

Photovoltaic Electricity- Green Development, Planning and Market Supply

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Springfield, Illinois May 14, 2003



Nature of Photovoltaic Electricity

- **Smaller and scalable**
 - Building-based in kilowatts of capacity
 - Larger scale in single digit megawatts of capacity
- **Flexible**
 - Ground-based
 - Dual-use
 - On building or part of building
- **Delivers electricity at high demand times**

Nature of Photovoltaic Electricity

- **Function of surface availability**
 - Crystalline technology 8-10 watts capacity per square foot
 - Thin film 4-6 watts per square foot
- **Each 1,000 watts capacity will generate 1,400 to 1,600 kilowatt hours/year**

Nature of Photovoltaic Electricity

- **Market supply has not been scratched yet**
 - **<2 MW installed in Illinois at present**
 - **World production in 2002 ~ 500 MW capacity, ~ 1,600 MW installed total**
 - **1.5% of IL power capacity, based on nameplate, <1% based on capacity factor**
- **\$3.5 Billion industry in 2002**

Nature of Photovoltaic Electricity

- Development and Planning
 - Predictable and scalable development
 - Reduce costs
 - Institutional acceptance

Interconnection Standards and Pricing

- Interconnection primarily below substation level
- Pricing reflect value of electricity
 - **Day, summer and peak rates**
- Addressing small-scale costs of interconnection
 - **Using existing standards of IEEE 929, and UL 1741**
 - **Default standards to reduce metering costs for small (<25 kW) installations**

Siting, Zoning and Construction Issues

- **Low profile/footprint**
 - Solar access
 - Aesthetics
- **Zoning minimal for <50-100 kW systems**
- **Construction itself fast (<50 kW)**
 - Installation 1-2 days
 - Wiring/interconnection 1-2 weeks

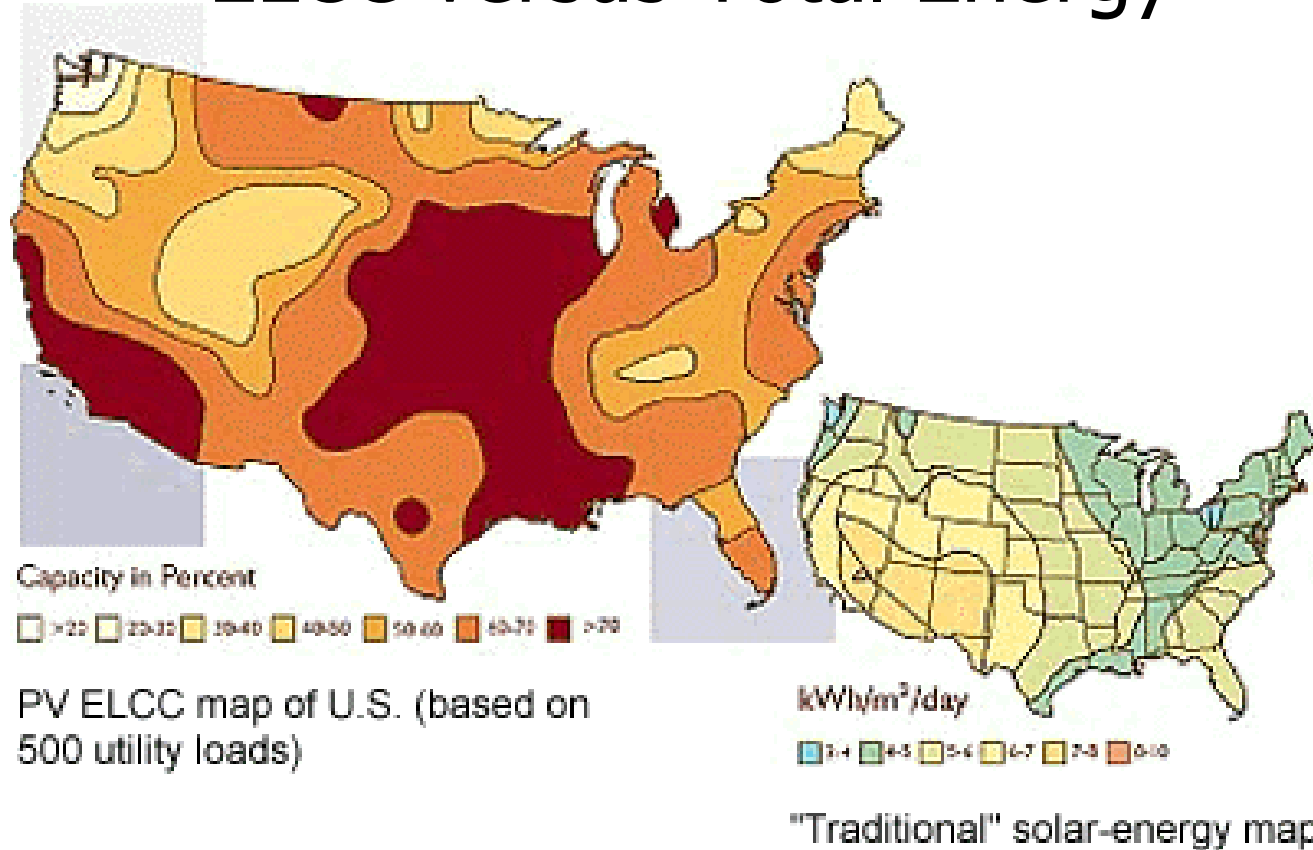
Transmission Constraints

- **Actually can enhance T&D infrastructure**
 - Reduces stress at peak times
 - Conserves existing equipment in high growth area
- **Distribution/Substation level**
 - Little/no problem at 5-10% of capacity
- **Transmission level**
 - Not much impact
 - Big (1 MW) system at summer peak ~ 900 kV

Dispatchability

- Very high Electric Load Carrying Capacity (ELCC)
- Even higher day ahead predictability (using weather forecasting)
- Can approach 100% with energy storage

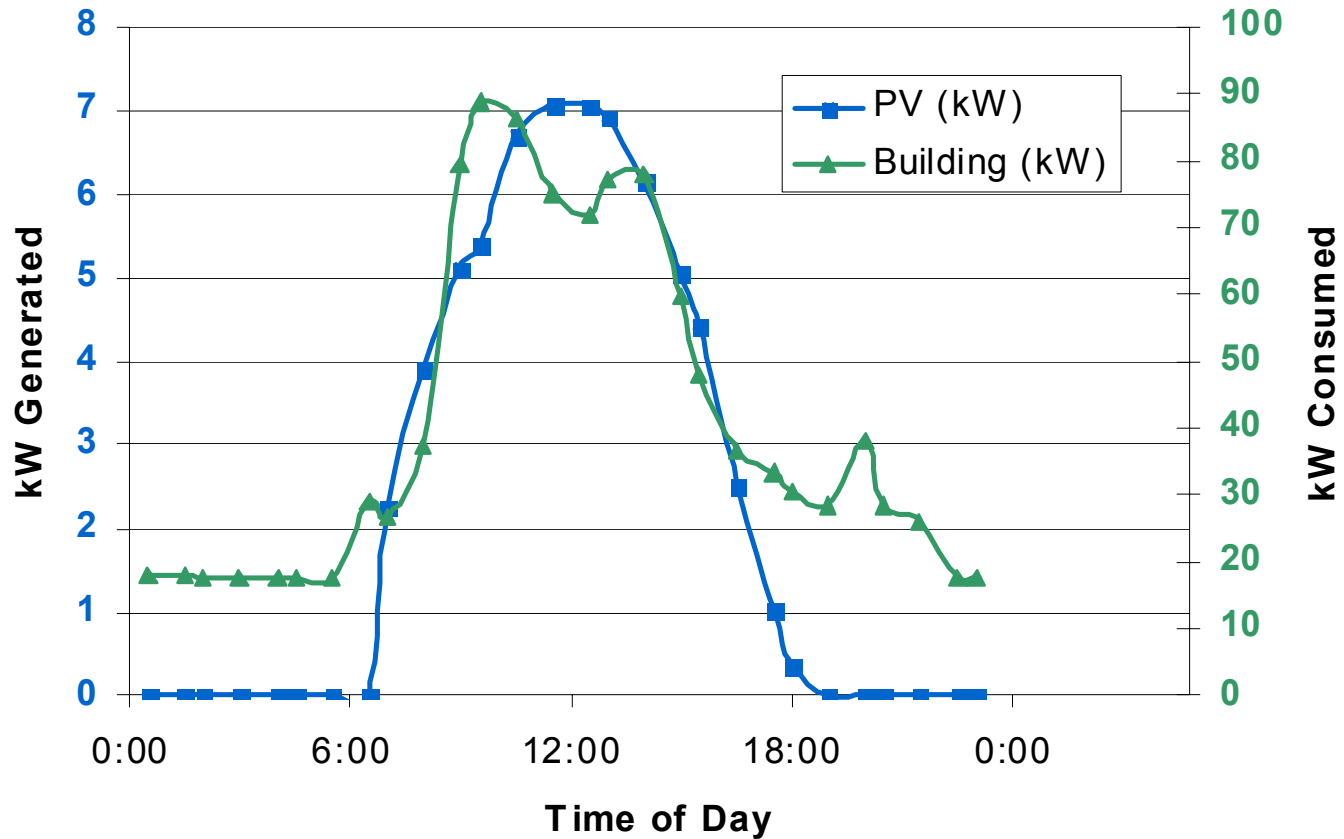
ELCC versus Total Energy



Source: National Renewable Energy Lab

Chicago Load Matching

10 kW School PV System (Aug, 2000)



Thank You!

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