

Siting Renewable Energy

Strategies for Balancing Land Protection with Meeting Aggressive Carbon Reduction Goals





Paul Raducha, Over 13 years of experience in Renewable Energy, starting with Lux Research, one of the top “Clean Technology” research firms in the world. I have, hands-on experience in all aspects of Renewable Energy projects from project identification, vetting, development, financing, analysis, due diligence, project management, and asset management.

Engaged in over 95MW of installed renewable energy projects, including landfills, brownfields and Landfill gas-to-energy and landfill gas-to-vehicle fuel. Involved in the drafting and support of renewable energy legislation in several states.

Graduated from Clarion University of Pennsylvania with honors and began a career as a Certified Public Accountant (CPA) at the international accounting firm of KPMG Peat Marwick.

Thru hiked the 2,200 miles of the Appalachian Trail in 2002

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Energy Issues / Benefits

- New England Energy issues
 - Natural Gas
 - Hydro Canada (Transmission)
- Exporting our Environmental Responsibility
 - By State
 - By Town
- Renewable Energy Economics
 - Locally Sourced
 - Local Control
 - Local Economic Benefits
 - Jobs
 - Lease
 - Brownfields

Renewable Headwinds

- Tariff on Solar Panels
 - 30%
- Tariff on Aluminum and Steel
 - 25%
- Changes in Tax Laws

1,000 MW Clean Energy Initiative By 2020

Renewable Energy Programs:

- Renewable Energy Growth
 - 40MW / YR
- Virtual Net Metering
 - Muni / Federal / Non-Profit / Education
- Community Distributed Generation
 - Residential / Low Moderate Income / 30 MW Pilot
- Renewable Energy Fund – Grants
 - Residential / Commercial
- USDA - Grants / Loans
- 400 MW State of Rhode Island Direct Procurement

Project Influences - The Economic Drivers

- Lowest Cost Procurement

- Carrots

- Incentives

- RECs

- Taxes

- Lease Rates

- Grants

- Sticks

- De-incentives



Project Constraints

Zoning

- Ordinances
- Lack of Ordinance

Location Limitation

- Substations
- Feeders

Unaddressed Brownfields / Landfills

- No plan
- No funding
- No Cap
- Timing

Project Siting Limitations and Flaws

- Roof Tops
 - Lease
 - Roof Condition
 - Structural issues (open roof)
- Parking Lot Solar Canopies
 - Cost
- Compromised Sites
 - Contaminated Sites / S & G / Former use
 - Cost
 - Output

Solar on Landfills – Rose Hill Superfund Site



5.0 MW

Solar on Landfills – URI Superfund Site

4.2 MW



Solar on Landfills – Edgeboro Landfill NJ

35.0 MW



Solar on Landfills – Edgeboro Landfill NJ



1 MW DC Solar Carbon Off-set Calculations

US Dept. of Energy Information Calculation - Solar/Tree CO2 off-set

30 year old Eastern White Pine	193.0 Lbs. of CO2 per yr	<i>Fast growth Hard wood off-set (241.9 Lbs.) source US DOE</i>
Solar off-set of 1 kWh	1.1 Lbs. of CO2	<i>Non Base load - Gas fired</i>
1 MW DC / 840 kW AC	1,134,000 kWhs per year	<i>Groundmount/375W Panels/120,632 Sqft/2.8 Acres=4.0 Acres</i>
Total Solar off-set of 1 MW	1,254,204 Lbs. of CO2	
Trees off-Set	6,498 4 MW DC Solar	
Trees per Acre	1,625 Per Acre	

Source: <https://www3.epa.gov/climate change/Downloads/method-calculating-carbon-sequestration-trees-urban-and-suburban-settings.pdf>

EPA Greenhouse Gas Equivalencies Calculator

1 MW DC / 840 kW AC	1,134,000 kWhs per year	<i>Groundmount/375W Panels/120,632 Sqft/2.8 Acres=4.0 Acres</i>
= Lbs. of CO2	1,860,574 Per Year	
= Barrels of Oil	1954 Per Year	
= CO2 sequestered by forest acres	994 Per Year	

Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>