Grafton Solar
Photovoltaics (PV)
March 28, 2013
## Proposed Solar Electricity in Grafton

<table>
<thead>
<tr>
<th>Site</th>
<th>System Size (kW DC)</th>
<th>System Size (kW AC)</th>
<th>Energy (kWh/year)</th>
<th>Area (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grafton Campus</td>
<td></td>
<td></td>
<td>11,325,421</td>
<td></td>
</tr>
<tr>
<td>Science Park</td>
<td>1,296</td>
<td>1,000</td>
<td>1,702,000</td>
<td>4.8</td>
</tr>
<tr>
<td>Knoll</td>
<td>2,580</td>
<td>2,000</td>
<td>3,380,000</td>
<td>14.00</td>
</tr>
<tr>
<td>Total</td>
<td>3,876</td>
<td>3,000</td>
<td>5,082,000</td>
<td>18.80</td>
</tr>
</tbody>
</table>

Grafton solar % Grafton Total: 45%

Grafton solar % University Total: 8%
Proposed Grafton Solar Project

- Two ground mounted systems
- Owned and operated by solar developer
- Solar developer sells Tufts electricity
- All solar generated electricity is used by Tufts
- Contractual vehicle is Power Purchase Agreement (PPA)
Power Purchase Agreement (PPA)

- Long-term (20 year) agreement between the solar provider and the host (Tufts)
- Host is obligated to buy ALL power generated from the solar installation
- Fair market value buyout option starts in year 6 of contract
- Contractual financial guarantees for system removal and site restoration
Solar PPA Benefits

• Affordable
• No on-going maintenance costs
• Locks in “all in” price of electricity
• Provides hedge against future price increases for 45% of campus needs
• Demonstrates Tufts’ leadership and commitment to climate change action
Emissions Reductions
U.S. Environmental Protection Agency’s Greenhouse Gas Equivalencies Calculator

The systems will generate approximately 5,082,000 kWh of electricity annually to avoid

This is equivalent to:
Annual greenhouse gas emissions from
CO₂ emissions from 3,586 Metric Tons of Carbon Dioxide emissions
CO₂ emissions from 747 passenger vehicles
CO₂ emissions from 401,974 gallons of gasoline consumed
CO₂ emissions from 8,339 barrels of oil consumed
CO₂ emissions from 47 tanker trucks’ worth of gasoline
CO₂ emissions from 537 homes for one year
CO₂ emissions from 185 homes for one year
CO₂ emissions from 91,939 tree seedlings grown for 10 years
CO₂ emissions from 2,939 acres of pine or fir forests
CO₂ emissions from 28 acres of forest preserved
CO₂ emissions from 149,400 propane cylinders used for home barbeques
CO₂ emissions from 1,343 tons of waste instead of sending it to landfill

Carbon sequestered by
Carbon sequestered annually by

Estimated forest acreage to be removed: 11
Benefits of Ground Mounted

- Ability to build large scale systems
- Simpler, less expensive installation
- Easiest to maintain
- Lower installation costs reflected in cost of power for 20 years
- Mounting angle is optimized (usually 30 degrees)
- Direction is optimized (due south)
The Solar Developer

- **SunEdison** selected after a rigorous competitive process lead by PowerOptions
- Selection based on best PPA pricing methodology, 10 year SREC fixed value, willingness to develop large and small projects, strength of company and team, **financial backing**
- SunEdison is a subsidiary of MEMC Electronics Materials, a global leader in polysilicon and silicon wafer manufacturing (the foundation of most solar cells and semiconductor devices)
Sites Selected for Development

The Knoll
Science Park Phase II

The Knoll
Grafton Science Park
Science Park Phase II
South East

Location shifted
Reduced system size
Net-metered: Generation assigned to main campus meter
Science Park

– System engineering just completed
– To be reviewed by Tufts
– Submitted to National Grid for review
– SunEdison performing due diligence at the site
The Knoll
View from Route 30 Looking South
The Knoll – Simulated
View from Route 30 Looking South
The Knoll – Simulated
View from Access Road Looking South
What is the technology?

• The preliminary designs use:
  – Modules:
    MEMC-M310AMC
    Manufacturing locations in the US and worldwide
  Inverters:
    AE Solaron 500
    AE Solaron 333
    Solaron products built in the US are fully compliant with the Buy American Act

• The final design could use a different manufacturers’ panel
Important to remember that...

- The solar system cannot provide power during an emergency
  - Electric code requires that the photovoltaic arrays automatically disconnect with the loss of utility power to prevent back feeding the utility grid and possible electrocution of personnel
Project Status

• Sites finalized
• PPA language amended with “out clause” should property tax negotiations fail
• PPA signed September 2012
• Preliminary engineering completed
• Knoll interconnection submitted to Ngrid January 2013
• Science Park interconnection to be submitted April 2013
• Local permitting process
• Construction anticipated in Fall 2013 or spring of 2014
More information:

- PowerOptions [www.poweroptions.org](http://www.poweroptions.org)
- SunEdison [www.sunedison.com](http://www.sunedison.com)