RENEWABLE ENERGY OVERVIEW

Scott Sklar
President, The Stella Group, Ltd.

On

July 24, 2012

Atlantic Council

Washington, DC

The Stella Group, Ltd.

The Stella Group, Ltd.. is a strategic technology optimization and policy firm for clean distributed energy users and companies which include advanced batteries and controls, energy efficiency, fuel cells, geoexchange, heat engines, microhydropower (including tidal and wave), modular biomass, photovoltaics, small wind, and solar thermal (including CSP, daylighting, water heating, industrial preheat, building air-conditioning, and electric power generation). The Stella Group, Ltd. blends distributed energy technologies, aggregates financing with a focus on system standardization. Scott Sklar serves as Steering Committee Chair of the Sustainable Energy Coalition, composed of the renewable and energy efficiency 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, teaches a unique interdisciplinary sustainable energy course at George Washington University, and appointed by Sec Locke onto the DOC RE/EE Advisory Committee.

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

202-347-2314 (f 2315) 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)

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.

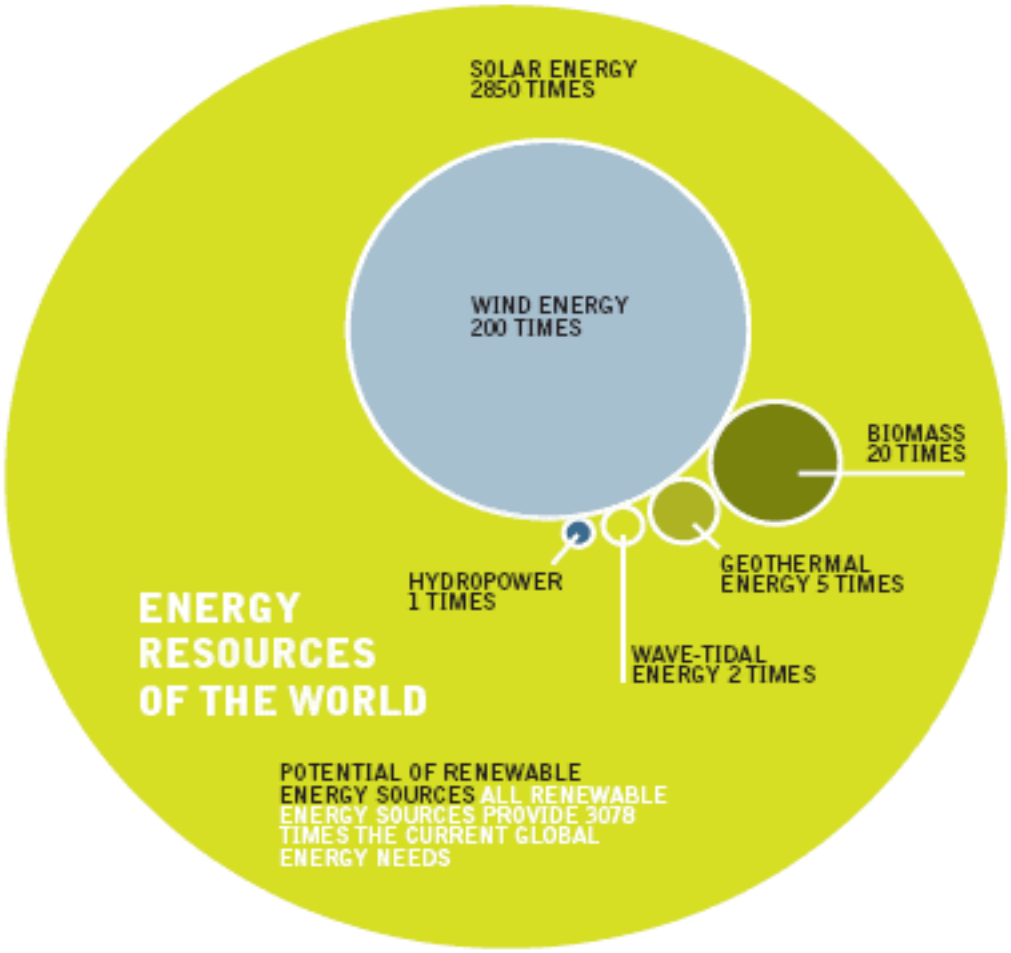
MORE REPORTS - 2009

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

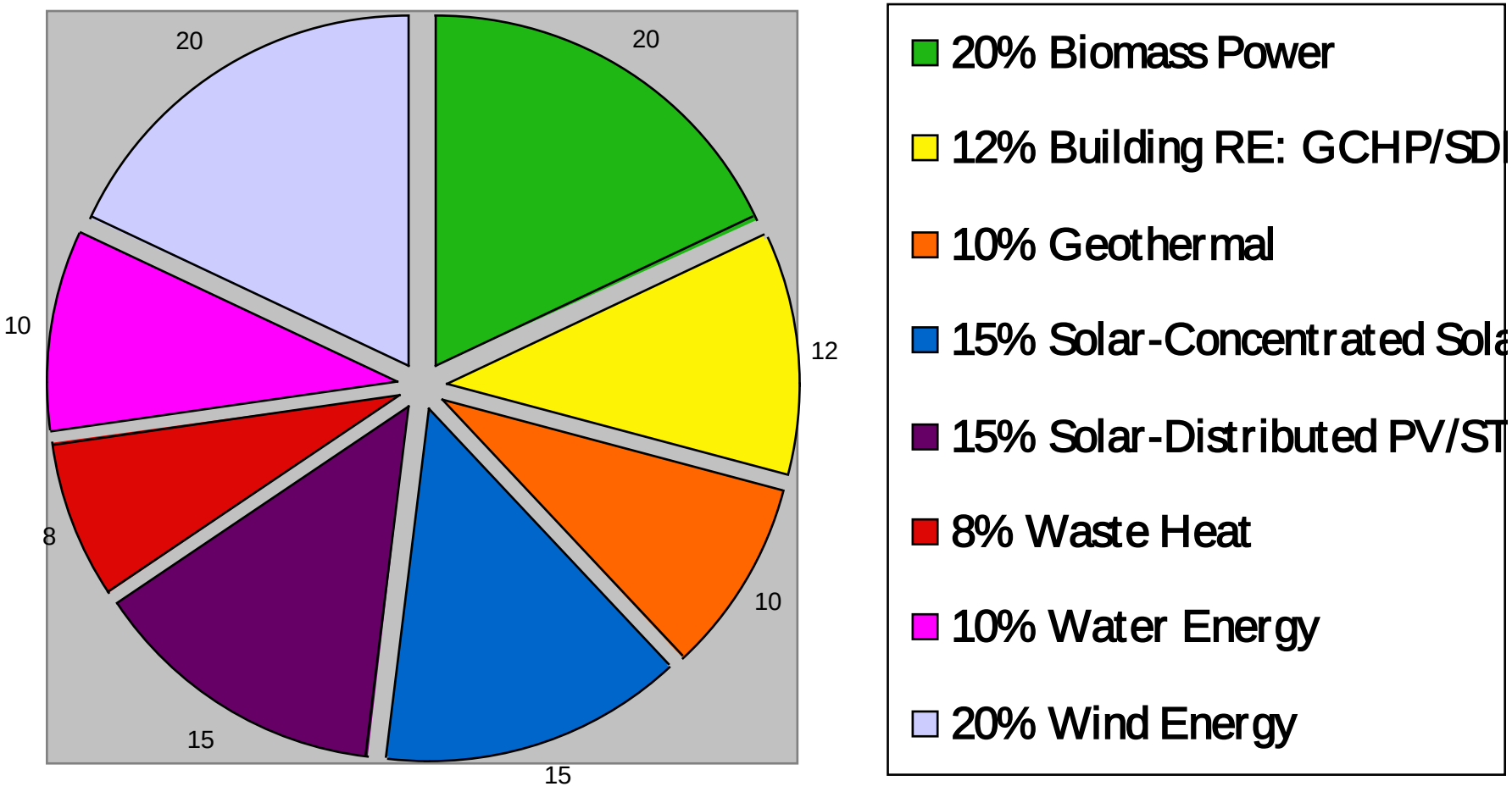
figure 30: **energy resources of the world**



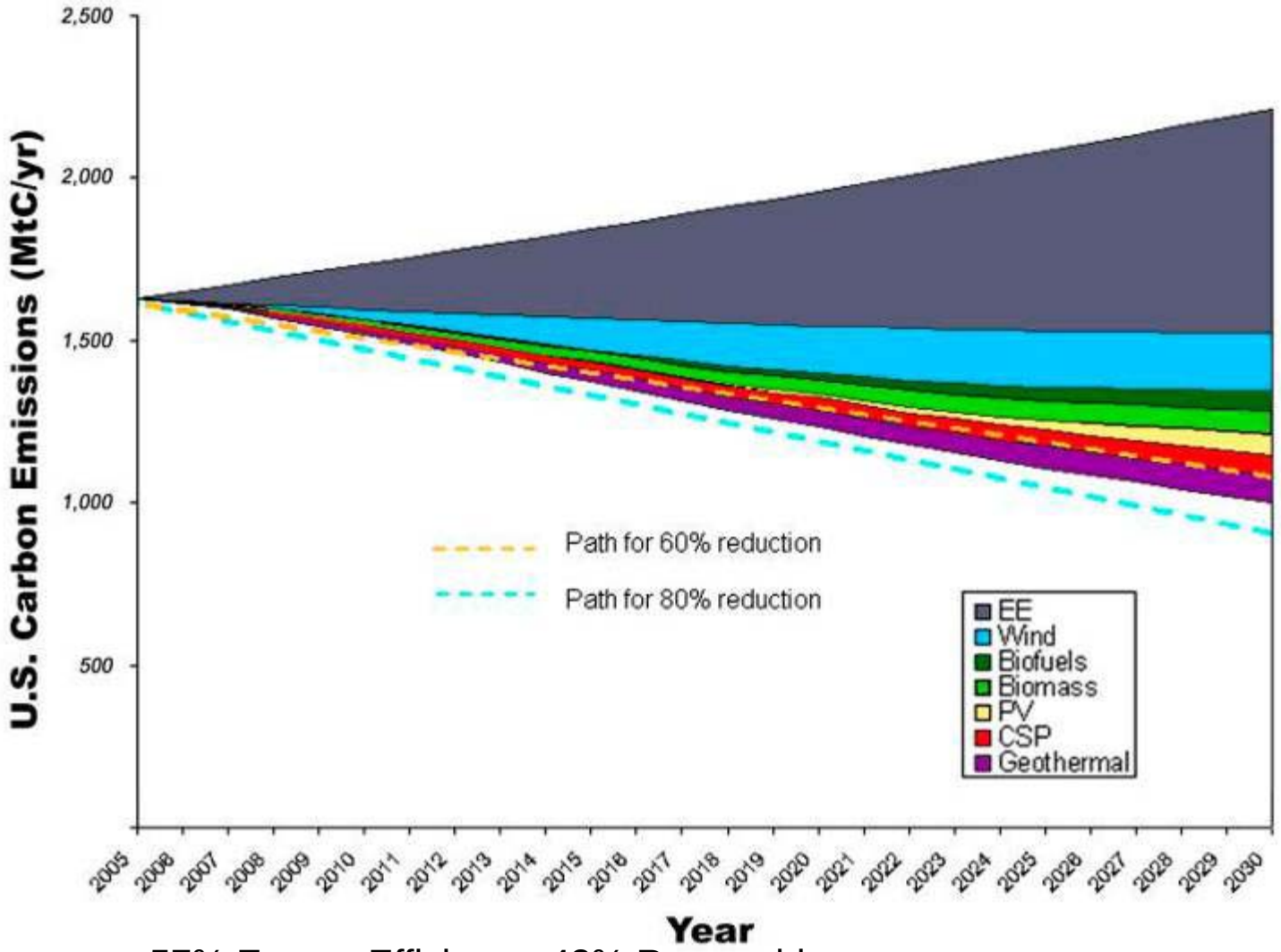
source WBGU

Institute DLR, Institute of Technical Thermodynamics, Department of Systems Analysis and Technology Assessment, Stuttgart, Germany Ecofys BV, P.O. Box 8408, NL-3503 RK Utrecht, Kanaalweg 16-G

Percentage of Clean Energy in 21st Century

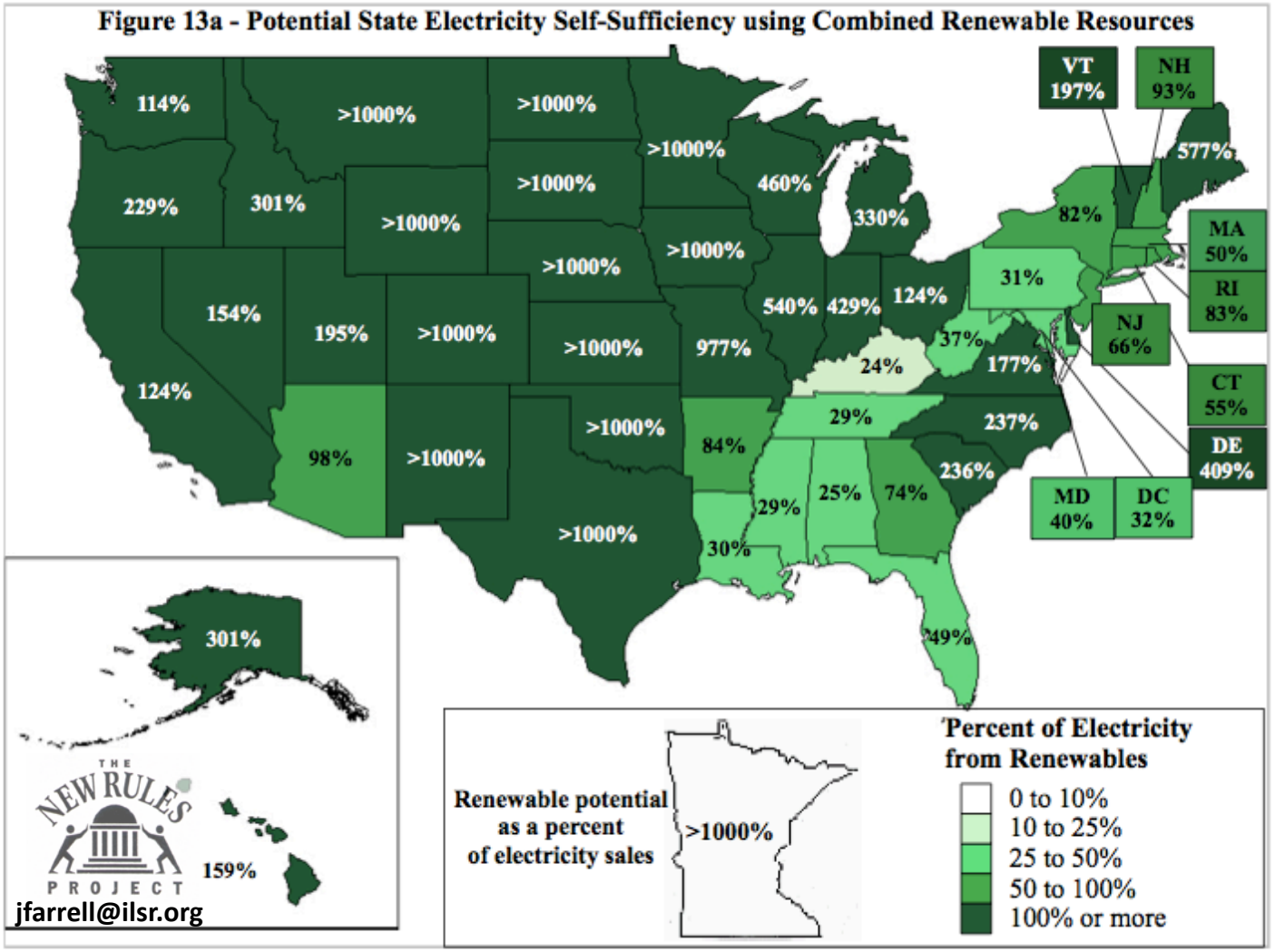


U.S. Carbon Emissions Displacement Potential from Energy Efficiency and Renewable Energy by 2030



57% Energy Efficiency, 43% Renewables

32 States can be Self-Sufficient

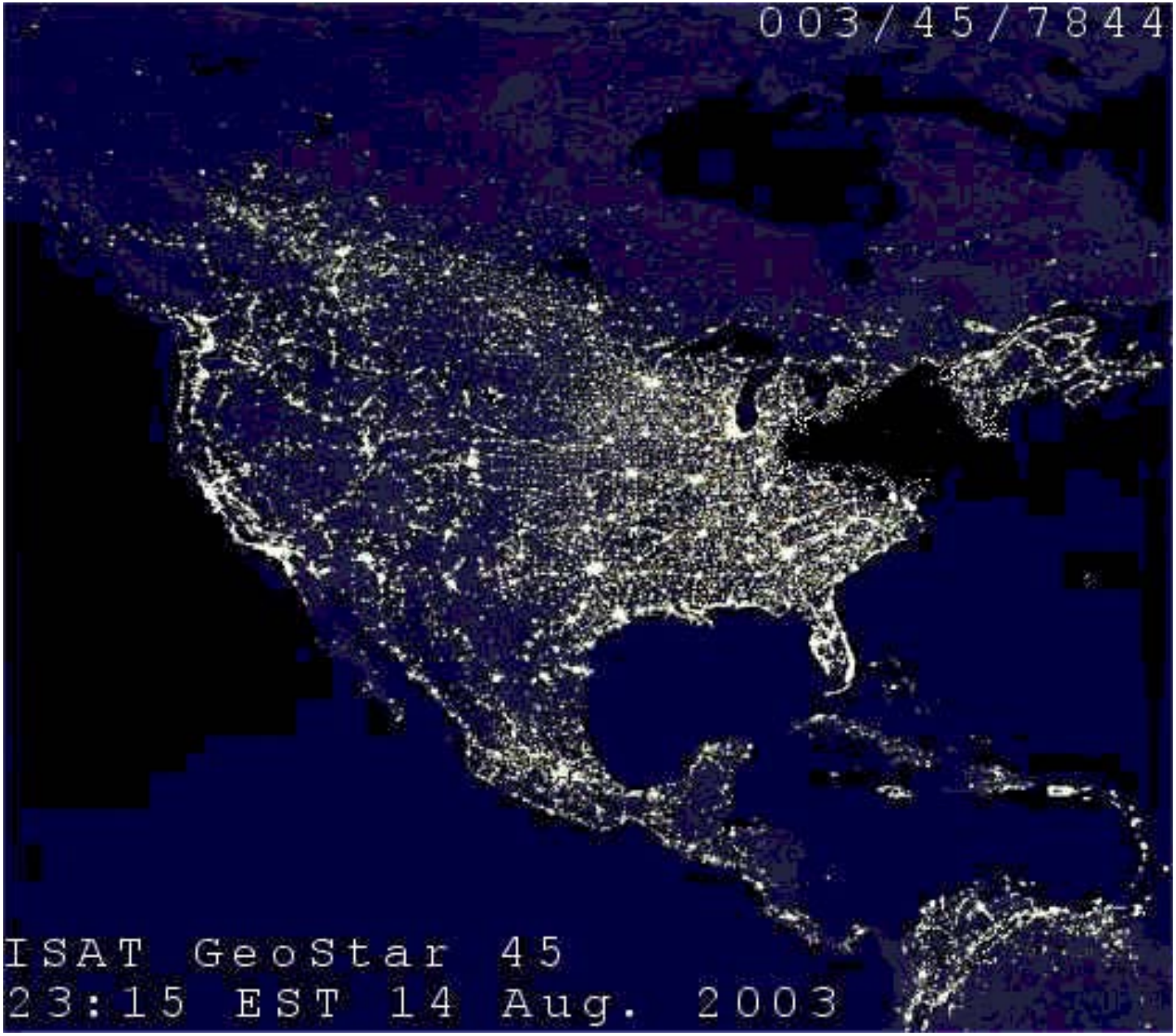


THE NEW RULES PROJECT

jfarrell@ilsr.org


NEW CONSTRUCTION

TSG VA Office


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

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

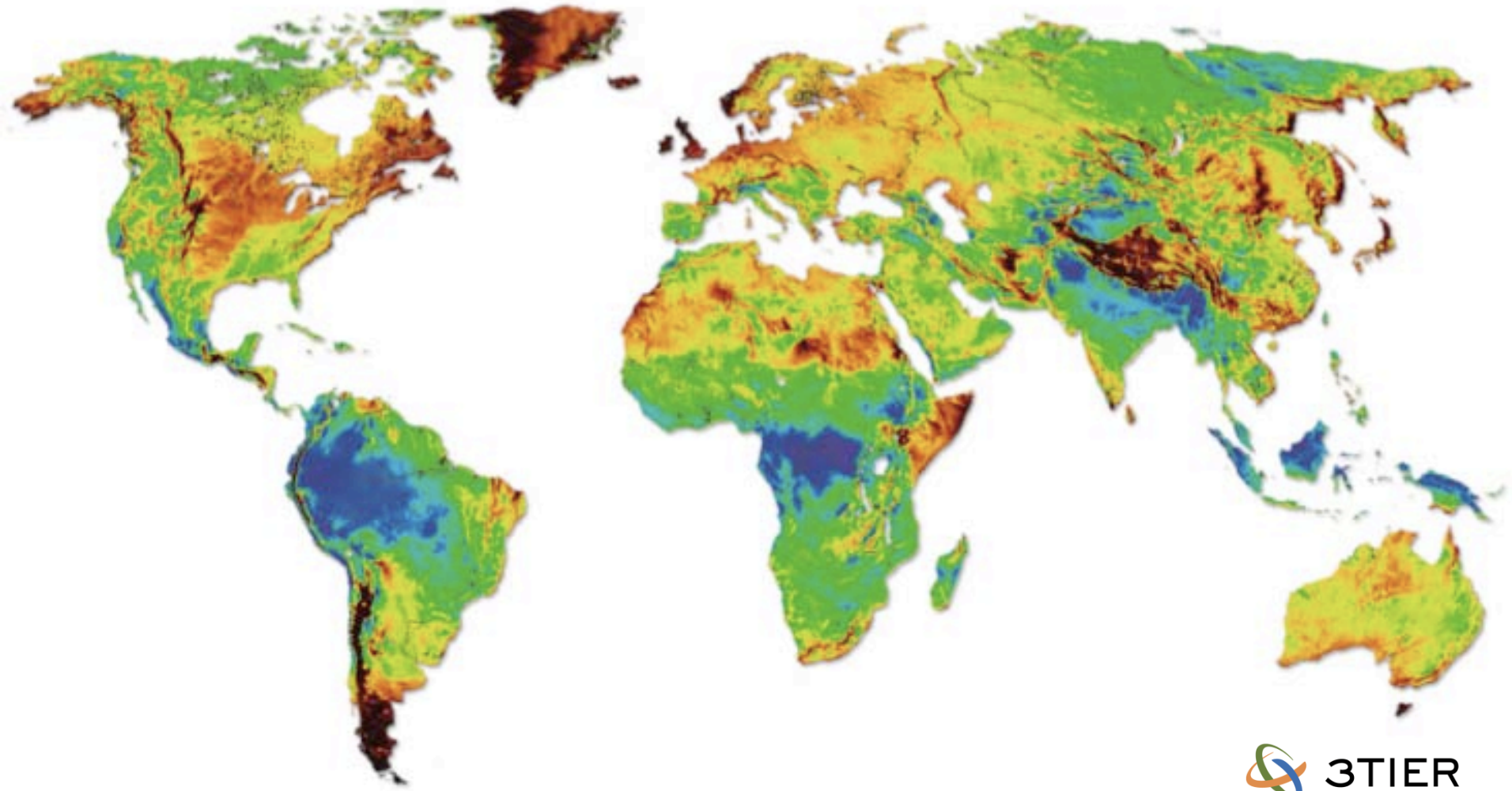
Power Disruption Events per Month

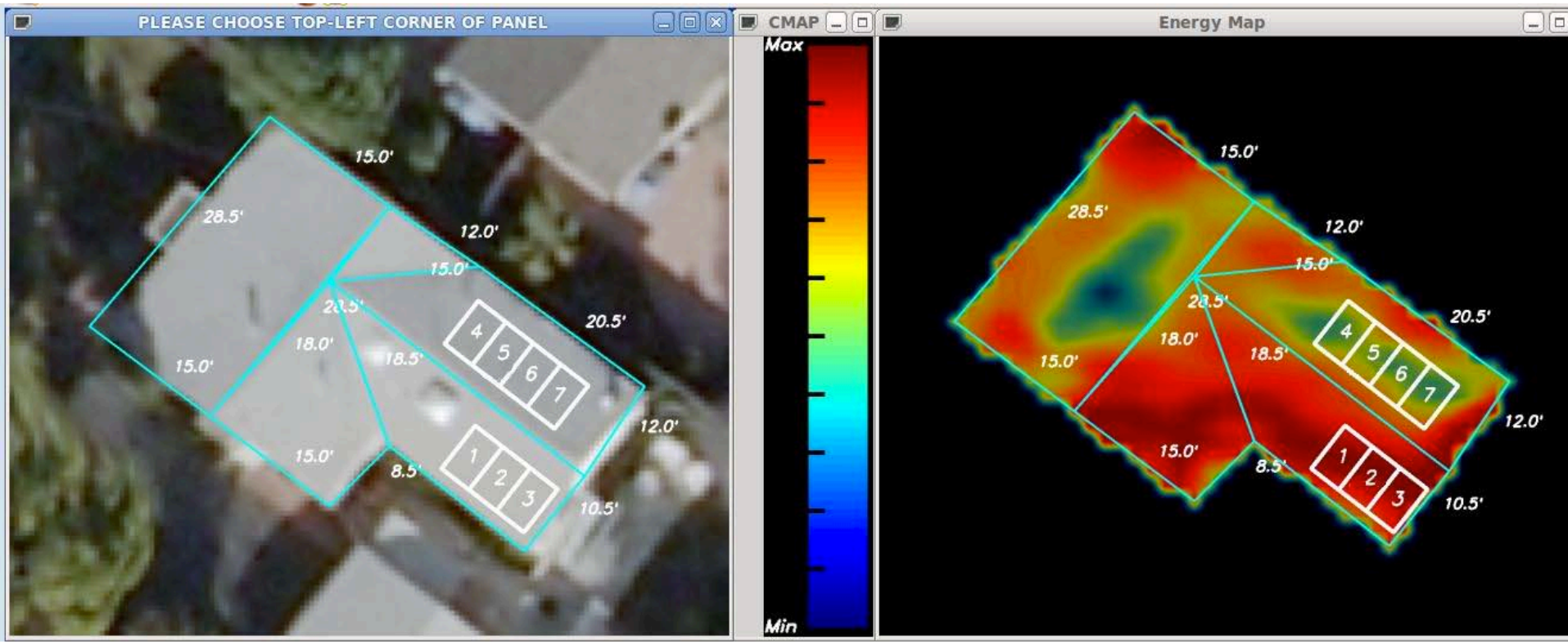
Event	Median	Average	Worst
Interruptions	1.0	1.3	10.0
Sags / undervoltages	4.1	27.9	1,660
Swells / overvoltages	3.4	13.9	1,450
Transients	15.7	63.5	1,166

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.





Solar Energy Siting Software

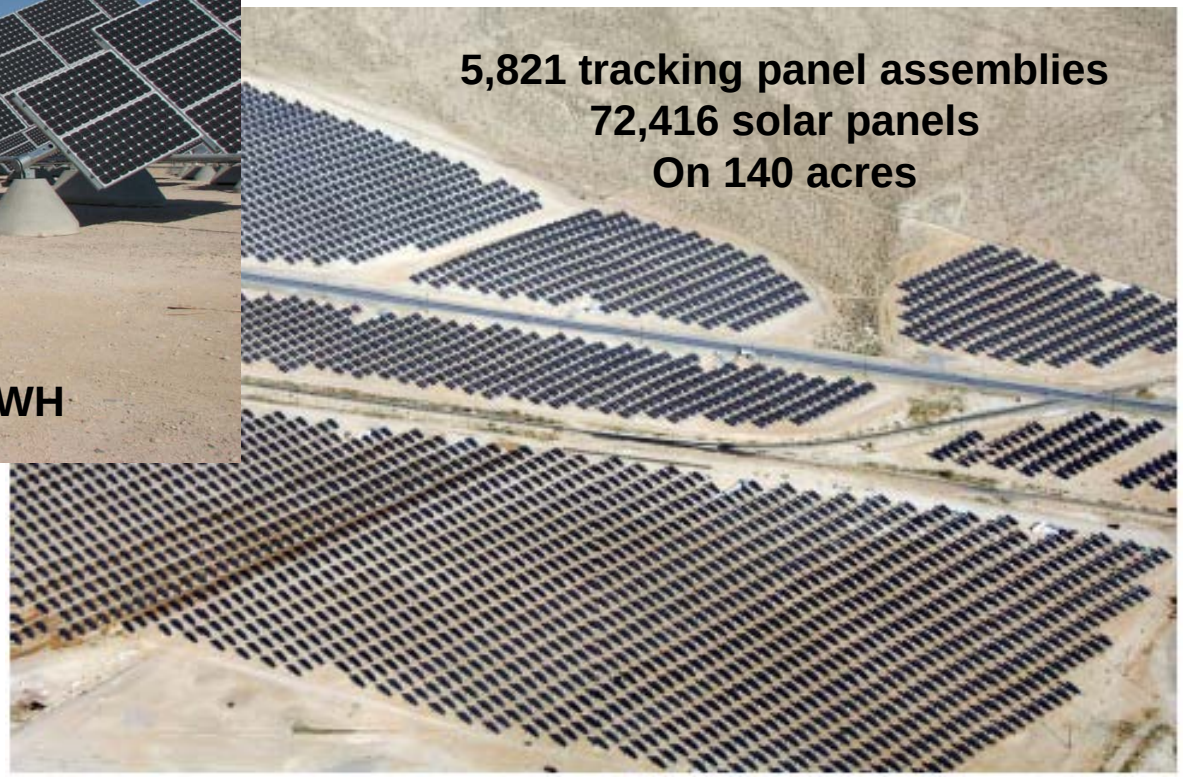
www.solar-red.net

NEVADA SOLAR ONE – ACCIONA SOLAR POWER

Stowed CSP – Nevada Solar One

Nellis AFB NV Solar Photovoltaic
North America's Largest Solar PV System

14.2 MW capacity
Annual output 30,000 MWH



5,821 tracking panel assemblies
72,416 solar panels
On 140 acres

University of Vermont PV System

Phoyovoltaic panels are located on the south facing roof of UVM's Cage Central Heating Plant near the library and the UVM Bookstore, Burlington, VT (44N, 73W) . They were placed here because it is a central location of campus where more people can walk by and see them, and It was also convenient to install and monitor the equipment There are forty-eight 120-Watt panels made by AstroPower, Inc. The solar cells are made from recycled semi-conductor wafers used in the computer industry and cover 500 square feet of roof space.

In full sun the system will produce between 4 and 6 kilowatts of AC electricity.

Under partly cloudy conditions the system will produce 4 to 5 kilowatts of AC electricity.

Under the thickest clouds, the system will produce 2 kilowatts of electricity or less.

SOURCE: http://www.uvm.edu

SkyBuilt Power

The Leader in Rapidly Deployable Renewable Energy Solutions

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

 | 866.786.2845 www.SkyBuilt.com

With high winds on the way, Michigan Thumb wind farm could stop spinning

Published: Tuesday, October 26, 2010, 11:55 AM

UBLY — High winds could bring spinning wind turbines to a halt at Michigan's wind farm in Huron County. An official from the Michigan Wind Farm office in Ubly said once winds hit 55 mph, the 46, 255-foot tall wind turbines will shut down automatically.

"We don't want the rotor to go any faster than (55 mph)

Arctic Six 6 kW Turbines

Operational ***PowerCube***™ New Castle, PA

Participating in the Regulation Market with PJM*

EV Charging Powered by a 30kW Grid-Tied Solar Array

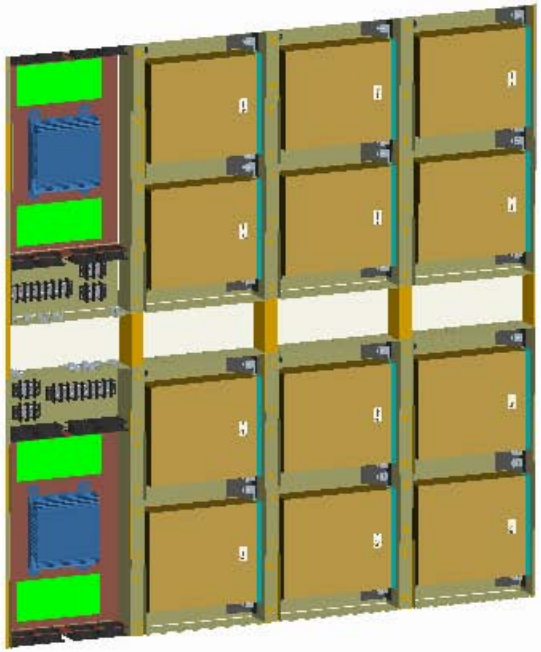
Operational *Power Cube*™ Commissioned at Axion Power's Battery Manufacturing Plant

PJM is the world's largest competitive wholesale electricity market

5.0 KW/2 Phase – 4 Hours of Operation

220V System

Twelve / 24 Volt
1.75 KWhr Modules



Two
2.5 KW Inverter
/ UPS

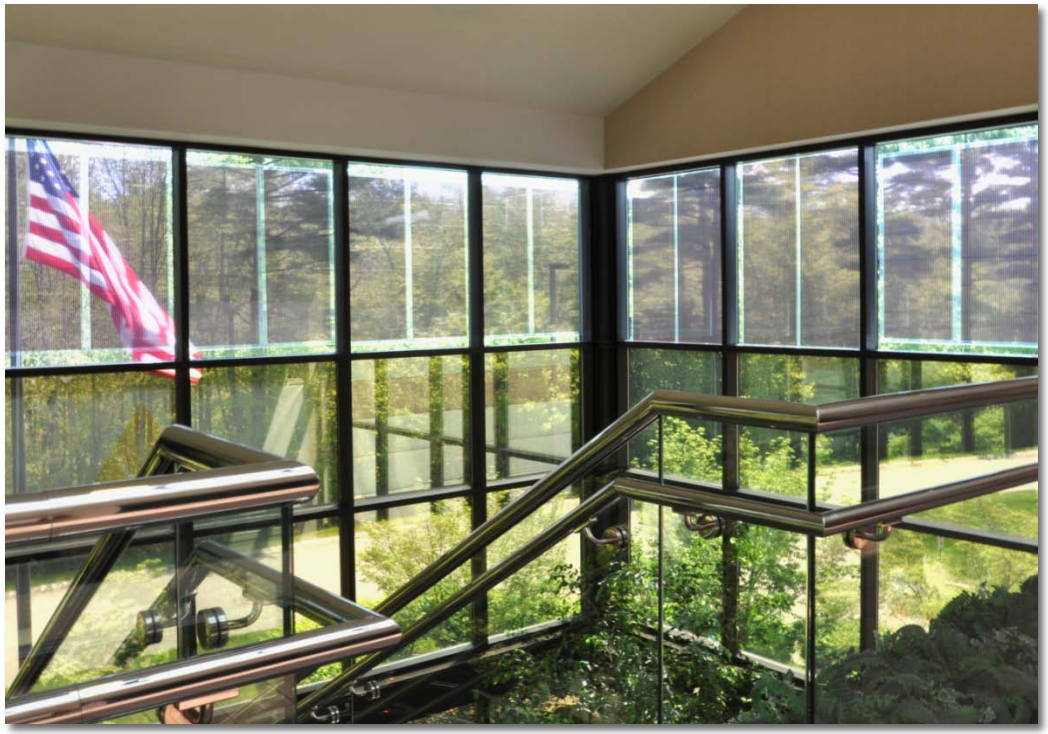
Total
Stored Energy
21 KWhrs

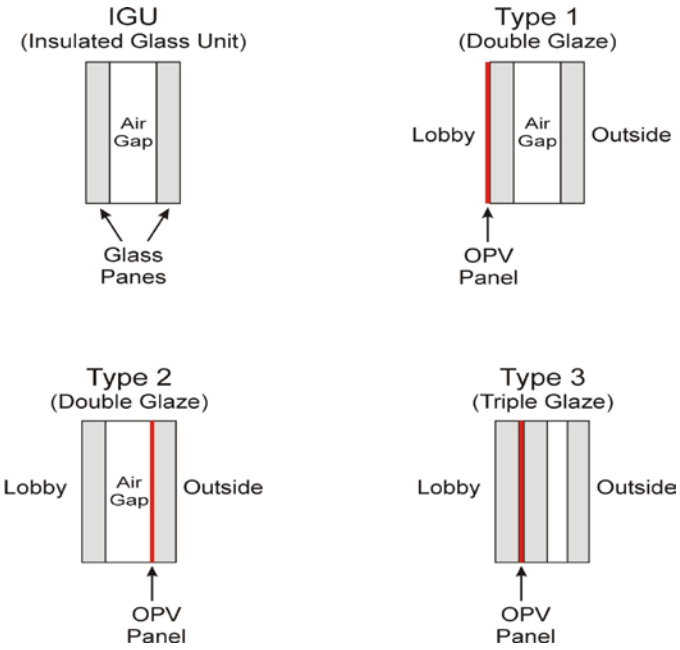
Total Continuous
Power 5 KW

Power Plastic® Solar for Windows

- Transparent
- Embedded in new construction
- Retrofitted to existing windows
- Reduces cooling load of building

Konarka Facility, New Bedford, MA

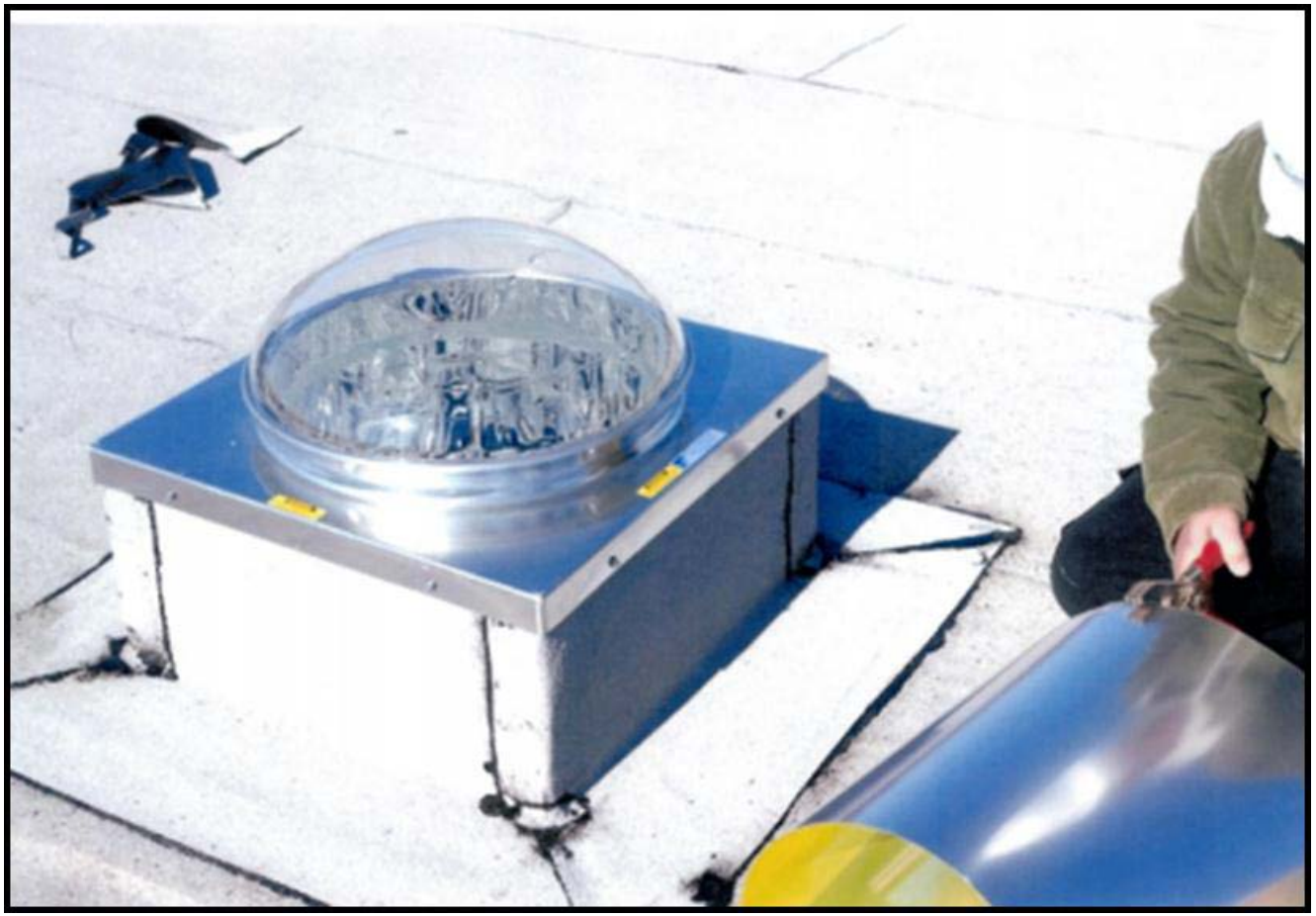




Kevin Debasitis
kdebasitis@konarka.com
978-376-3219

www.konarka.com

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

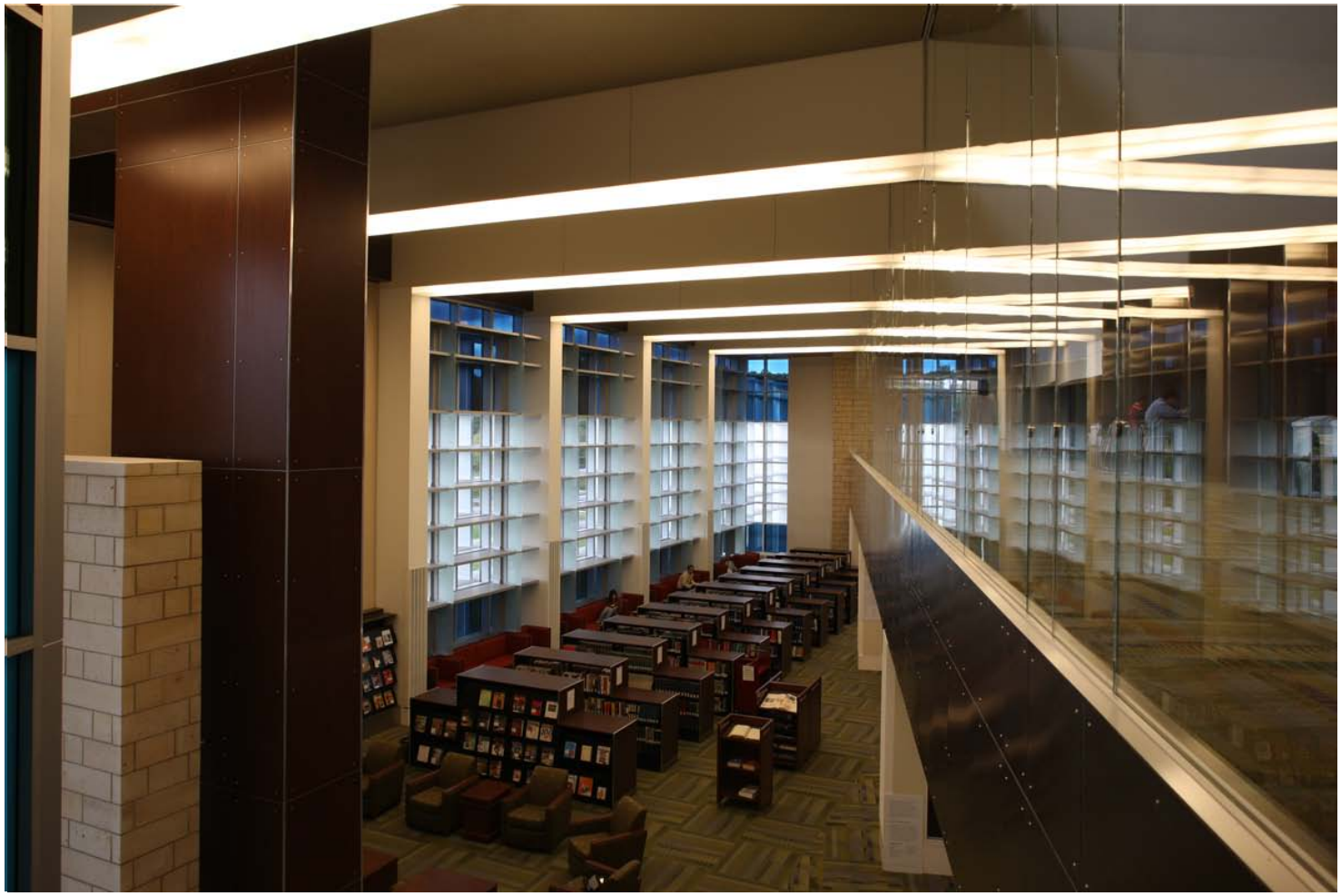
Award: 2008 SDG@E Large Sustainable Communities Champion
Daylight Inside's Contribution: Designed, manufactured and installed passive daylighting Light Harvest Fixtures in 43 buildings
Results: Average 75 fc for 8 hours per day, reduction of kWh usage, safer working environment
Annual Savings: Estimated $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℠

Century College

White Bear Lake, MN



Technology Overview

Solargenix is a pioneer in solar thermal technology. Providing solar thermal solutions to:

- Utility scale generation projects
- Industrial process heat and thermal co-generation
- Commercial hot water and integrated with building heating and cooling applications.

Solar Air Conditioning System

Solar air conditioning installation comprised of 180 collectors powering a 30 ton capacity single-effect absorption cooling system. Sandhill Power Plant, Austin, Texas

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.

On-Site Generation Utilization List

- **Lighting** (outside area, motion detector and remote lighting) — Security lighting systems attached to buildings, light poles, or specialized for safety
- **Monitoring and/or Surveillance** (cameras, motion detectors, sensors) — Low power operation — primarily fuel cells, solar and small wind.
- **Cellular and WiFi** - (distributed communi-cations for internet, telephones, remote sensors, and security - fuel cells, advanced batteries, photovoltaics, small wind, etc .....

ELEVATED SECURITY

Sacred Power Systems on Flatbread (5/2011)

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

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.

U.S. Tidal Energy Project (New York, NY)

Turbines being assembled

Turbines being lowered to underwater position

Turbines submerged below the surface, invisible from shore

Introduction

Verdant Power is interested in providing select potential investors the opportunity to invest in a U.S.-based producer and developer of marine renewable energy

- Verdant Power established in 2000, headquartered in New York, NY, with subsidiaries in Canada, UK, and Hong Kong
- Commercial pilot project being developed in New York supported by funding from various public and private institutions
- Poised to receive first-ever commercial license for tidal power generation in U.S.

Highlights

Proprietary Technology

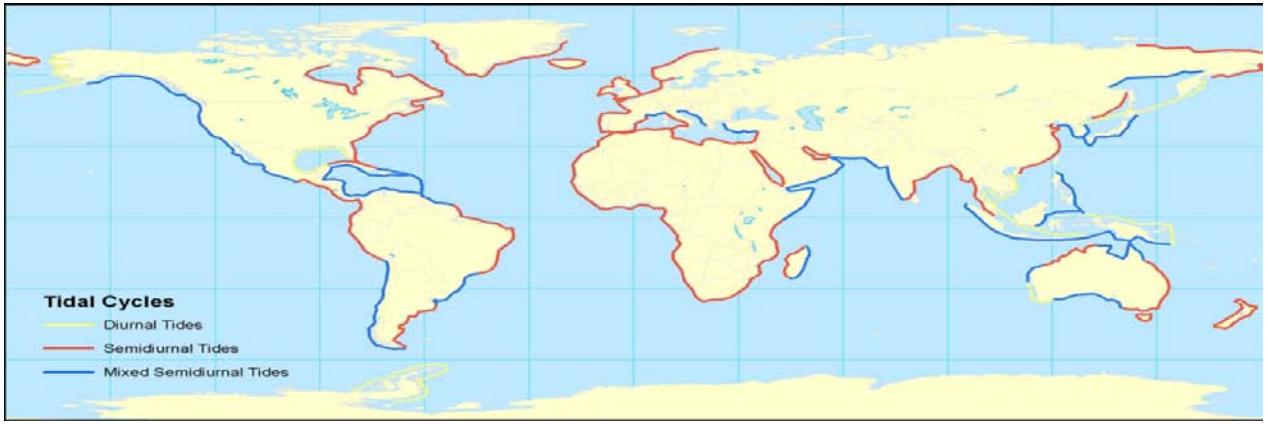
- Generates clean energy from the currents of tides, rivers and large canals
- Energy resources are predictable and underwater placement eliminates view shed disruption
- Simple, scalable design maximizes siting potential (deep offshore, urban, village) and differentiates Company from competitors
- Gen4 turbine proven in an array (world first), supplying power to New York City customers
- Commercial class Gen5 system developed in partnership with U.S. Dept of Energy and U.S. and Canadian national labs

Highly Experienced Management Team

- Members of senior management are seasoned and highly accomplished cleantech and energy professionals, each with 25-30 years of experience

Market

- Global tidal potential estimated at 60,000 MW (Red areas = prime tidal sites; Blue = good)

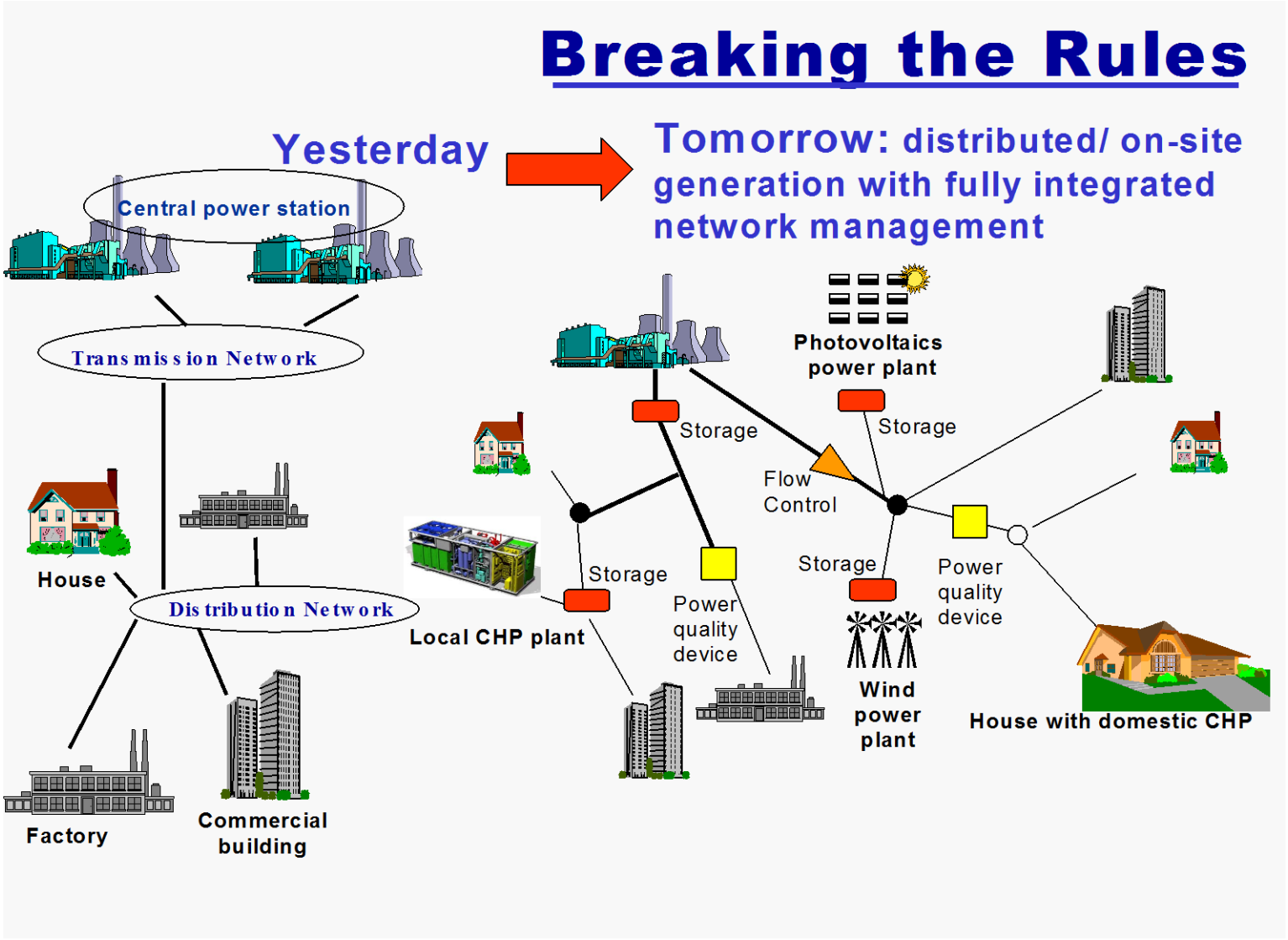


Biomass Gasifier: Distributed Energy

- gen set
- transformer

A photo of the one-megawatt microgrid planned for Afghanistan during testing in California.(Credit: Dennis Simon/U.S. Army) June 30, 2011 8:06 AM PDT

Developing Countries: New paradigms are under development




Good planets are hard to find.