

Task 10 - Urban-Scale PV Applications & US Subsidy for BIPV

Swedish Stakeholders Workshop
Augustenborgs Solar Energy Centre
Malmo, Sweden
Sept. 13, 2006

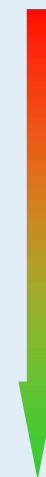
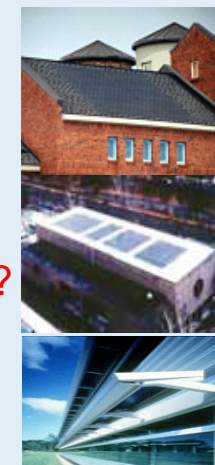
Christy Herig
Segue Energy Consulting, LLC
cherig@tampabay.rr.com

PVPS



IEA Work Leading to Task 10 BIPV in IEA Perspective

- IEA SHC Task 16
What is BIPV ?
- IEA PVPS Task 7
How can we do BIPV ?
- IEA PVPS Task 10
Let's do BIPV !



PVPS

Stefan Nowak, IEA-PVPS Chairman, Feb 3, 2004, Vienna, AUT

Task 10 Countries Participating

Australia	Malaysia
Austria	Netherlands PV-UPSCALE
Canada	Norway
Denmark	Portugal
France	Sweden
Italy	Switzerland
Japan	USA
Korea	

PVPS

Task 10 - Urban Scale PV Applications

Overall objective

The objective of IEA PVPS Task 10 is to enhance the opportunities for wide-scale, **solution-oriented** application of photovoltaic power electricity production in the **urban environment** as part of an **integrated approach that maximizes building energy efficiency and solar thermal and photovoltaic usage**. Value analysis, policy incentives, analysis tools as well as system design and integration that have proven successful in the IEA PVPS participating countries will be developed to the extent possible into a uniform international set of tools for the global market.

PVPS

Task 10-Workplan

SUBTASK 1: ECONOMICS AND INSTITUTIONAL FACTORS

- 1.1 Value analysis
- 1.2 Barriers Resolution
- 1.3 Market Drivers
- 1.4 Market Roadmap

SUBTASK 2: PLANNING, DESIGN AND DEVELOPMENT

- 2.1 Integrating PV development and design practices
- 2.2 Urban Planning

SUBTASK 3: TECHNICAL FACTORS

- 3.1 Building Industry/BIPV Products and Projects
- 3.2 Codes and Standards
- 3.3 Electricity Networks
- 3.4 Market Driven Approach
- 3.5 Certification Practices

SUBTASK 4: TARGETED INFORMATION DEVELOPMENT INTERESTED PARTICIPANTS

- 4.1 Educational tools
- 4.2 Marketing Competition
- 4.3 Marketing approaches and consumer aides
- 4.4 Stakeholder Perceptions
- 4.5 Continuous communication/results

PVPS

Analysis and Research Results will have Multiple Products Targeted at Stakeholders

- **Building Sector:** builders and developers, urban planners, architects, engineers, permit and code authorities;
- **End-Users:** residential and commercial building owners;
- **Government:** supporting, regulatory and housing agencies;
- **Finance and Insurance Sector:** Banks, insurance companies, loan for houses;
- **PV Industry:** system manufacturers, PV system supply chain, retail sector;
- **Electricity Sector:** network and retail utilities; and
- **Education Sector.**

PVPS

Economic Values and Institutional Factors

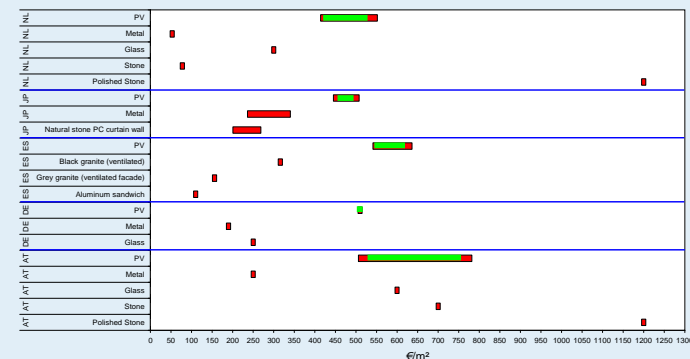
Values

- | | | |
|--------------------------------------|----|----------------------|
| 1. Avoided primary energy (MWh) | -> | Supply Security |
| CO ₂ Saving (g/kWh) | -> | Environment |
| NO _x Saving (g/kWh) | -> | Environment |
| SO ₂ Saving (g/kWh) | -> | Environment |
| (Water Saving (m ³ /kWh)) | -> | Environment |
| 2. External Cost Saving (€/kWh) | -> | Government/Society |
| 3. Peak shaving €/kWp | -> | Utility |
| 4. Market value €/kWp | -> | Utility/PV generator |
| 5. Other values (materials) | -> | Various |

PVPS

Some examples Material Saving – Facade

Costs Range of PV System and Facade Materials (Stand 2004-2005)

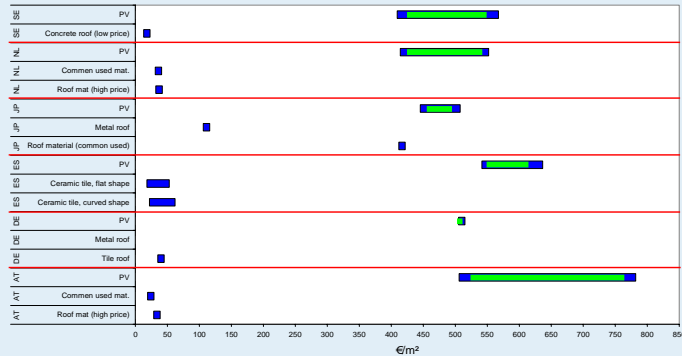


PVPS

Note: Price of PV system is excluding installation costs!

Some examples Material Saving – Roof

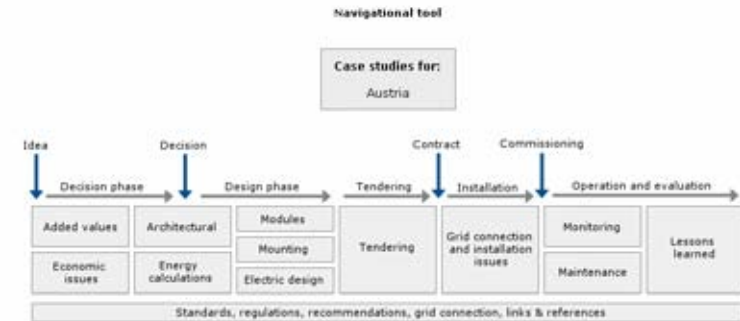
Cost Range of PV System and Roof Materials (Stand 2004-2005)



Note: Price of PV system is excluding installation costs!

IEA PVPS Task 2 and Task 10 Educational Tool

Building Integrated PV - from idea to operation



Name of the projects: Aspem at the Sun
 Location: Vienna
 Project type: Roof / shading device
 Peak power installed: 11.0 kWp
 Start of operation: August 1999



Energy Payback Time Report – The product

One overall presentation (2 A4 pages)



International design competition aimed at fostering innovative ideas relevant to the development of urban structures integrating photovoltaic (PV) systems and technologies.



Technology Market Transition with.....

.....BIPV



.....Solar Communities



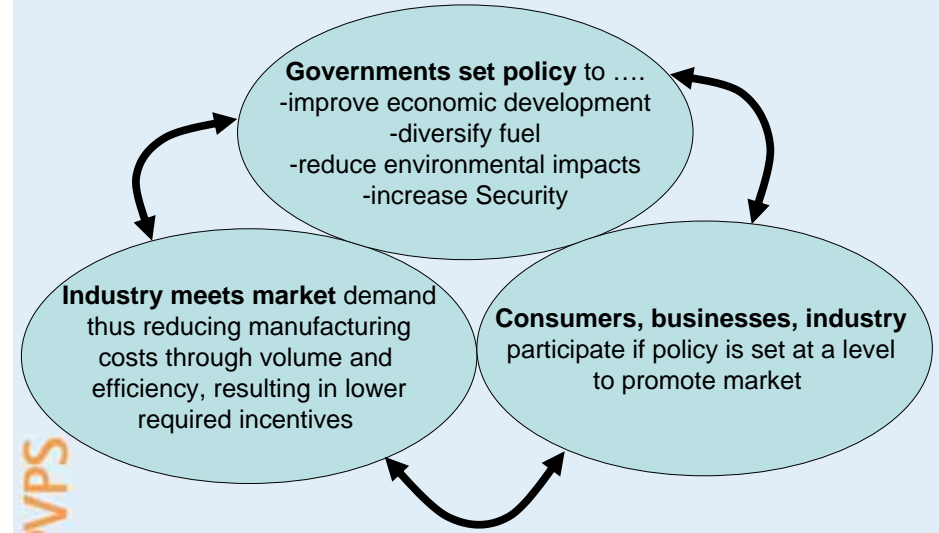
.....Solar Developments



PVPS

© Prof. Kurokawa and Mr. Ozeki, TUAT

Sustained Global "Solar" Market



PVPS

US Subsidies

- Federal
- State
- Local

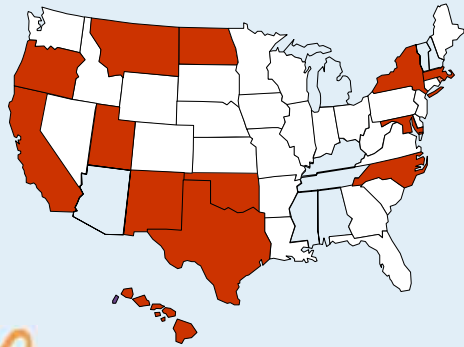
PVPS

Federal Tax Credit

- Commercial
30% of the "tax credit basis" that a company has invested in "eligible property" that is "put into service" during 2006 and 2007.
It is 10% of tax credit basis for property put into service in other years.
- Residential – 30% max \$2,000, 2006 & 2007
Cannot use two years
Advantages to condos and coops
- A tax credit is a dollar for dollar reduction of an entity's Federal tax burden. A tax deduction is deducted from taxable income and therefore has a value equal to the tax rate times the deduction.

PVPS

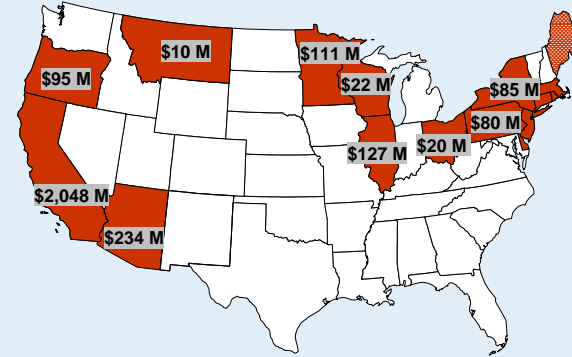
State Corporate Tax Credits & Deductions



- Range from 10% - 35%; \$1,000 - \$10M
- Most are for several technologies – usually solar, wind, biomass
- A few states use production-based credits
- Most states allowing carryover of any unused credits
- 3 states have declining credits over time

State Public Benefit Funds for Renewables

Cumulative 1998 - 2012

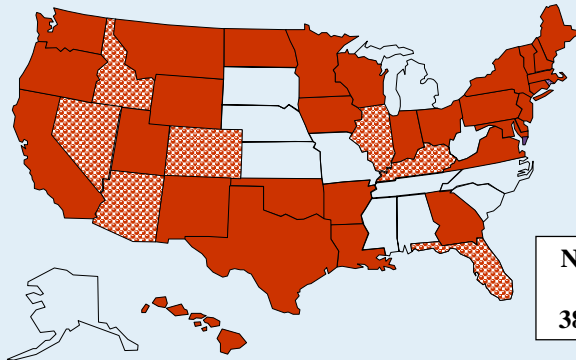


MA: \$383 M
RI: \$10 M
CT: \$338 M
NJ: \$279 M
DE: \$11 M

15 State Funds = \$3.8B by 2012

■ Funded by Voluntary Contributions

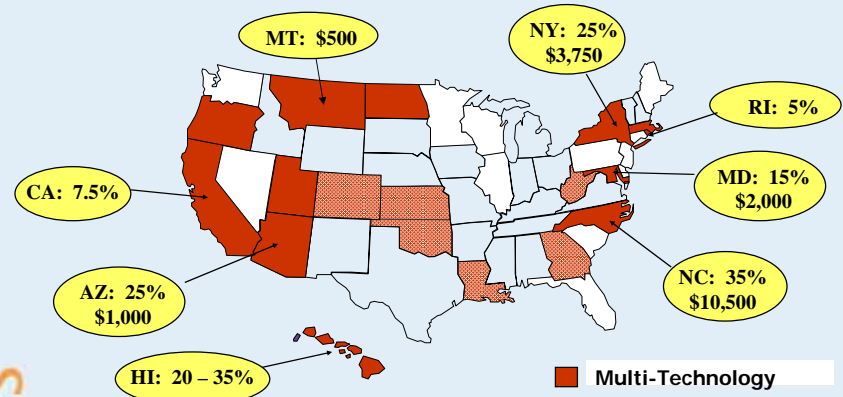
Net Metering Rules



Net metering is available in 38 states + D.C.

- State-wide net metering for certain utility types
- ▨ Net metering offered by one or more individual utilities

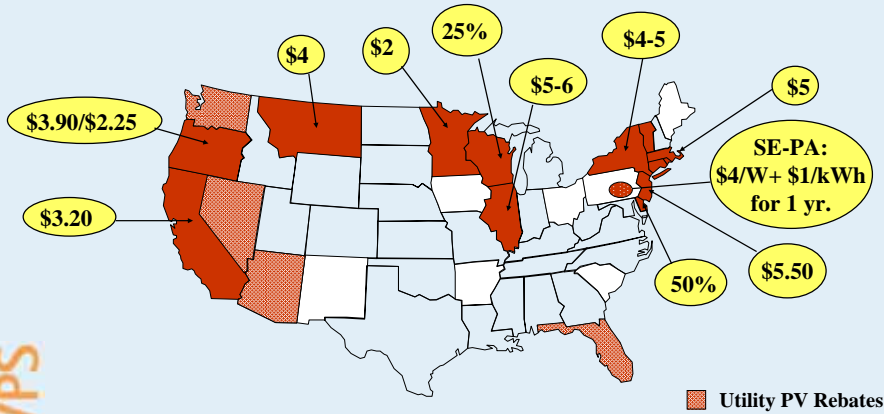
State Personal Tax Credits



- Multi-Technology
- ▨ RE Fuel Vehicles

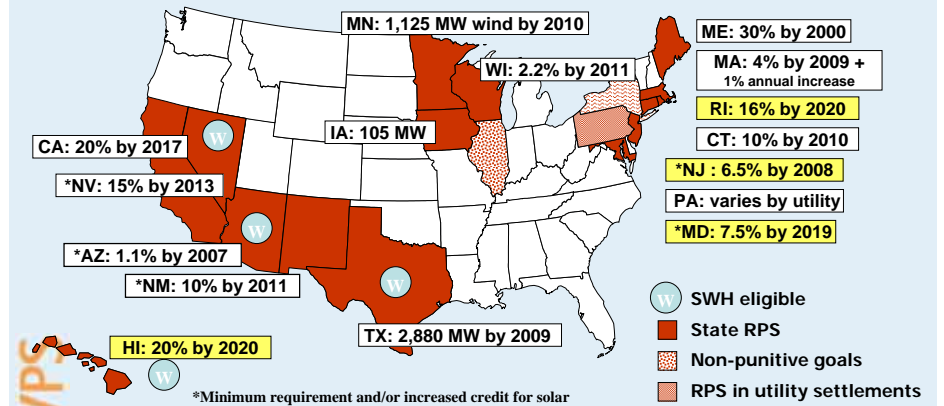
State PV Grants & Rebates

(\$/W or % of costs)



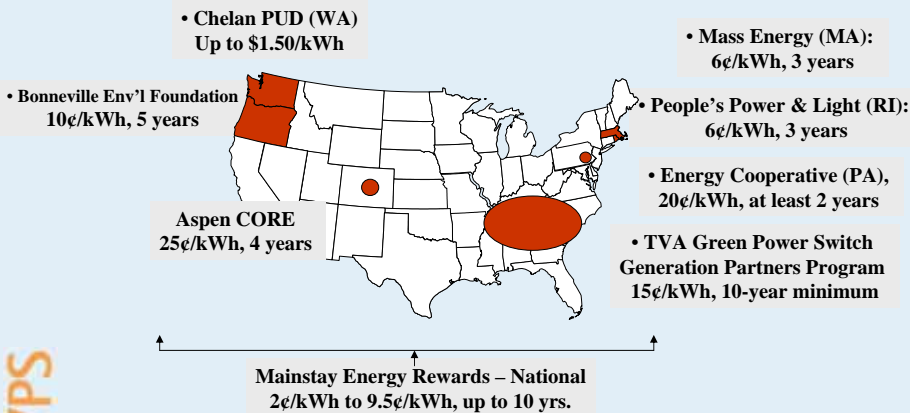
PVPS

Renewables Portfolio Standards



PVPS

Production Incentives for PV



PVPS

Solar Cities

1. San Diego

50 MW of solar/RE on public bldgs. by 2013
10% renewable energy use in public bldgs.
Expedited permitting for new homes using 50% RE and commercial bldgs. using 15% RE

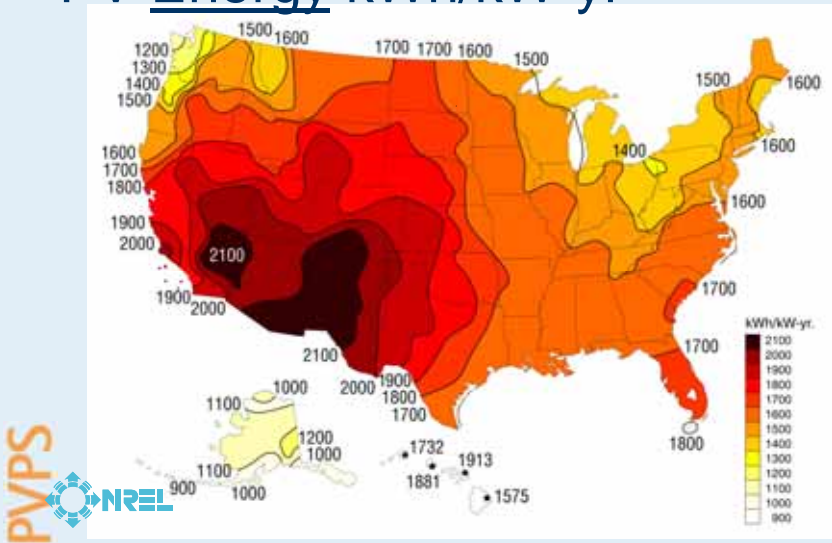
2. Austin

Austin Energy RPS: 20% renewables by 2020
15 MW solar by 2007, 100 MW by 2020
\$5/W residential/commercial PV rebate program

Source: North Carolina Solar Center, DSIRE

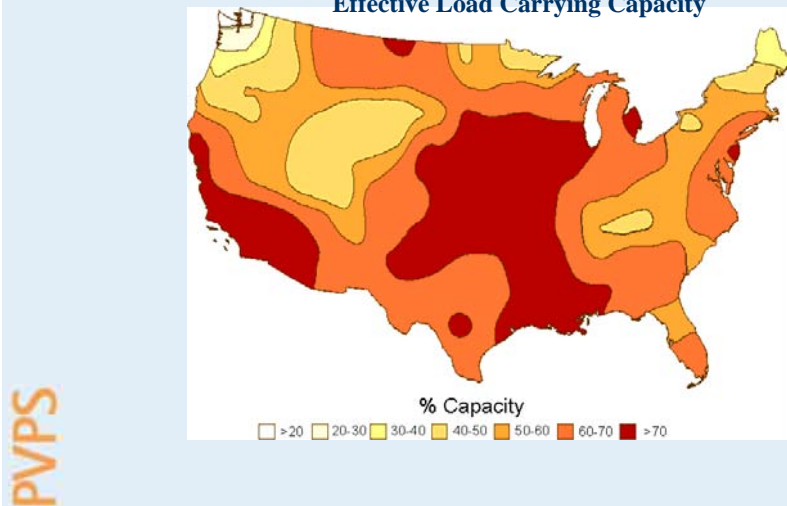
PVPS

PV Energy kWh/kW-yr



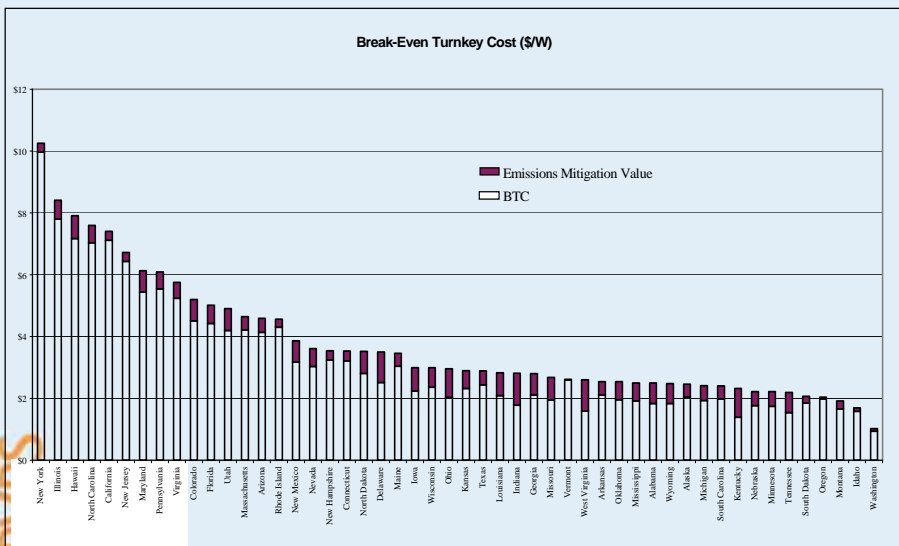
PV Demand/Capacity

Effective Load Carrying Capacity

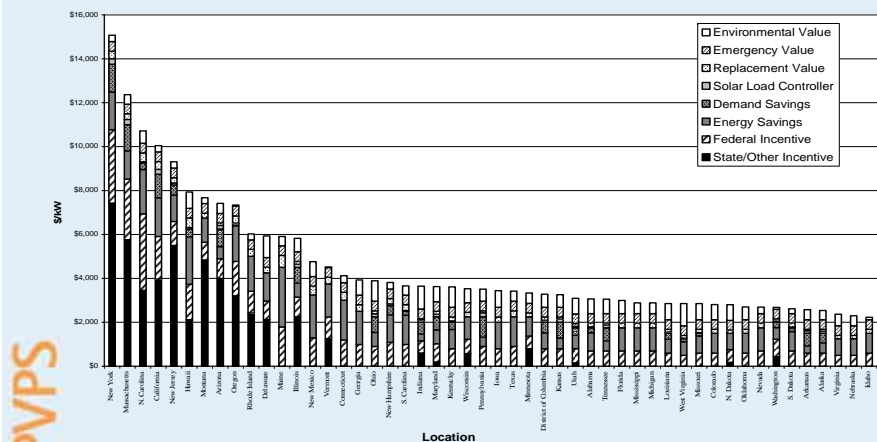


Residential Consumer Value

Break-Even Turnkey Cost (\$/W)



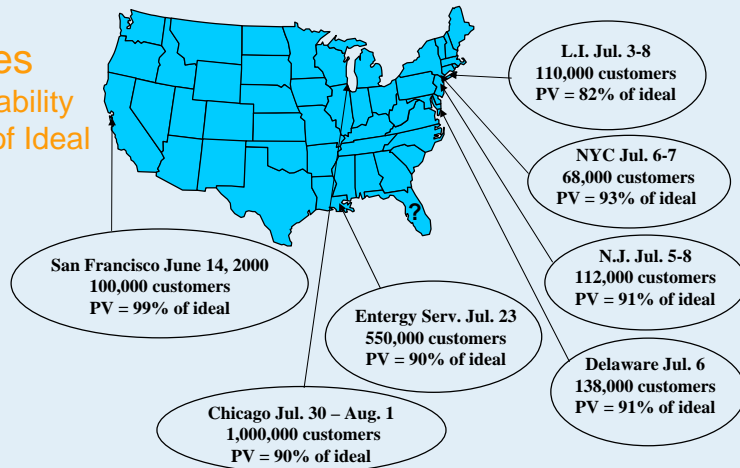
Breakeven Turnkey cost for commercial PV



Solar Reliability Value

- the cause of the peak demand is also the resource
- disaster mitigation/preparedness

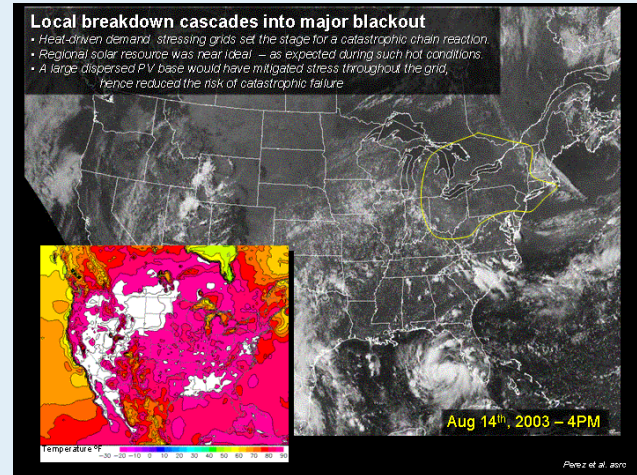
Power Outages
PV Availability
as % of Ideal
Output



PVPS

Solar Reliability Value

How much revenue was lost on August 14th? \$8 billion
What amount of dispersed PV would have supported the grid?
Initially 40-60 MW supporting cooling load, for the large outage, 500MW



PVPS

Task 10 - Urban Scale PV Applications

<http://www.iea-pvps-task10.org>

US Policy - www.dsireusa.org



PVPS