



Cleveland Urban Renewable Power



September 2016

Site Selection Process

Potential Locations

- Cuyahoga Land Bank, County, and others identified several potential vacant and blighted parcels with quick acquisition potential and minimum size requirements

| Site | Location | Available Land (acres) | Potential Installed Capacity (kW DC) |
|---------------|--|------------------------|--------------------------------------|
| A | W 11 th Street / Spring Road Landfill | 12.6 acres | ~1,000 |
| B | E 93 rd and St Catherine | 14.5 acres | 3,540 |
| C | Harvard Road Landfill | ~48 acres | 4,000+ |
| D | City of Brooklyn Landfill | ~78 acres | 6,000+ |
| Totals | | 153.1 acres | 14,540 kW+ DC |

- Sites considered but not currently under consideration:

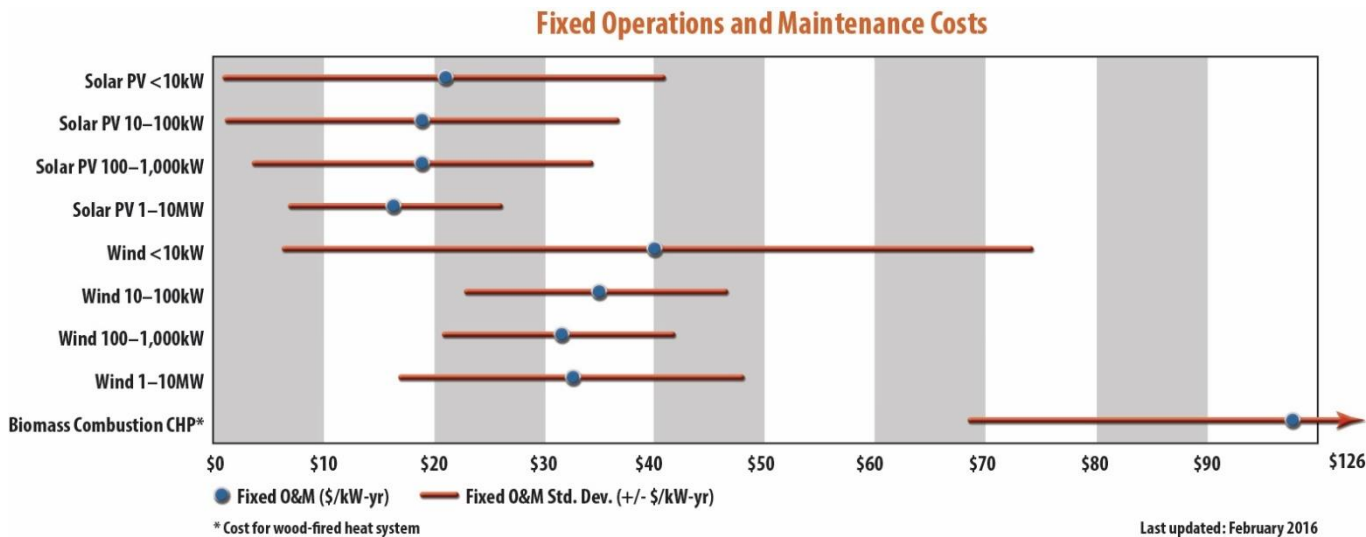
| Location | Available Land (acres) | Potential Installed Capacity (kW DC) | |
|--|------------------------|--------------------------------------|---|
| Kinsman and E 79 th St | 5.7 acres | 1,580 | <i>These two sites removed due to small size and not as easy to obtain site control</i> |
| Luke Easter Park / Kinsman & E116th St | 4.5 acres | 1,019 | |

Project EPC Process

- Schedule:
 - Release of RFP: July 8, 2016
 - Deadline for Questions regarding RFP: July 22, 2016 5:00 PM EDT
 - Answer to Questions provided: July 27, 2016
 - Proposals Due: August 5, 2016 5:00 PM EDT
 - Establish Short List: September, 2016
 - Selection of Vendor: 3rd Quarter 2016
 - Execute Contracts: 3rd Quarter 2016
 - Commercial Operation Date: late 2016 into 2017 (depending upon sites and phasing)
- RFP was sent to 17 identified EPC firms
- Formal bids received from 7 EPCs
- Project scoring considered the following key areas:
 - Pricing
 - Experience and history
 - Local content and labor
 - Overall proposal strength
- Of the 7 formal bids, 3 identified for the “short list” for additional evaluation in conjunction with Eutectics and the project investor group

Project Operations Considerations

DOE Operations Costs Data



- Department of Energy's National Renewable Energy Lab (NREL) data indicates solar projects in the 1-10 MW size have total operations costs averaging \$0.18/W per year
 - URP project estimates for O&M + insurance are in this range

Source: http://www.nrel.gov/analysis/tech_cost_om_dg.html

Project Lifetime Considerations

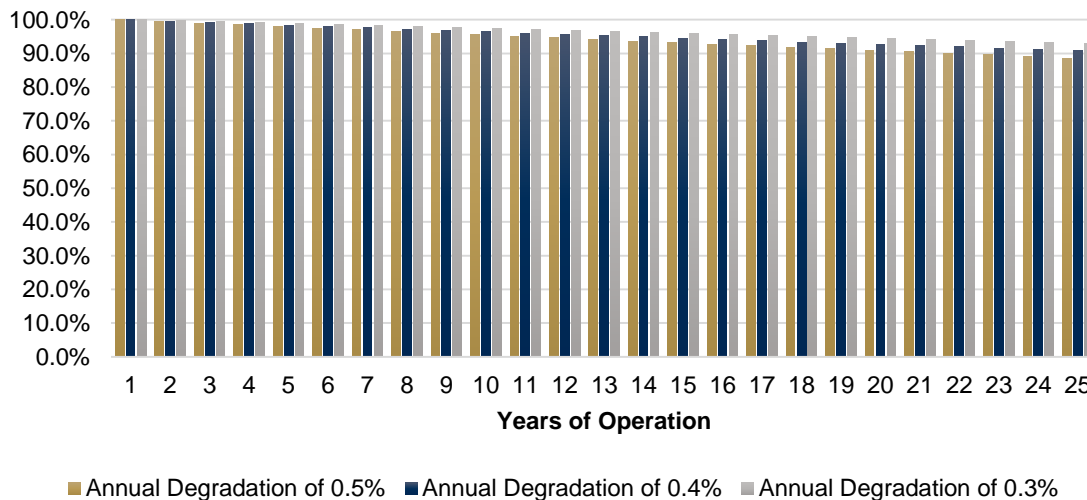
- Solar system component warranties are generally as follows:
 - Solar Panels: 20- or 25-year warranty with efficiency guarantees
 - Inverters: 10+ year warranty. For this project, we would have an extended (20-year) warranty built into the overall project installation costs
 - Racking, electrical, etc. all have anticipated useful life of 25+ years.

Useful Life

| Useful Life | |
|---------------------------------|---|
| System Useful Life | Years |
| Photovoltaics | 25 to 40 yr |
| Wind | 20 yr |
| Biomass Combined Heat and Power | 20 to 30 yr |
| Biomass Heat | 20 to 30 yr |
| Solar Water Heat | 10 to 25 yr |
| Solar Vent Preheat | 30 to 40 yr |
| Ground Source Heat Pump | 20 yr for interior components 100 yr for ground loop |

- Panels are rated for 0.4% annual loss of efficiency
- Most panels perform better than that.
- At 0.4% efficiency loss, after 20 years the panels are producing **over 92%** of the original energy rating

Percentage of Original Power based on Panel Degradation



Source:
http://www.nrel.gov/analysis/tech_cost_om_dg.html

Project Repowering

- System has useful life of 25+ years
- What happens at 25+ years?
 - Solar panels experience some degradation in power output
 - Inverter reliability may be nearing end of life
 - Racking, etc. has extensive useful life left.
- Options:
 - Continue operating as is
 - Replace panels with newer / more efficiency panels
 - Power density is generally increasing on a square footage basis.
 - If panels are replaced, inverters may need to be upsized as well

Project Team Contacts

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