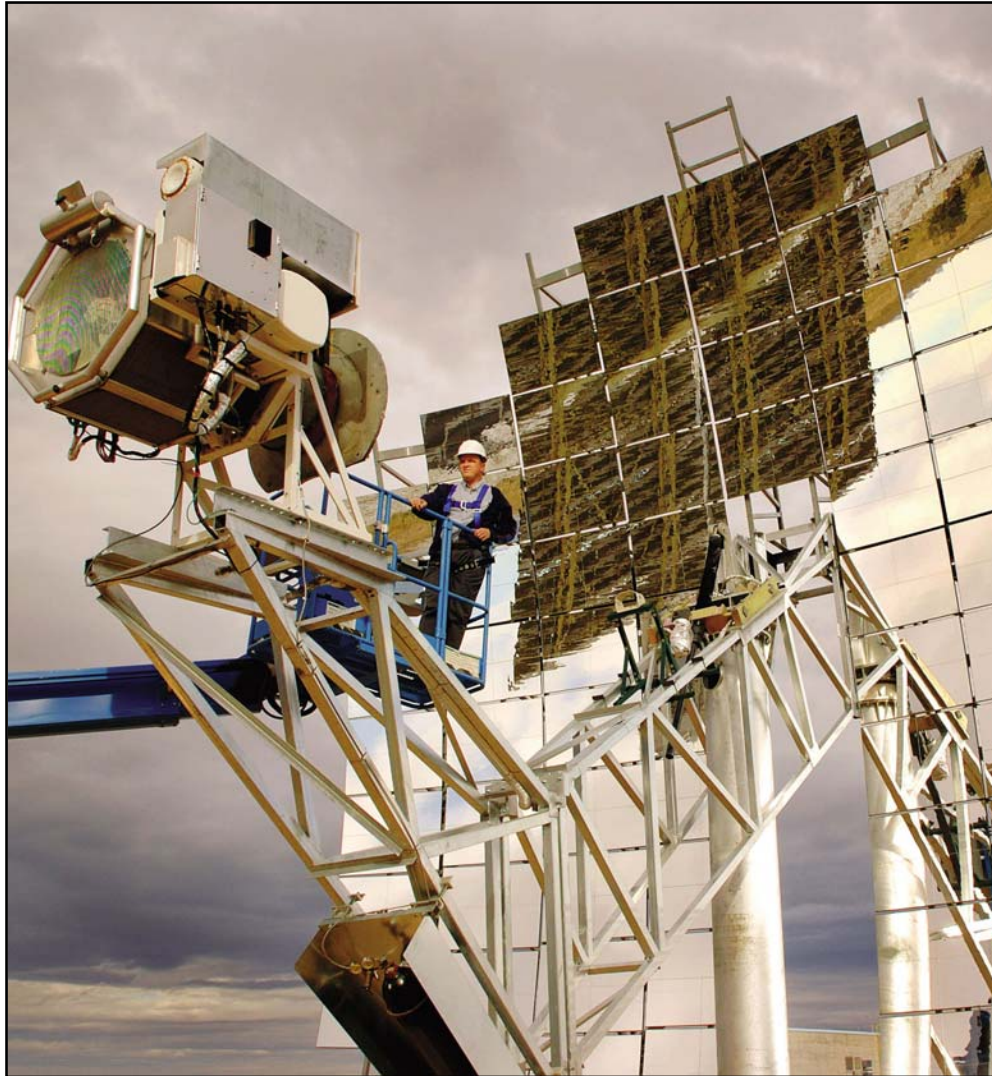


# Solar Power Update

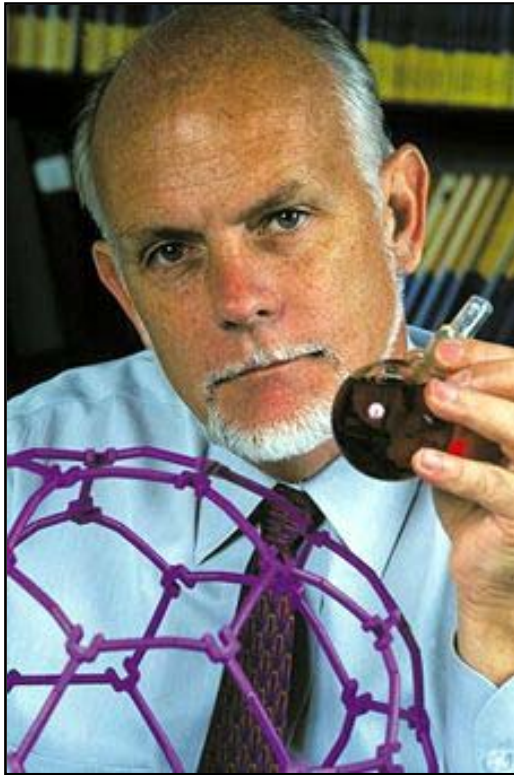
**Bill Barker, AICP  
Executive Director  
Solar San Antonio, Inc.  
[www.solarsanantonio.org](http://www.solarsanantonio.org)**



**Green Building Seminar  
in Boerne**

**September 25, 2008**

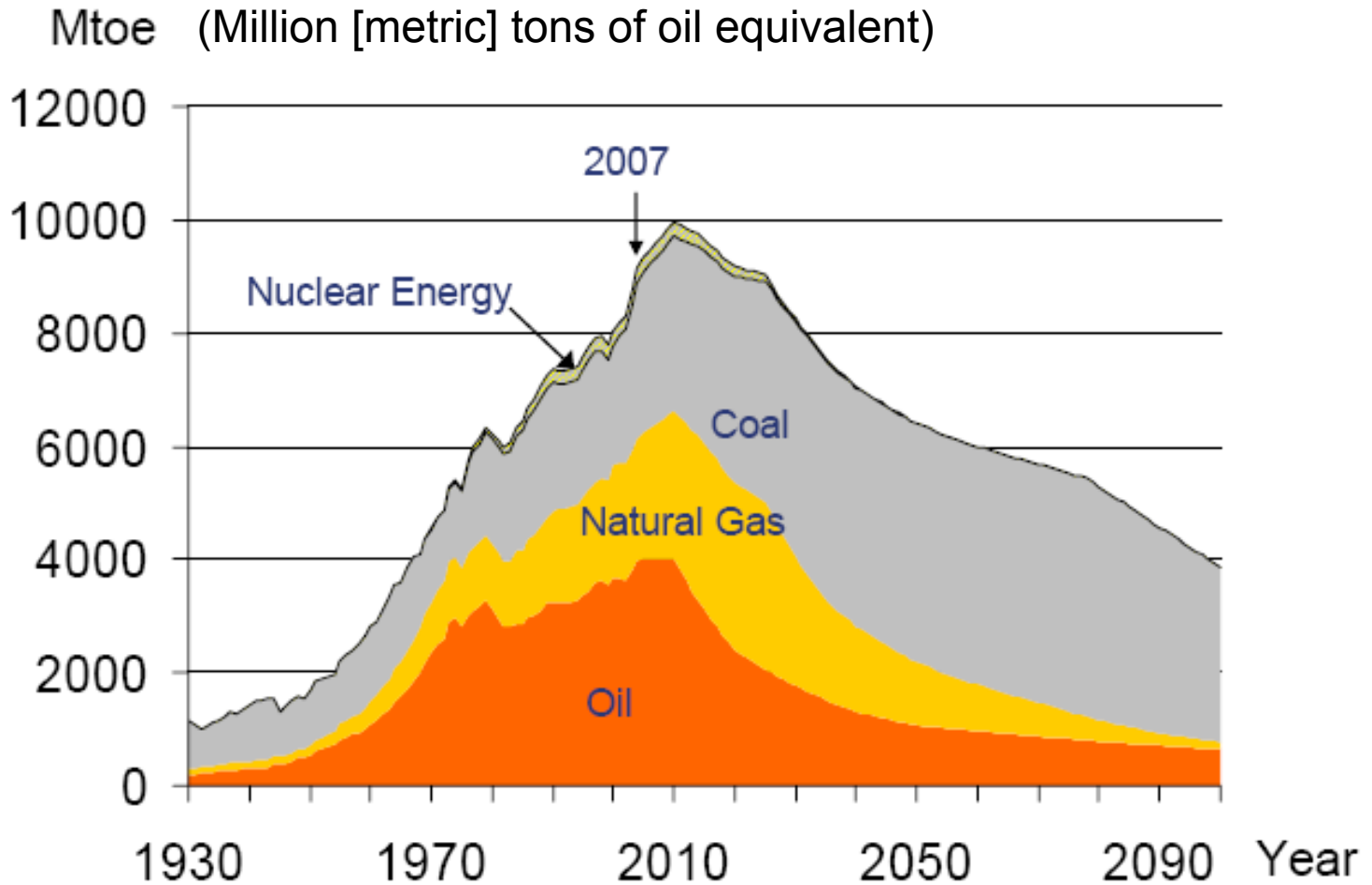
# Terawatt Challenge



Dr. Richard Smalley  
1943 - 2005  
Nobel Prize in Chemistry, 1996

- April 16, 2003 Trinity University presentation
- “To solve the energy challenge, we will have to find a way to produce, every day, not just what we are producing right now, but at least twice that much.”
- “...we have to revolutionize the world’s energy system.”
- “...our biggest resources are in the areas where we generate hardly any energy at all right now – solar, wind and geothermal.”
- “...creating an efficient local storage solution should be one of our prime energy targets.”

# World Energy Production Forecast

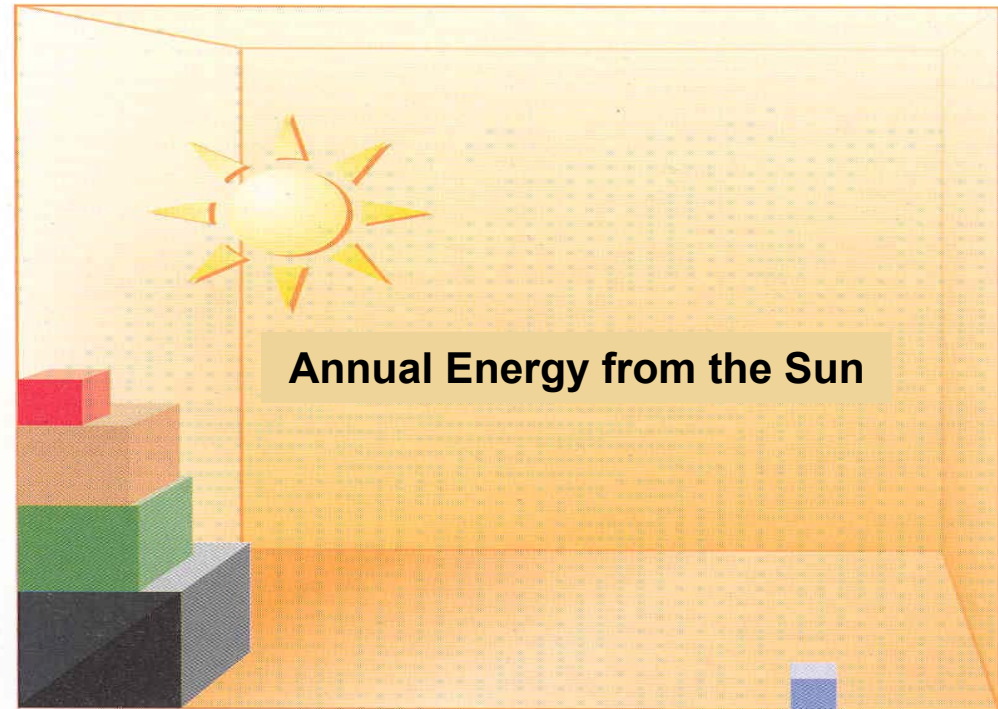


J. Schindler, R. Wurster, M. Zerta, V. Blandow and W. Zittel, *Where will the Energy for Hydrogen Production come from?*, Commissioned by the German Hydrogen and Fuel Cell Association, Ludwig-Bölkow-Systemtechnik GmbH, Ottobrunn, Germany, 2006

# How much do we have?

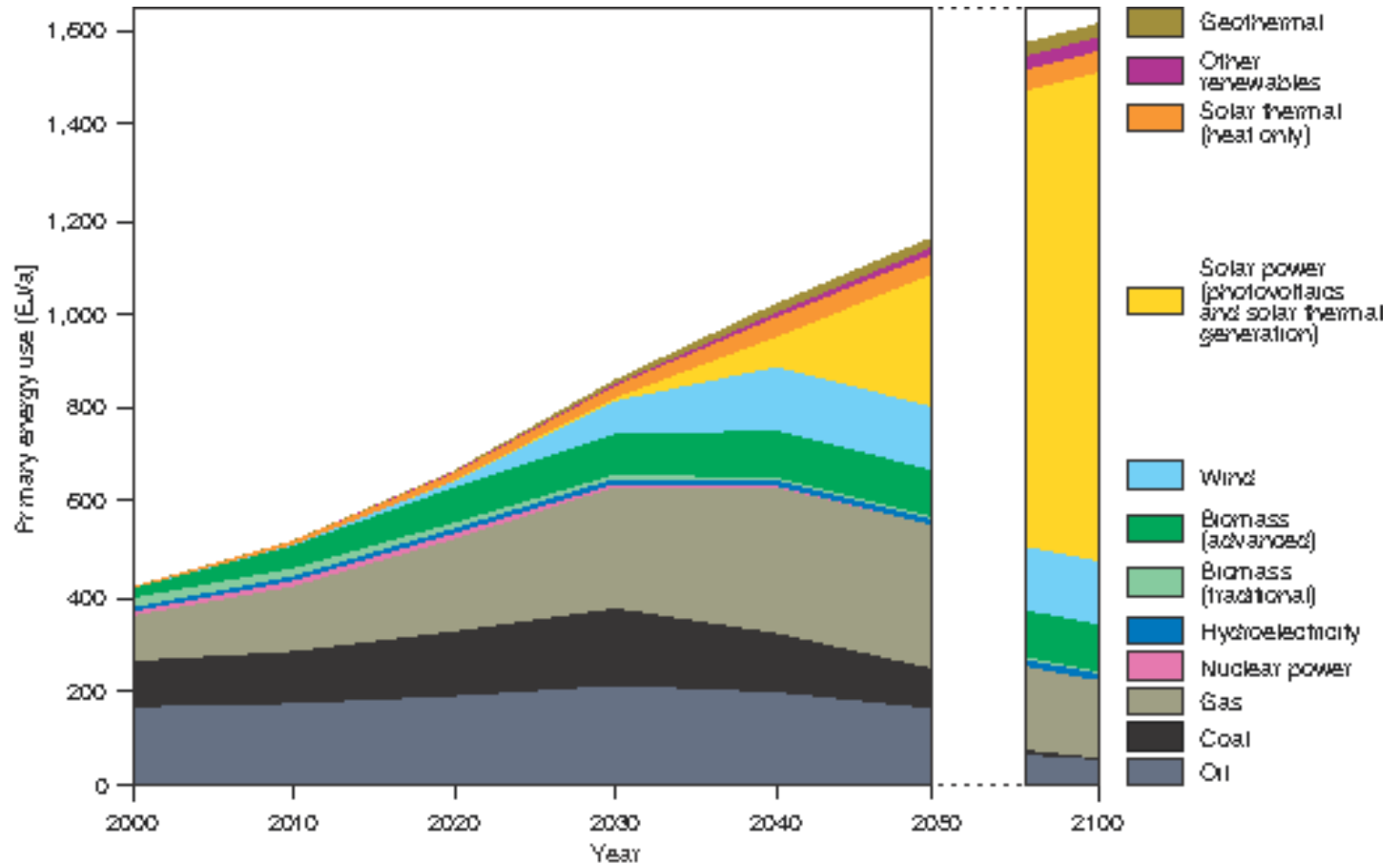
40 minutes  
sunlight on  
Earth's  
surface =  
energy  
consumed by  
population of  
the planet in  
one year

Equivalent Stock of  
Energy Source



Uranium    Natural Gas    Oil    Coal    Annual Energy Demand

# Solar Power May Dominate Global Energy Mix by Century End

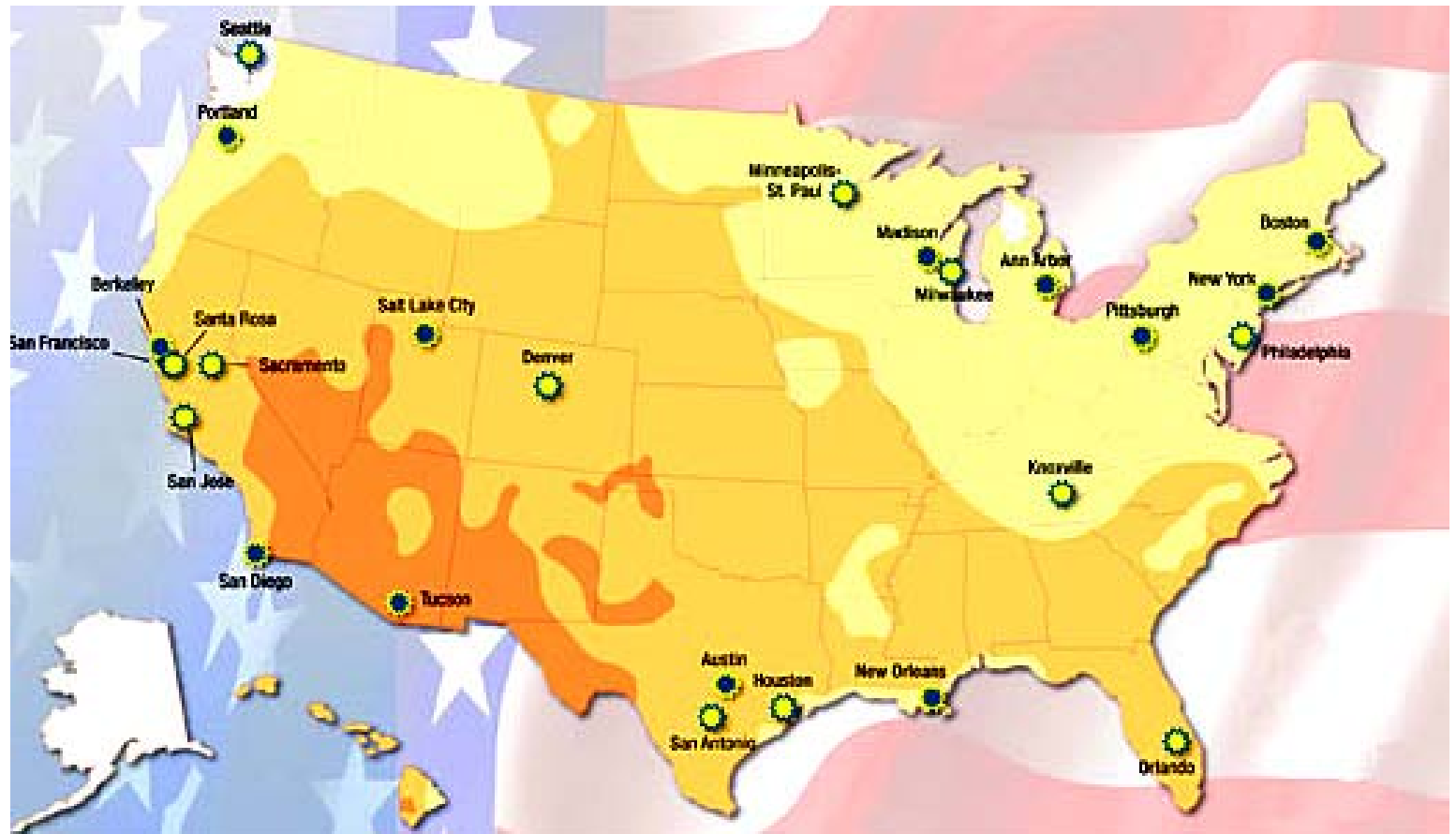


Source: German Advisory Council on Global Change, *World in Transition – Towards Sustainable Energy Systems*, 2003

# Why use solar power?

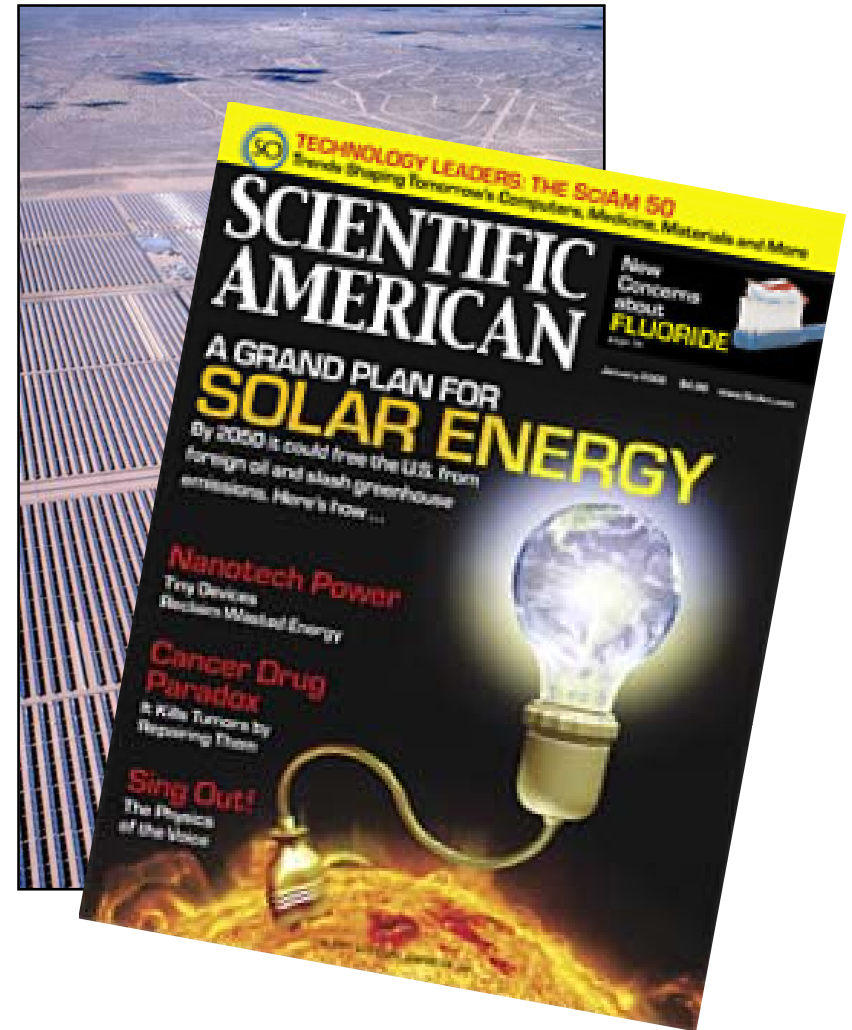
	Conventional	Solar
Reduce ozone		✓
Reduce greenhouse gases		✓
No transmission losses/costs		✓
No imported fuel		✓
Fuel price stability		✓
No waste problems		✓
Long term fuel availability		✓
Less vulnerable distributed power		✓
No water impacts		✓

# DOE Solar America Cities

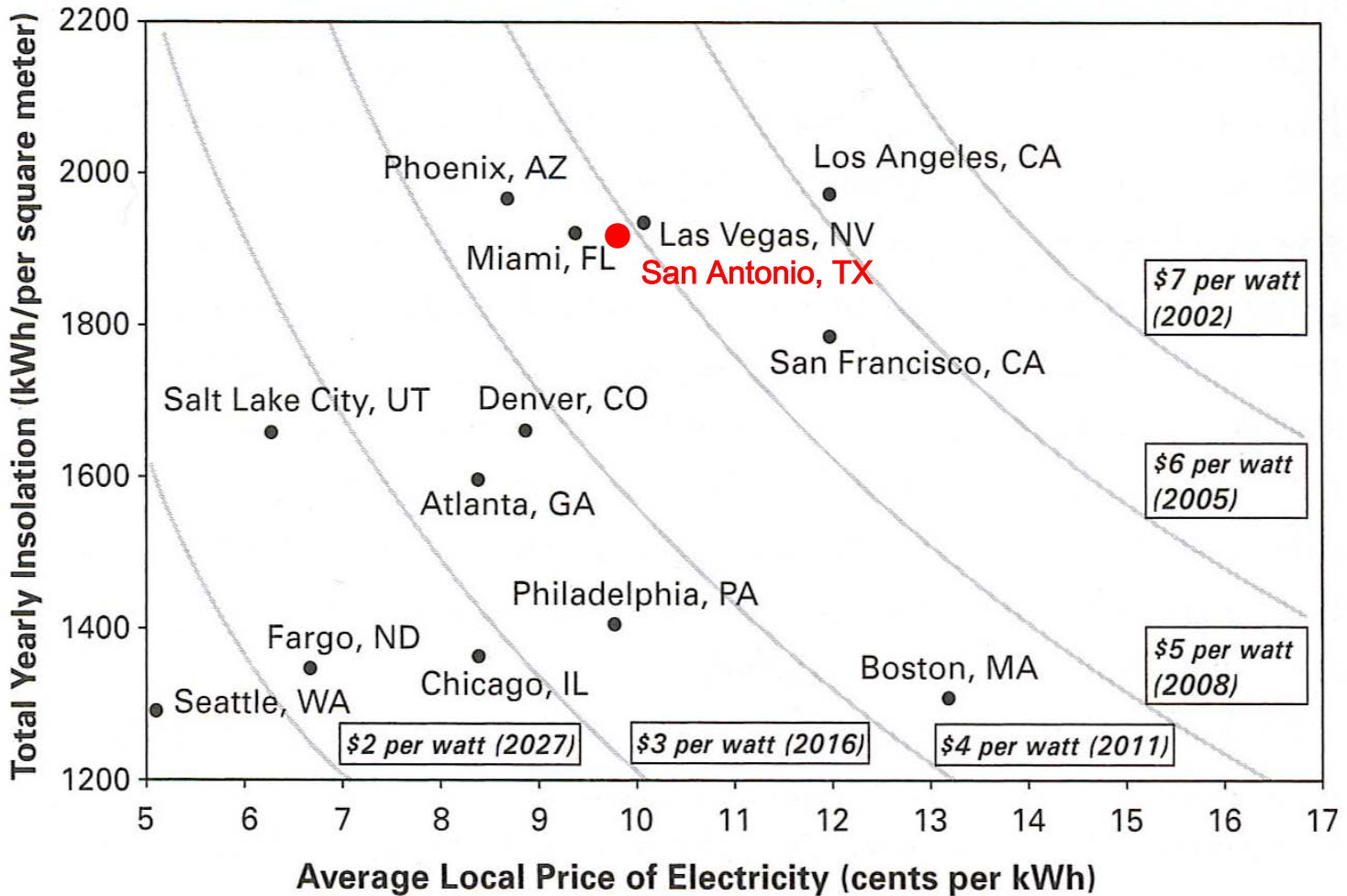


# A Grand Solar Plan

- Solar power could meet 69% of U.S. electricity needs by 2050
- Solar plants would be built in the Southwest with compressed air storage of energy for nighttime power
- A new high-voltage, direct-current (VDC) transmission backbone would be needed to distribute power across the U.S. from Los Angeles through San Antonio to Atlanta



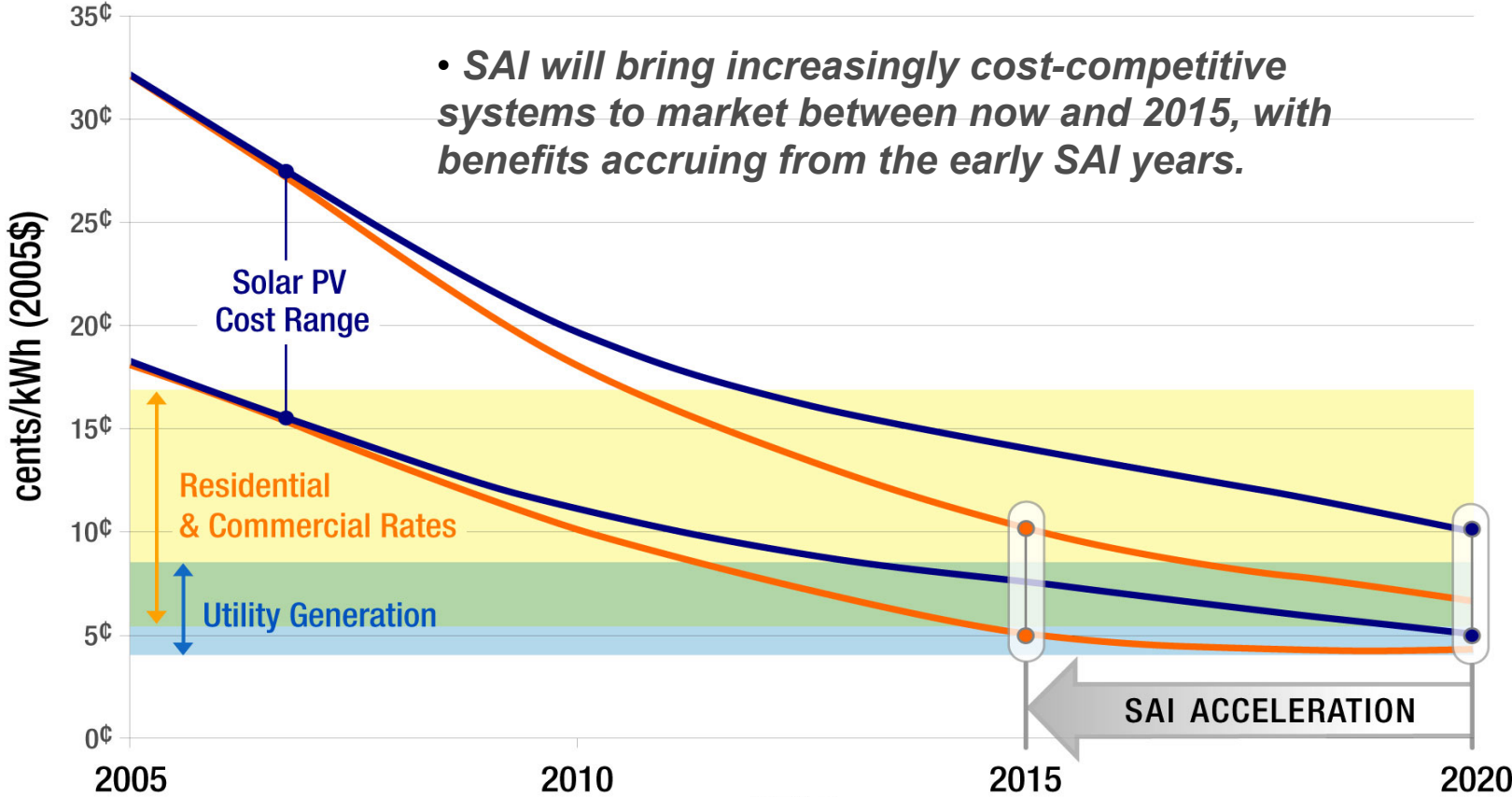
# Isocost Curves of Solar Grid Parity



Adapted from Travis Bradford, *Solar Revolution: The Economic Transformation of the Global Energy Industry*, The MIT Press, 2006

# DOE Solar America Initiative

## Projected Cost Reductions for Solar PV

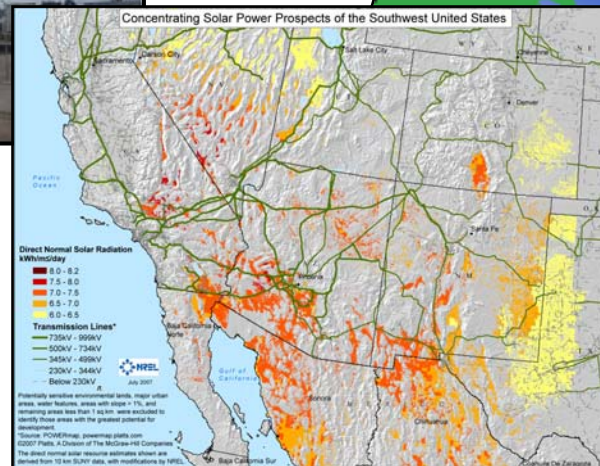
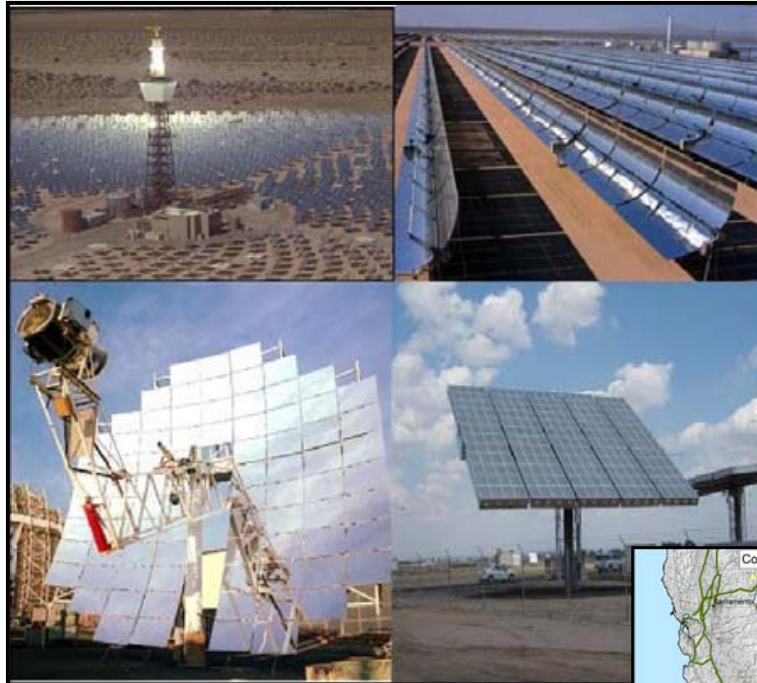


# Two Basic Directions for Solar Electric Power Generation



- Centralized power generation
  - Large facilities remote from population
  - Quickest, cheapest way to get 100's of solar MW online?
  - Transmission losses & costs
  - Vulnerable target?
  - Stored heat and/or natural gas hybrid
- Distributed generation
  - Local solar combined with fuel cells, CHP, etc. into smart microgrid
  - Distributed storage
  - Smart sharing of power to match local loads and interface with grid
  - Ultimately more efficient, secure and cost-effective?

# Utility Scale Solar Power



# Announced Utility Projects



**Location:** Mojave Desert, USA.

**Megawatts:** 500 MW, with plans to expand to 900 MW.

**Electric Utility:** Pacific Gas & Electric.

**Status:** Will begin operating as early as 2011.



**Location:** Mojave Desert, USA.

**Megawatts:** 500 MW, with possible expansion to 850 MW.

**Electric Utility:** San Diego Gas & Electric.

**Status:** Will begin operating in 2011.



**Location:** Florida, USA

**Megawatts:** 300 MW.

**Solar Company & Electric Utility:** Florida Power & Light.

**Status:** Scheduled to begin operating in 2011.



**Location:** Arizona, USA.

**Megawatts:** 280 MW.

**Electric Utility:** Arizona Public Service Co.

**Status:** Scheduled to begin operating in 2011.

# Energy Storage Technology



1.2 MW Sodium-Sulfur Flow Battery, Charleston, WV

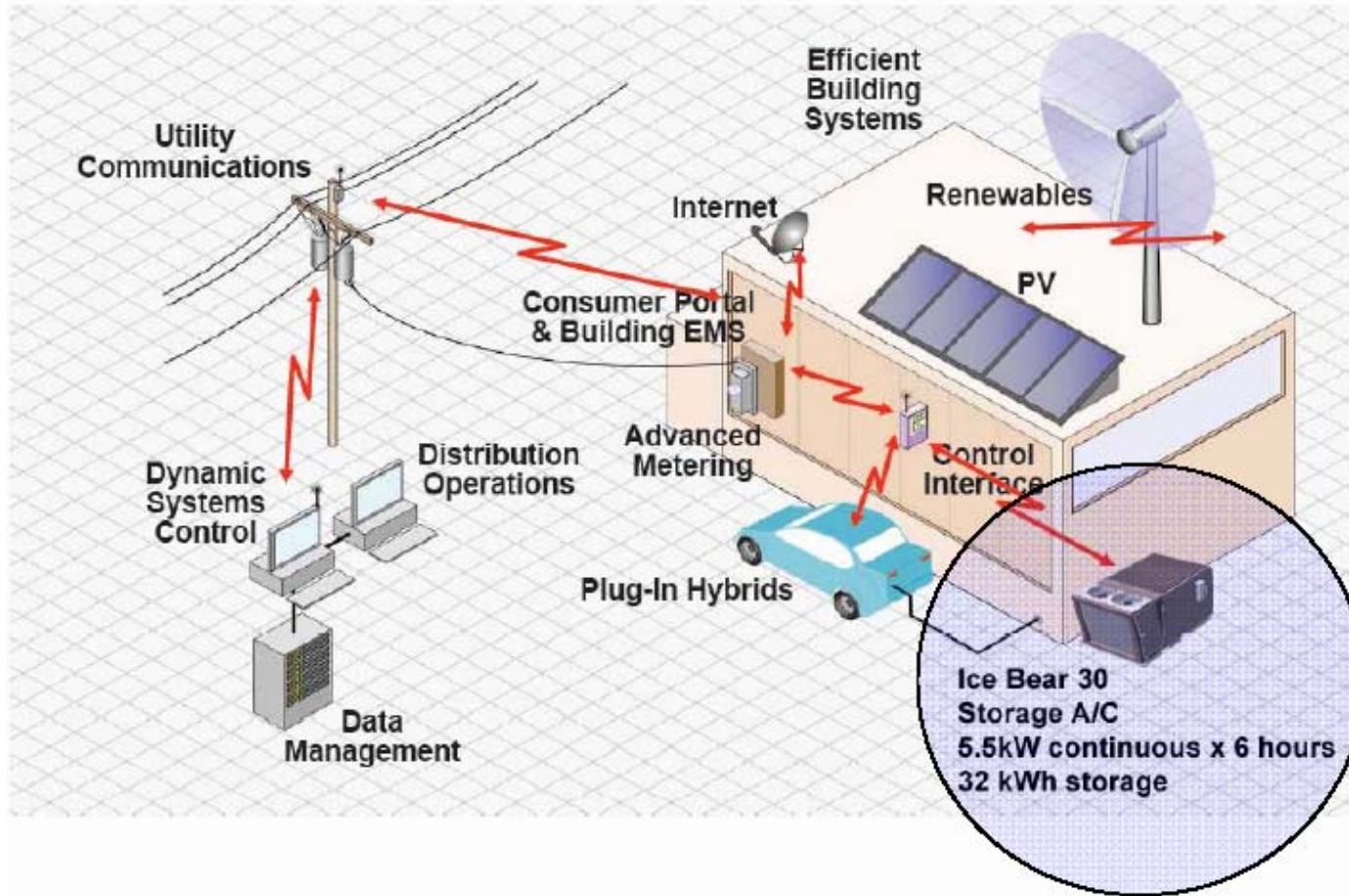


110 MW Compressed Air Energy Storage Facility, McIntosh, AL

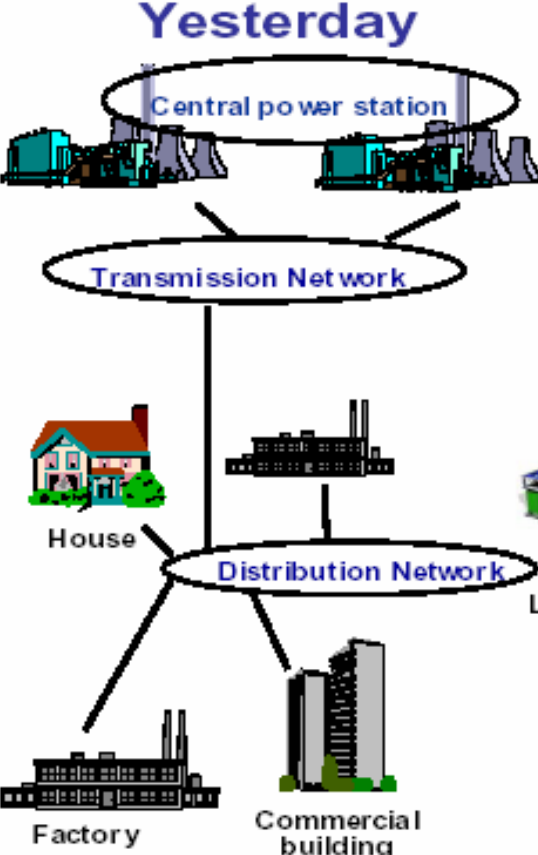


32 KWhr Residential Air Conditioner with Ice Storage

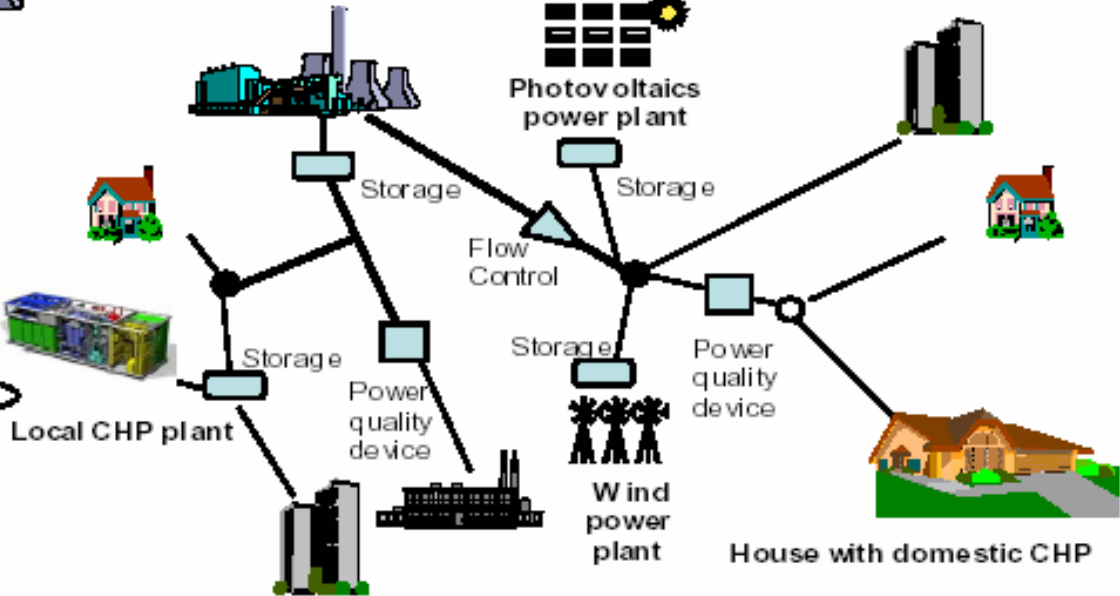
# Residential Energy Generation and Storage as Part of Integrated, Managed Network



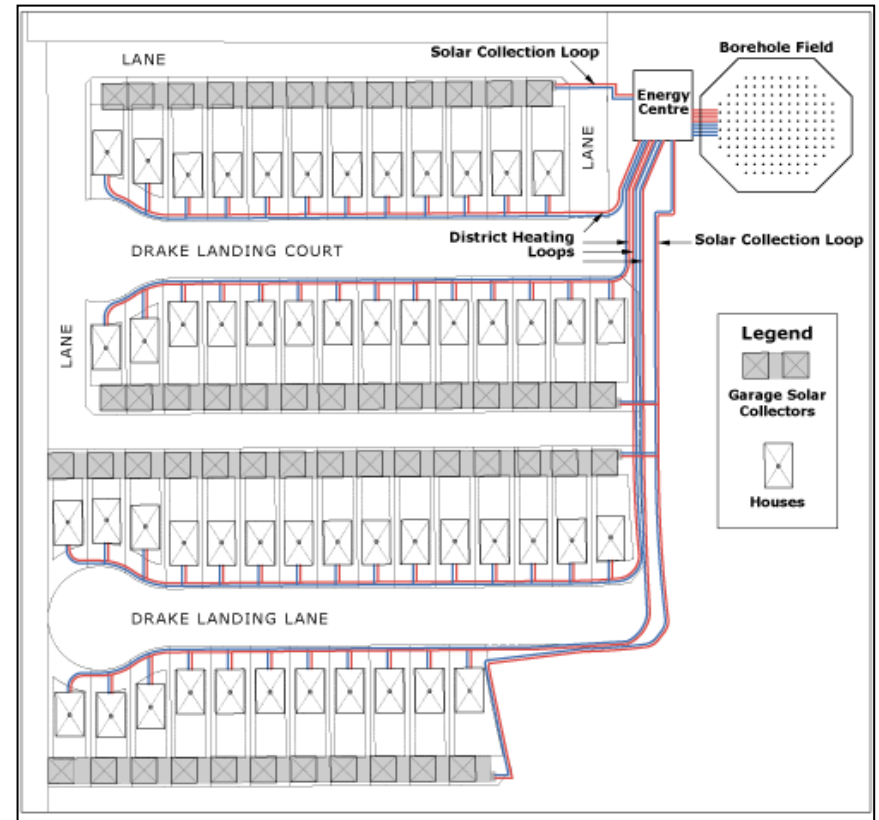
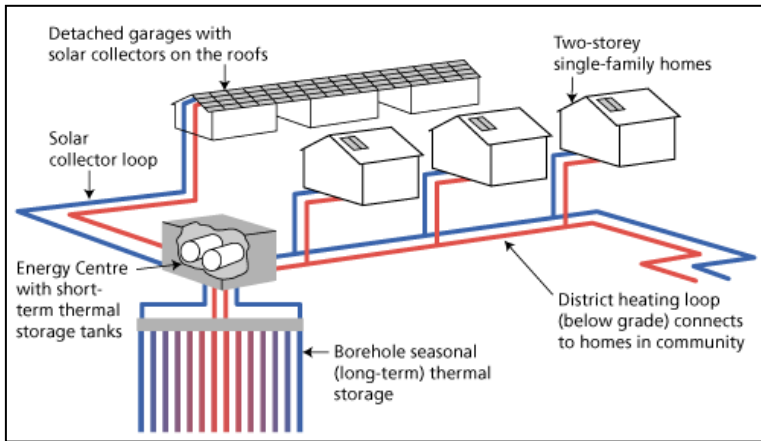
# Centralized vs. Distributed Generation



➔ **Tomorrow: distributed/ on-site generation with fully integrated network management**



# Drake Landing, Canada: Community Microgrid





[www.solarsanantonio.org](http://www.solarsanantonio.org)

10/4/08 – Free, self-guided solar tour of 10 solar-powered businesses and residences in San Antonio - Noon-6pm

10/17/08 – All-day professional workshop on Building Integrated Photovoltaics (BIPV) at the Bright Shawl in San Antonio