NTU
Solar projects

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Land Grant Projects

Solar Air-Collectors

Greenhouse Solar Arrays
Restoring Solar Air-Collectors

- **Restoring 98 solar air collectors**
  - Disassemble collectors
  - Strip caulking from Selective absorber, Back absorber & Housing
  - Remove old insulation
  - Sand all components to remove rust

- **Priming & Painting Units**
  - Rust is sanded out off metal surfaces
  - The units are painted black
Steps in restoration process

- Disassembling collectors
- Stripping caulking from components
- Removing old insulation
- Sanding all the components
- Priming all the components
- Painting all the components
How It All Works
Next step for collectors

• Install the air collectors
  ➢ Veterinary clinic barn
  ➢ Greenhouse
  ➢ Buildings on campus
  ➢ Community homes
NTU Greenhouse P.V. System

- Finish wiring the P.V. System
  - Bending conduit & securing conduit
  - Installing Enphase Micro-inverters
  - Grounding the entire system
  - Installing junction boxes & disconnects
  - Pull conductors & terminate conductors
Planning installation

This design has 20' 5 ¾" x 22' 3 ½" platform

Wiring diagram for the entire system
Planning the placement of mounting poles

Daystar reading

Schedule 80 pipe background

Daystar reading at each array

5’ hole

2½’ deep trench

2” of gravel at the bottom
PV modules

- **Canadian Solar** Model: CS6P-235PX
- Rating: 235W, 29.8V, 7.90A
- The modules are Polycrystalline Silicon Material
- The Array is all connected in Series to produce high voltage.
### Calculated performance

1 panel = 235W, 29.8V, 7.90A

<table>
<thead>
<tr>
<th>Panels</th>
<th>Total Watts</th>
<th>Total Voltage</th>
<th>Total Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1410w</td>
<td>178.8v</td>
<td>6 Panel Array - Eastern side</td>
</tr>
<tr>
<td>3</td>
<td>705w</td>
<td>89.4v</td>
<td>3 Panel Array - Western side</td>
</tr>
<tr>
<td>6</td>
<td>1410w</td>
<td>178.8v</td>
<td>6 Panel Array - Northern side</td>
</tr>
</tbody>
</table>

Total Watts 3,525W
Total Voltage 447 V
Total Amps 7.90A
Conduit, J-boxes, Disconnects

30 degree bend

10 degree bend

Secured conduit

Mounted J-box

Terminating conductors

Line over Load
Enphase Micro-inverters

Top of inverter

Wrong installation

Bottom of inverter

Proper installation
Protecting the system

# 6 bare conductor & 2/0 Ground rod

20A disconnect & Lightning arrester
Solar Array & Greenhouse

Before

After
The next step of research

- Laser scan the array
- 3D model array from laser scan
- Import model into a energy analysis software
- Simulate Irradiance levels
- Subject model to stress test from wind gust, or shadow study
Point cloud & 3D model
Acknowledgements:

1. AIHEC
2. USDA
3. AIREI
4. Navajo Technical University
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Thank you!