



## Massachusetts Initiatives to Promote PV Development on Closed Landfills



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## Landfills = Renewable Energy Opportunities

- ▶ 490 + MA landfills active since 1971
- ▶ 460+ are now inactive or closed
- ▶ > 100 have “post closure” uses



## Good Sites for PV Development

- Large open parcels
- Flat
- Close to connections to the electrical grid
- See Massachusetts Landfill Profiles:  
<http://www.mass.gov/dep/energy/landfill.htm>



## Steps to Develop a Successful Project

1. Assess Feasibility



2. Procure developer services



3. Design project/ secure permits



4. Build project



## Permits Needed for a PV facility



- **MassDEP: Post closure use permit**
- ISO New England: Power generation approval
- Electricity Utility: Interconnection agreement
- Municipality: Building permit, possibly wetlands approval

## MassDEP Post Closure Use Permit

- ▶ To start: review existing permits, inspect the landfill, set up “pre-application” meeting with MassDEP
- ▶ Submit “Post Closure Use” Application to MassDEP (prepared by Resident MA Professional Engineer, with Owner’s approval)
- ▶ Agency review:
  - ❖ 2-6 months if landfill has been assessed and closed
  - ❖ Longer review if landfill has not been assessed and properly closed

## Solid Waste Considerations

- ▶ MassDEP approval criteria:
  - ▶ Maintain integrity of cap, final cover system
  - ▶ No adverse impacts to public health, safety, welfare, or the environment
- ▶ Major issues:
  - ▶ Foundations
  - ▶ Storm water controls
  - ▶ Landfill gas
  - ▶ Long-term maintenance



## Foundations

- ▶ Landfill cap/cover system: keep water out and landfill gas in
- ▶ Geotechnically stable, must accommodate loading, settlement
- ▶ Plans for storm water management, long-term maintenance must reflect design, development density



## Storm Water Control

- ▶ **Consider:**
  - ▶ Foundation design, development density
  - ▶ Location, orientation of power lines
- ▶ **Will the development:**
  - ▶ Concentrate runoff?
  - ▶ Increase erosion potential?
  - ▶ Create water bars?
- ▶ **Design for 24-hour, 25-year storm**
- ▶ **Evaluate potential for flooding in 24-hour, 100-year storm**



## Landfill Gas

- ▶ **Consider:**
  - ▶ Existing gas control system
  - ▶ Gas characteristics, migration pathways
- ▶ **Protect:**
  - ▶ Public Health (toxic compounds in ambient air)
  - ▶ Safety (explosion, fire, asphyxiation)
  - ▶ Welfare (nuisance odors)
- ▶ **Plan includes:**
  - ▶ Engineering and management controls
  - ▶ Monitoring



## Long Term Maintenance

- ▶ Keep water out and landfill gas in
  - ✓ Designed well: minimal maintenance over the long term
  - ✓ Designed poorly: will need to address instability and erosion, cap repairs, expensive vegetation control



## Supporting Materials

- ▶ Existing Site Conditions
  - ▶ Site plans (probably on file at MassDEP)
  - ▶ Report (narrative)
  - ▶ Findings (identify any baseline issues)
- ▶ Proposed Post Closure Use Design Plans
  - ▶ Site plans & detailed designs (P.E. stamped & sealed)
  - ▶ Narrative Report:
    - ▶ Technical analysis
    - ▶ Effects of changes
  - ▶ Financial assurance for final closure (privately-owned facilities only)



## A Successful Project:

- ▶ Coordinates designs by multiple consultants
- ▶ Integrates well with the landfill cap and final cover system
- ▶ Won't increase potential for erosion
- ▶ Doesn't create new exposures to landfill gas or leachate
- ▶ Provides for adequate maintenance



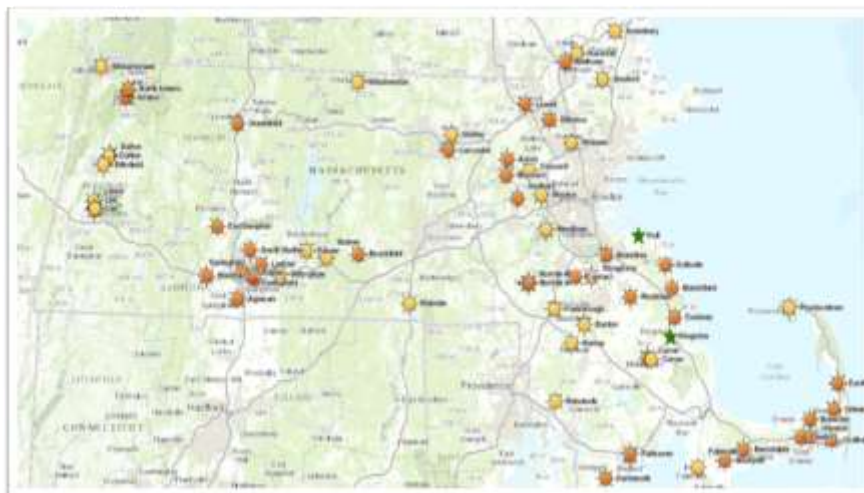
## Recent Issues that MassDEP has addressed:

- ▶ Project developer/operator's liability for problems at the landfill
  - ▶ Developer/operator is responsible for problems caused by the construction/operation/maintenance of the PV project
  - ▶ Landfill owner keeps full responsibility for all problems at the underlying closed landfill
- ▶ Financial assurance required for privately-owned landfills & for municipally-owned facilities if the municipality is not a co-applicant
- ▶ Original developer/operator transfers interest in project to a new entity for long-term facility operation
  - ▶ Submits a Certification of Transfer of a Permit – new operator commits to meeting permit conditions





## What has happened so far?



## PV isn't the only renewable energy option for closed Massachusetts landfills

▶ Two wind turbines are operating on closed MA landfills:

- ▶ Hull (1.8 MW, 2006)
- ▶ Kingston (1.8 MW, 2012)





## Why is this happening in Massachusetts?

- ▶ 3 conferences introduced PV developers to landfill owners, solid waste consultants
- ▶ Renewable Portfolio Standard for investor-owned utilities
- ▶ Net metering established
- ▶ Benefits for landfill owners vs. fallow land



## MassDEP Resources for Project Planning

- ▶ Visit:
  - <http://www.mass.gov/eea/agencies/massdep/service/energy/landfills/renewable-energy-projects-at-closed-landfills.html>
  - ▶ Fact Sheet: Developing Renewable Energy Facilities on Closed Landfills
  - ▶ Post Closure Use Permit Instructions & Application Form
- ▶ Technical references about closing landfills:
  - <http://www.mass.gov/eea/agencies/massdep/recycle/regulations/waste-and-recycling-policies-and-guidance.html#4>
  - ▶ Landfill Technical Guidance Manual
  - ▶ Control of Odorous Gas at MA Landfills
- ▶ Solid Waste Regulations:
  - <http://www.mass.gov/eea/agencies/massdep/recycle/regulations/waste-and-recycling-regulations-and-standards.html>



## Questions?

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