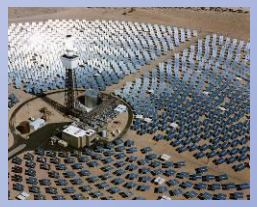
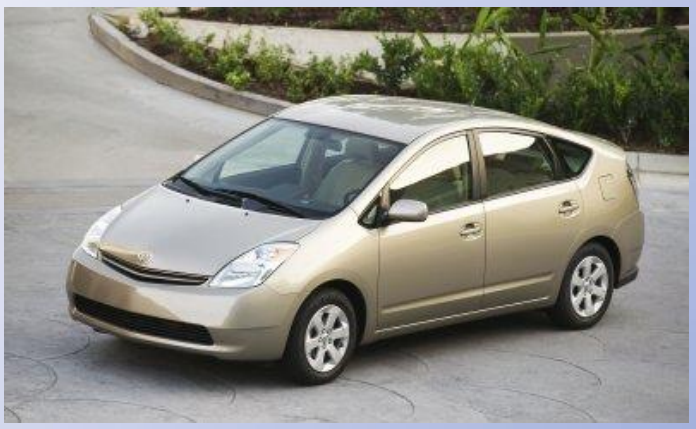
The 21st Century Energy Revolution and its Impact on Research Innovation, Technology Development, and Teaching

P. T. Krein
Grainger Center for Electric Machinery and Electromechanics
Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign


The 21st Century Energy Revolution

- We are entering a new energy revolution: the transformation to sustainable energy.
- Driven by increasing cost and demand for fossil fuels, and concerns about environmental impacts.



The 21st Century Energy Revolution

Generation and use are changing quickly.

www.nrel.gov

Philips Lumileds

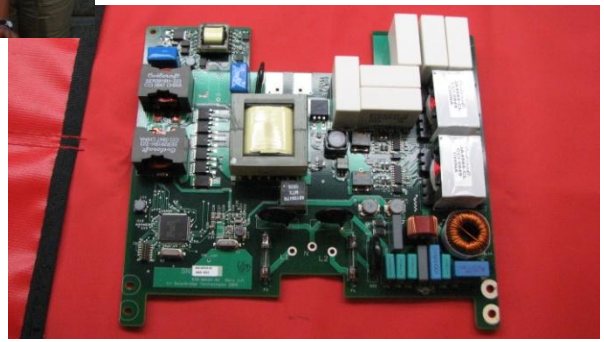
treehugger.com

Illinois plug-in hybrid prototype

Illinois leadership: helping to drive this revolution.

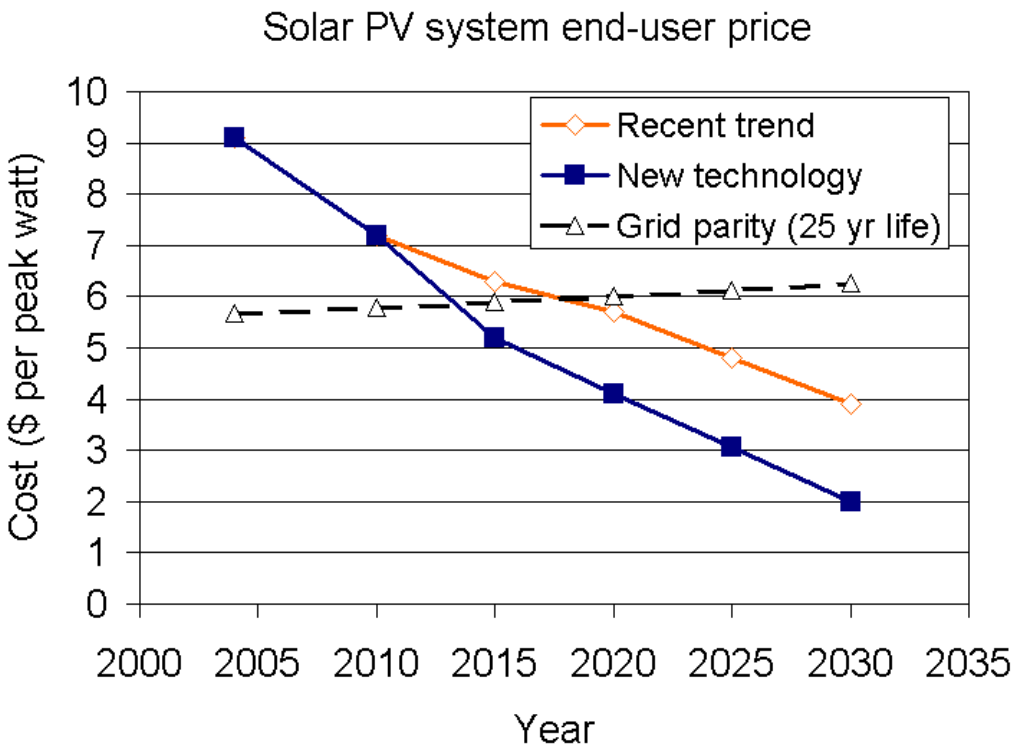
Innovations ahead of their time: technology transfer requires an entrepreneurial linkage.

SOLARBRIDGE TECHNOLOGIES™



SolarBridge Technologies

- Electronics hardware for solar energy.
- Applies innovations from Illinois that will cut costs of solar energy *in half*.
- Devices that last as long as a solar panel: fifty years of low-maintenance electricity.



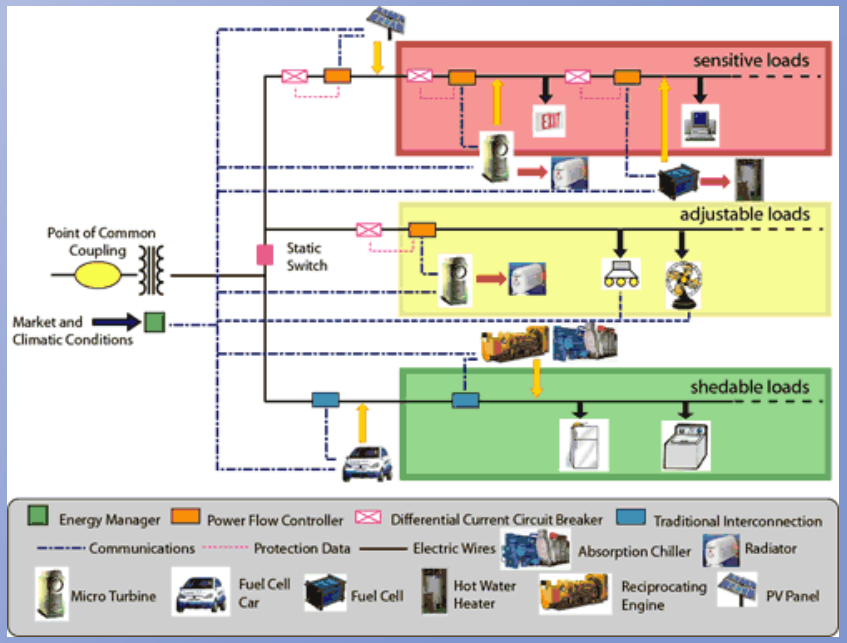
Adapted from Solar Energy Industries Association, "Our Solar Energy Future," 2004, with data updates

SOLARBRIDGE TECHNOLOGIES

Research Cross-Fertilization

- Basic research ←→ technology development ←→ high-impact product realization.
- How to create electronics that will work in a harsh environment untouched for decades?
- What can go wrong, and how to mitigate issues?

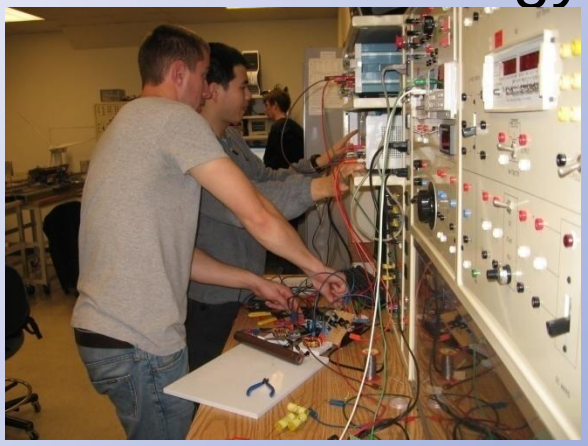
National effort on “microgrid” systems.



certs.lbl.gov

Teaching and Student Activities

- Multiple classes on renewable and alternative energy systems.
- Project courses such as the Solar Decathlon and Formula Hybrid.
- Industry internships.
- Direct classroom experiments on electrical energy systems.



Conclusion

- Illinois research contributions have been far-reaching, and will lead to whole new industries.
- The Research Park concept supports active technology transfer as these industries develop.
- Research interactions on new classes of challenges.