2008 Solar Annual Review Meeting

Session: PV MT Activities
Crowder College MARET Center

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Missouri Alternative & Renewable Energy 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;

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(Incl. Match)
Relevance to the Solar Program

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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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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
Solar Decathlon

ENERGY WE CAN LIVE WITH
PVT Module Design

2005 Decathlon Design - Modularized construction
PVT Hybrid Design Criteria

- PV conversion efficiencies comparable to unmodified module
- Thermal conversion equal to or greater than electricity production
- Module mounting and packing comparable to std. PV
- Thermal collection @ 35°C 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
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.
Roof Collector Augmentation

Winter

Summer

= 37° Lat

= 37° Lat
Energy Utilization, BOS

• PV optimized for cooling loads
• Radiant delivery of heating and cooling
• Thermal displacement of cooling load
  (desiccant dehumidification)
• Potential for seasonal thermal storage
  (multiple ground-source well fields)
Seasonal Thermal Collection Modes
MARET Center Phase 1
MARET Center Phase 1
MARET Prototype Structure
65 kW Nordtank Turbine
Parting Thoughts

• Solar Annual Review Meeting is very valuable;
• We welcome partners and collaborations;
• DOE solar competitions have important role;
• SAI can benefit from unidentified technologies.
• Thanks!