)
- **Wetlands**
- **Building Permit**
- **Federal Aviation Administration**
  - Wind projects

Financial Feasibility

How do I fund the Cleanup?

MassDEP

Federal (EPA) Brownfield Program

- **Assessment Grants**
  - $200,000 Per Property
  - $1M Coalition Assessment Grant
  - Non-profits and municipals
- **Cleanup Grants**
  - $200,000 Per Property
  - $1M Cleanup Revolving Loan Fund
  - Non-profits and municipals
- **Federal Targeted Brownfield Assessment**
  - EPA Region 1 Uses contractors
  - <$75,000 Grant of Service
- **State Targeted Brownfield Assessment**

  (Not Available)

Massachusetts Brownfield Programs

- **Assessment Loans (MassDevelopment)**
  - Up to $100,000
- **Cleanup Loans (MassDevelopment)**
  - Up to $500,000
- **Brownfield Tax Credits (completion of cleanup)**
  - Expires August 5th 2013 (work must be done prior to)
  - 50% of Cleanup Costs
  - 25% for Cleanups Using AUL

Qualifications (for above three)

- Borrower did not own/operate at time of release and/or cause or contribute to contamination
- Must be located in Economically Distressed Area (EDA)
- MCP related cleanups only (need RTN)

- **Environmental Insurance (MassBusiness)**
  - 50% State Subsidy for Insurance Premium
    - Capped at $50,000 for Private Sector
    - Capped at $150,000 for Municipal/Non-Profit

Financial Feasibility (cont.)

How do I fund the Solar Photovoltaic (PV) Renewable Energy System?

MassDEP

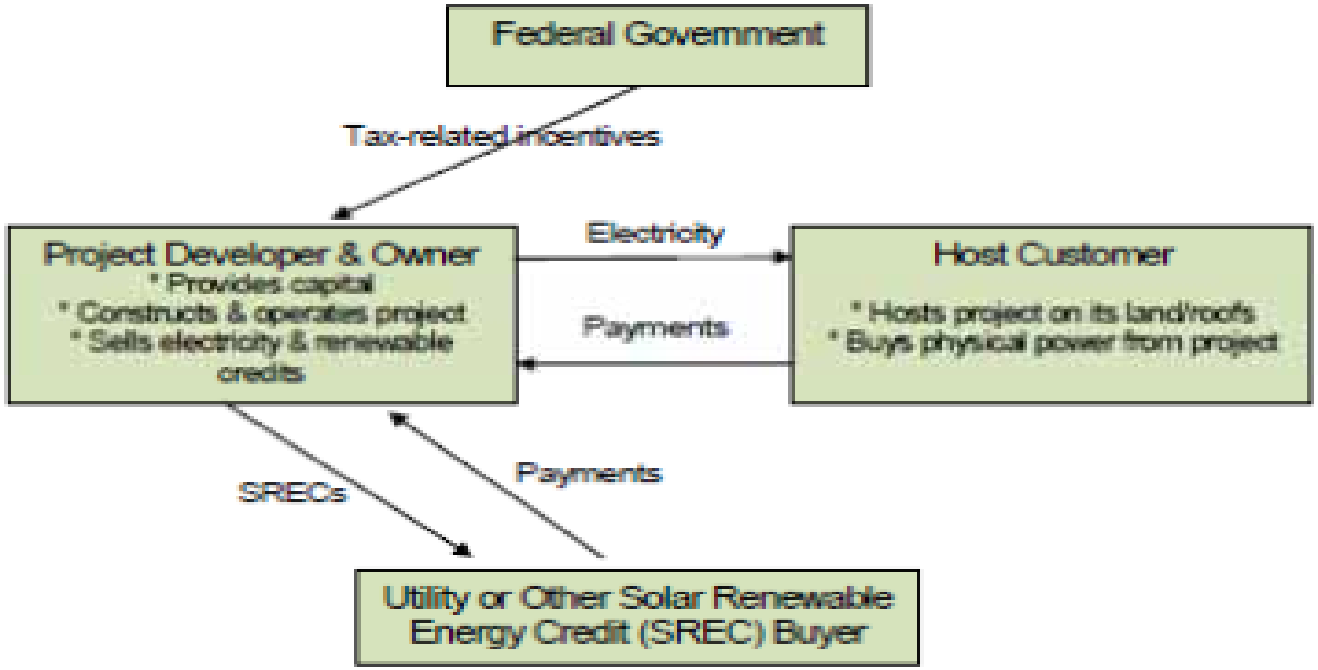
Federal PV Incentive Programs (commercial scale)

- **Investment Tax Credit (ITC)**
  - Up to 30% of eligible system costs
  - Hard cost of equipment
  - Taken and applied against federal tax obligation of a “for-profit entity”
  - Expires 12/31/16
- **Modified Accelerated Cost-recovery System (MACRS)**
  - Recover costs through depreciation reductions
  - 5-year accelerated depreciation
  - Expires by 12/31/16
  - Bonus 50% if placed in service by end of 2012!

Massachusetts PV Incentive Programs (commercial scale)

- **Solar Renewable Energy Certificates (SRECs)**
  - I SREC = 1 MWh
  - Retail electrical providers required to buy
  - Minimum value $285/MWh
  - Ceiling value up to $550/MWh
- **Net Metering**
  - Customers located in investor-owned utilities (National Grid, NSTAR, Western Massachusetts Electric Company, and Unitil) have the option of selling net excess electricity generation from a qualifying solar project via net metering.

Third-Party Power Purchase Agreement (PPA)

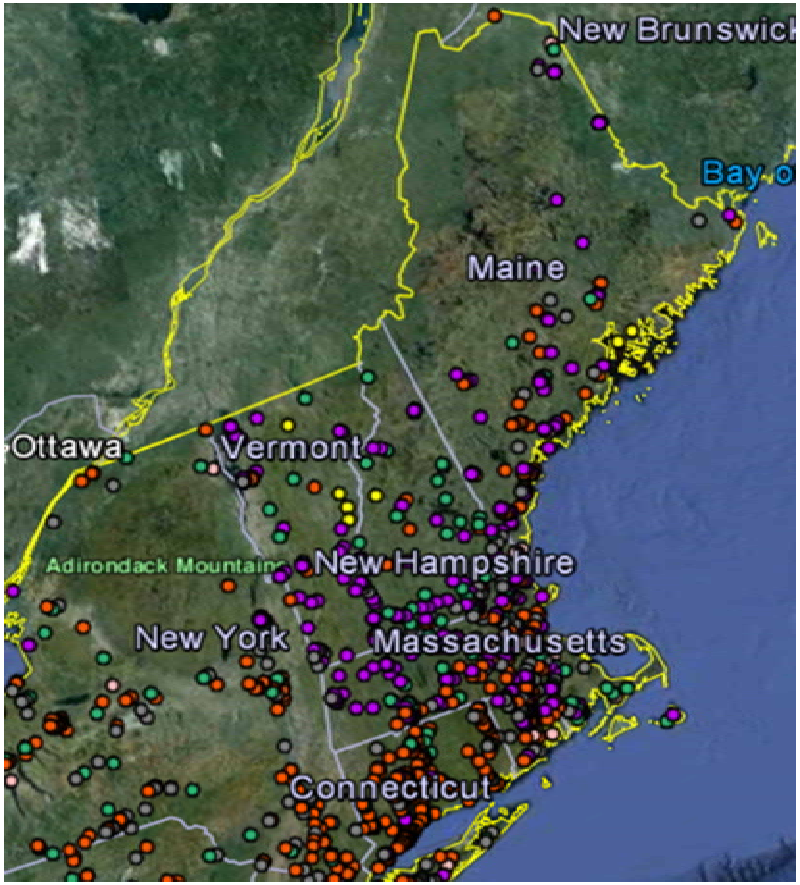


Incentive Resource

- "Database of State Incentives for Renewable & Efficiency"
- www.DSIRE.org
- Comprehensive repository of incentive programs

Additional Resources

- CERCLA Liability Fact Sheet (Final 3/2011)
- Contaminated Land Reuse Fact Sheet (July 2012)
- Handbook for Siting Renewable Energy Projects While Addressing Environmental Issues (April 2012)
- Solar/Wind Decision Trees to screen for resource potential (in conjunction with NREL)
- http://www.epa.gov/renewableenergyland



Source: Provided through the U.S. EPA's RE-Powering America's Land Initiative, 2012

THANK YOU!

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Please remember to vote!