Summer Series of Webinars

Second Thursday of each month, from 1 - 2pm

June 9
Solar 101 + Financing and Contracting
Great for Developers

July 14
Solar Design for New Construction
Great for Architects and Developers

August 11
Zoning & Certifications
Great for Architects and Developers
Agenda

1. Summer Series & Introductions
2. Key Stakeholders
3. Planning for Solar Equipment
4. Roof Materials & Warranties
5. Structural & Racking Solutions
6. Code and Equipment Locations

Q&A Session (20 Minutes)

Please add all questions to the Q&A box, as we will have time at the end to address them.
Who We Are

- **Mission**: To expand access to clean energy in underinvested communities
- **About**: Boston-based development company building projects in MA, NY
- **Focus**: Affordable Housing, Nonprofit, Small Commercial
- **Mechanics**: Aggregating solar projects for low-cost, high quality installations and impact financing
Key Stakeholders
Solar Project

- Developers
- General Contractor
- Architects
- Engineers & Electricians
- Plumbing & HVAC
How & When to Engage with Us

No Cost Feasibility Analysis
- 50% + Construction Documents (CD’s)

Design Phase I
- 70-100% CD’s
- Interconnection submission

Design Phase II
- Solar site visit
- Solar permit set submission

Installation and Post Solar Construction
Planning for Solar Equipment
Planning Call for Design Phase I

Project Timeline
Roof Type/Manufacturer
Attachment Plan
Inverter Location
Conduit Run

Installation Staging
Output Allocation Plan
Internet Connectivity
Disconnect & SMART Meter
Tie in Strategy
Common Roof Equipment Obstructions

Plumbing:
• Vent pipes
• Roof drains

HVAC (flat roofs only):
• Equipment placement
• Walkway pads
• Gas lines

Communications:
• Cell antennas
• Fire department comms
• Starry internet

★ Any equipment located on the roof surface is a potential obstruction for solar arrays
Planning for Solar Equipment

- **Inverters**: Can go on the roof, internally, or external at ground level. Ideally should be in a relatively shaded spot.

- **Internal Conduit**: Request GC to add a 4” metal conduit from the roof in as straight a shot as possible to the electric room.
  - Internal conduit should be included by the GC’s scope of work during the design phase

- **External Conduit**: Solar installer will run the metal conduit at time of installation

- **Tie in**: separate breaker will likely be needed for solar and should be coordinated with the electrical subcontractor
Commercial Equip Example

Commercial AC switch / disconnect (Eaton)

Combiner Panel

Inverter

*Note: this is not an MA example, so it is missing the additional utility SMART meter required.
Planning for Solar Equipment

● SMART Meter & Disconnect:
  ○ Interior Placement: If the building has an underground service drop and the meter bank is interior, the utility will typically require “meter grouping” with the SMART meter inside and two disconnects (one outside and one inside)
  ○ Exterior Placement: If the building has an overhead drop and external meters, then the disconnect and SMART meter must be outside, near the meter bank (typically outside the electric room)
MA Resi Equipment Example

*NOTE: SMART Meter and Disconnect must be on the exterior of the building where utility can easily locate.
Roof Materials & Warranty
Roofing Material Considerations

• For flat roofs, clients are increasingly required to use **white** material for reflectivity, which often means TPO.
  − Requires manufacturer certified technician to flash each attachment if needed
  − Up to $250 per penetration
  − Added design phases and coordination

• White EPDM is preferred for solar flat roof installations
The Dewitt Center - Madison Park Development Corporation
Roof Warranty Process

• Resonant Energy works with clients to ensure that each installation we do does not impact existing manufacturers’ warranties for roofs.

• This may require paying the roofing contractor for pre- / post- solar installation inspections
  – Inspection costs are covered as part of the solar installation
Structural / Racking Solutions
Solar Structural Planning

- **Flat Roofs**: 10 lbs/sf of dead load capacity should be allocated for solar pv.
  - *if you are going for a super dense racking set up for solar, should plan for 15 lbs conservatively*

- **Sloped Roofs**: 5 lbs/sq ft. of dead load capacity should be allocated for solar pv.
## Common Racking Solutions

### Most Common

<table>
<thead>
<tr>
<th>Racking Design Choice</th>
<th>Roof Type</th>
<th>Weight</th>
<th>Recommendation</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballast Mounted</td>
<td>Flat</td>
<td>6-9 lbs/sf.</td>
<td>10 lbs/sf.</td>
<td>No penetrations - easy / cost effective solar install. Heaviest solution.</td>
</tr>
<tr>
<td>Mechanical Attachments</td>
<td>Sloped Flat</td>
<td>2-3 lbs/sf.</td>
<td>Sloped: 5 lbs/sf Flat: 7-10 lbs/sf</td>
<td></td>
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</tbody>
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- Ballast Mounted:
  - Flat: 6-9 lbs/sf.
  - 10 lbs/sf. recommended
  - No penetrations - easy / cost effective solar install. Heaviest solution.

- Mechanical Attachments:
  - Sloped: 2-3 lbs/sf.
  - Flat: 7-10 lbs/sf.
  - Sloped: 5 lbs/sf

**Note:** Sometimes designs can be both where it’s mostly ballasted, but requires a few penetrations to meet wind loading requirements.
# Special Racking Solutions

<table>
<thead>
<tr>
<th>Racking Design Choice</th>
<th>Roof Type</th>
<th>Weight</th>
<th>Recommendation</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelet Racking</td>
<td>Flat</td>
<td>7-10 lbs/sf.</td>
<td>15 lbs/sf</td>
<td>Heaviest solution due to density.</td>
</tr>
</tbody>
</table>

★ City of Boston E+ 273 Highland St to achieve maximum energy density
Code Req’s & Equipment Location
Solar Setback Code Requirements

Flat Roof:

- 4’ from edge of the roof
- For buildings greater than 250 ft in width, an 8’ or 4’ access path must be inserted every 150’ (Fire Lane).

★ Setback requirements can vary based on township. Collaborating with local inspectors is encouraged when in doubt.

Sloped Roof:

- Depends on use of building - multifamily buildings typically need a 3ft path from each eave to ridge, and up to a 3ft path along the ridge
- Snow Guards: Additional setbacks from the eaves are also recommended to make space over walkways and entryways
Solar Fall Protection Planning

Fall Protection During Construction:
- **Flat Roofs:** Weighted Rails
- **Sloped Roofs:** Temp anchors
- *No advanced planning needed here typically*

Fall Protection for Ongoing O&M:
- A parapet wall > 39” in height
- Tie-Backs / Roof Anchors to Clip Into (See Image)
  - A: Requires blocking - must be planned early.
  - B: Can upgrade to “davits” with stronger attachment to cover window washing
- A permanent metal rail along the roof’s edge

**OR**
- 10’ from roof’s edge (very uncommon)

Example Tie-Back for fall protection
Thank You!