POWERLIGHT®

SOLAR ELECTRIC SYSTEMS

Affordable Power From the Sun
Energy 2003

August 19, 2003

AGENDA

- Photovoltaics Basics
- (Brief) PowerLight Introduction
- Grid-connected PV System Applications
- Federal Installation Examples
- System Economics, Contracting and Financing Options
- Getting started …

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PV Basics – Photovoltaics vs. Other Solar

Solar thermal

Parabolic trough

Photovoltaics

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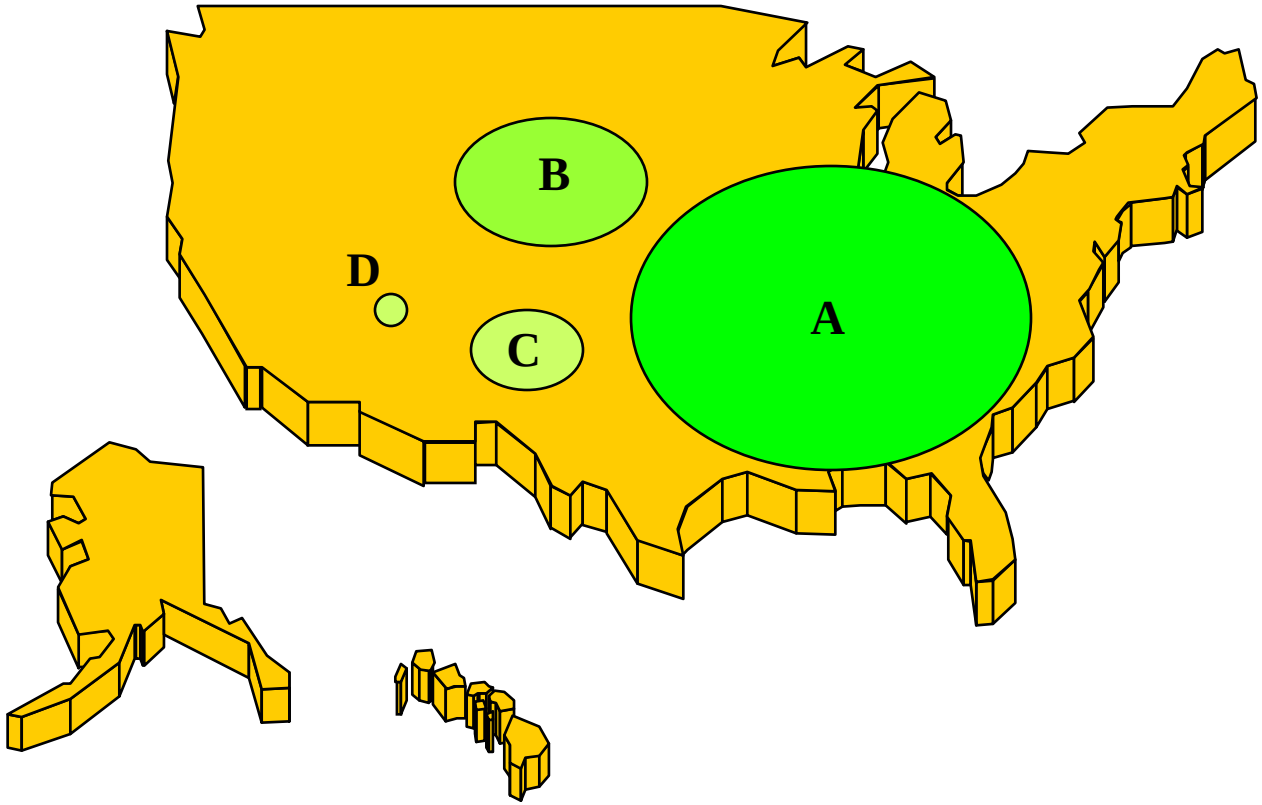
Quiz: What area of Solar PV is required to satisfy 100% of U.S. electrical energy needs (~3,500 TWh/year)?



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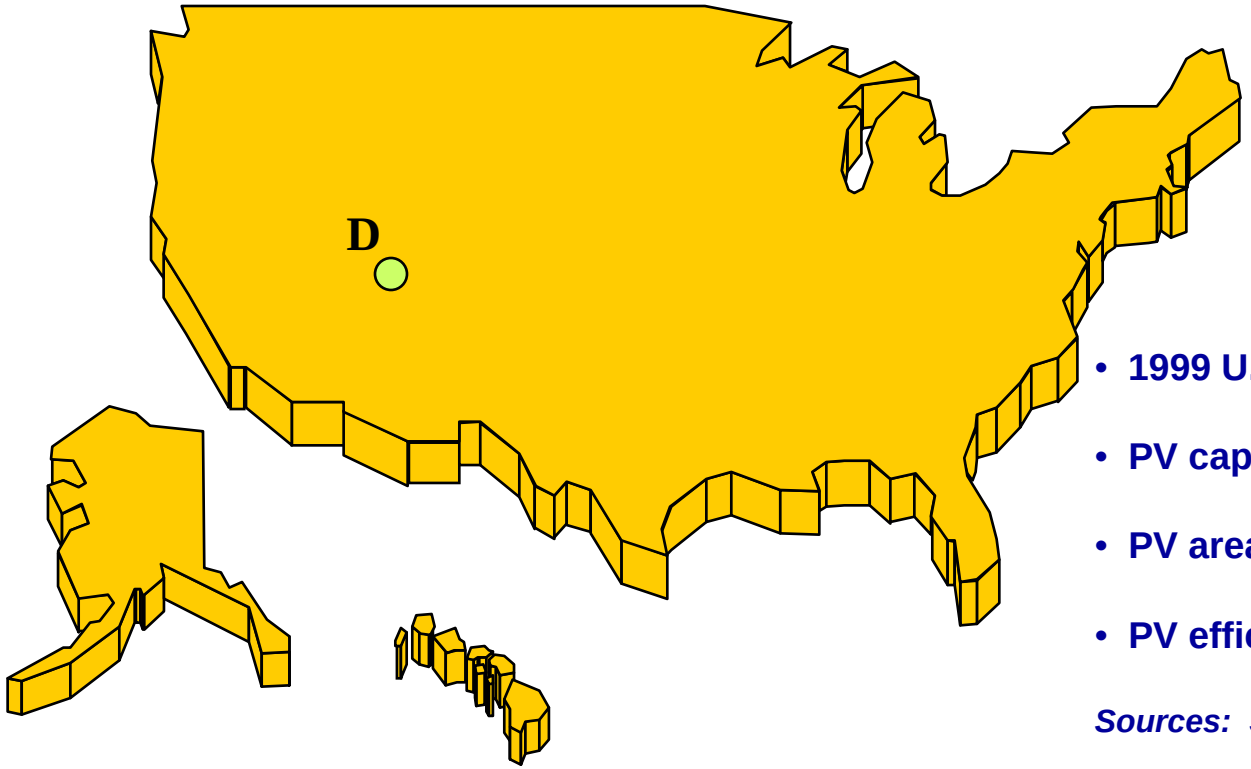
Answer: Area D. Solar PV in a 50-mile radius would serve 100% of US electric energy needs



- **1999 U.S. energy use**
  3,500 TWh/yr
- **PV capacity**
  2.2 TW
- **PV area**
  6,600 sq. mi.
- **PV efficiency**
  12%

Sources: SEIA

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PV is an excellent choice for clean, reliable DG

- **Financially prudent**
  - Zero fuel cost
  - Price volatility hedge
  - Coincident w/ peak
- **Reliable**
  - Proven
  - 20-25 yr warranties
  - Virtually no maintenance
- **Clean**
  - Emission & noise free
  - Distributed
  - Well suited for urban areas
- **Highly popular**

37 kWp PowerGuard PV Installation
US Coast Guard/GSA Facility, Boston, MA

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Grid-Connected PV

The Fastest Growing PV Segment

- **CAGR of 55% for the past 5 years - no sign of slowing**
- **Represents > 50% industry shipments by volume**

924 kWp PowerShade PV Installation
US Navy, Coronado Island

470 kWp PowerGuard PV Installation
Franchise Tax Board, Sacramento, CA

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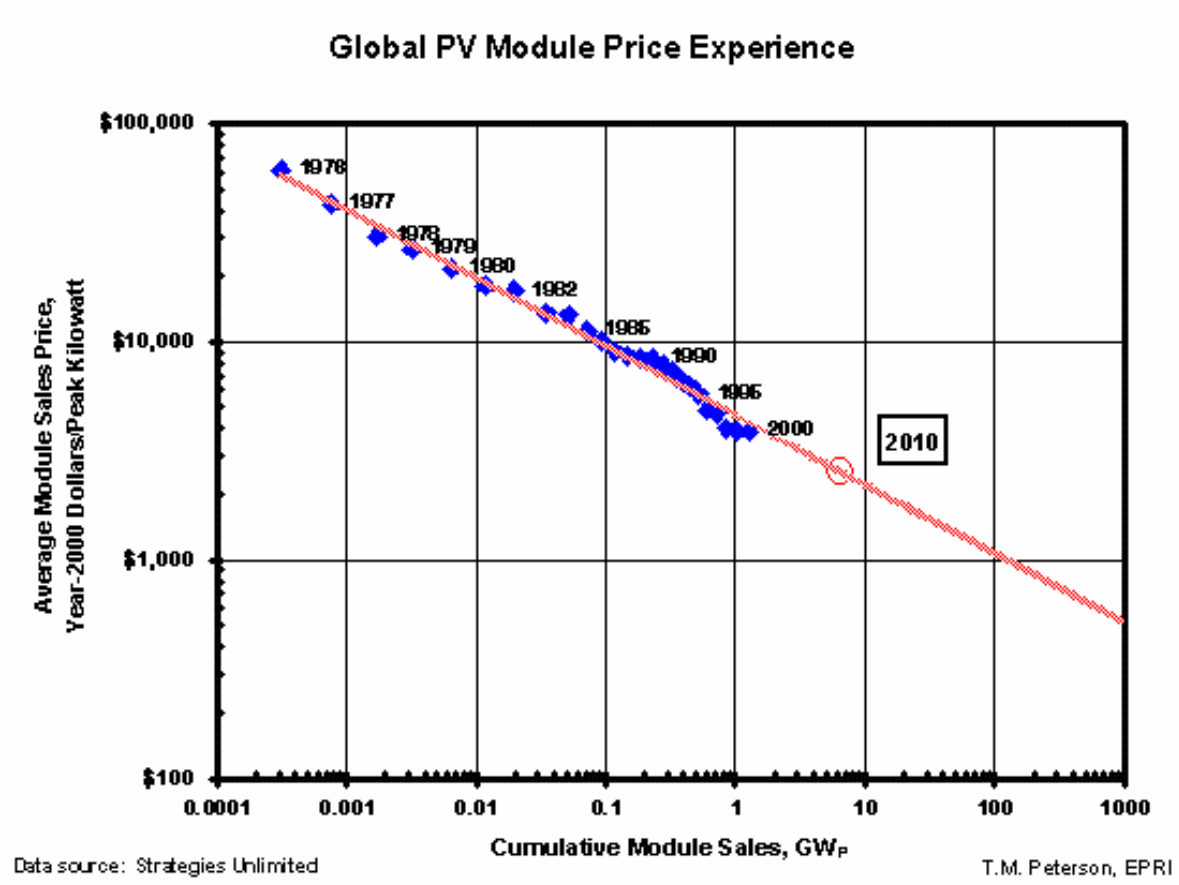
PV Prices have fallen 10x in the Last 25 Years



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State PV Incentive Program Examples (Large Systems)

- CA State Buydowns
  - $4.50/watt up to 50% max of $4.5M (CPUC)
  - $6.00/watt up to 85% (LADWP)
- NJ State Buydown – up to 60% of system cost
- Hawaii 35% state tax credit
- Nevada RPS/Solar REC purchase

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PowerLight is a worldwide leader in large-scale grid-tied PV systems

- Focus:
  - PV systems manufacturer
  - Turnkey solutions provider
- Founded 1991
- High growth
  - 140% average growth per year since 1997
  - INC 500 listed for the past three years.
- Solid technology base > 50 US and international patents

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Drivers of PowerLight's Market Leadership

- Focus on turn-key grid-tied, commercial-scale PV
- Focus on system economics – maximize value to customers
- Proprietary, value-added technology
- Full service O&M and marketing services
- **Most important**: long list of satisfied customers

675 kWp PowerGuard System
Moscone Covention Ctr, SF, CA

546 kWp PowerGuard System
Neutrogena Corp, LA

120 kWp PowerGuard System
Tehama Golf Course, CA

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PowerLight Grid Connected PV System Applications

Sloped PowerGuard

PowerGuard ®

PowerRoof

PowerShade

PowerTracker

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Rooftop Applications-PowerGuard

Traditional Flat-Roof PV Mounting Systems are Problematic

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Rooftop Applications-PowerGuard

PowerGuard resolves these issues with an aesthetic, lightweight penetration-free design

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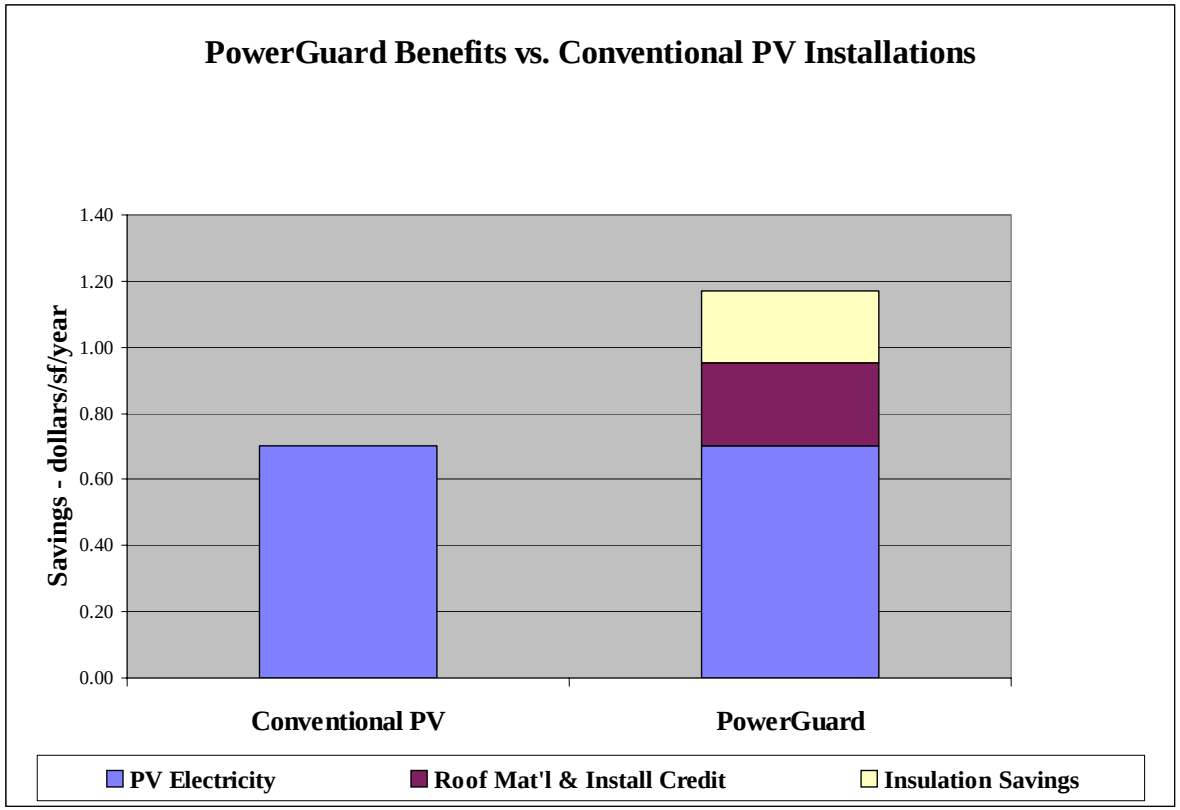
Rooftop Applications-PowerGuard

Value Advantage of PowerLight Rooftop Systems



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Rooftop Applications-PowerGuard

Toyota Motor Company -Torrance,CA **536 kW**

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Rooftop Applications-PowerGuard

Santa Rita Jail – Dublin, CA

1.18 MW largest US rooftop system

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Rooftop Applications-Sloped PowerGuard

GSA Federal Building – Los Angeles, CA **308 kW**

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Rooftop Applications-Conventionally Attached

San Mateo Forensics Lab – San Mateo, CA **224 kW**

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Carport Applications

Fixed-Tilt Covered Parking PV System Designs

Single Cantilevered

Double Cantilevered

Free Standing Beam

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Carport Applications

Fixed Carport Application
US Navy: 1 MW PowerShade
World's Largest PV Carport

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Tracking Applications

PowerTracker™ Technology Overview

- 18% to 45% energy increase over fixed-tilt systems
- Proven: dozens of operational systems
- High reliability & corrosion resistance
- Accommodates all modules
- Modular & scalable
- Patented

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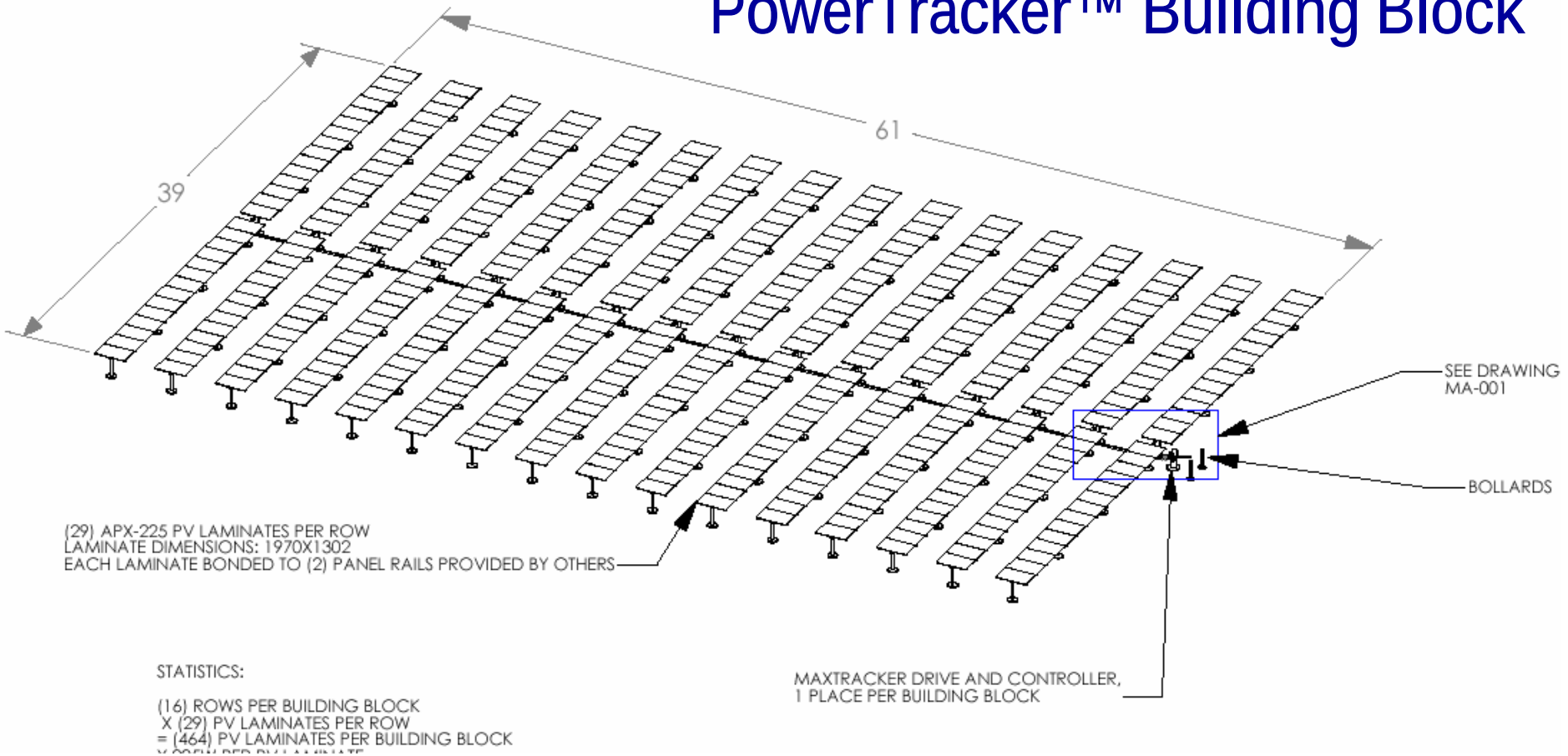
Tracking Applications

PowerTracker™ Building Block



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Tracking Applications

Single industrial tracker/drive controller advantages

- Industrial strength
- Lowest installed cost
- Single lubrication point/year
- No maintenance on gear motor
- No metal to metal contact on bearings

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Tracking Applications

270 kWdc Aqua Fria Power Plant, Peoria AZ

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Tracking Applications

219 kWdc Parker Ranch, Hawaii

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Tracking Applications

Elevated PowerTracker – Carport application

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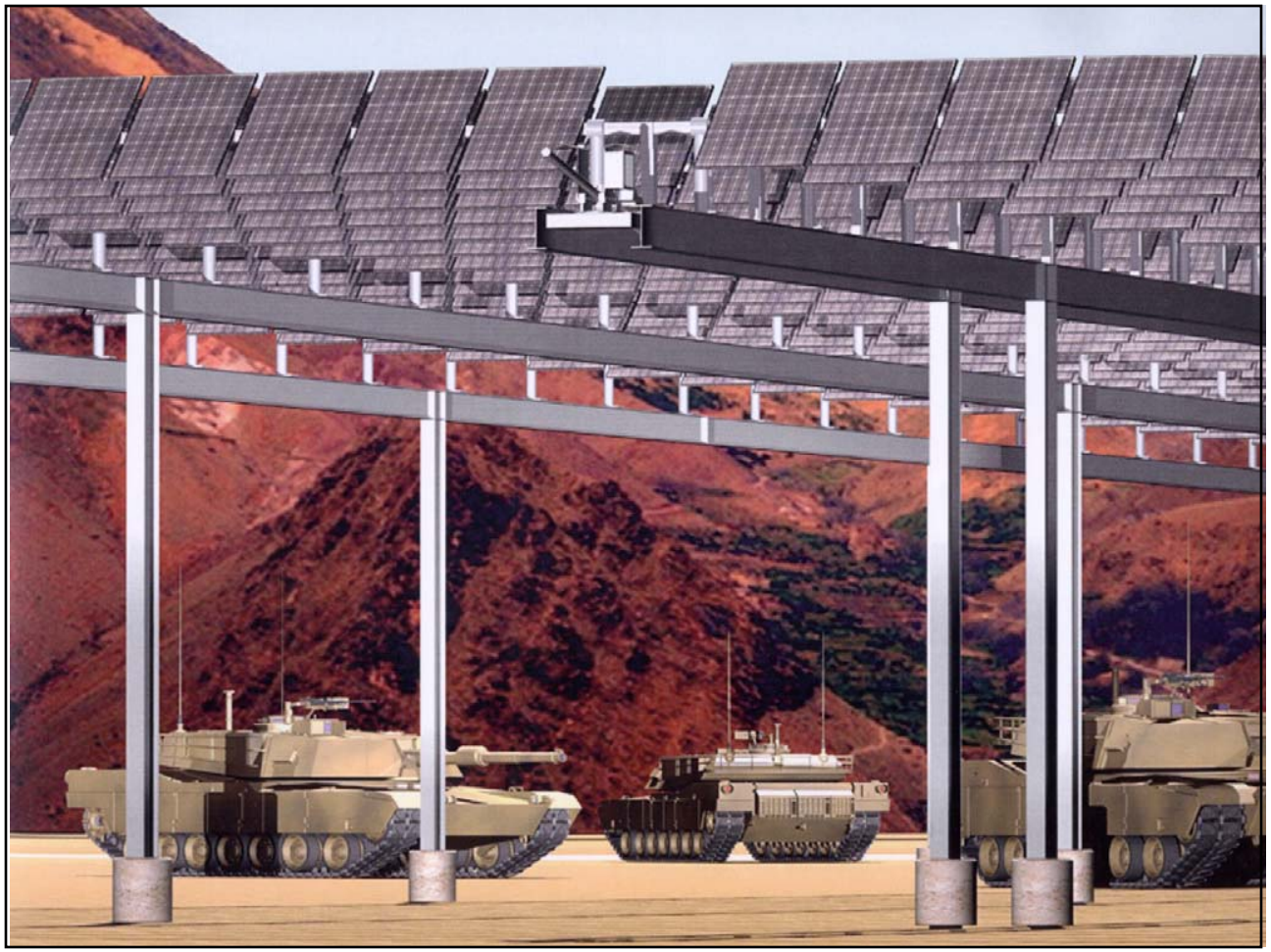
Tracking Applications

Elevated PowerTracker – Tankport application



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PowerTracker installations to date:

Project	Integrator	Module	Module, Wdc	System, kWdc	MWdc	Area, sf
Installed/In Construction						
Embry Riddle University	APS	ASE-300	300	230	0.2	20400
Gilbert Nature Center	APS	ASE-300	300	144	0.1	12750
Ocotillo Power Plant	APS	Mix	300	115	0.1	10200
Prescott Airport	APS	Mix	160	2903	2.9	254016
Scottsdale Tank 1	300	ASE-300	300	230	0.2	20400
Scottsdale Tank 2	APS	ASE-300	300	230	0.2	20400
Yucca Power Plant	APS	ASE-300	300	130	0.1	11475
Agua Fria Power Plant	PowerlLight	LAP460	460	270	0.3	25055
Muana Lani Resort	PowerLight	ASE-300	300	288	0.3	25500
29 Palms Marine Base	BP Solar	SX-150	150	1274	1.3	114865
Vallejo Pump Station	BP Solar	SX-150	150	256	0.3	23037
Parker Ranch	PowerLight	LAP460	460	219	0.2	20283
Santa Rita Jail	PowerLight	LAP285	285	128	0.1	19264
SRP Rogers Substation	PowerLight	Sanyo	190	243	0.2	16640
				6661	6.7	594285
				Rating, kWdc	MWdc	Area, sf

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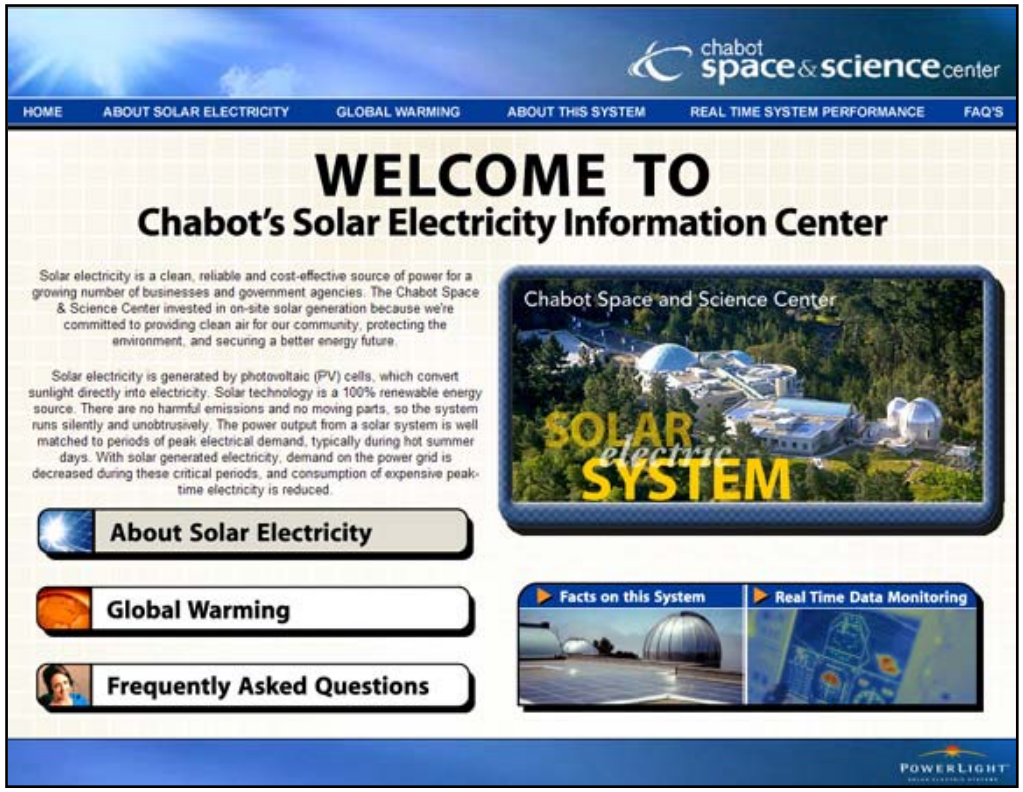
System Performance Monitoring is Critical



Customer access via Internet

Optional display kiosk

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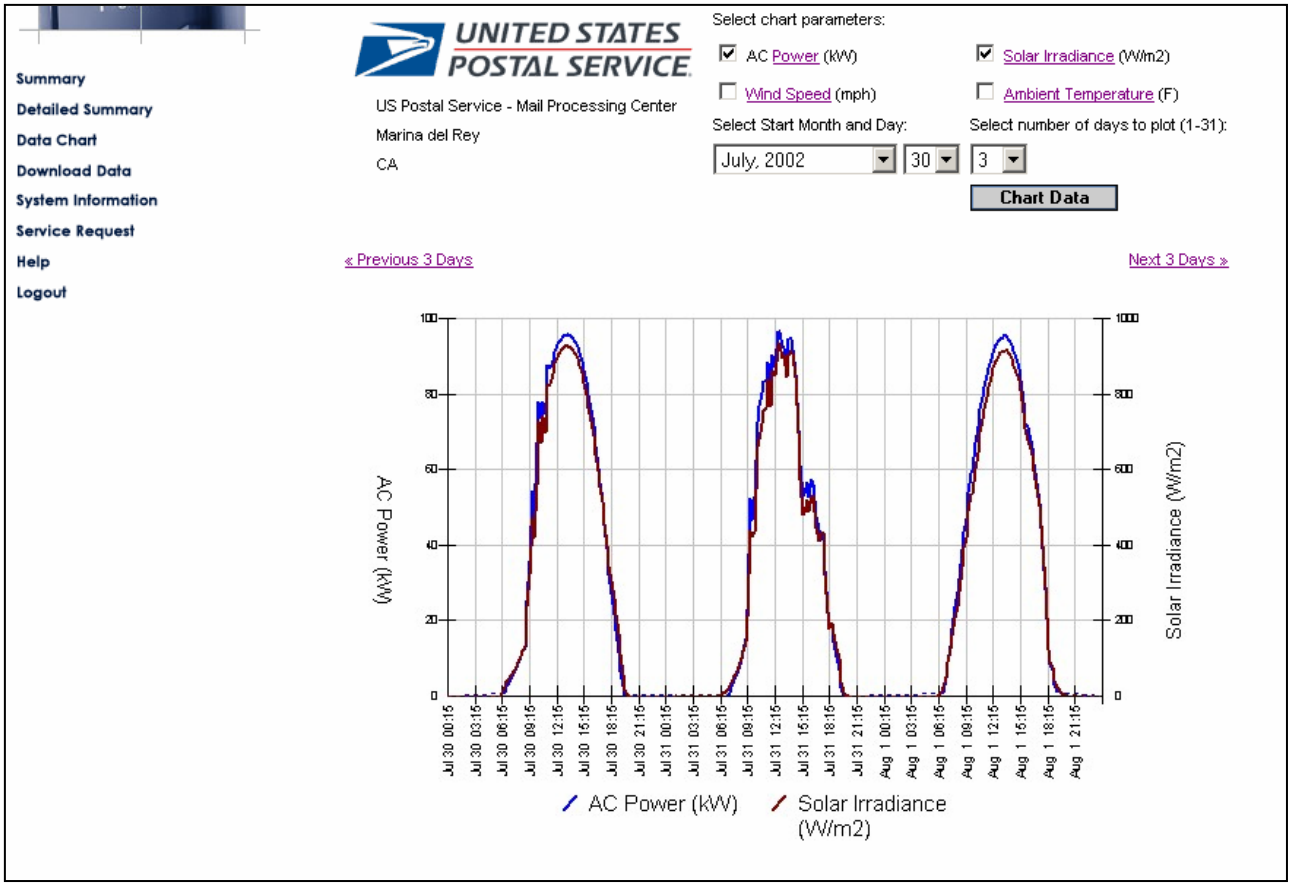
Example of Performance Monitoring



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PowerLight has sold/installed more solar at federal facilities than any other firm nationwide

1,100 kW	29 Palms PowerTracker Components
955 kW	U.S. Naval Base Coronado (2 projects)
308 kW	GSA Federal Building
127 kW	U.S. Postal Service
78 kW	U.S. Department of Energy (4 systems)
75 kW	Environmental Protection Agency
47 kW	U.S. Dept. of the Interior, National Park Service
37 kW	U.S. Dept. of Transportation, Coast Guard
35 kW	U.S. Dept. of Commerce
2,762 kW	

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U.S. Navy

- Naval Base
  Coronado, CA
- 924 kW carport and
  31 kW rooftop systems
- Completed May 2003

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General Services Administration Federal Building

- Los Angeles, CA
- 308 kW peak
- Sloped PowerGuard
- Completed May 2003

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U.S. Postal Service

- Marina del Rey, CA
- 127 kW peak
- PowerGuard
- Completed Nov. 2001

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U.S. Department of Energy

(Western Area Power Administration)

- Folsom, CA
- Four systems, totaling 78 kW peak
- PowerGuard
- Completed June 1998

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Environmental Protection Agency National Computer Center

- Research Triangle, NC
- 75 kW peak
- PowerGuard
- Completed February 2002

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U.S. Dept. of the Interior
National Park Service

- Yosemite, CA
- 47 kW peak
- PowerGuard
- Completed October 2001

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U.S. Department of Transportation, Coast Guard Partnership through GSA

- Boston, MA
- 37 kW peak
- PowerGuard
- Completed Sept. 1999

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U.S. Department of Commerce (NIST Headquarters)

- Gaithersburg, MD
- 35 kW peak
- PowerGuard
- Completed Sept. 2001

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Total project economics has several components

- **Geographic location**
  1) Amount of sun available
  2) Electricity rates, especially daytime and summer
  3) Local PV financial incentives

- **Net system cost**
  1) Initial system cost
  2) Maintenance costs (virtually none)

- **Savings from total-system benefits**
  1) Avoided purchases of utility electricity over 25 years
  2) Reduced roof maintenance costs
  3) Lower heating and air conditioning costs

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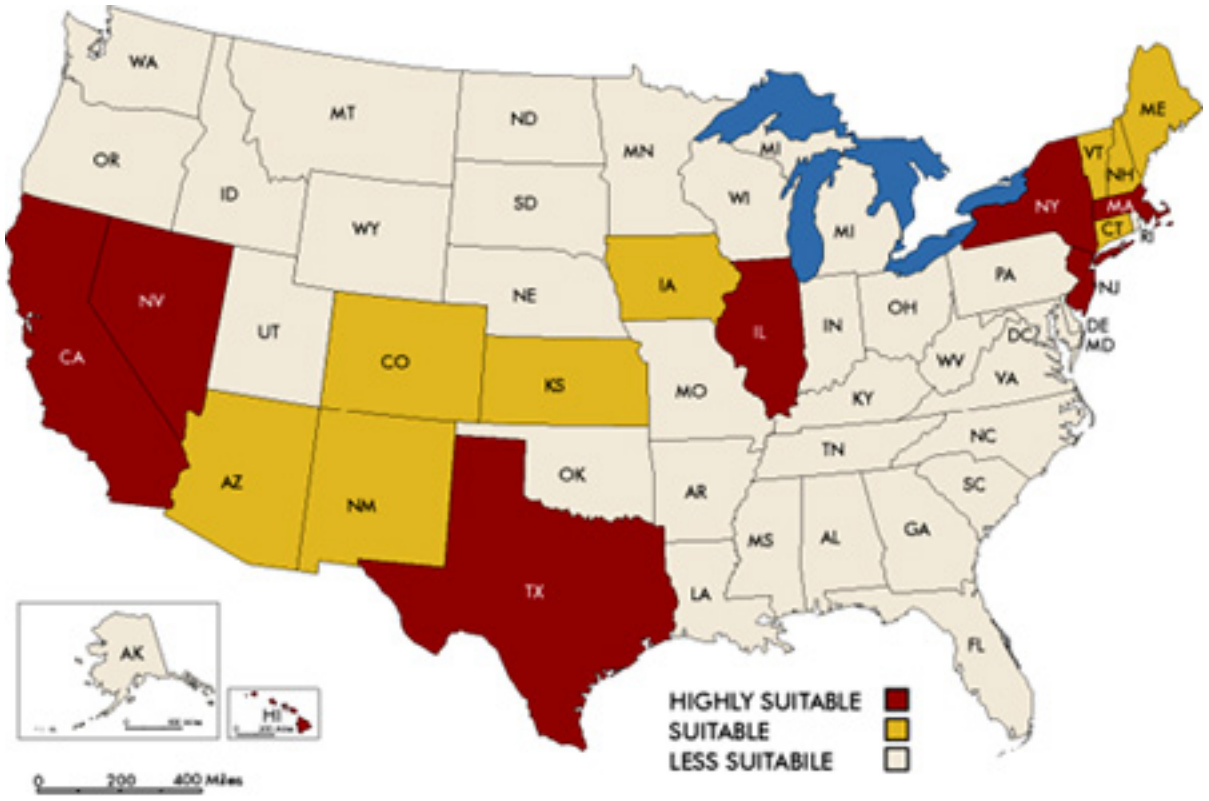
Geographic Site Suitability

- **Available sunlight**
- **Electricity rates**
- **PV incentives**



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Contracting and Financing Options

Option	Pros	Cons
Utility Energy Savings Contract (UESC)	• Easy to implement • Integration with EE possible • Leverage third party financing via utility	• Can be expensive • Project must show simple payback < 10 years
Energy Savings Performance Contract (ESPC)	• Lots of precedent; PV + EE • ESPC's already long-term focused • Leverage third party financing via ESCO	• Can be expensive • ESPC requires performance guarantees, increases project overhead cost
BPA Interagency Agreement	• Flexible agreement • Low cost contracting and financing mechanism • Long term financing available	• Requires Contracting Officer commitment • Not well known

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Questions to Consider for On-site PV

- Do you have solar incentives in your State?
- How much solar can your real estate support (flat or sloped roofs, parking lots, open land)? (~ 10 W/sq.ft)
- What is your annual electricity consumption in kWh and kW?
- What do you pay your utility per kWh and per kW?
- How will you purchase and/or finance your PV system?
- **Most important**: who are the key stakeholders/ decision makers that need to support this project? (may vary depending on how the system is financed)

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Thank you for being a great audience!

For additional questions after today's session, please call/email:

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