2008 Solar Annual Review Meeting

Session: PV MT Activities
Crowder College MARET Center

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Missouri **A**lternative & **R**enewable **E**nergy
Technology **Center**

Relevance to the Solar Program

MARET Facility Project:

1. Addresses goal of SAI of cost reduction for solar parity;
2. Provides systems design for PV combining and BOS;
3. Develops technologies not identified in SAI;

Project Beginning Date	FY07 Budget	FY08 Budget	Total Budget
6/1/2006	$0.96	$0.99	$5.10
			(Incl. Match)

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2. Provides systems design for PV combining and BOS;
3. Develops technologies not identified in SAI;
4. This project is partially funded by DOE Earmarks.

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	(Earmark)	(Earmark)	(Incl. Match)

Project Specific Information

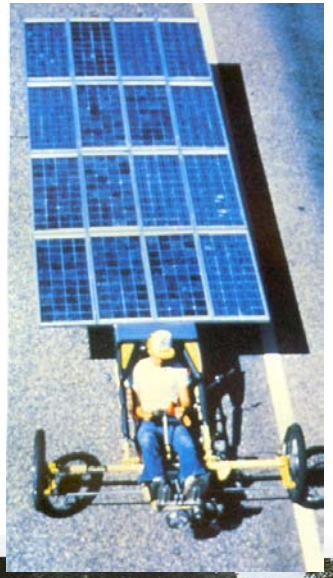
MARET Facility Project:

1. Provides experimental platform to develop energy systems;
2. Integrates PV and thermal conversion (PVT Hybrid module);
3. Uses installation procedures with conventional module appearance and packing;
4. Utilizes building envelope and delivery systems as BOS;
5. **Potential**: **double energy conversion and delivery from existing PV modules.**

The Crowder MARET Center serves Renewable Industry with . . .

- Educational programs
  - renewable energy & construction tech
- Applied research
  - new product development
- Renewable Business assistance
  -incubator/start-up/assessment

MARET Roots : Community College Competition-Based Applied Research



Crowder College's "Star II" on the road racing.

Crowder's "Star II" is tilted toward the sun to help recharge its batteries on the morning of the second day in Floral City, Florida.

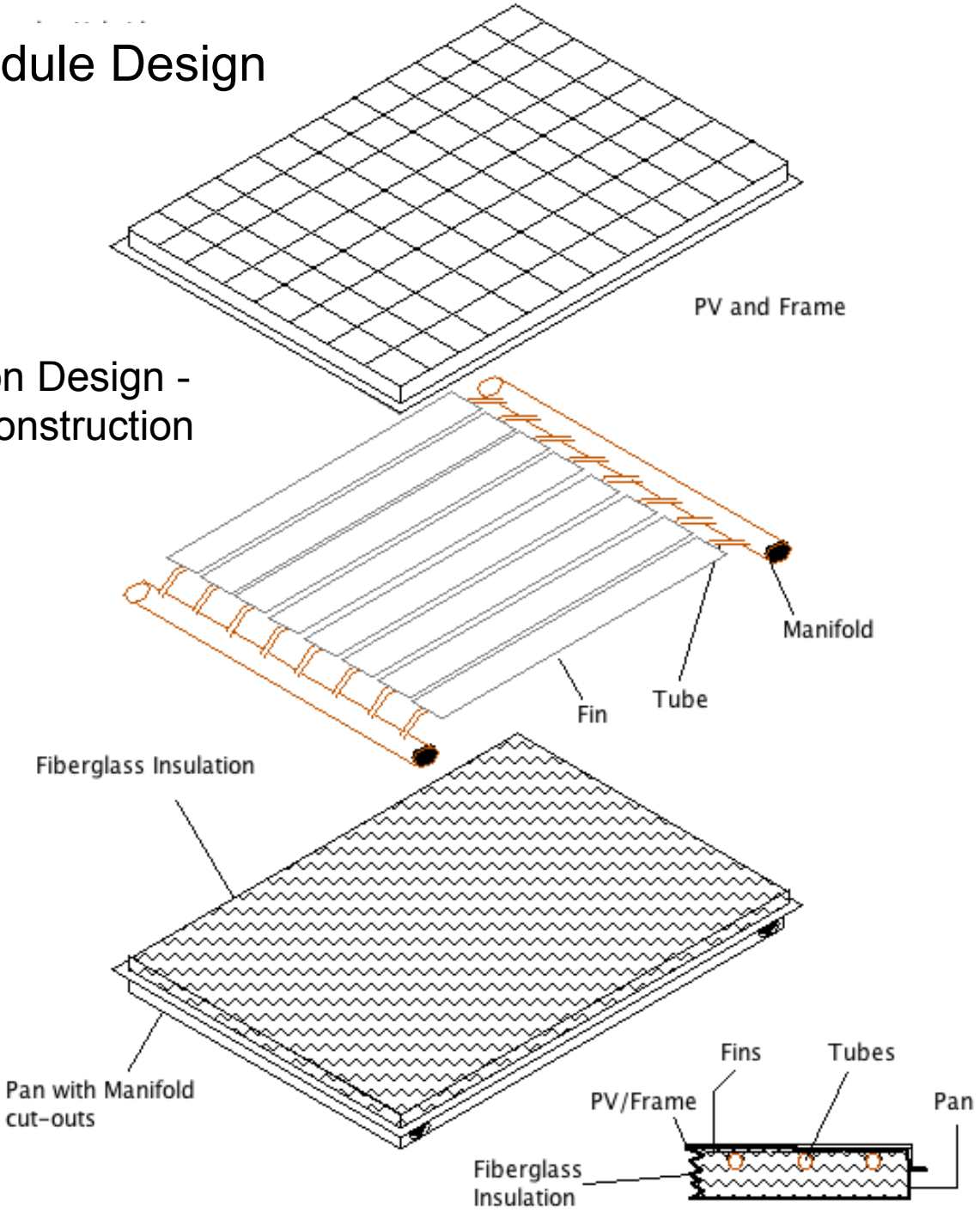

2002 SOLAR DECATHLON
NATIONAL MALL

Solar Decathlon

ENERGY WE CAN LIVE WITH

PVT Module Design

2005 Decathlon Design -
Modularized construction

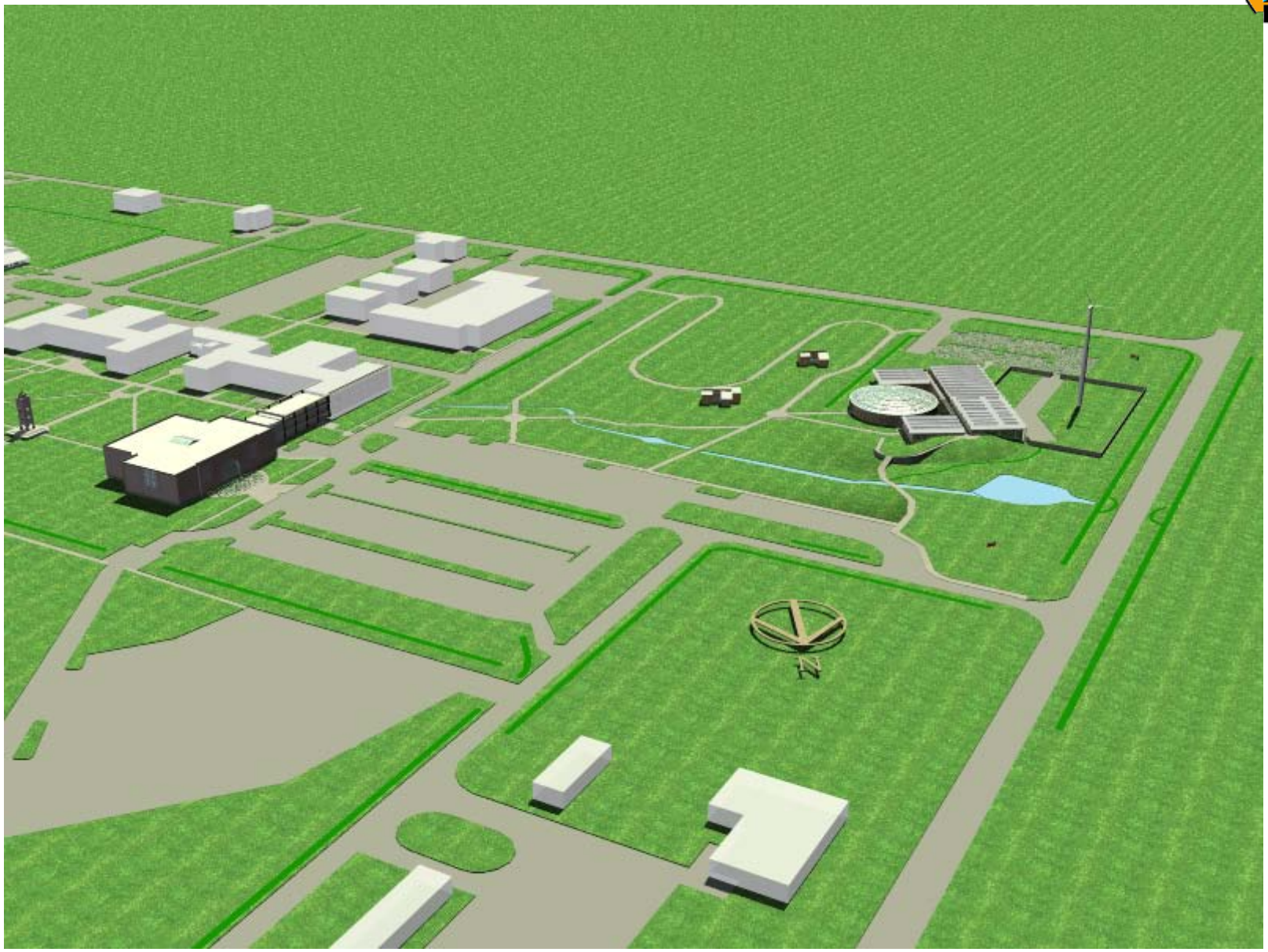


PVT Hybrid Design Criteria

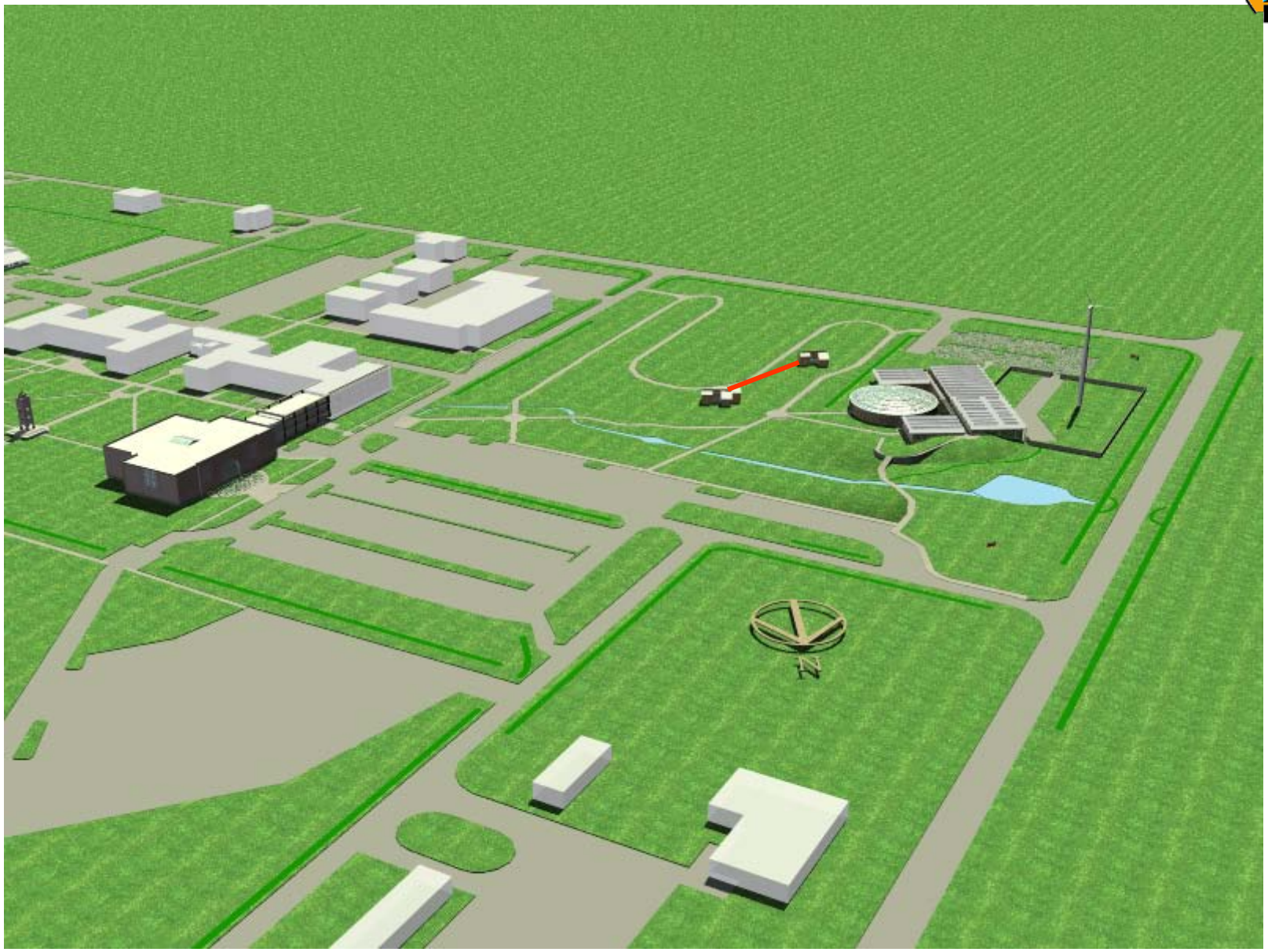
- PV conversion efficiencies comparable to un-modified module
- Thermal conversion equal to or greater than electricity production
- Module mounting and array density comparable to standard PV
- Thermal collection @ 35ºC ΔT to ambient.

Decathlon homes return to Crowder to become part of *another* solar village...

MARET Center and Energy Park



MARET Center and Energy Park (LVDC)

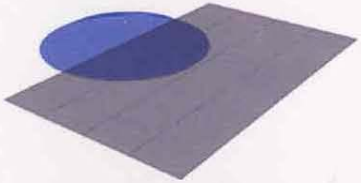


MARET Facility Plan -

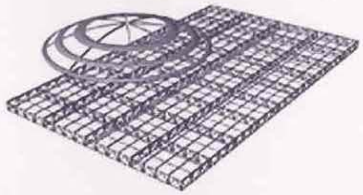
- Structure to house program activities
- Learning and demonstration lab
- Flexible format for future needs
- Transferability to other buildings

3D Images

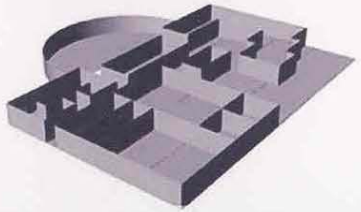
Crowder College



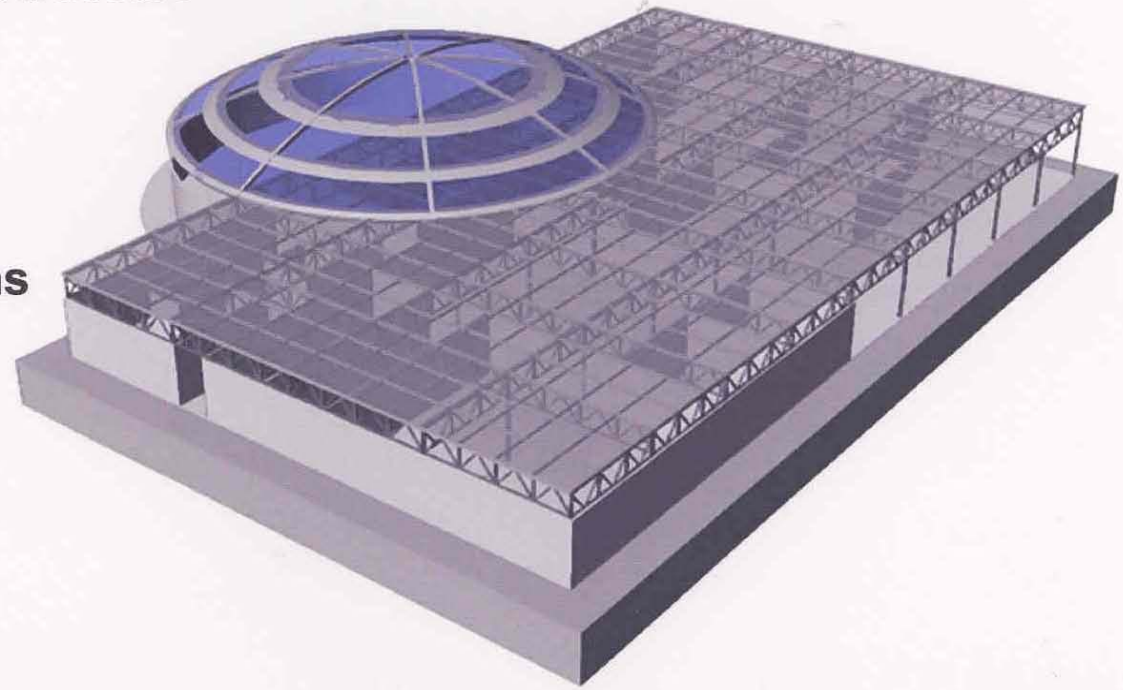
Roof

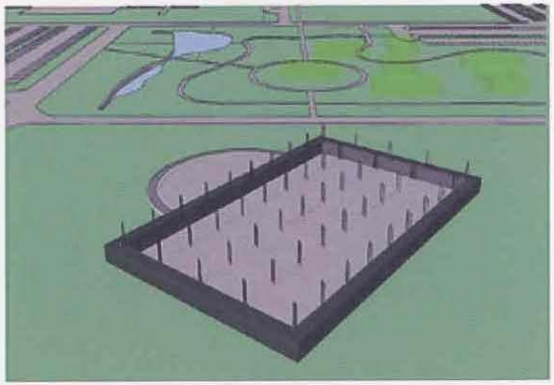


Energy Structure



Interior Partitions



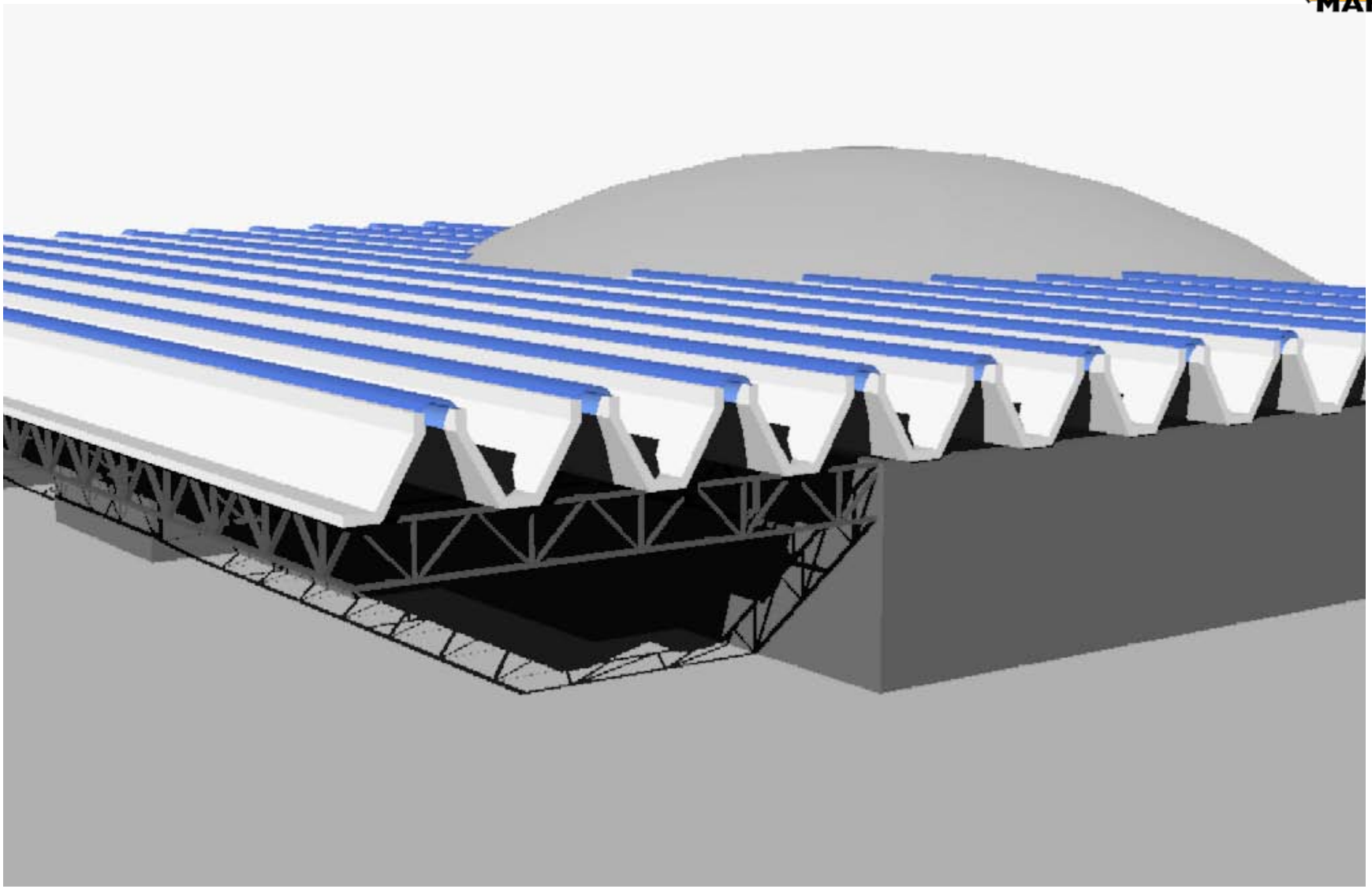


Energy Distribution Structure

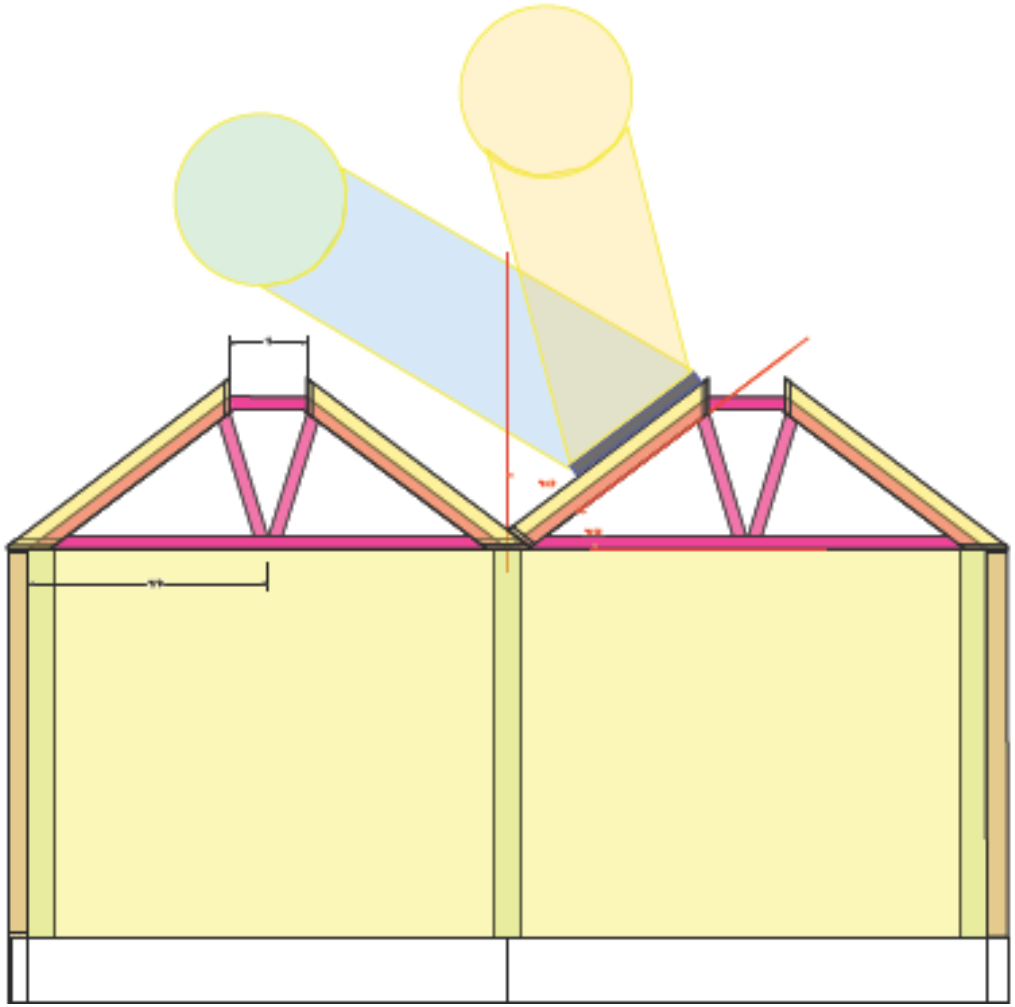
Facility Design Criteria

- Efficient envelope & internal systems
- Load shifting from PV whenever possible
- Diverse renewable power sources
- Grid-tie with UPS capability for plug power
- LEED Platinum Certification
- *Positive* net energy to grid

MARET Roof System



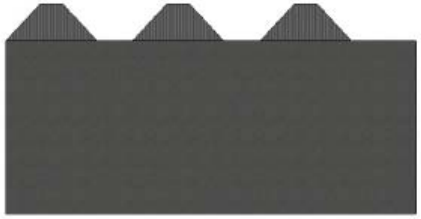
Multiple Collection Systems

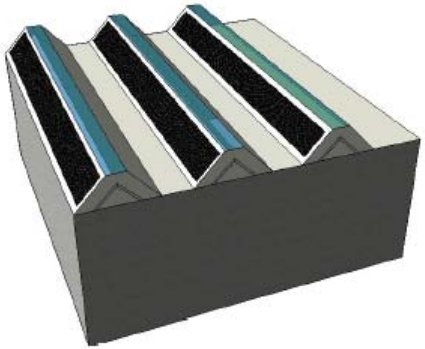


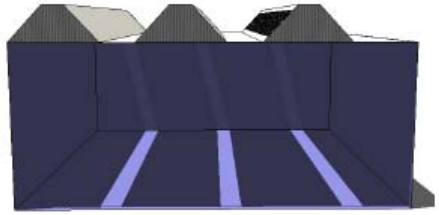
Base 2: Overview

The top lighting configuration shown to the right utilizes 47 degree angles with a 2 ft glazing aperture centered in the middle. This approach is similar to the Kimbell Art Museum in Dallas, Texas.

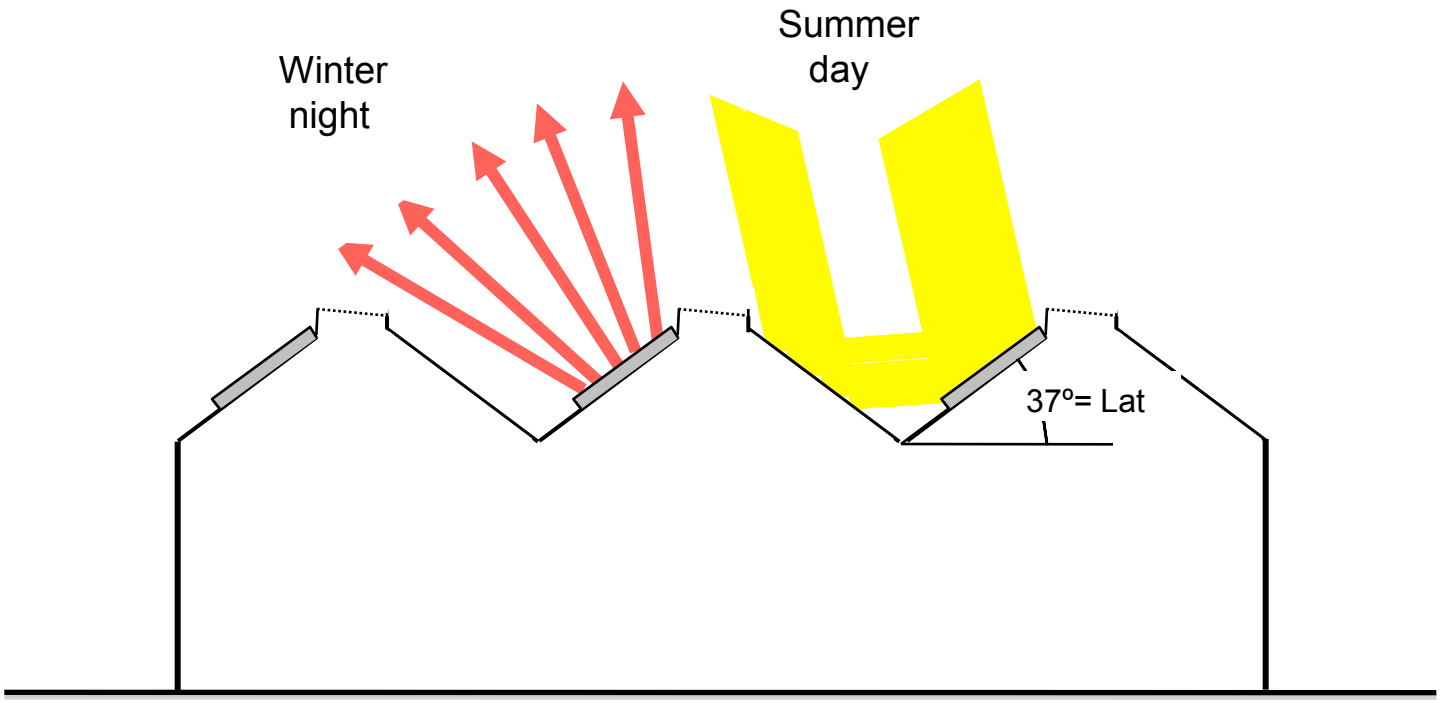
The roof monitors are spaced approximately 3ft-6in apart. The bottom right image shows sun penetration on June 21st at noon.







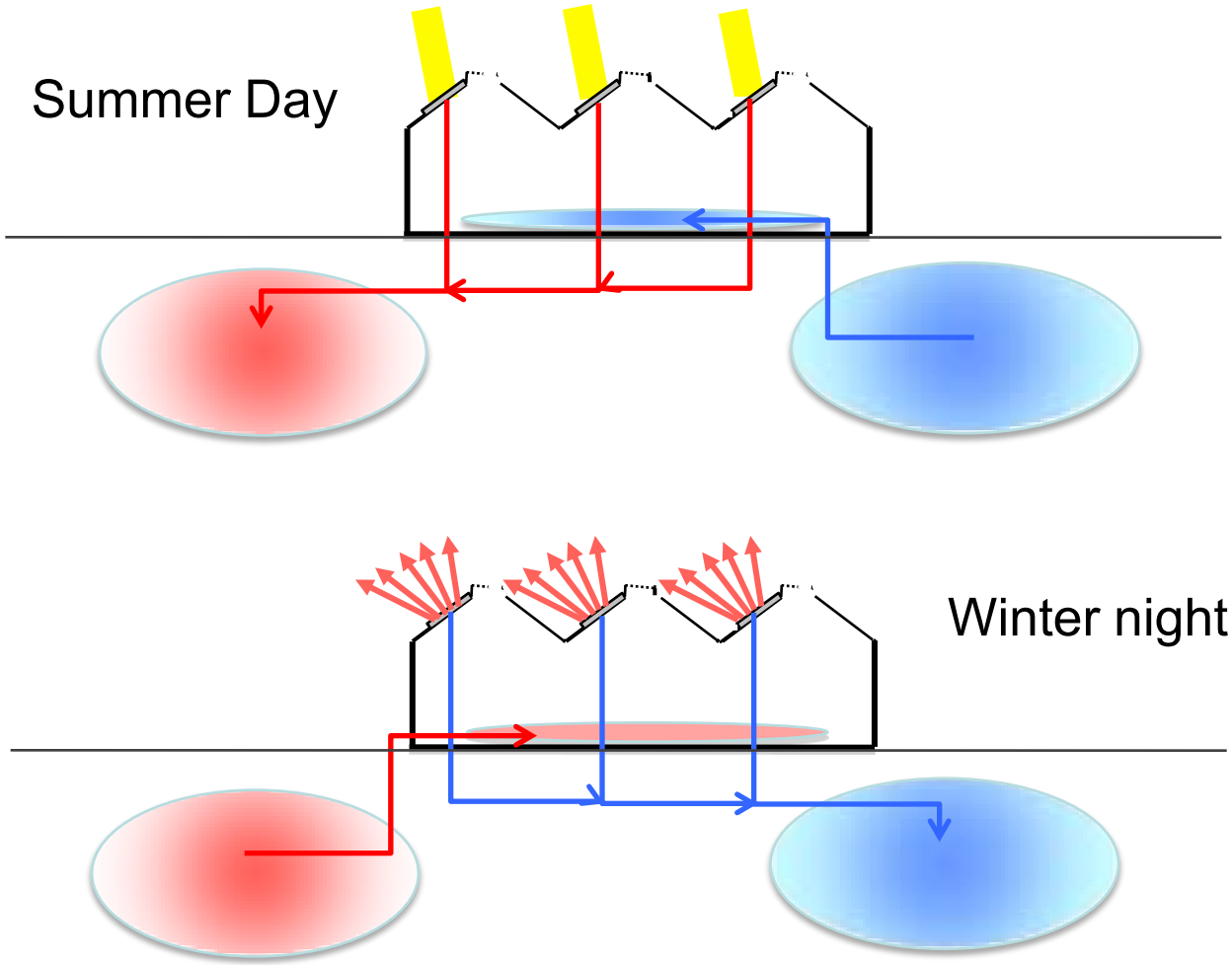
HPVT Optimal Seasonal Thermal Collection Modes



Energy Utilization, BOS

- PV is optimized for cooling loads
- Radiant delivery of heating and cooling
- Thermal displacement of cooling load
(40% of load = desiccant dehumidification)
- Potential for seasonal thermal storage
(multiple ground-source well fields)

Seasonal Thermal Storage Modes



MARET Center Phase 1

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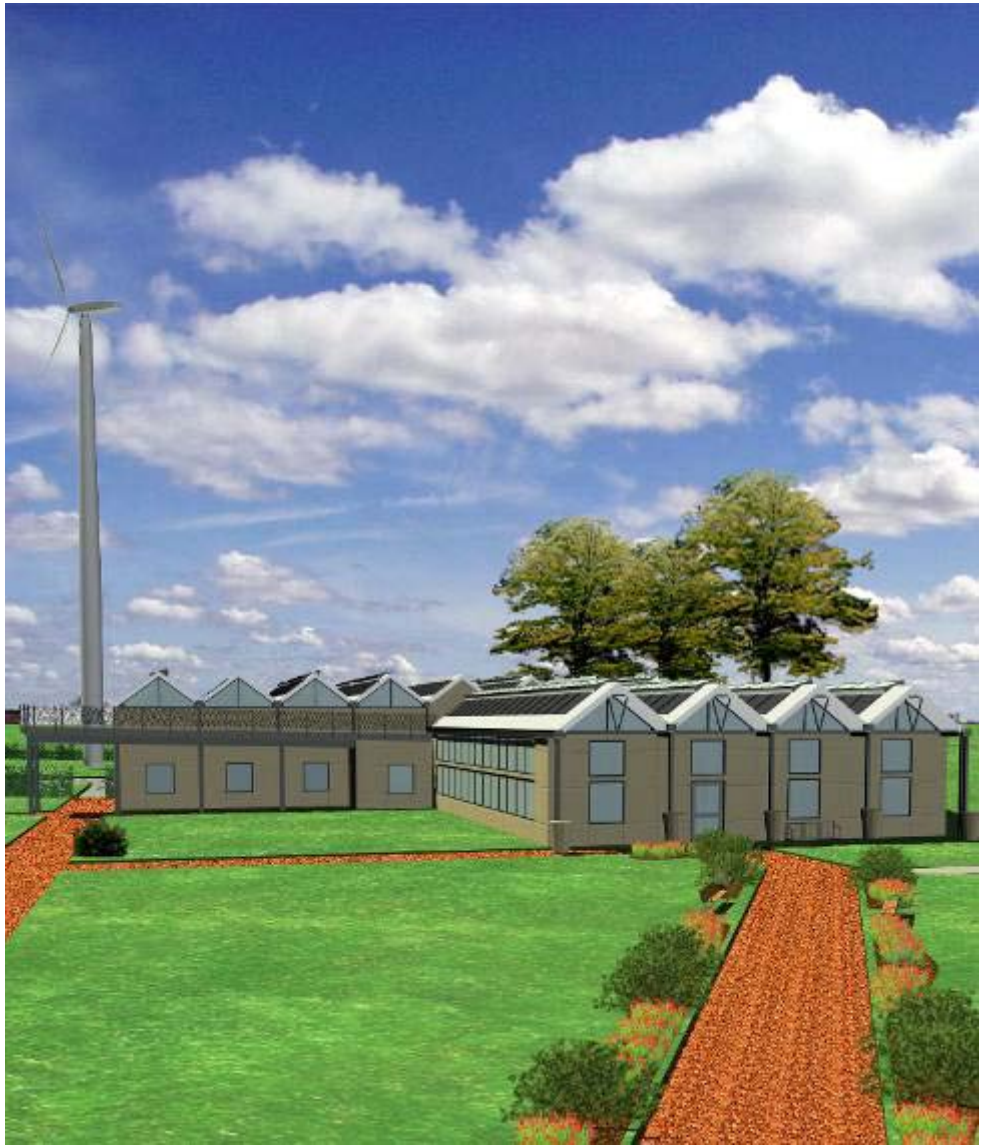
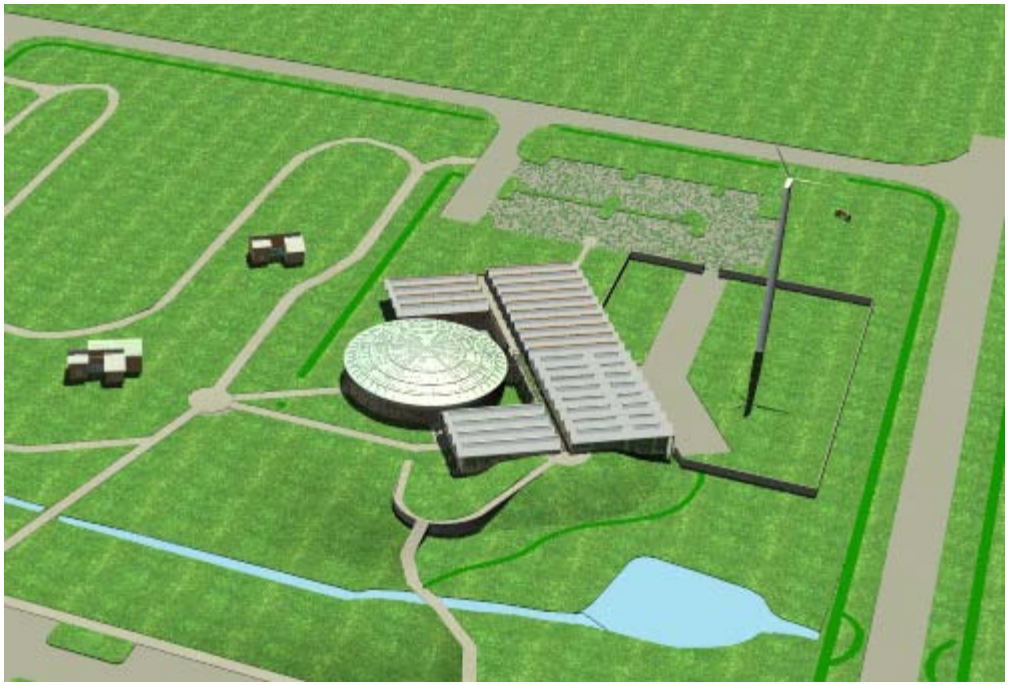


MARET Center Phase 1

MARET Prototype Structure

65 kW Nordtank Turbine

Parting Thoughts



- We welcome partners and collaborations;
- DOE solar competitions have important role;
- SAI can benefit from unidentified technologies.
- Thanks!

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