# The Stella Group, Ltd.

The Stella Group, Ltd.. is a strategic marketing and 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 CoChairs the Policy Committee of the Sustainable Buildings Industry Council.

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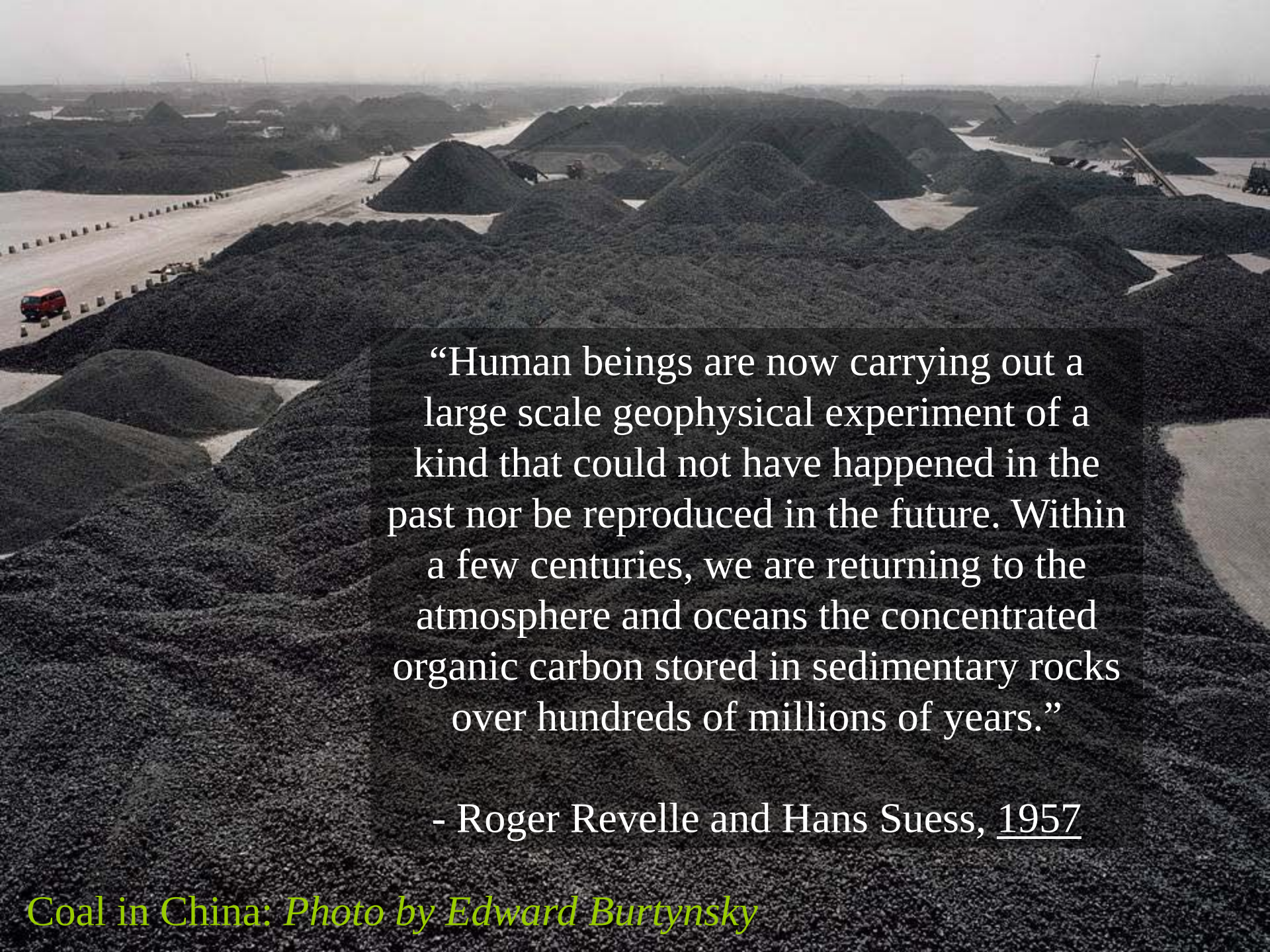


"Human beings are now carrying out a large scale geophysical experiment of a kind that could not have happened in the past nor be reproduced in the future. Within a few centuries, we are returning to the atmosphere and oceans the concentrated organic carbon stored in sedimentary rocks over hundreds of millions of years."

- Roger Revelle and Hans Suess, 1957

Coal in China: *Photo by Edward Burtynsky*

# 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

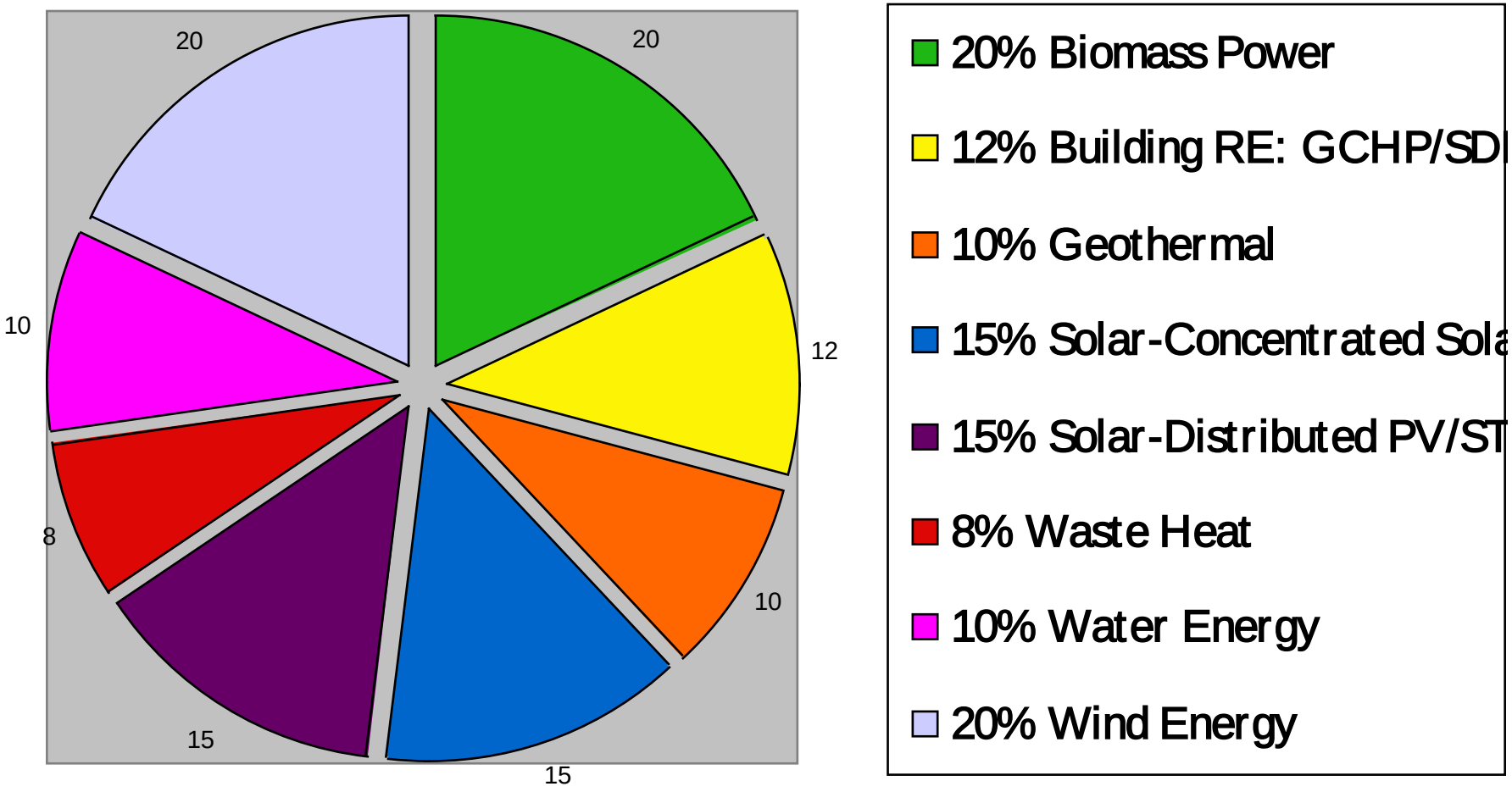
3. **GOOGLE** Google.org, the philanthropic arm of the search giant, has unveiled a plan to move the U.S. to a clean-energy future. The vision: In 2030, electricity will be generated not from coal or oil but from wind, solar, and geothermal power. Energy demand will be two-thirds what it is now, thanks 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

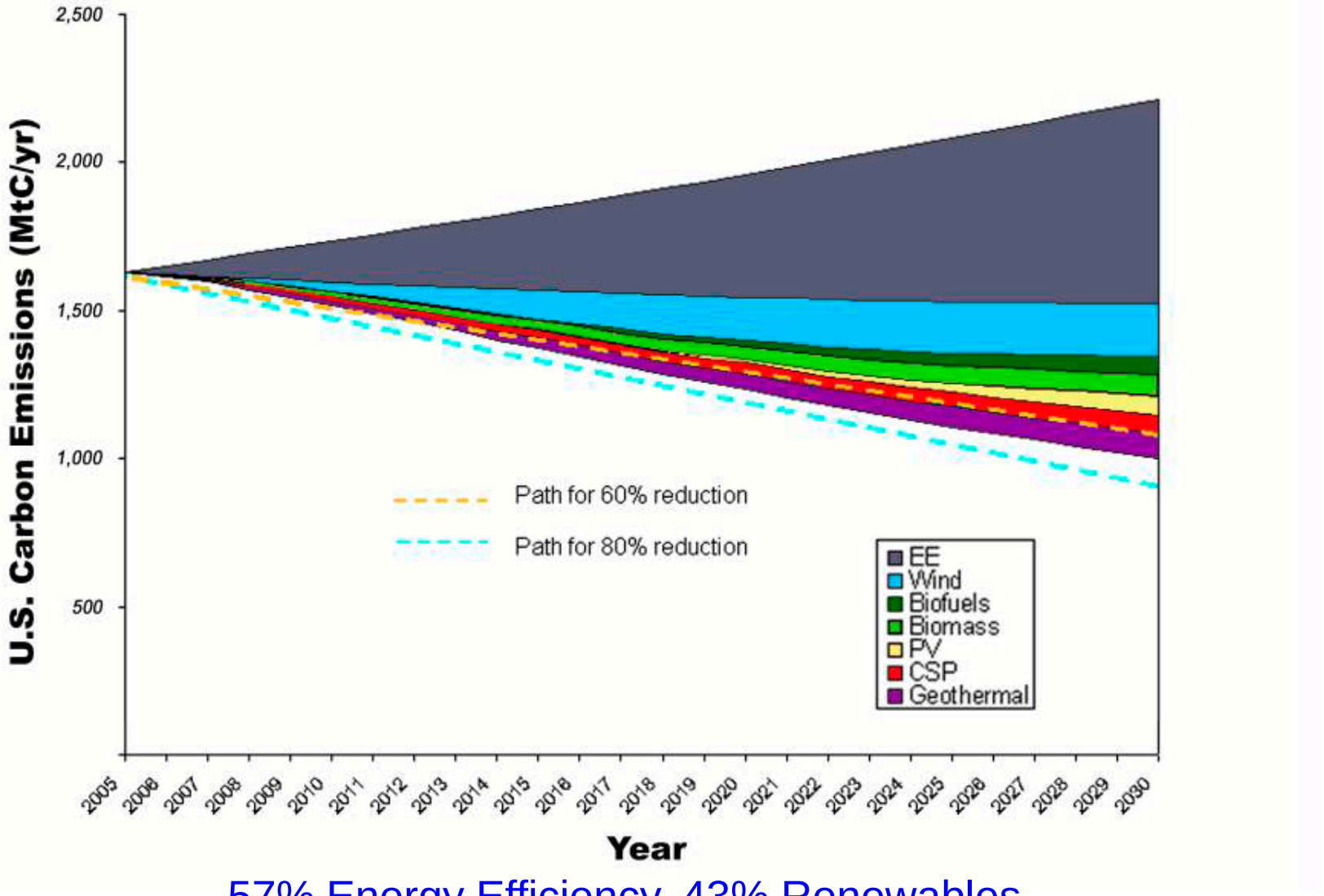
National Research Council Renewables Report - June 09

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/onpinews/newsitem.aspx?RecordID=12619 or http://tinyurl.com/neka69

# Percentage of Clean Energy in 21st Century

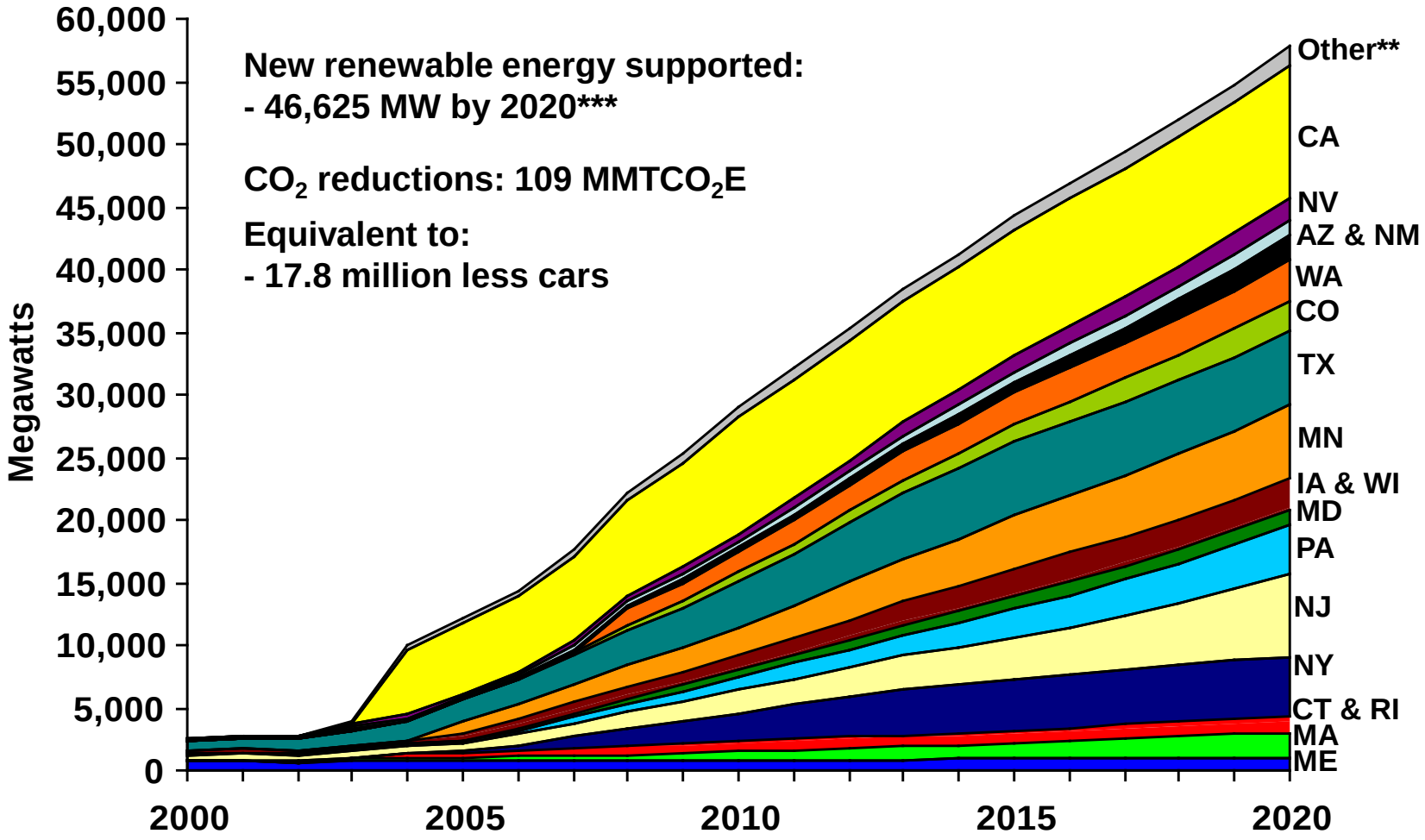


# U.S. Carbon Emissions Displacement Potential from Energy Efficiency and Renewable Energy by 2030




57% Energy Efficiency, 43% Renewables

# Renewable Energy Expected From State Standards and Funds*



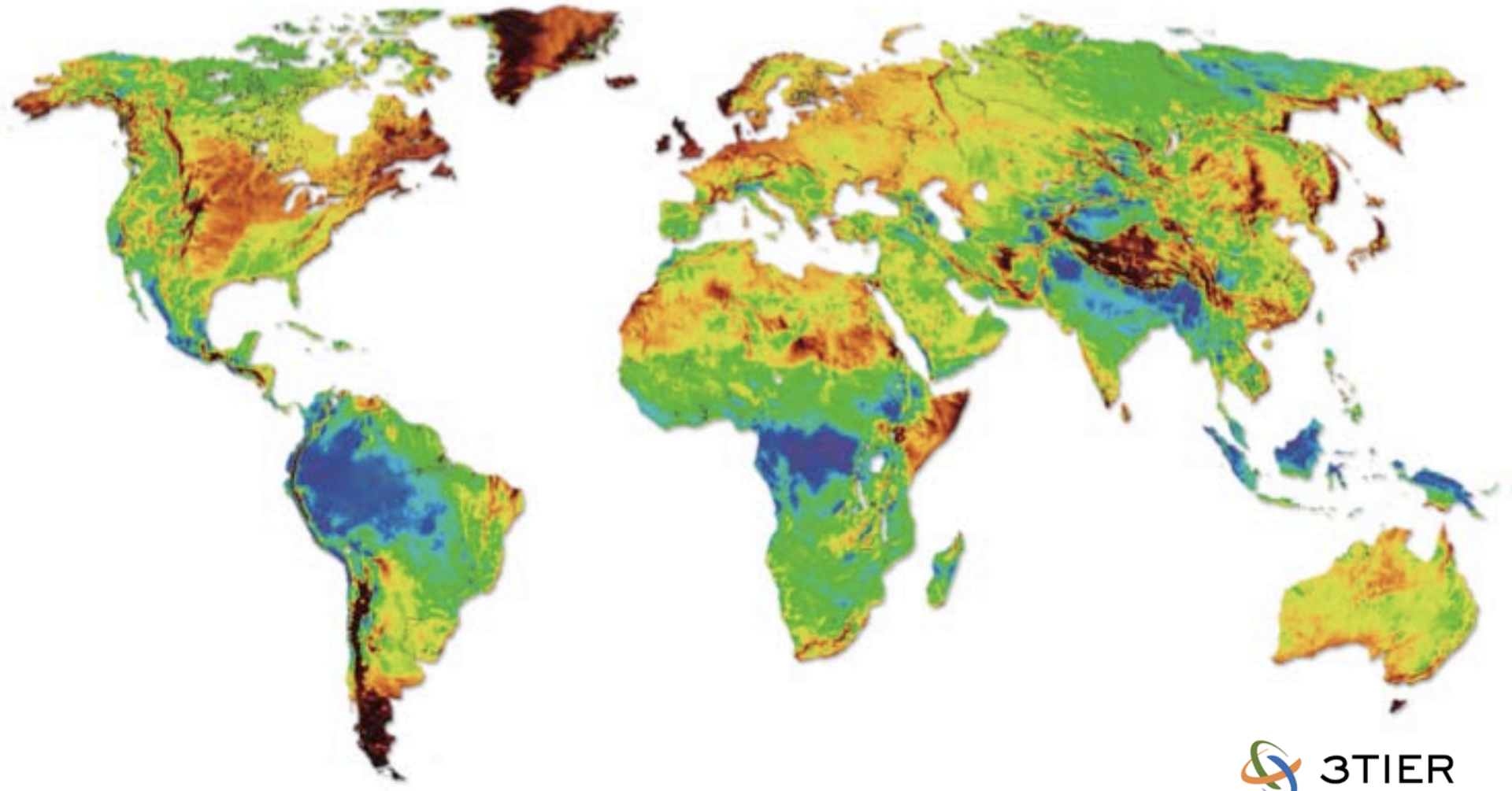

*Projected development assuming states achieve annual renewable energy targets.
**Includes Delaware, Hawaii, Illinois, Montana, Ohio, Oregon, and Washington D.C.
***If achieved, IA, IL, and ME goals would support an additional 4,400 MW by 2020.

Source: Union of Concerned Scientists

| Energy Source | $SO_x$ ($gSO_x$/kWh) | $NO_x$ ($gNO_x$/kWh) | C in $CO_2$ (gC/kWh) | C in $CO_2$ from non-generating portion of fuel cycle* (gC/kWh) |
|---|---|---|---|---|
| Coal | 3.400 | 1.8 | 322.8 | 50.0 |
| Oil | 1.700 | 0.88 | 258.5 | 50.0 |
| Natural Gas | 0.001 | 0.9 | 178.0 | 30.0 |
| Nuclear | 0.030 | 0.003 | 7.8 | 7.8 |
| Photovoltaics | 0.020 | 0.007 | 5.3 | 5.3 |

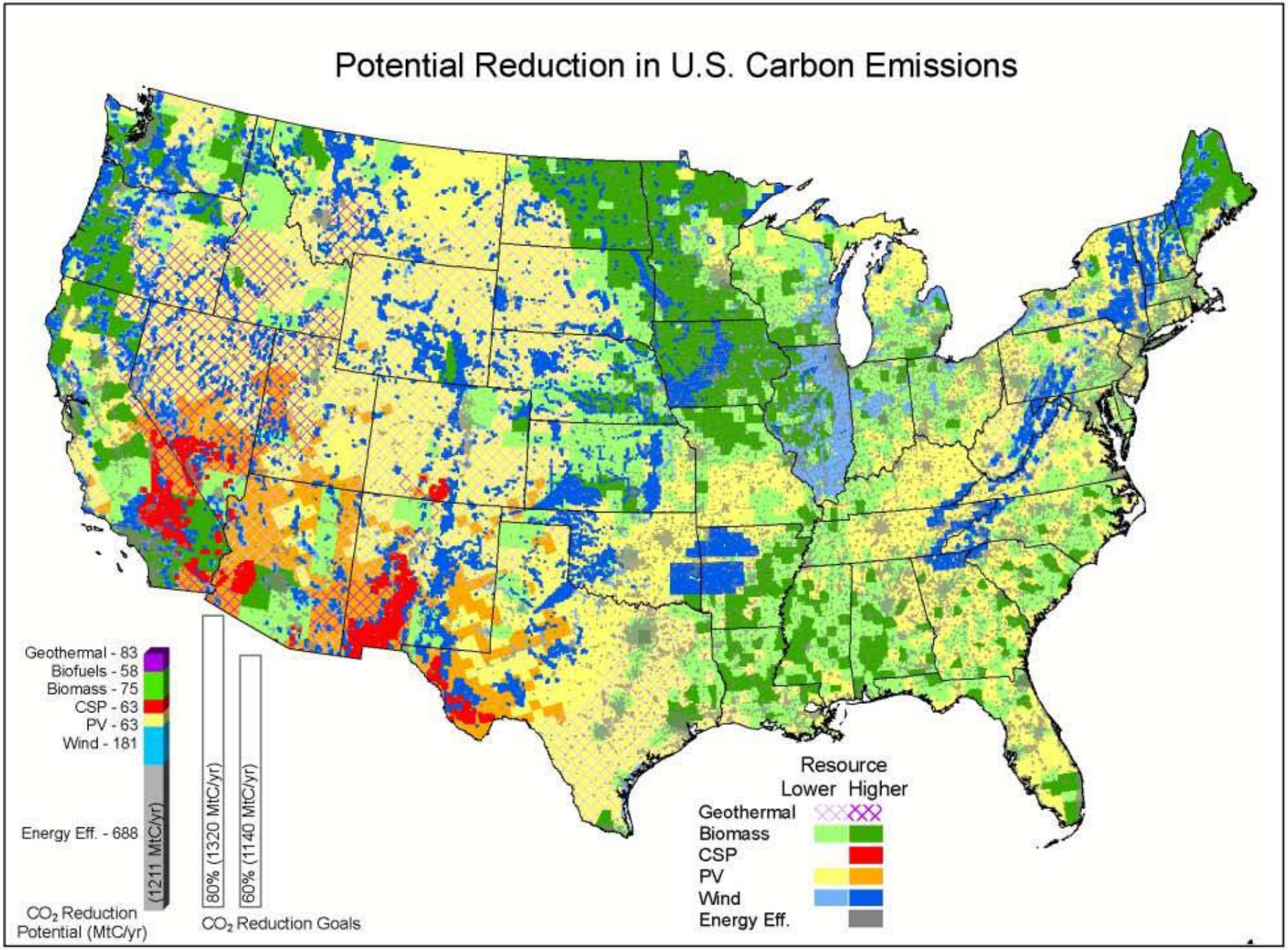
*Estimated emissions related only to the gathering and processing of fuel, and to the building and decommissioning of the generation plant. Based on calculations derived from: R. Dones and R. Frischknecht, "Life Cycle Assessment of Photovoltaic Systems: Results of Swiss Studies on Energy Chains," *Environmental Aspects of PV Power Systems: Report on the IEA PVPS Task 1*, Report No. 97072, December 1997. Emission factors for fossil fuel from The American Gas Association; emission factors for nuclear and renewable energy sources from the Council for Renewable Energy Education (as reported by SEIA, ref. 7).

# www.3TierGroup.com

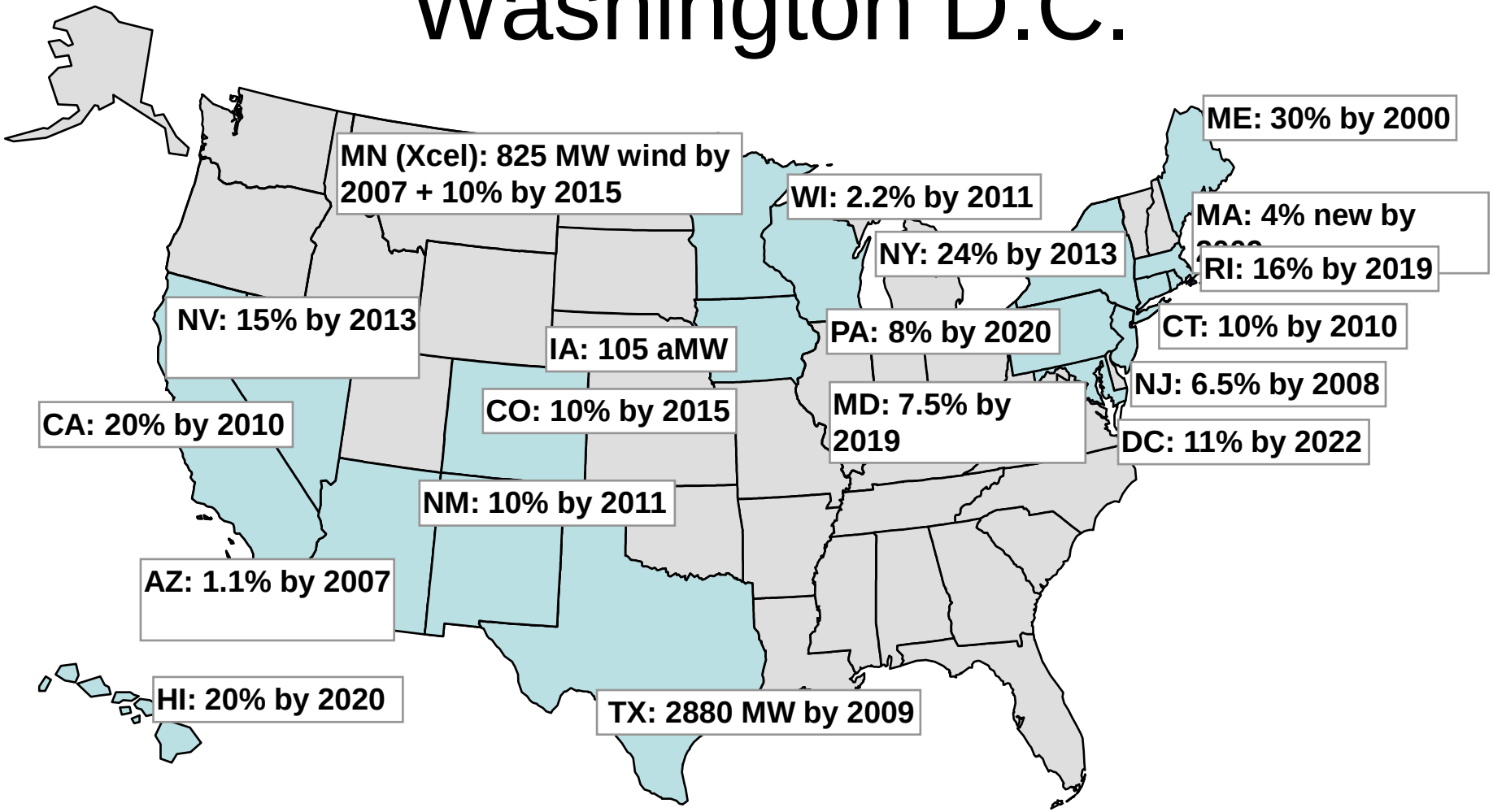


3TIER
knowledge is power

# Potential Reduction in U.S. Carbon Emissions

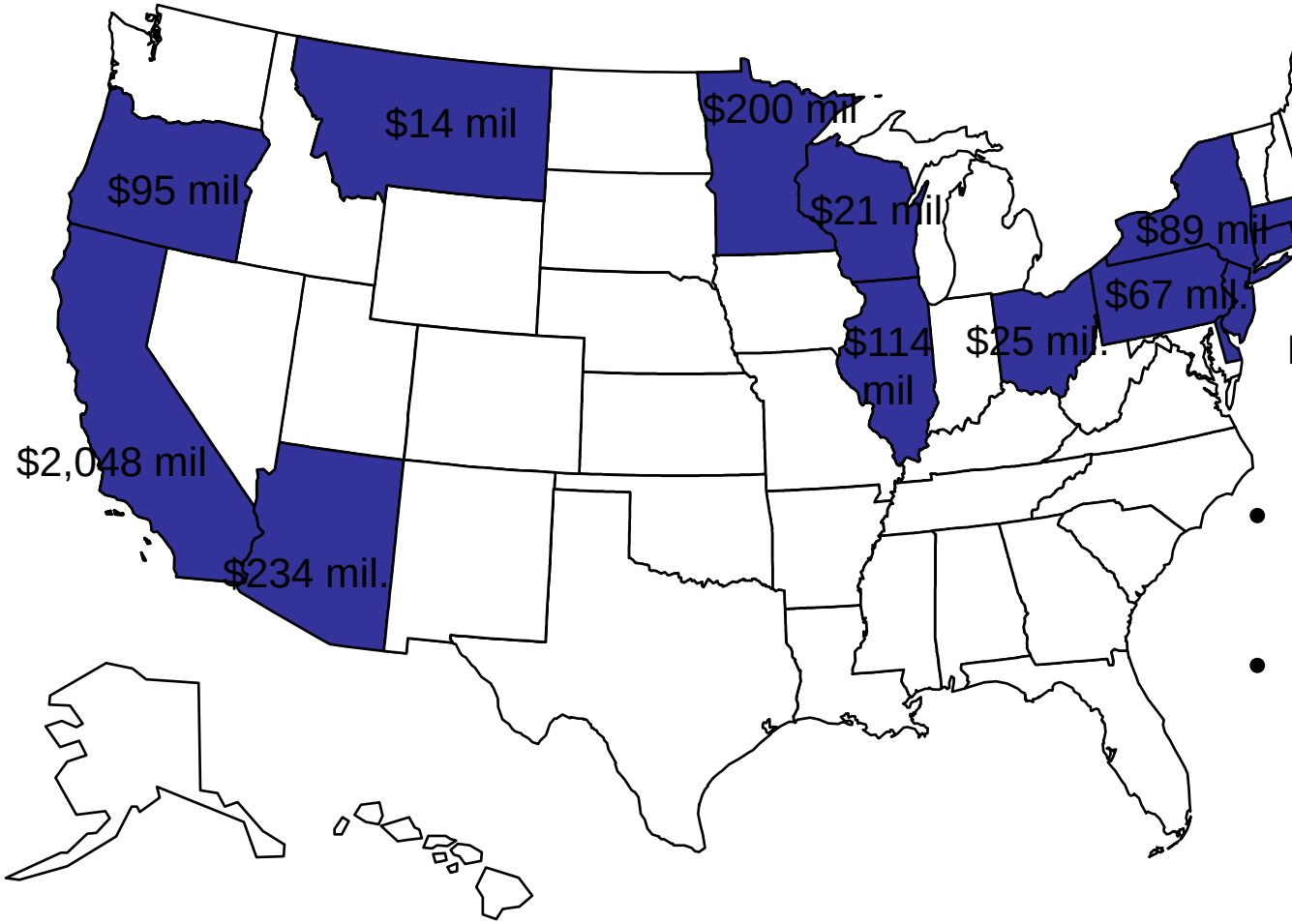


# Existing State RPS Requirements: 18 States and Washington D.C.



# Renewable Energy Funds

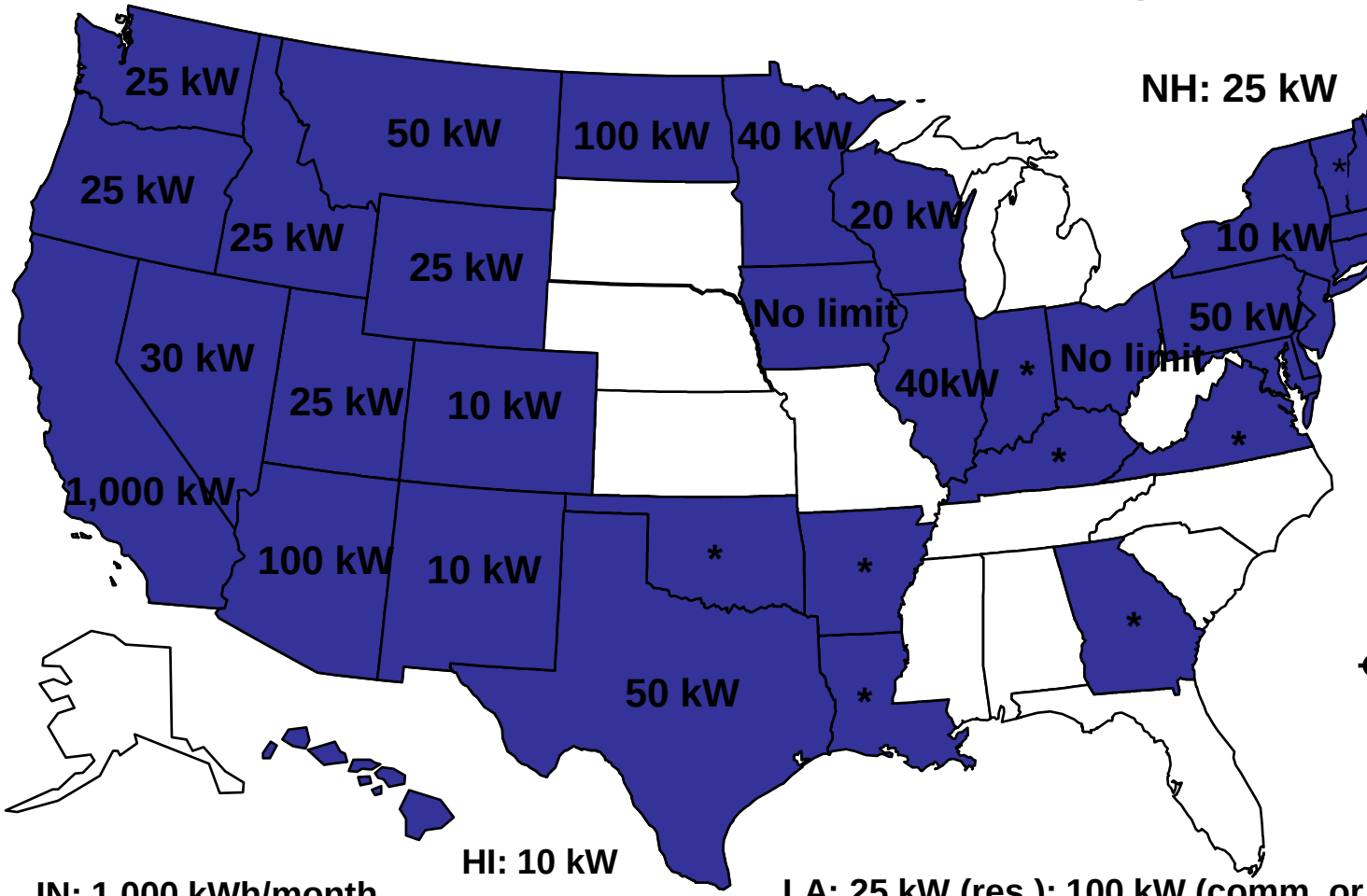
**Cumulative 1998 - 2017**




MA: $494 mil
RI: $30 mil
CT: $248 mil
NJ: $286 mil.
DE: $18 mil.

- 15 state funds = $4 billion by 2017
- 8 states with funds & standards

# Net Metering Rules



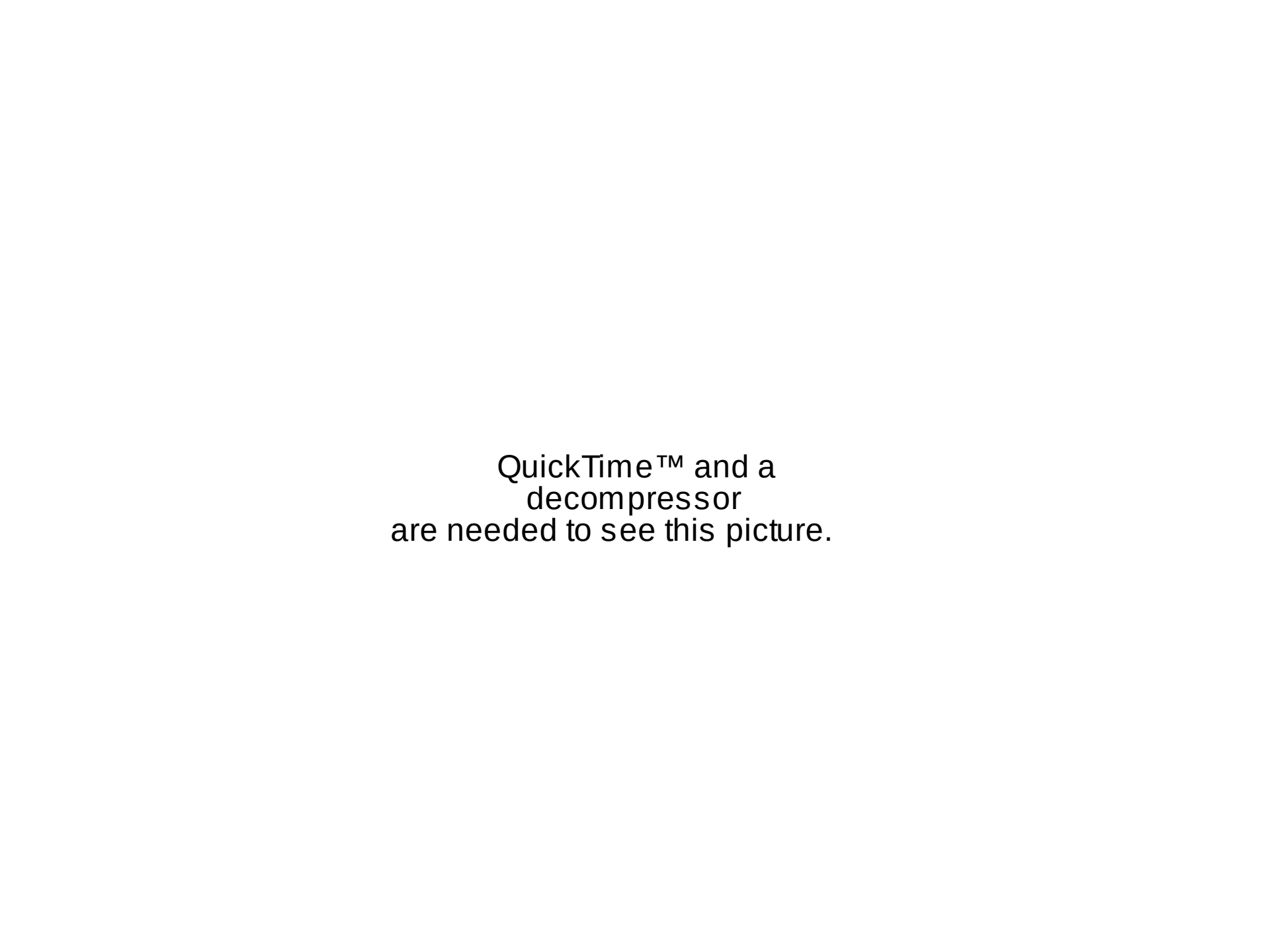

**37 states**

**IN: 1,000 kWh/month**
**VT: 15 kW, 150 kW for farm systems**
**VA: 10 kW (res.);25 kW (comm.)**
**KY: 10 kW (res.); 25 kW (comm.)**

**LA: 25 kW (res.); 100 kW (comm. or ag.)**
**OK: 100 kW and 25,000 kWh**
**GA: 10 kW (res.); 100 kW (comm.)**
**AR: 25 kW (res.); 100 kW (comm. or ag.)**

# **Concentrated Solar Power** — 15% of US Electricity

- Concentrated Solar Power from Earth Policy Institute
  http://www.earth-policy.org/Updates/2008/Update73.htm - easy 15%
- also see: SOLAR ENERGY COULD PROVIDE 8000+ MW OF CAPACITY IN WESTERN STATES BY 2015 www.sustainableenergycoalition.org/factoids/factoid_12.html
- WAPA and Sandia/NREL Studies - similar conclusions
- A USDOE report for the Western Governors' Association (WGA) in 2005 provided an assessment of the potential impact of CSP. It found that by using only available land with the most intense sunshine, over 6,800 GW of electricity could be generated in the Southwest.17 To put this in perspective, the electric generating capacity of the entirecountry is currently about 1,000 GW.18 And further: Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts" Draft 3, Sargent and Lundy, LLC, October 2002
- http://www.nrel.gov/csp/troughnet/pdfs/41233.pdf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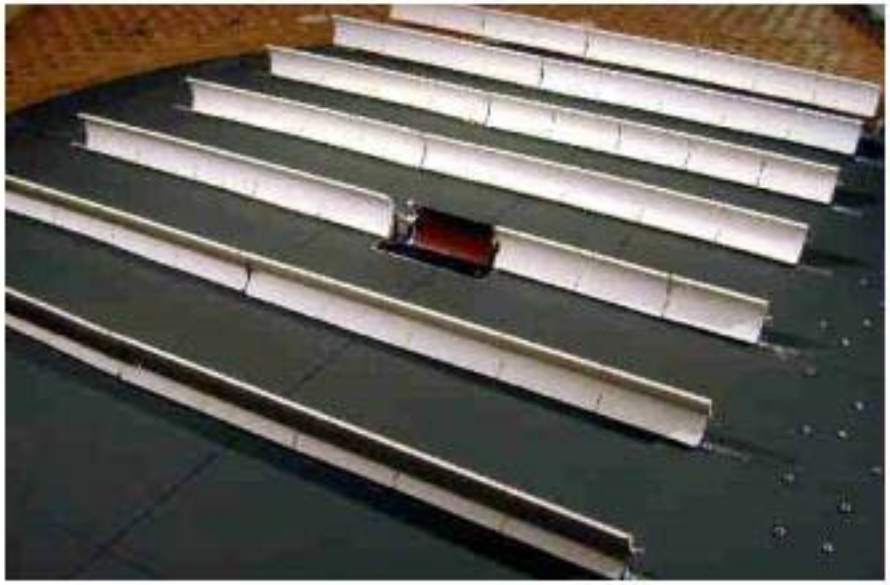
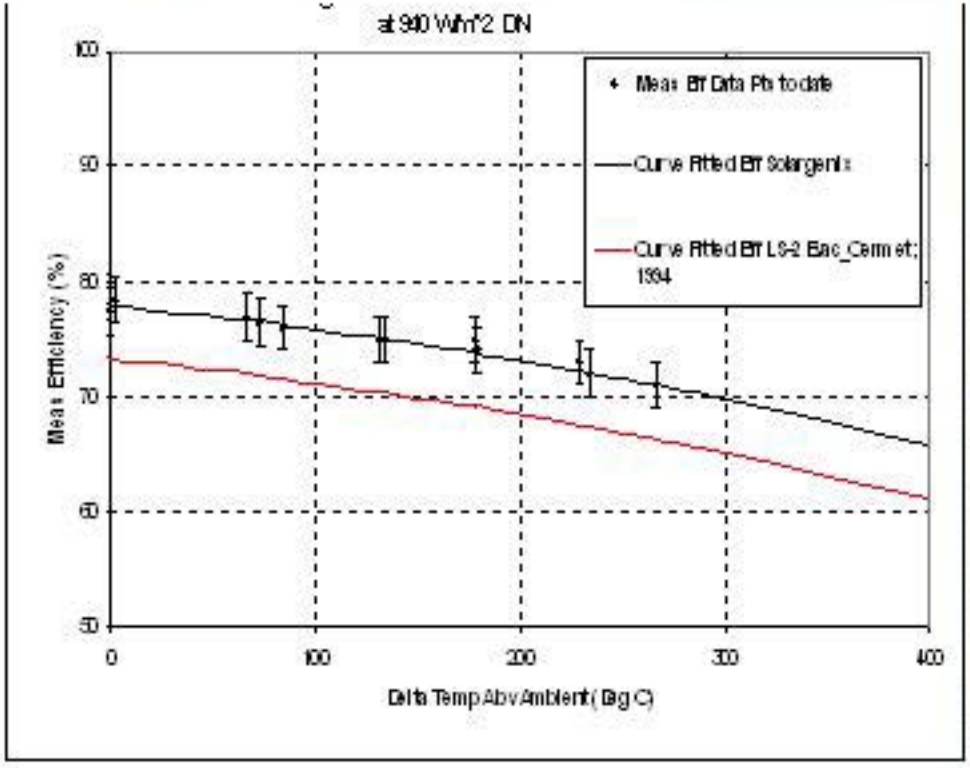
NEVADA SOLAR ONE – ACCIONA SOLAR POWER

NEVADA SOLAR ONE – ACCIONA SOLAR POWER

**Over 500 MW of Solar Power for Fort Irwin, California**

**Under a contract from the Army Corps of Engineers, Clark Energy Group and Acciona Solar Power will construct a solar power system for the Department of Defense at Fort Irwin in California that includes both PV and concentrated solar thermal technologies. The development will eventually include over 500 MW of solar power.**
**Press at: http://tinyurl.com/myz99q http://tinyurl.com/nk2c2q**
**Clark Energy Group: http://www.clarkenergygroup.com/**
**Acciona: http://www.acciona.com/**







SOLARGENIX ENERGY
Formerly Duke Solar Energy

# Waste Heat

*Ormat geothermal electric generation facility in Imperial County, California.*

*Courtesy of www.ormat.com*

# Landfill Gas

*A 200 kW biogas electric unit installation at a landfill in Michigan, 2003.*

*Courtesy of www.stmpower.com*

# Solar Air-Conditioning

*Solargenix Energy LLC's solar powered air-conditioning unit.*

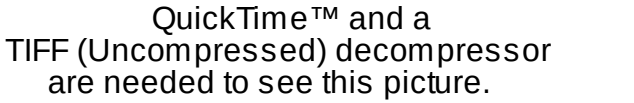
*Courtesy of www.solargenix.com*

# 2007 PV STATS

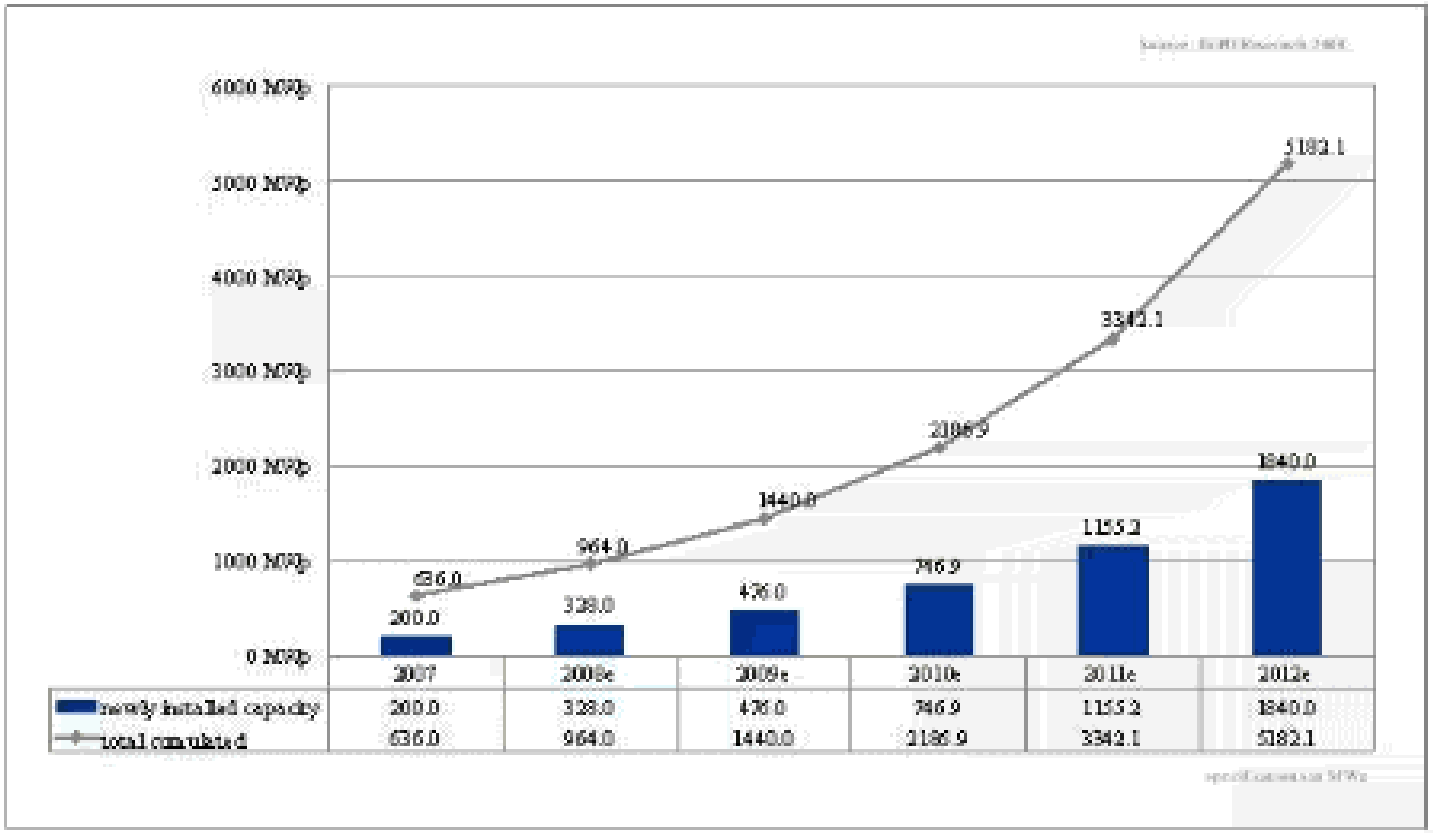
Global production of PV cells increased 51% in 2007 to 3,733 MW according to the latest Vital Signs Update from the Worldwatch Institute, produced in collaboration with the Prometheus Institute. More than 2,935 MW of solar modules were installed in 2007, according to early estimates, bringing cumulative global installations of PV since 1996 to more than 9,740 MW.

Story at RenewableEnergyWorld:
http://www.renewableenergyworld.com/rea/news/infocus/
story?id=52491 or http://tinyurl.com/3lllac
Worldwatch Institute Report: http://www.worldwatch.org/node/5449
Prometheus Institute: http://www.prometheus.org/

# Photovoltaics: Sector Electric Comparisons



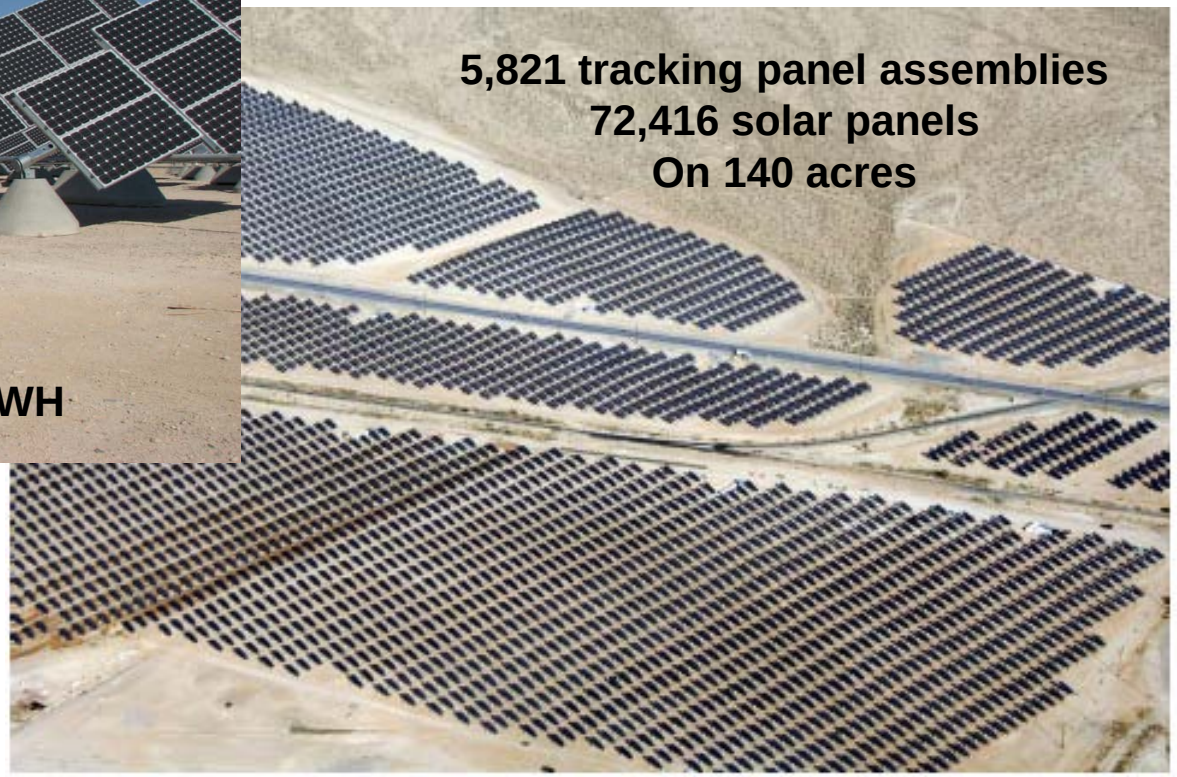
# 52% US PV GROWTH CAPACITY POSSIBLE




growth in newly installed capacity in the United States from 200 megawatts (MW) in 2007 to 1840 MW in 2012. The companies also said that there will be a cumulative total installed capacity increase from 636 MW in 2007 to 5182.1 MW in 2012, or an average of 52% growth per year over the next five years.

# 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**

# WASH DC - STELLA GROUP: GRANGE BUILDING - 1.5 kw

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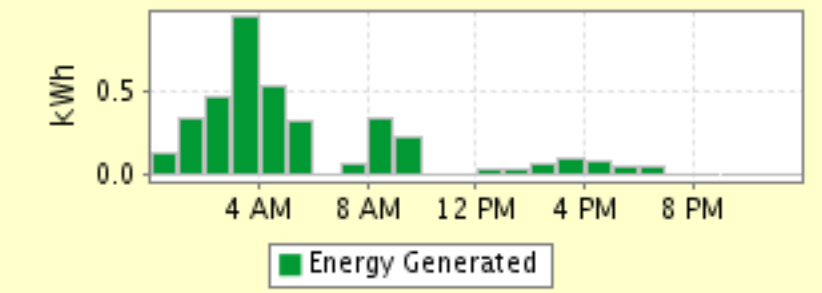
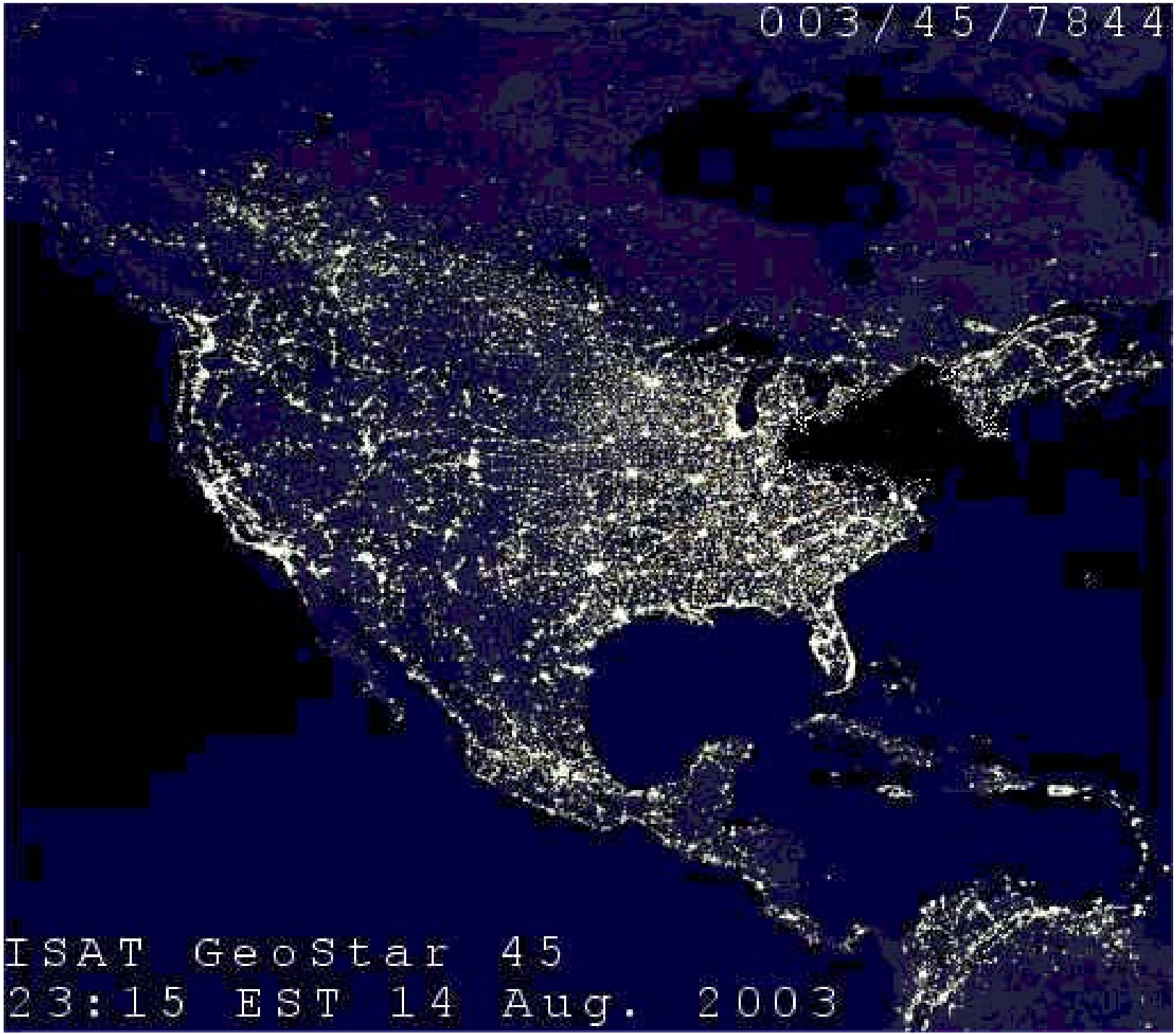
# SkyStream - Fort Irwin May 2008




3.7 kW

8 homes - 528 lbs CO2

19 days of CO from one car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# SQUIRRELS and the GRID

A parked car belonging to Lindsay Miller of Bayonne, NJ, burst into flames one October afternoon; authorities reportedly concluded that a squirrel had gnawed through the insulation on overhead power lines, caught on fire, and fallen close enough to the car to ignite as well.  Cite; January 4, 2008, Washington City Paper

# Federal Programs, Approaches to Leverage

- **Interconnection**
  - IEEE 1547 Standards, UL and NFC
  - Standardize communication protocols
- Procurement Aggregation
  - Federal Energy Management Program (FEMP), GSA Streamlining, DLA Goals
  - Initiatives (funded) including Guardian Program, Facility Portfolio for Emergencies
- **Interface with Existing Systems**
  - Common plugs, communications
  - Distributed Generation deployment
    focus on hybrid systems
- Securitizing Infrastructure
  - First Responder (primarily police and fire and healthcare, and communications)
  - Critical infrastructure (pumps, ports, transportation, airports, pipelines)
- Environmental Protection, Waste **Minimalization**
  - Waste streams and waste heat
  - Zero or low emissions - effects
    on sophisticated

# What's the goal?

- Leveraging resources and programs, multiple requirements
- Replicable installations – sustained orderly development
- Evolving installation, sales and service infrastructure
- Modularity and standardization – including remote monitoring, diagnostics and controls (smart grid - scada)
- New economic development in interface with transmission, distribution, or at the facility - on-site energy can stand on its own feet - *sustainably*

Prepared by Scott Sklar, The Stella Group, Ltd. (2009)

Good planets are hard to find.