



Solar Energy Innovation

David Riley, Assoc. Professor
Penn State Architectural Engineering



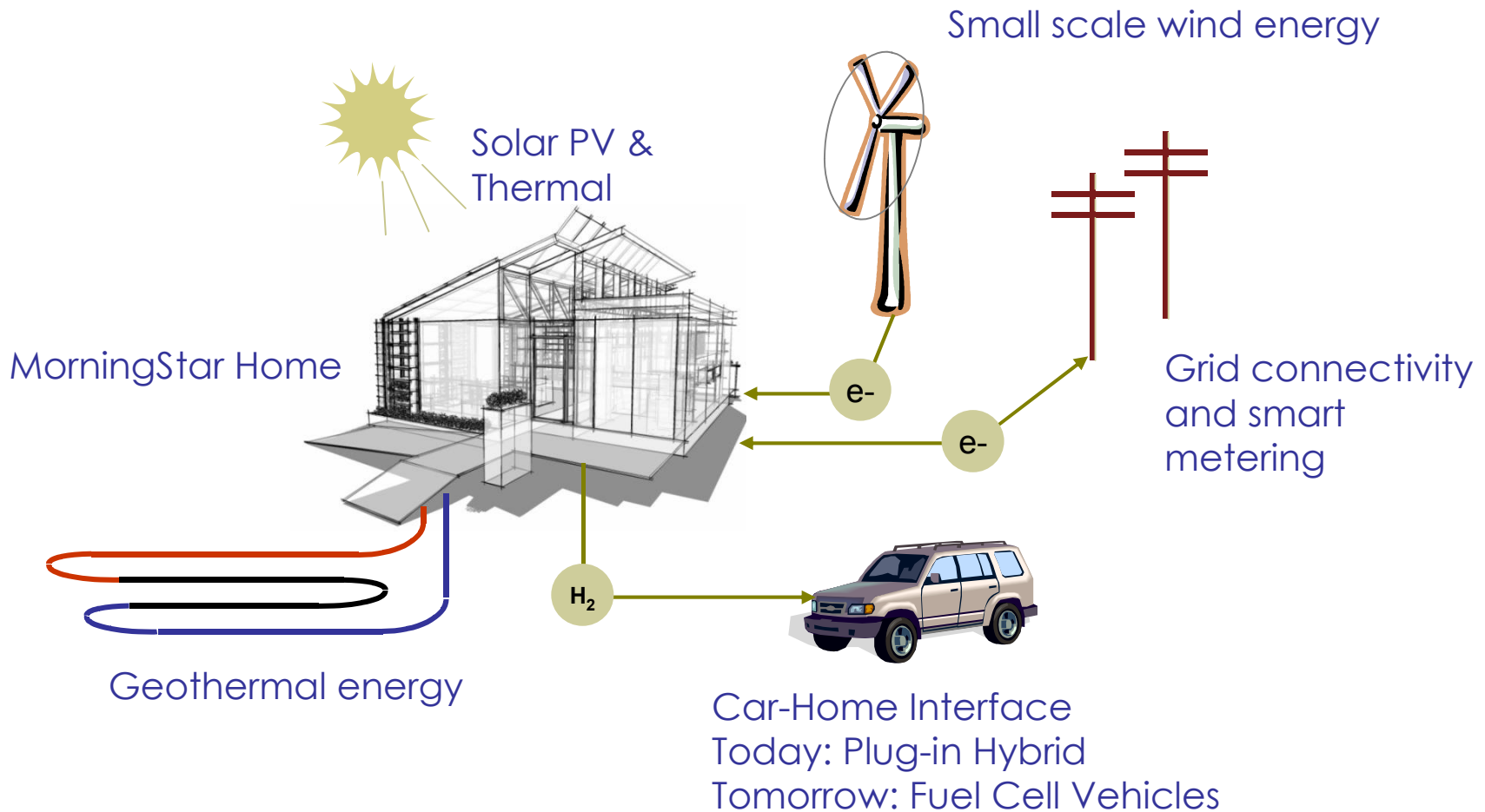
The **MorningStar Home** will serve as a **teaching and research** facility dedicated to *renewable energy systems and energy efficient technologies*.



MorningStar at the Penn State Visitor Center – Open for tours, special events, and now, as a data collection facility.

Hybrid Renewable Energy Systems (HyRES) Laboratory

MorningStar Hybrid Energy System (permanent site)





Background

- Research emphasis: Green buildings and sustainable technologies
- Development of new solar energy / energy efficiency research program at Penn State
- Implementing new curriculum in renewable energy systems
- Currently conducting research on solar energy growth for Center for Env. Innovation in roofing



Agenda

What's new?

Research Update

Outlook



What's new?

Economy

Bailouts

New administration

“Stimulus”

PENNSSTATE



Center for Sustainability

People

Pennsylvania

Planet

Solar Energy?



Solar Energy?

Here to stay?

Should I get in the business?

How should I get started?

How can I differentiate?



Research Update

Goal: Assess contracting/business strategies for building integrated solar systems

Scope: Solar roofing applications and energy efficiency integration



Methods

- **Monitor Policy Developments and Workforce Issues** – impacts on the solar industry and roofing industry are being monitored and explored.
- **Case Studies of Roofing Contractors Entering the Roofing Industry** – Case studies, interviews, and site visits of roofing contractors who have entered the solar market.
- **Solar Energy Conference** – A conference/ symposium will draw together experts in policy, finance, workforce, and technology strategies in the solar industry **May 6-7**.



Expected Results

- **Solar and Energy Efficiency Roadmap** – A summary of factors affecting the roofing industry and the rapid growth of solar energy and energy efficiency markets.
- **Best Practices** – Lessons learned from early adopters of solar businesses by roofing contractors including marketing, financing, contracting, warranty, and service programs.
- **Technology Pipeline** – A summary of developing solar PV and racking technologies that will impact the cost and profitability of roofing installations.



Roadmap

Policy Developments

- Portfolio standards
- Federal incentives RE + Green Jobs
- State incentives
- Utility / Grid initiatives
- Next: *Carbon*



Roadmap

Project Innovation

- Finance models
- Public / private strategies
- PV Systems
- Racking / assembly / constructability
- Energy efficiency integration



Best Practices

- **Integration:** Cut out margin stacking
- **Technology:** Seek to add value
- **Financial services:** Know options
- **Electrical contractor:** Manage relationship
- **Warranty:** Align with roof membrane



Technology Roadmap

- **PV Systems:** traditional modules dominate
- **Racking:** Constructability / productivity
- **Micro inverters:** reduce system complexity
- **Energy storage:** Improve ROA
- **Energy Management:** Smart Grid / Feedback





Outlook

All systems go!

Early adopters are seeing profit

We have a long way to go

PENNSTATE



Center for Sustainability

People

Pennsylvania

Planet

Thank you

Contact Us

www.cfs.psu.edu

Mission of the Center for Sustainability:

Demonstrate national leadership in the development of global citizens through integrated research, education and outreach efforts that advance the ethic and science of environmental sustainability.

