Solar for Critical Infrastructure and Aggregated Markets

By

Scott Sklar, The Stella Group, Ltd.

October , 2011

The Stella Group, Ltd.

The Stella Group, Ltd.. is a technology optimization and strategic policy firm for clean distributed energy users and companies which include advanced batteries and controls, energy efficiency, fuel cells, heat engines, minigeneration (natural gas), microhydropower, modular biomass, photovoltaics, small wind, and solar thermal (including daylighting, water heating, industrial preheat, building air-conditioning, and electric power generation). The Stella Group, Ltd. blends distributed energy technologies, aggregates financing (including leasing), with a focus on system standardization. Scott Sklar serves as Steering Committee Chair of the Sustainable Energy Coalition, composed of the renewable energy and energy efficiency trade associations and analytical groups, and sits on the national Boards of Directors of the non-profit Business Council for Sustainable Energy, Renewable Energy Policy Project, and **Sklar is an Adjunct Professor at the George Washington University teaching a unique multidisciplinary sustainable energy course. On November 4, 2010 Secretary Locke approved Sklar's appointment to the Department of Commerce Renewable Energy and Energy Efficiency Advisory Committee (RE&EEAC)**.

The Stella Group, Ltd. 1616 H Street, NW, 10th fl Washington, DC 20006

202-347-2214 (f-2215) www.TheStellaGroupLtd.com solarsklar@aol.com

A new report released by The Pew Charitable Trust, globally, 2010 clean energy finance and investments grew by 30 percent to a record $243 billion. The US received $34 billion in equity last year, a 51 percent increase from 2009. However, the gap with China, which attracted a record $54.4 billion, continues to widen. Germany also Attracted more money than the U.S. with $41.2 billion, claiming the number two spot, up from third the previous year.

Energy Investments 2009 'Investments in renewable energy increased from $39.24 billion in 2001 to $336.78 billion in 2009 at a CAGR of 30.8% during this period. (5\11\10 BN)

Clean Energy Reports

1. **GREENPEACE/DLR**

The world could eliminate fossil fuel use by 2090 by spending trillions of dollars on a renewable energy revolution, the European Renewable Energy Council (EREC) and environmental group Greenpeace said. The 210-page study is one of few reports -- even by lobby groups -- to look in detail at how energy use would have to be overhauled to meet the toughest scenarios for curbing greenhouse gases outlined by the U.N. a Climate Panel. "Renewable energy could provide all global energy needs by 2090," according to the study, entitled "Energy (R)evolution." EREC represents renewable energy industries and trade and research associations in Europe.

2. **ASES/NREL** U.S. Energy Experts Announce Way to Freeze Global Warming

On January 31, 2007 at a press conference in Washington, D.C., ASES unveiled a 200-page report, Tackling Climate Change in the U.S.: Potential Carbon Emissions Reductions from Energy Efficiency and Renewable Energy by 2030. The result of more than a year of study, the report illustrates how energy efficiency and renewable energy technologies can provide the emissions reductions required to address global warming. U.S. Carbon Emissions Displacement Potential from Energy Efficiency and Renewable Energy by 2030 - 57% Energy Efficiency, 43% Renewables

3. **GOOGLE** Google.org, the philanthropic arm of the search giant, has unveiled a plan to move the U.S. to a clean-energy future. The vision: In 2030, electricity will be generated not from coal or oil but from wind, solar, and geothermal power. Energy demand will be two-thirds what it is now, thanks to stringent energy-efficiency measures. Ninety percent of new vehicle sales will be plug-in hybrids. Carbon dioxide emissions will be down 48 percent. Getting there will cost $4.4 trillion, says the plan -- but will recoup $5.4 trillion in savings. The Clean Energy 2030 plan would require ambitious national policies, a huge boost to renewables, increased transmission capacity, a smart electricity grid, and much higher fuel-efficiency standards for vehicles.

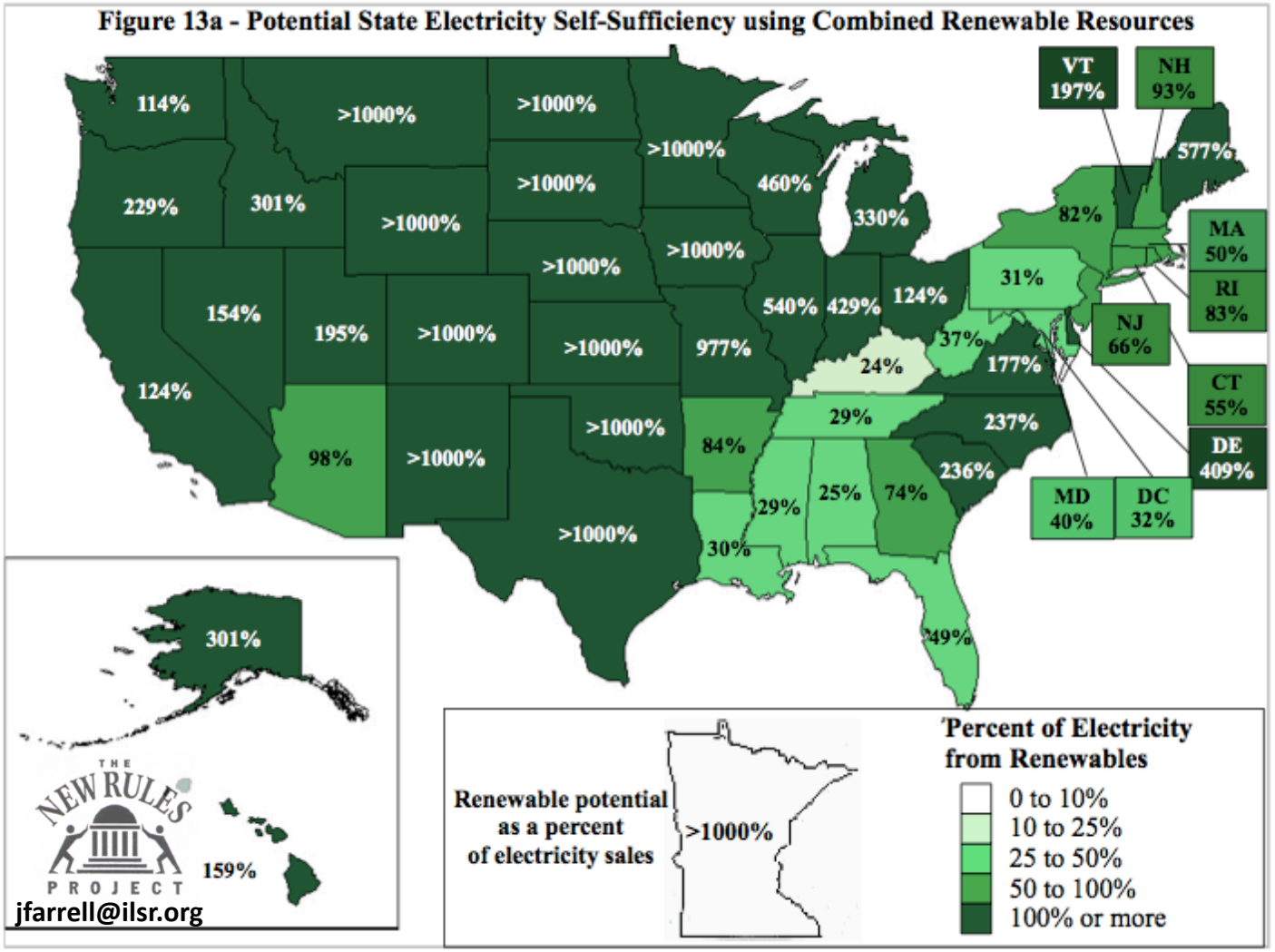
MORE REPORTS - 2009

National Research Council Renewables Report - June 09

Renewable energy resources in the U.S. are sufficient to meet a significant
portion of the nation's electricity needs says a new report from the National Research Council. Press and link to report at:
http://www8.nationalacademies.org/onpinew
s/newsitem.aspx?RecordID=12619 or http://tinyurl.com/neka69

INSTITUTE FOR LOCAL SELF RELIANCE (October 2009) report by David Morris
"SELF RELIANT STATES" -- Excerpted Executive Summary Conclusion:
"All 36 states with either renewable energy goals or renewable energy mandates could meet them by relying on in-state renewable fuels. Sixty-four percent could be self-sufficient in electricity from in-state renewables; another 14 percent could generate 75 percent of their electricity from homegrown fuels. Indeed, the nation may be able to achieve a significant degree of energy independence by harnessing the most decentralized of all renewable resources: solar energy. More than 40 states plus the District of Columbia could generate 25 percent of their electricity just with rooftop PV. In fact, these data may be conservative. The report does not, for example, estimate the potential for ground photovoltaic arrays – although it does estimate the amount of land needed in each state to be self-sufficient relying on solar – even though common sense suggests that this should dwarf the rooftop potential..... It is at the local level that new technologies like smart grids, electric vehicles, distributed storage, and rooftop solar will have their major impact."
Contact for David Morris at: cell 612-220-7649 or dmorris@ilsr.org

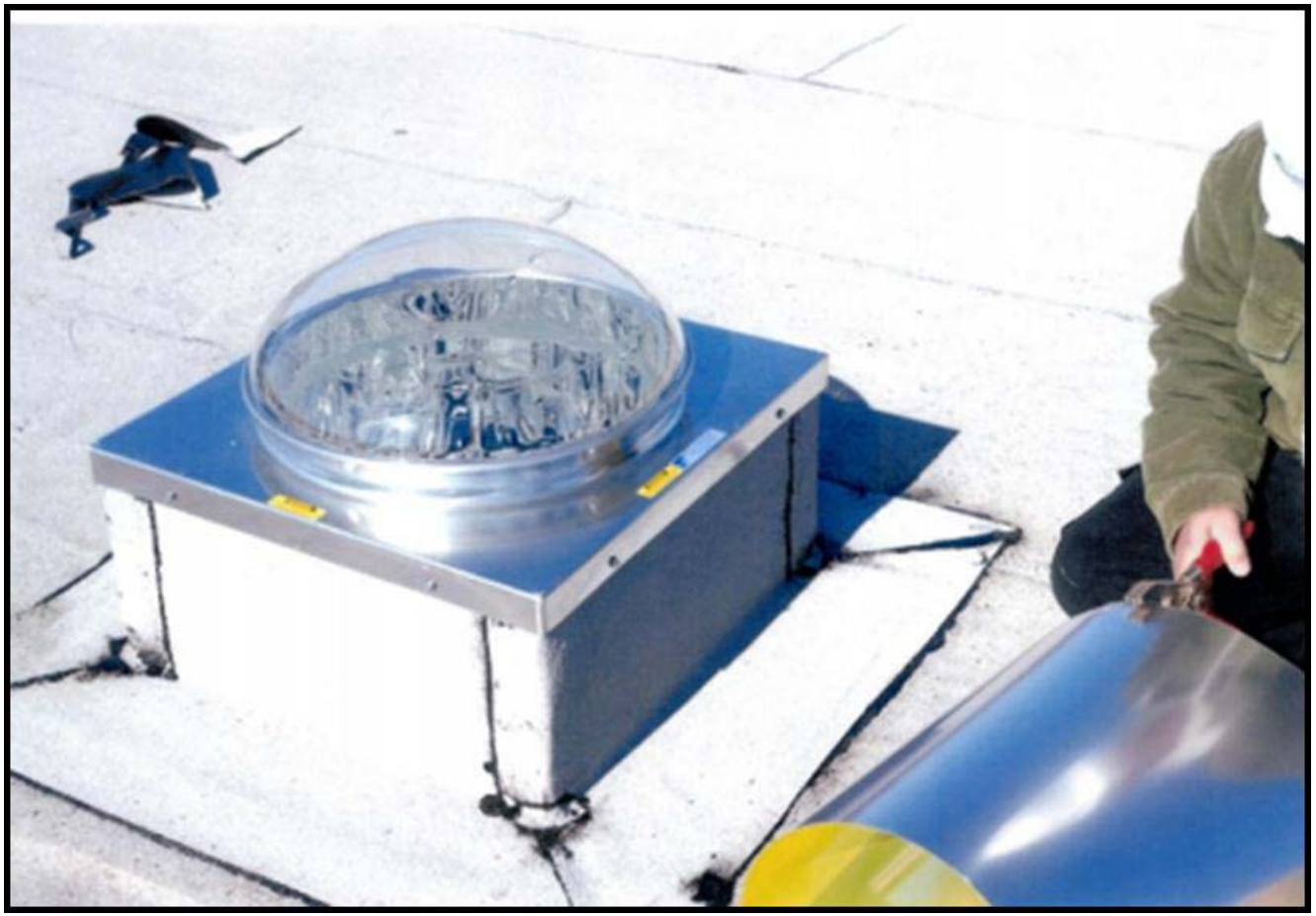
32 States can be Self-Sufficient



Types of Solar

- Passive solar (buildings)
- Solar Daylighting
- Solar Water Heating (also preheat & a/c)
- Concentrated Solar Power (n/a in region)
- Photovoltaics – for remote, building integrated, and utility-scale

HUVCO Daylighting Solutions™



NSA Visitors Center, Ft. Meade, MD

Use of 21” tubular skylights, with 2’x2’ diffuser to bring free, pure, healthy natural light into the space.

Camp Pendleton Marine Corp Base

Award: 2008 SDG@E Large Sustainable Communities Champion
Daylight Inside's Contribution: Designed, manufactured and installed passive daylighting Light Harvest Fixtures in 43 buildings
Results: Average 75 fc for 8 hours per day, reduction of kWh usage, safer working environment
Annual Savings: Estimated $238,000
Referral: "*MCB Camp Pendleton is including daylighting installations in future modernization projects and would recommend the services of Daylight Inside.*"
Jeff Allen, Energy Manager, Camp Pendleton, USMC

www.daylightinside.com

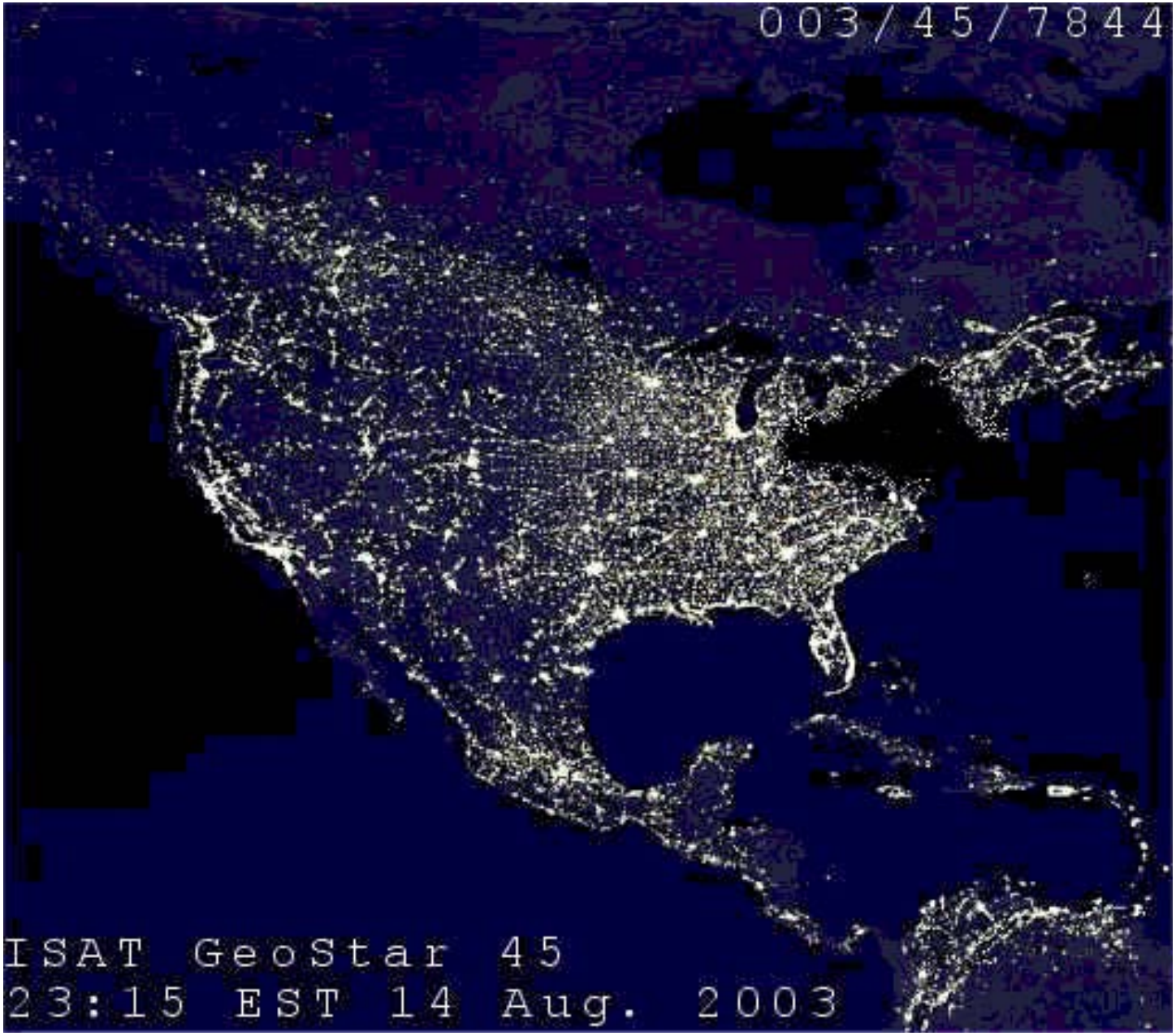
DAYLIGHT INSIDE℠

TSG VA Office

Federal Government Tools

- Energy Performance Service Contractors
  (ESCO's – shared savings)
- Privatization (i.e. military base housing)
- Enhanced Use Leasing (EULs)
- Power Purchase Agreements (PPA)**

  Note: seeking longer term contracting authority; opt out security


003/45/7844
ISAT GeoStar 45
23:15 EST 14 Aug. 2003

Area Security

The three security areas covered are:

- low-power sensors, cameras, motion detectors and chemical sniffers - **detection**

- hardening infrastructure and buildings such as back-up power, sensors, uninterruptible power, and power quality – **prevention**

- scanners, electric fences, communications and emergency preparedness – **offensive and defensive preparations and actions**

PV Streetlights

- Sturdy – able to withstand hurricane winds and provide needed lighting when the electricity grid is down.

Dade County
Florida USA

After Hurricane Andrew, Picture facing N.W.

SkyBuilt Power

The Leader in Rapidly Deployable Renewable Energy Solutions

DHS Repeater Site – SkyBuilt Solar+Wind+Batteries (no fuel solution)

 | 866.986.2845 www.SkyBuilt.com

Emergency Preparedness

- On-site electric power generation
- On-site hot water (showers and food prep)
- On-site water purification and pumping
- On-site communications towers/repeaters
  cell phone/laptop charging, WIFI/MIFI
- Intersection signal lights and area lighting
- On-site health care – vaccine refrigeration and medical unit powering

ZEROBASE™

The ZeroBase ReGenerator is:

Portable

Environmentally-sealed, marine-grade housing

Hybrid

Manages up to 10kW of production & storage

Power Generation

Distributed power generation from solar, wind & fossil-fuels

Storage

Stores up to 43kWh in sealed AGM batteries

Appliance

Easy set-up, simple to operate and maintain
COTS since 2007 – In-theater since 2008
Mounts to standard TQG trailers

The hybrid generator cell tower and a mobile security tower generating enough power to provide 7/24/365

Specifications:

4 – 85 watt solar panels w/swivel mounts
1 - 250 watt wind generator w/pole mount
1 – charge control unit for solar
1 – charge control unit for wind generator
1- 22’ telescoping tower
1 - 24” all weather battery enclosure
1 – HD steel frame and box enclosure w/ solar mount receiving tubes, outrigger receiver tubes, and outrigger travel mounts
5 – HD steel outriggers w/stabilizing jacks
1 – removable tow hitch
2 – 15” five lug wheels and tires w/removable axle assembly
3 – batteries w/100amp hours each
1 – all weather wiring harness terminated in electric box at top of tower
1 – removable 12v power winch

Standard Mini Cell – several options available.

On-Site Generation Utilization List

- **Lighting** (outside area, motion detectors and remote lighting) — Lighting systems attached to buildings, light poles, or specialized for public areas.

- **Water and/or Irrigations** (pumps, pipelines compressors) — Low and high power operation — primarily fuel & water pipelines, refrigeration and air-conditioning.

DG 24-7 Solar/Wind powered disaster and emergency water filtering unit also removes arsenic and lead

- **Ultrafiltration removes 99.99% of bacteria, viruses, cysts, pathogens, medical waste**
- **Filtration media removes 99.99% of arsenic, lead and other heavy metals**
- **Robust, scalable with a small foot print**
  - 6500 gallons per day on solar power, 13000 gallons per day with upscaled solar power
- **Minimal/Versatile power requirements**
  - 24-7 can be solar/wind powered or attached to power grid/generator
- **Rapid deployment**
  - Small size, 6x6x5ft, designed to fit 463L pallet
  - Air, surface or surface ship deliverable
  - Setup in less than 30 minutes
- **Simple and reliable components**
  - Proven water filtering capability in austere environments

www.DynGlobal.com (888) 235-7755

Substation Upgrades and Utility Line Congestion Alleviation

- Substation switching to critical feeder lines
- Power augmentation to electric feeder lines to meet critical functions
- Substitution for Islanding Generators – particularly in hot, humid, weather
- Augmentation to prepare for transformer blow-outs, long term repair (cybersecurity)

Early adopters of fuel cells are driven by the need for uninterrupted, high quality power.

Power Disruption Events per Month

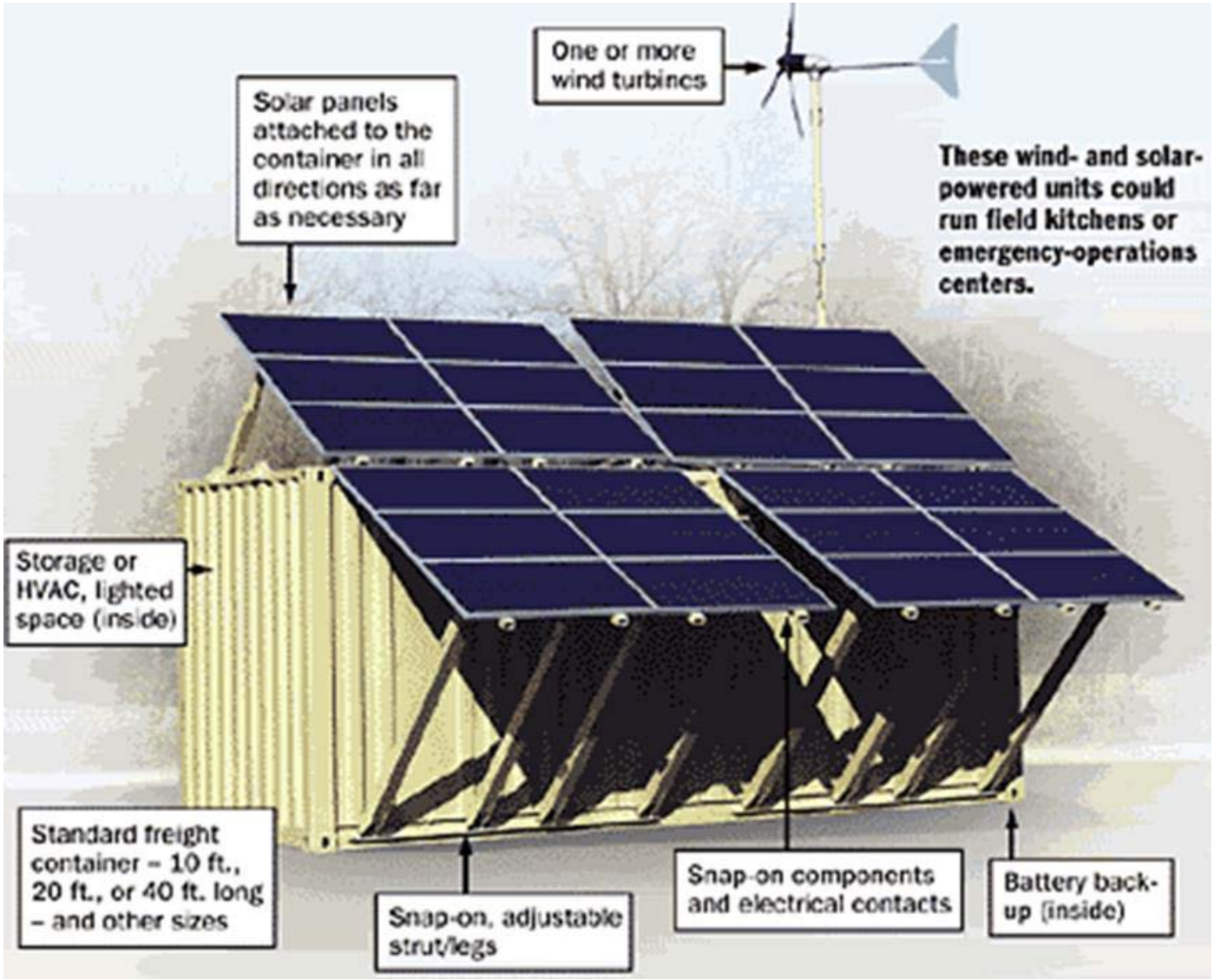
Event	Median	Average	Worst
Interruptions	1.0	1.3	10.0
Sags / undervoltages	4.1	27.9	1,660
Swells / overvoltages	3.4	13.9	1,450
Transients	15.7	63.5	1,166

Source: Duke Power, Sandia National Laboratories

- Power disruptions may cause sensitive equipment to fail.
- As a result, organizations face potential for significant losses – lost data, lost materials, lost productivity, and lost income – as well as risks to public safety.
- A study by Sandia National Laboratories estimates losses from power disruptions at more than $150 billion per year in the U.S.
- In response, more and more organizations are turning to on-site generation to boost power availability.

Nexus Associates, Inc.

‘Plop and drop’ power center



Market Certainty and Aggregation

- Sustained, orderly, predictable markets
  allow businesses to commit resources

- Small and medium-sized business employ over
  60 percent of US workers, can hire more quickly

- Aggregating end-use markets (applications) between
  governments, institutions, and commercial


NEW CONSTRUCTION

Handhold Business and Have Interagency Coordination

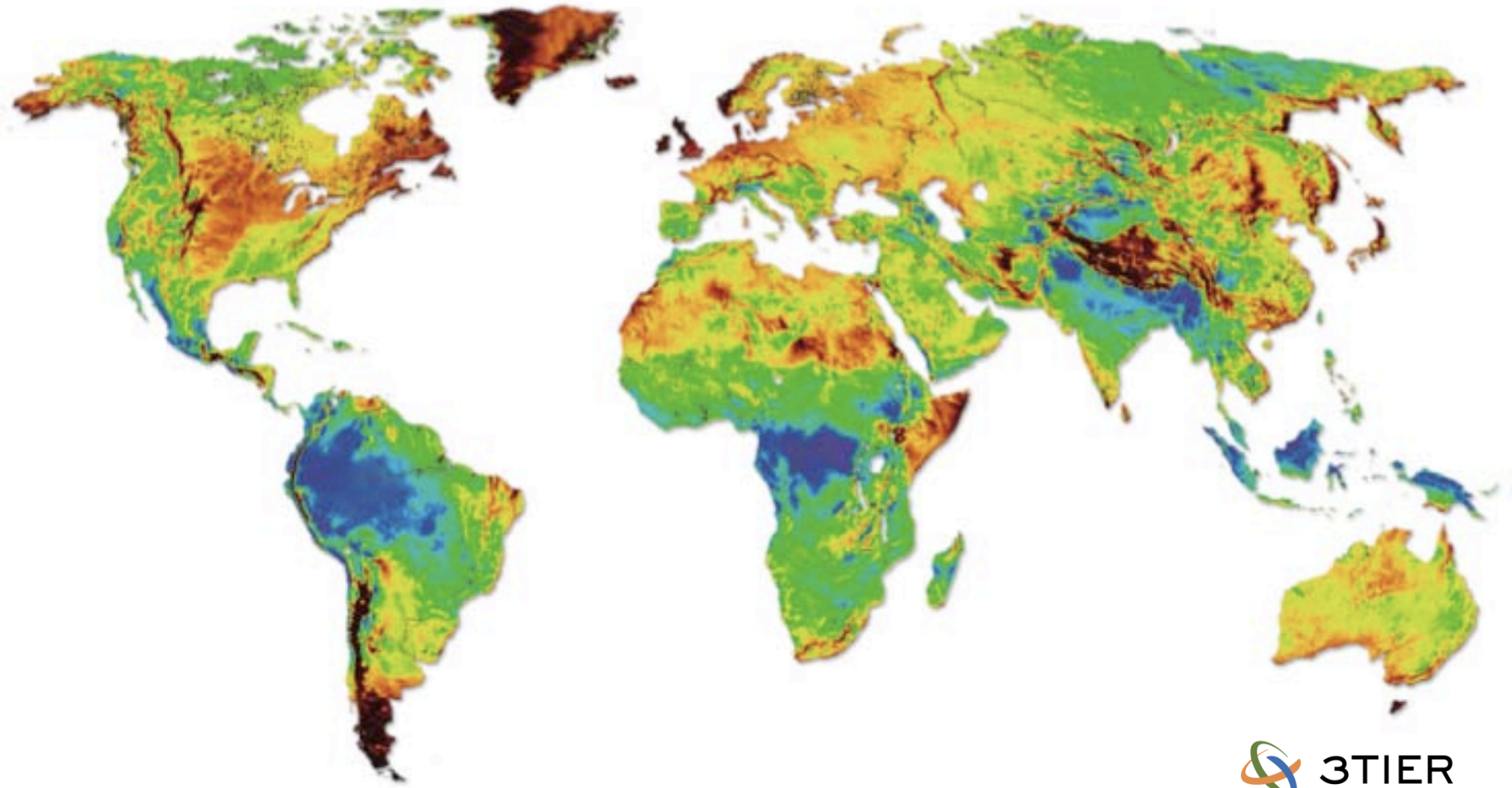
- State and local governments must coordinate
- Some entity must drive coordination in local governments with some convening authority
- Training and emotional handholding is required as well as transparency
- Markets and consumer education must be an ongoing commitment (not just on Earth Day)

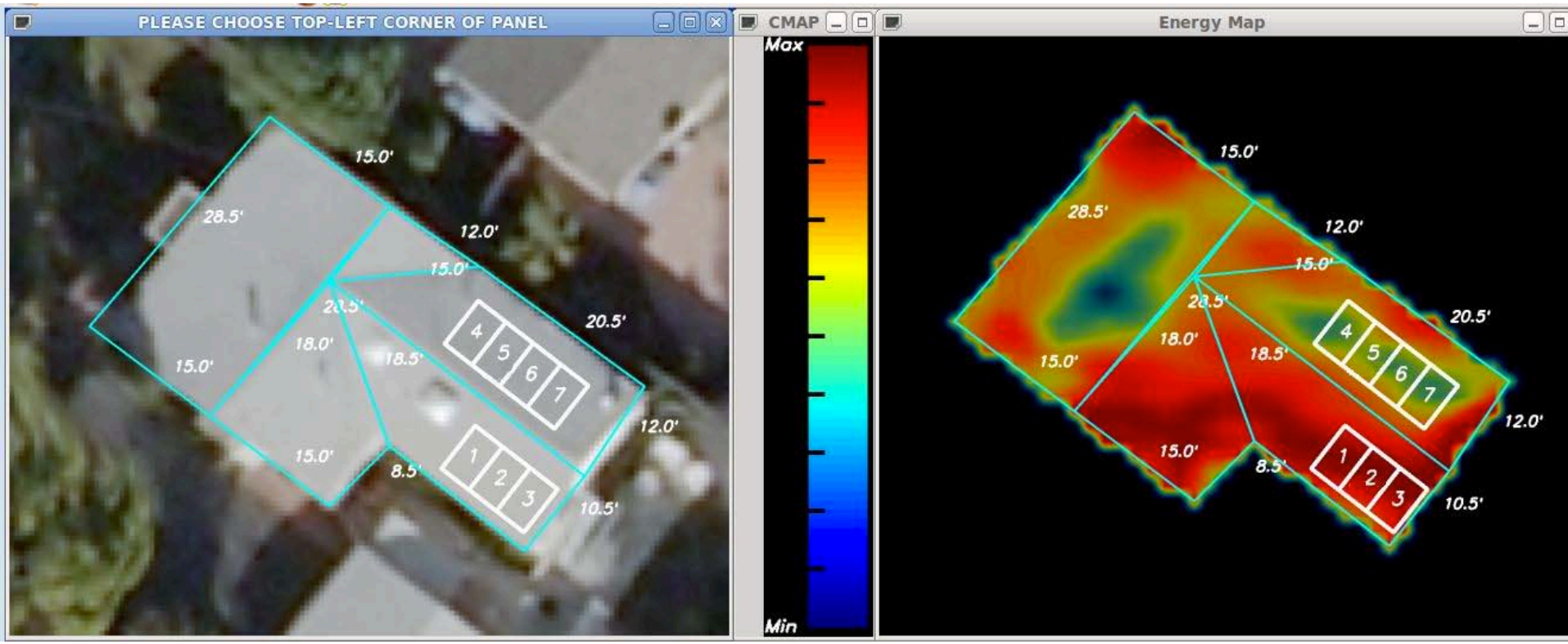
Montgomery County Public Schools

Since 2008, SunEdison has designed, financed, and installed 8 separate photovoltaic systems at various Montgomery County Public Schools locations. This “distributed generation” portfolio places the solar array directly where the power is consumed, leading to lower energy bills and increased savings to the client.

SunEdison’s 277 kW roof-mounted fixed tilt photovoltaic PV array in Clarksburg, Maryland.

SunEdison®
simplifying solar





Solar Energy Siting Software

www.solar-red.net


Good planets are hard to find.