

Facilitating the Development of Clean Energy on Contaminated Land in Massachusetts

NEWMOA

“Moving Toward More Sustainable Remediation”

Wednesday, December 4, 2013 – Dayville, CT

Thursday, December 5, 2013 – Westford, MA

Thomas M. Potter

MADEP's *Acting* Clean Energy Director



Mass Clean Energy Mandates

- 2007 Top Priority for Patrick Administration
- **2008 Global Warming Solutions Act**
 - Comprehensive Program -> Climate Change
 - Goal 25 % Below 1990 GHG levels by 2020
- **2008 Green Communities Act (GCA)**
 - Supports Development of Clean Energy Resources
 - Expands Efforts to Promote Energy Efficiency
 - **Increased the Renewable Energy Portfolio Standard**

Renewable Energy Portfolio Standard (RPS)

Renewable Energy Portfolio Standard (RPS)

- 2003 Statutory obligation for energy suppliers to obtain energy from new renewable sources
- 2003 obligation of 1% (increasing by 0.5% per year)
- 2008 GCA – increased to 1% per year
- 2013 – currently at 8%

Administration Clean Energy Goals

- 15% of Massachusetts electricity supplied from new renewable sources by 2020.
 - **Solar: 250 MWs installed by 2017, 400 MWs generated by 2020** (347 MW as of 11/27/13)
 - *May 2013 New Solar Goal of 1,200 additional MW's*
 - **Wind: 2,000 MWs by 2020** (103 MW as of 11/27/13)

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
 - Utility Scale Solar Photovoltaic's



GOAL: Contaminated Land Development

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



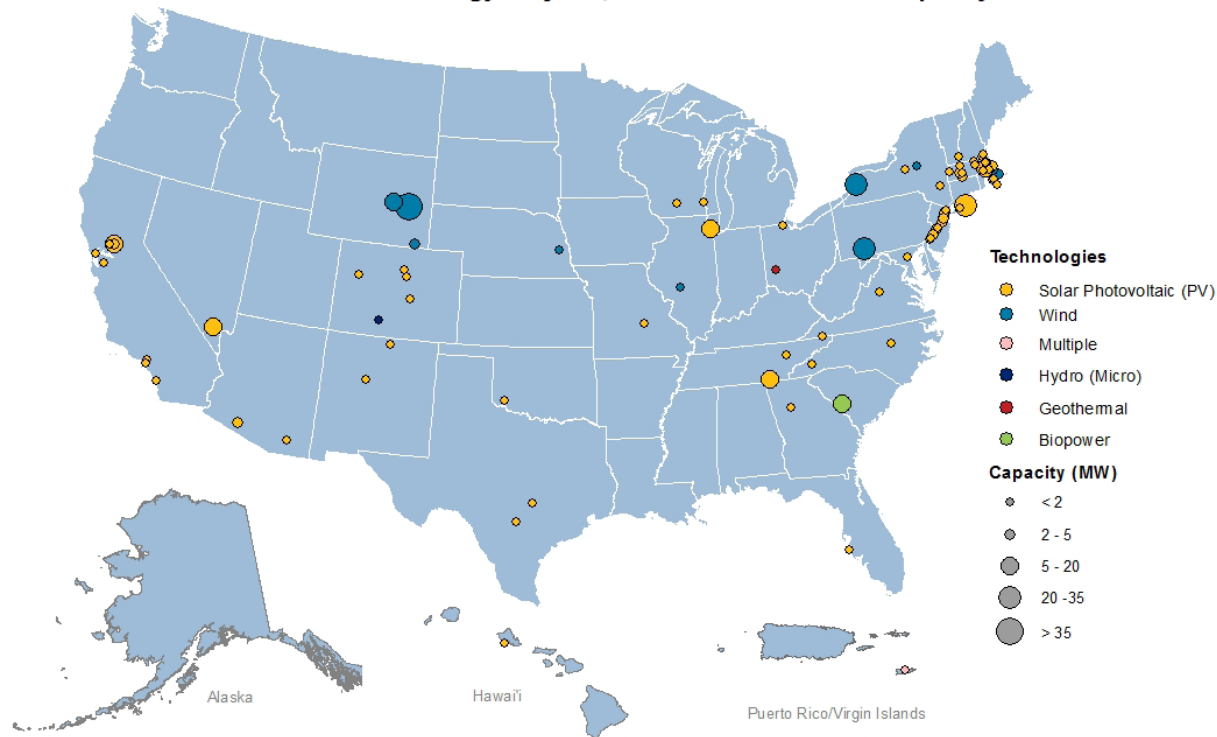
Brockton Brightfields, 425 kW solar PV

*MassDEP Bureau of Waste Prevention (BWP)

USEPA RE-Powering America's Land Initiative: Massachusetts (Nov 2013)

RE-Powering America's Land Initiative:
Completed Renewable Energy Projects on Potentially Contaminated Lands, Landfills, and Mine Sites

80+ Renewable Energy Projects, Over 500 MW Installed Capacity



This map is for informational purposes only. The information was gathered from public announcements of renewable energy projects in the form of company press releases, news releases, and, in some cases, conversations with the parties involved. This map may not be a comprehensive representation of all completed renewable energy projects on contaminated lands. To provide information on additional projects, please email cleanenergy@epa.gov.

November 2013

USEPA RE-Powering America's Land Initiative: Massachusetts (Nov 2013)

National Deployment

RE-Powering has identified installations of renewable energy on contaminated lands, landfills, and mine sites in 27 states and territories. The locations of these installations reflect evolving market trends generally linked to available renewable energy resource, Renewable Portfolio Standards, net-metering laws, and other incentives.

INSTALLATIONS BY STATE ¹						
State	# Sites	Installed Capacity (MW)	State Renewable Portfolio Standard ²	Solar Set-Aside Policy ³	Solar Multiplier Policy ⁴	Distributed Generation Requirement ⁵
MA	22	36.8	✓	✓		
NJ	10	22.7	✓	✓		
CA	8	12.1	✓			
NY	6	67.2	✓			✓
CO	5	5.9	✓		✓	✓
WY	3	256.8				
TN	3	9.9				
PA	2	38.0	✓	✓		
IL	2	10.9	✓	✓		✓
AZ	2	5.0	✓		✓	✓
NM	2	3.0	✓	✓		✓
WI	2	0.6	✓			
NC	2	0.6	✓	✓		
OH	2	0.3	✓	✓		
TX	2	0.1	✓	✓ ⁶	✓ ⁷	
RoUS ⁸	12	37.4				
	85	507.3				

Massachusetts Contaminated Land Installations To Date

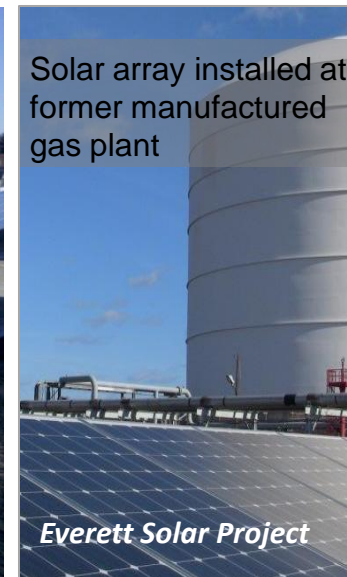
Solar array installed at former gas works



Solar array installed at former manufactured gas plant



Solar array installed at former manufactured gas plant



Fixed tilt system at landfill



Two of three turbines powering remediation



Solar array installed at former foundry



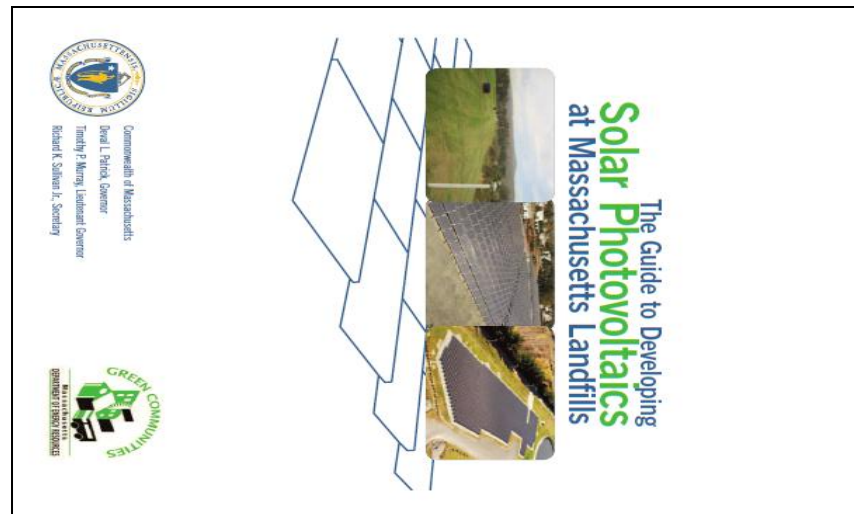
Source: Provided through the U.S. EPA's RE-Powering America's Land Initiative, 2012

Landfills

- **CLOSED** - Ideal for Solar and Wind Projects
- **Requires: MassDEP Post-Closure Use Permit**
 - Applicants submit permits to MassDEP for review and approval
- **Progress:**
 - 42 PCU Permits Issued
 - 83 megawatts clean energy permitted
 - 15 Projects Operational (23.5 MW's)
- **DOER Solar on Landfill Guide** →

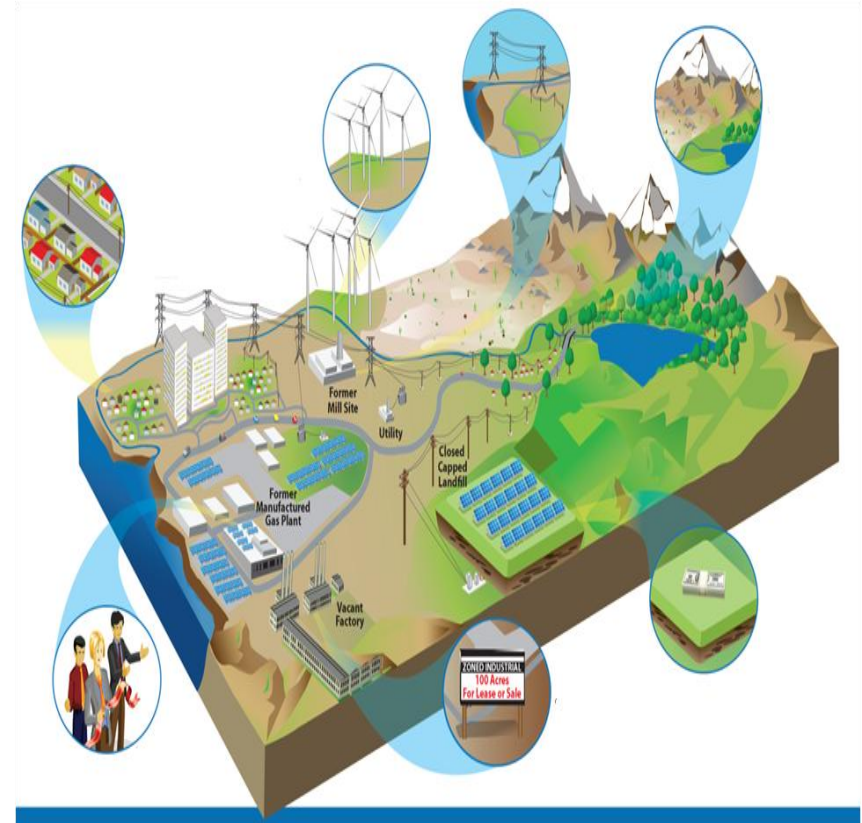


Easthampton Landfill: Photo Courtesy of Borrego Solar Systems, Inc.



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

How?

- Technical Feasibility
- Regulatory Feasibility
- Financial Feasibility



WMECO, Pittsfield, MA

Technical Siting Feasibility

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

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 Brownfield's
- **Distance to Graded Roads**
 - Less than ½ mile optimal
 - Greater than adds cost
 - Favorable characteristic for urban Brownfield's



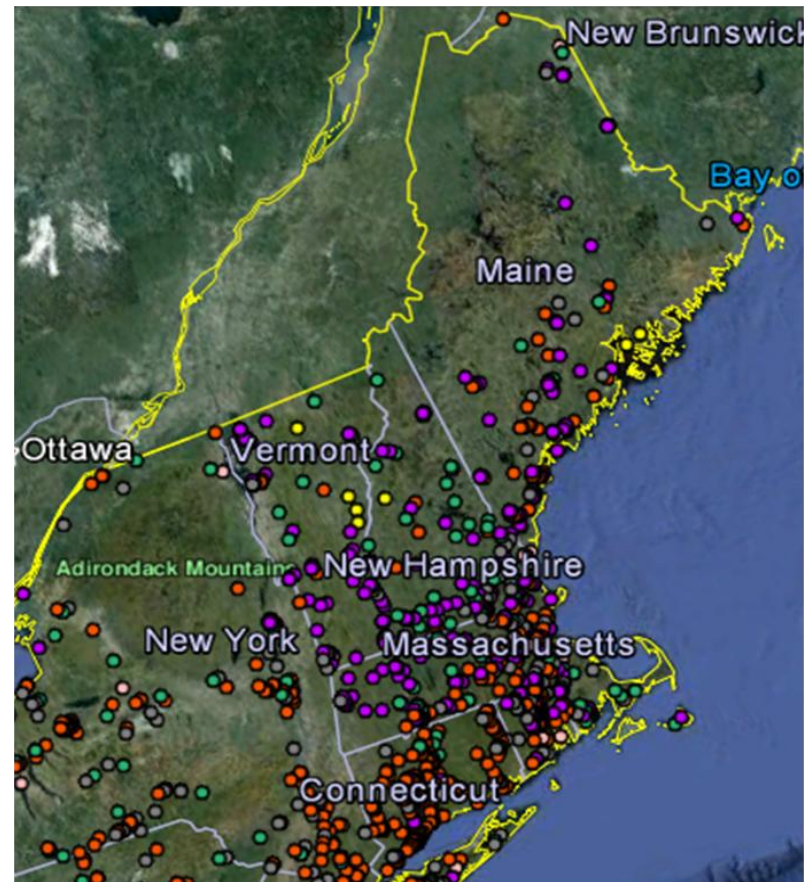
Baird & McGuire, Holbrook, 2006

Desktop Resources

Site Characteristics

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

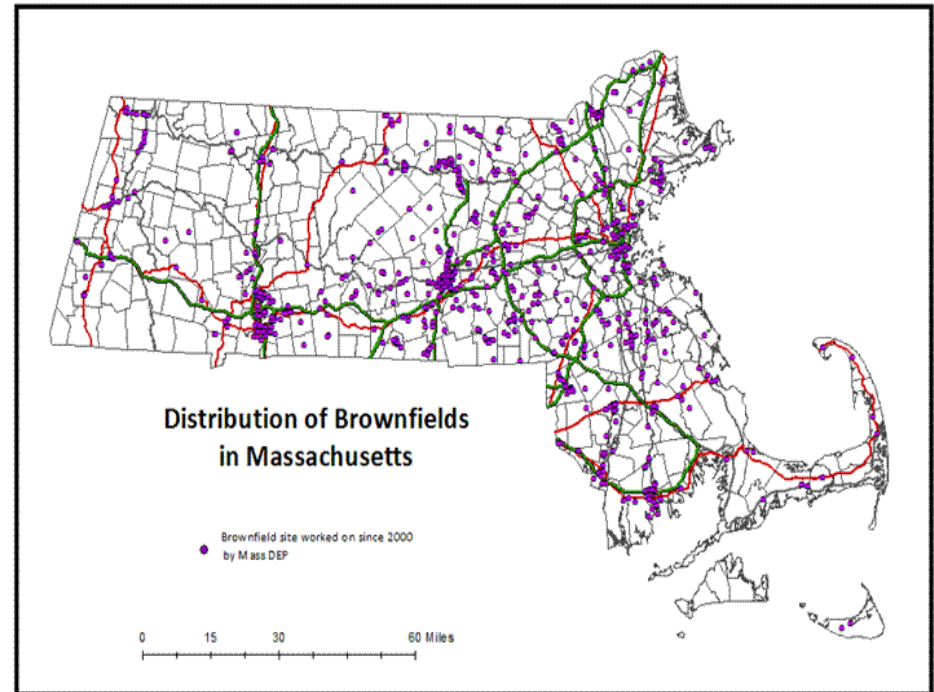
Contaminated Lands Profile List

- Identify development opportunities
- ~ 800 MassDEP “Brownfield” Sites
 - “Underutilized”
 - “Abandoned”
 - “For Sale/”Lease”
- EPA “Superfund” Sites in MA (~30)
- Available online



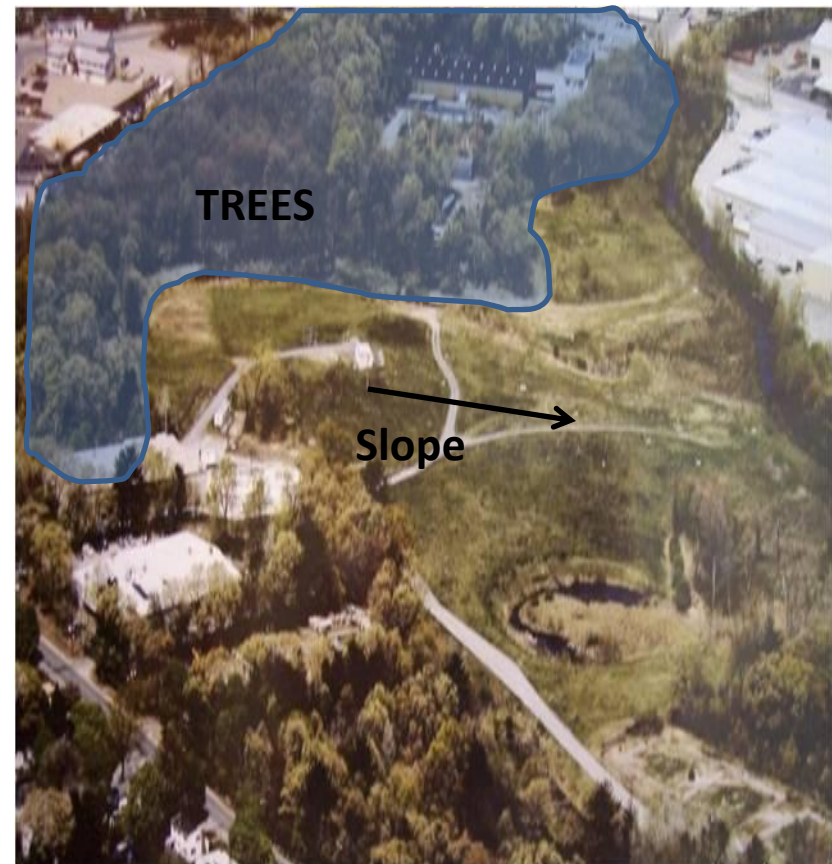
MassDEP BWSC Contaminated Lands Profile List

- 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

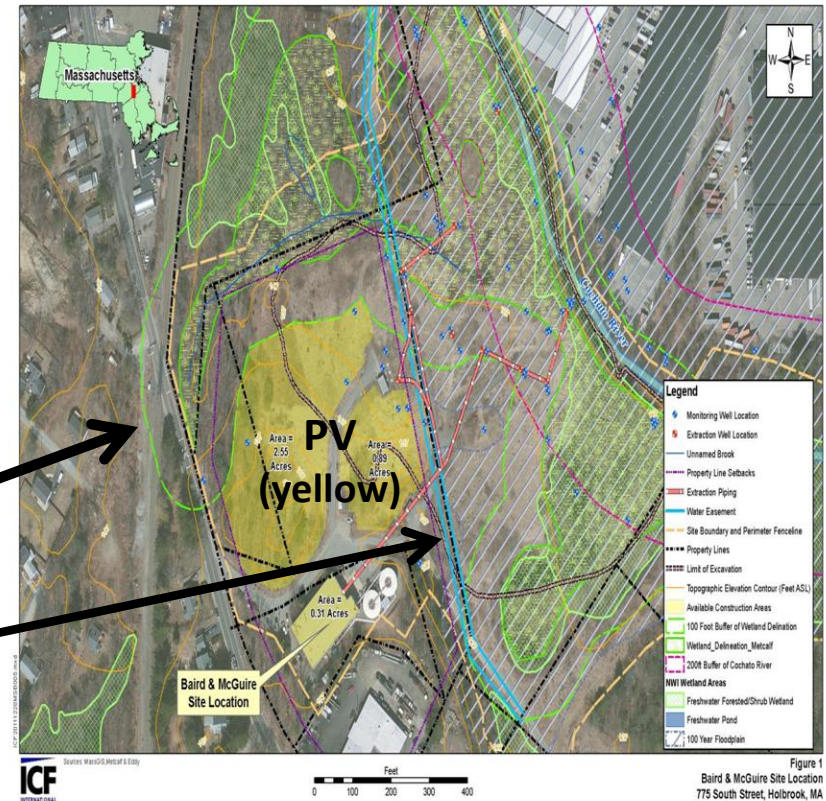
- **South Facing**
 - optimize orientation for true south
- **Usable acreage is “flat to gently sloping”**
 - Less than 6 degree (10% grade)
 - Can be graded
- **Minimal Shading**
 - At least 6 hours per day of sunlight
 - For every foot of tree height, PV should be that distance away
 - Shading analysis 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
- **Ownership information**
 - MA Registry of Deeds

www.masslandrecords.com



Liability Considerations/Protections

[for parties who own or acquire contaminated property but did not cause or contribute to the contamination]

EPA - CERCLA Liability Status

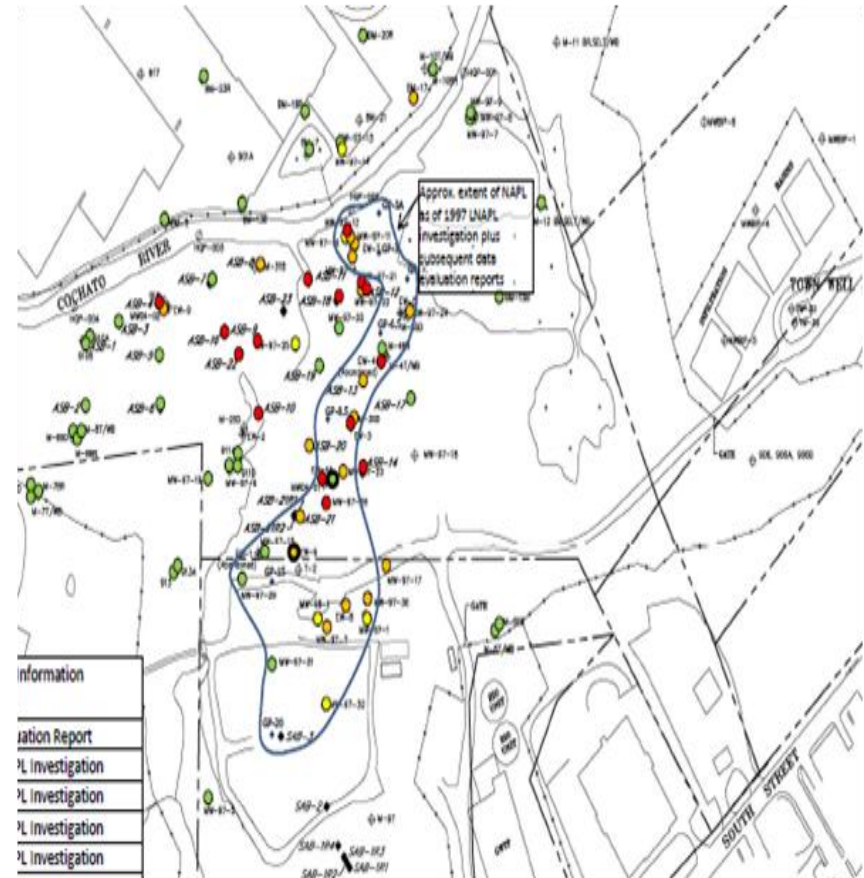
- **2002 Brownfield Amendments to CERCLA** (*new protections*)
- **“Innocent Landowners”** (modified defense)
 - i.e. State/Local Governments
- **“Bona Fide Prospective Purchasers” (BFPPs)**
 - Protects purchaser (or tenant of purchaser)
 - Can purchase with knowledge of contamination
 - Threshold Criteria
 - Acquire ownership after 1/11/02
 - Disposal occurred before purchase
 - Conduct “all appropriate inquiries” (AAI)
 - Not a liable party and no affiliation with a liable party
 - Continuing Obligations
 - Provide cooperation, assistance, access
 - Comply with land use restrictions; not impede institutional controls
- **“Comfort Letters” for RE Projects**

MassDEP - 21E Liability Status

- **1998 Brownfield Amendments to 21E**
- **Eligible Owners**
 - Must Meet liability Endpoints (i.e. RAO, ROS)
- **Eligible Tenants**
 - Must meet statutory requirements
 - **“Lessee”** considered an eligible tenant under 21E
 - MassDEP Fact Sheet
- **Other “Safe Harbors”**
 - Redevelopment Authorities
 - Secured Lenders
- **Covenant Not To Sue Program**
 - Attorney General Administers
 - For non-applicable statutory protections
- **“Comfort Letters” for RE Projects**

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?

Regulatory Considerations

EPA - SUPERFUND SITES

- A. **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA - “Superfund Law” – does not include oil)
 - National Contingency Plan (NCP)
- B. **Direct Oversight**
 - Decision making by EPA
 - Oversight role by MassDEP
- C. **Cleanup Plan = “Record of Decision”**
 - tailor cleanup to site-specific goals
 - May include multiple settling parties = “Consent Decree”
 - May include “Fund Lead”

MassDEP - STATE SITES

- A. **M.G.L. Ch 21E** (“OHM Materials Release Prevention Act”)
 - Massachusetts Contingency Plan (MCP)
- B. **Privatized Program**
 - Decision making by LSP’s
 - Audit role by MassDEP
- C. **Flexibility in Cleanup**
 - Tailor Cleanup to Reuse (current/future)
 - Multiple standardized cleanup options

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

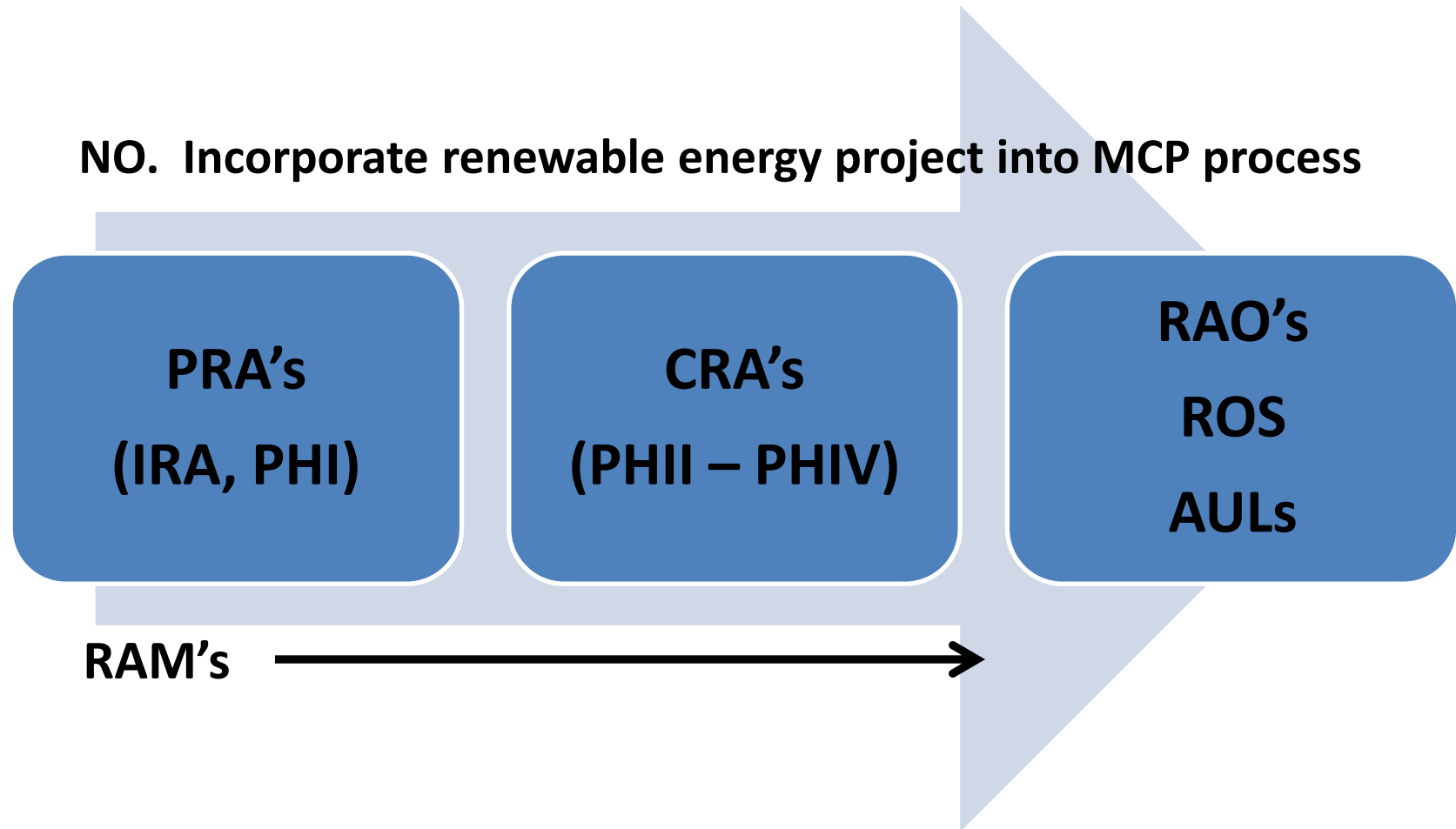
SUBPART A: GENERAL PROVISIONS

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?

NO. Incorporate renewable energy project into MCP process



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/ROS/AUL=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

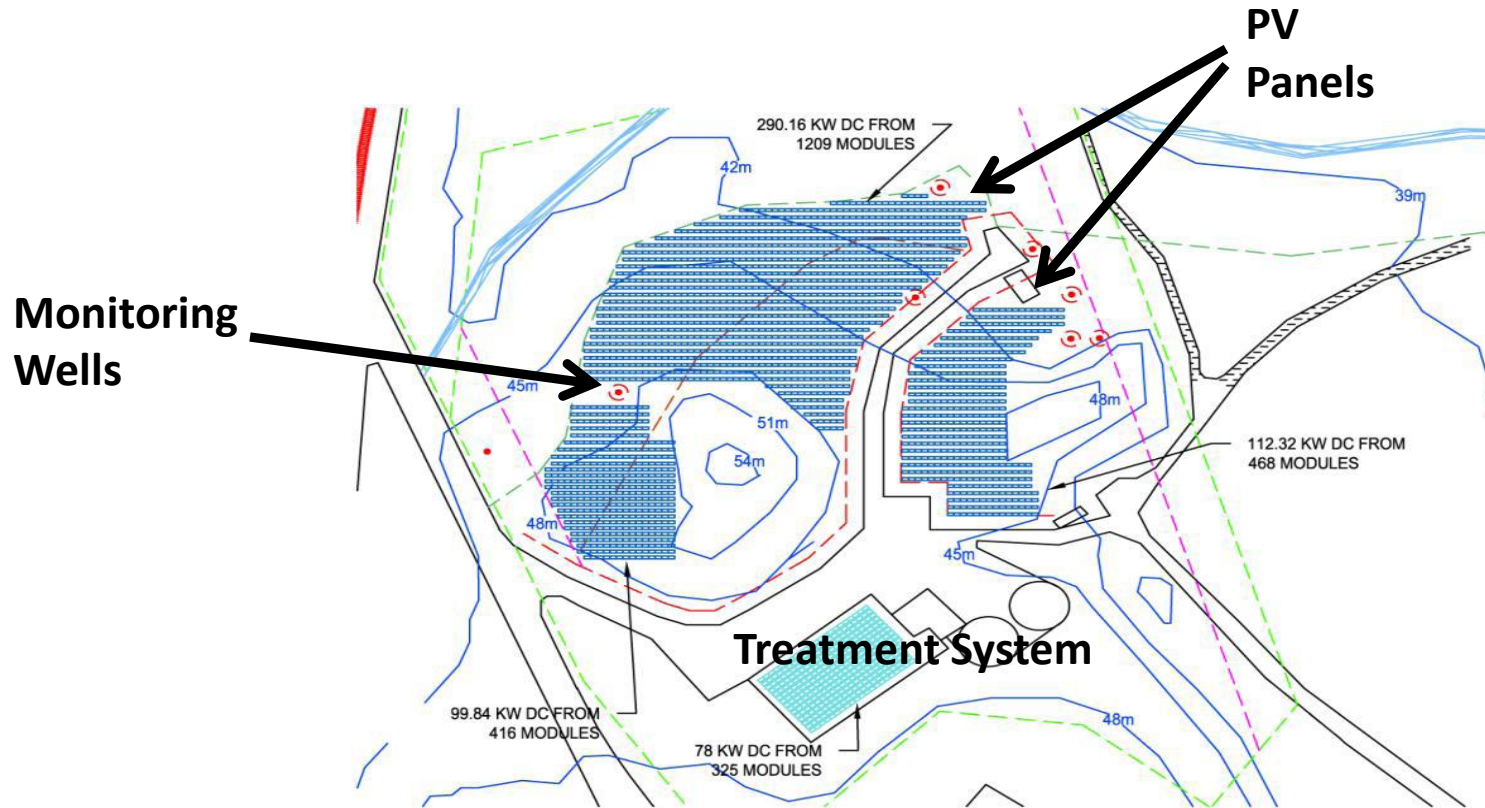
- In Situ Bioremediation
- Long-Term Pump & Treat
- Monitored natural Attenuation
- Permeable Reactive barriers
- Soil Vapor Extraction
- Activity & Use Limitation*

* 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?

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

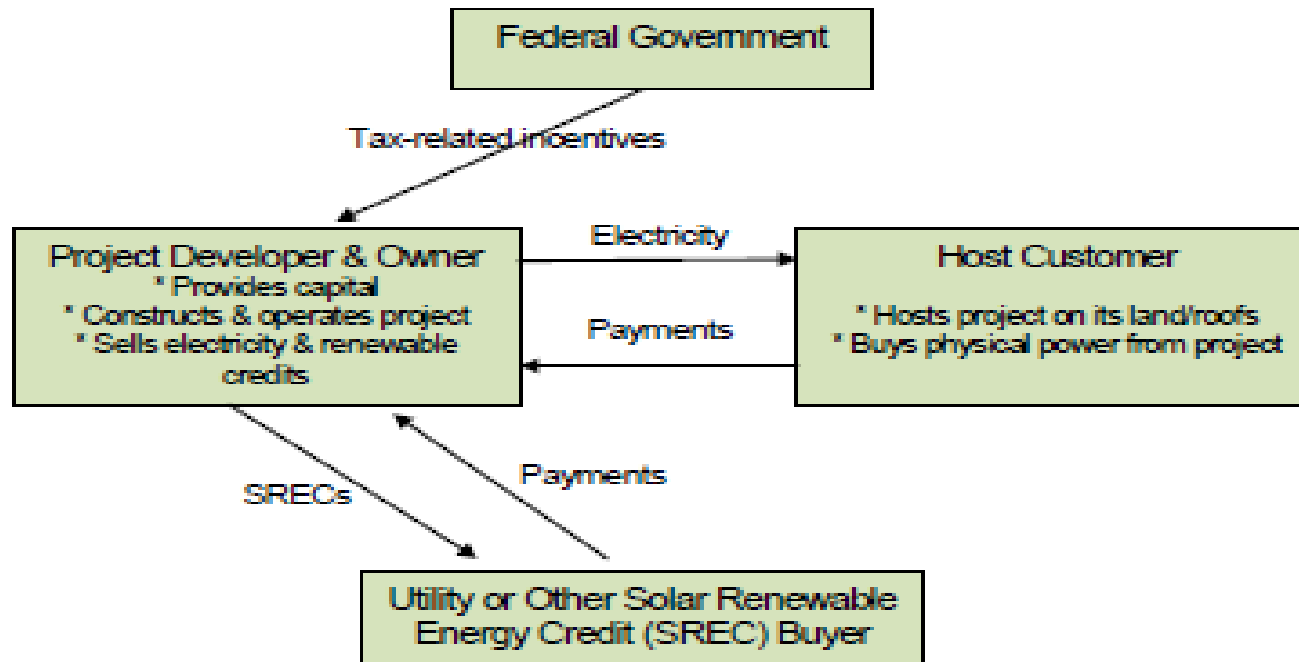
Qualifications (for above three)

- 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?

Third-Party Power Purchase Agreement (PPA)



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



Massachusetts PV Incentive Programs (commercial scale)

- **Solar Renewable Energy Certificates (SRECs)**
 - 1 SREC = 1 MWh
 - Retail electrical providers required to buy
- **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.



RPS SOLAR CARVE-OUT II

PROPOSED DESIGN

SREC I

- 2008 Goal = 400 MW Goal
- Exceeded by 150 MW's 2013
- Any project type (e.g. residential, commercial)
- Market Price for REC's
 - \$585 ceiling
 - \$285 floor?
- Oversupplied market conditions lead to uncertainties

SREC II (Proposed)

- 2013 Goal = 1200 MW
- Financial incentive will differentiate between market sectors.
- Landfills and Brownfield's projects proposed to receive the second highest incentive levels
- Greenfield and open space-type will bid competitively for incentives, referred to as "managed growth"
- DOER is expected to issue draft regulations for SREC II in the fall of 2013.

DIFFERENTIATING MARKET SECTORS

Market Sector	SREC Factor
Residential*, Solar Parking Canopies, Emergency Power for Public Safety, all projects <= 25 kW	0.9
All Roof Mounted Projects; and Ground Mounted Projects > 25 kW with over 67% on-site electric use annually	0.9
Projects on Landfills and Brownfields	0.8
Ground Mounted project <= 500 kW, with less than 67% on-site electric use annually.	0.7
Managed Growth Sector - Ground Mounted projects over 500 kW with less than 67% on-site electric use annually.	competitively bid

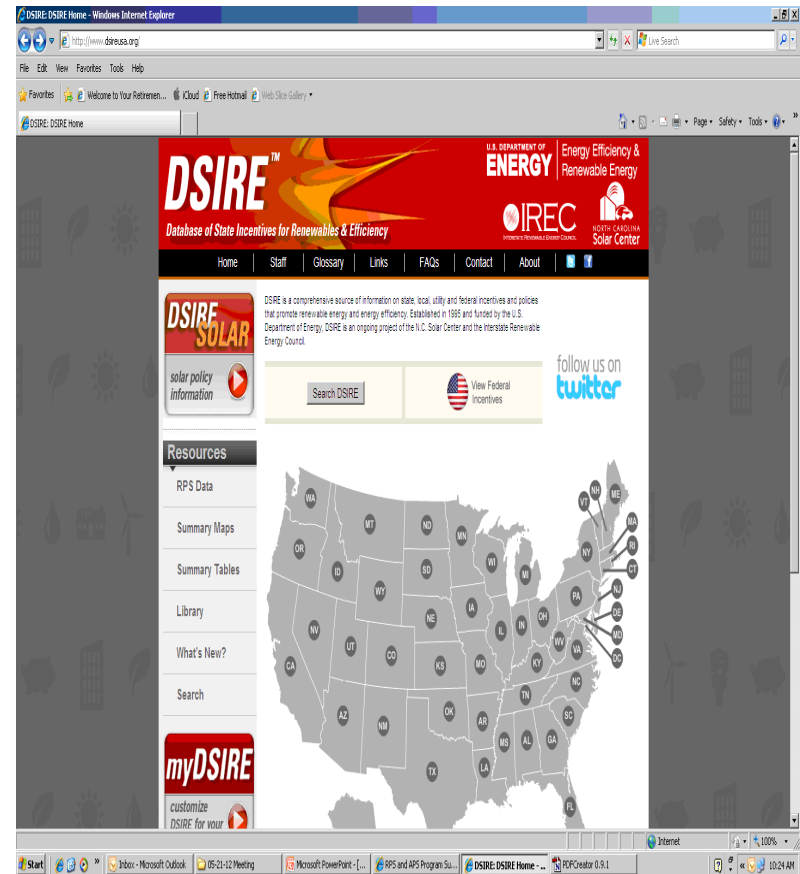
Each MWh of Generation is minted 1*SREC Factor MWhs of SRECs.

Remainder of Generation is minted as zero-emissions System Mix on NEPOOL-GIS. This generation will be ineligible for other REC markets.

*Comm Solar II Rebates will continue through end of SREC-I Program. MassCEC will consider its role to support the residential solar market under SREC-II. Stakeholders are asked to comment on these incentive levels assuming no Comm Solar rebates are available.

Incentive Resource

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



THANK YOU!

Thomas M. Potter
Massachusetts Department of
Environmental Protection
Bureau of Waste Site Cleanup
***Acting* Clean Energy Director**

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Mass Department of Environmental Protection
(MassDEP) Clean Energy Results Program:

<http://www.mass.gov/dep/cleanenergy.htm>

Mass Department of Energy Resources (DOER)

<http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/doer/>

Massachusetts Clean Energy Center (CEC)

<http://masscec.com/>