

# United States Representative Gabrielle Giffords

Presents

*Solar 101*

*A Look Back*



[www.Giffords.House.gov](http://www.Giffords.House.gov)



The 8th District of Arizona

# INTRODUCTION

1. November 2007- Woods Library
2. December 2007- Himmel Library
3. January 2008 – Wilmot Library
4. February 2008 - Golf Links Library
5. March 2008- Valencia Library
6. April 2008 – Nanini Library
7. May 2008 – Main Library

# Woods Library

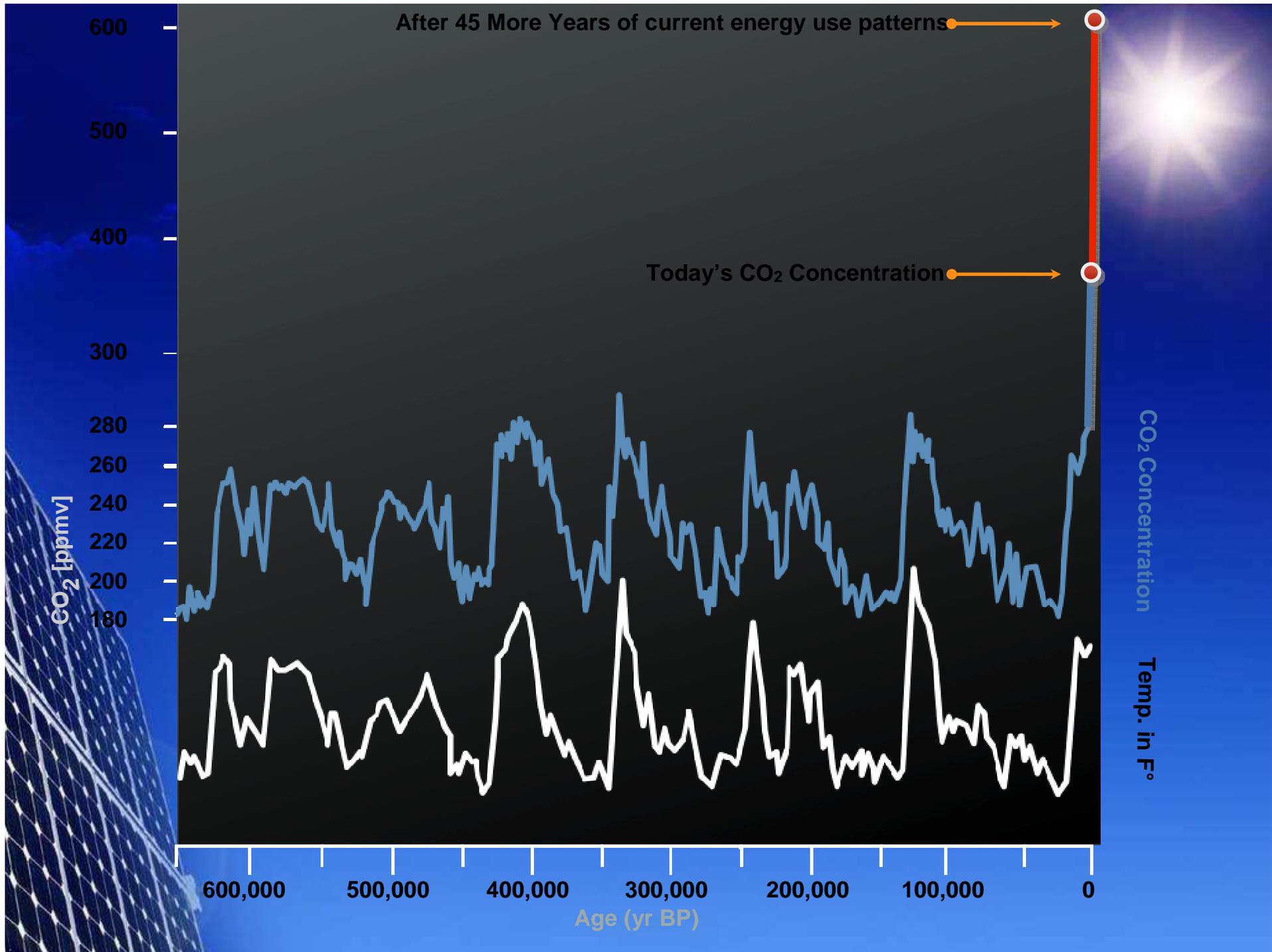
- SP101 Premiere



# Woods Library

- Scott Johnson, Defenders of Wildlife





# The Ten Hottest Years on Record Have Occurred in the Last 18 Years

2005

2007

1998

2002

2003

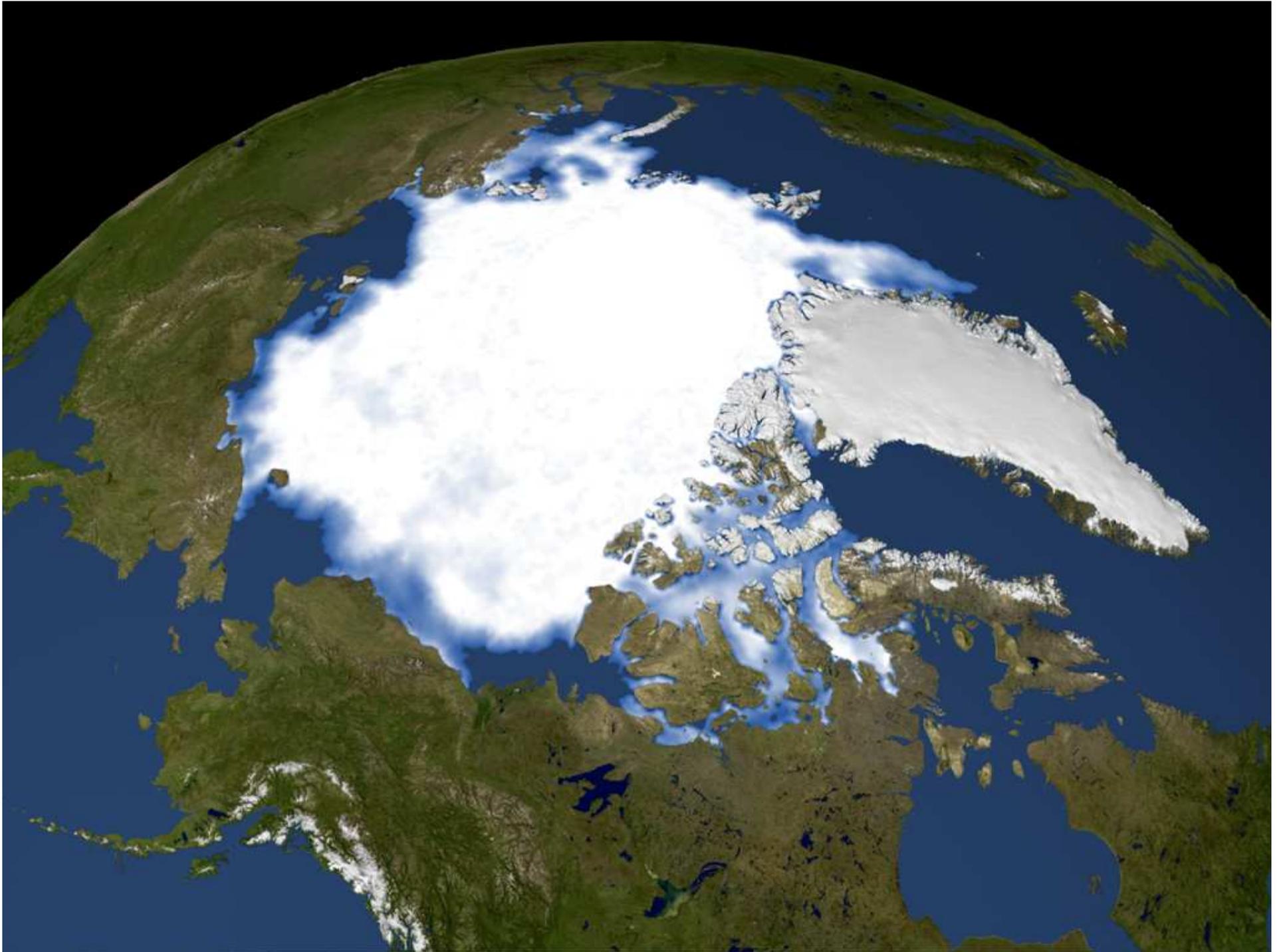
2006

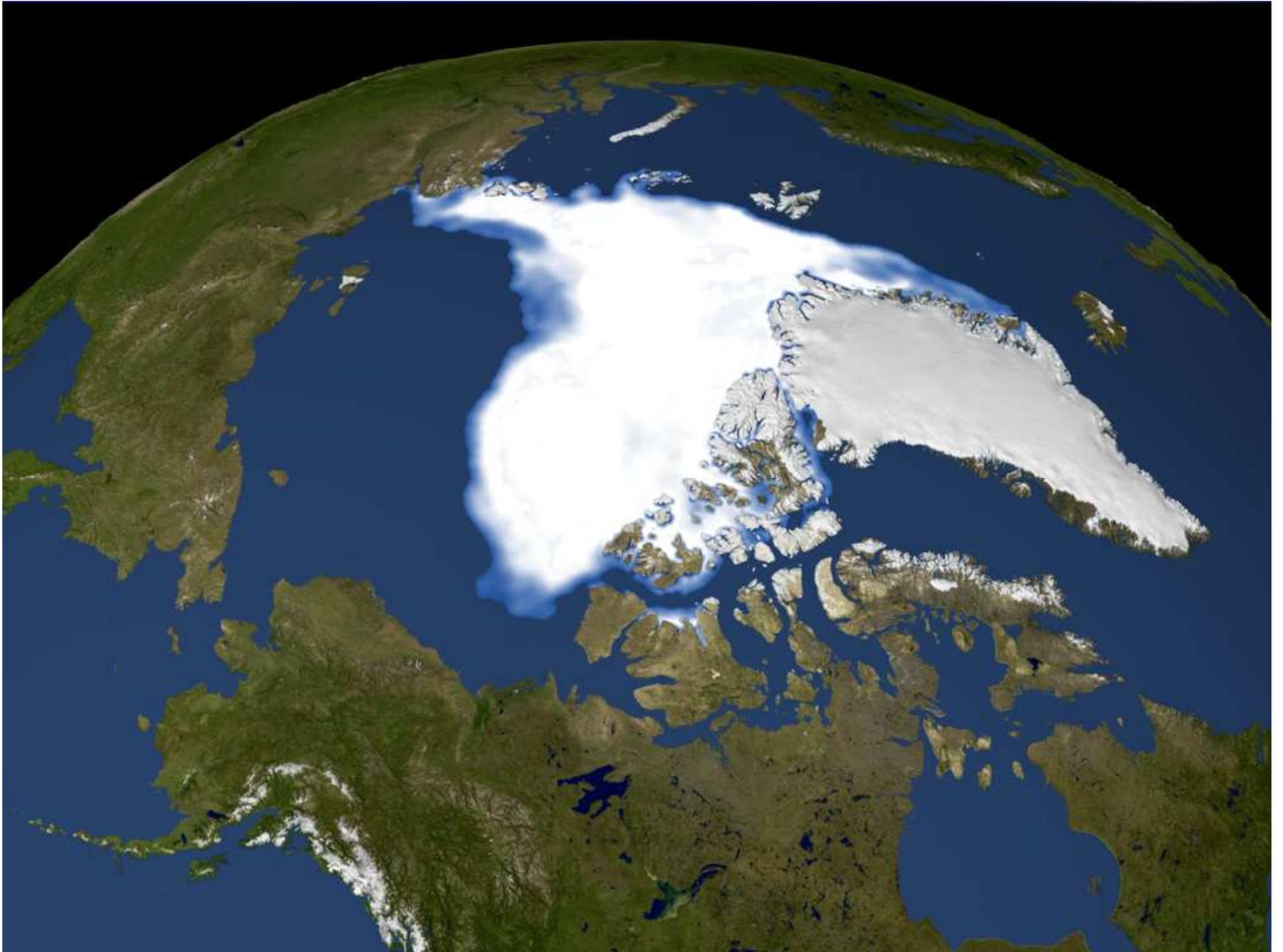
2004

2001

1990

1999





# Himmel Library

- George Villec
- Kevin Koch
- Jim Cooley
- Scott Canada



*Renewable  
Energy*

# Himmel Library

- **George & Kevin**
- **Solar Electric (Photovoltaic)**
  - Stand Alone
    - Independence - batteries
  - Grid Tie
    - Use the grid as a battery
- **Efficiency Pays \$**



# Himmel Library

- Find a good installer
- Site visit
- Contact your HOA
- Permit from City or County
- Interconnection agreement with utility
- Apply for utility rebate
- Installation
- Inspection by City or County
- Inspection by utility
- System operational
- Receive utility rebate



# Himmel Library

## Solar Hot Water

- Solar hot water system is a \$2,500 - \$4,500 investment.
- Saves between \$20-\$40 a month for typical family.

- Hot Water System

- Passive system
- Active system

- Pool Heater

- Proven technology
- Fast payback



# Himmel Library

- Concentrated Solar Power
  - Thermal
  - PV
- Storage Key
  - Molten Salt
  - Compressed Air
- Large scale projects



# Wilmot Library

- Katharine Kent
- Ardeth Barnhart

**AZRISE**  
Arizona Research Institute for Solar Energy



# Wilmot Library

- Tax Credits
- Federal
  - Residential 30% Max \$2,000
  - Commercial 30% No Max
- Arizona State
  - Residential 25% Max \$1,000
  - Commercial 10% Max \$15,000
  - One time credit per residence



# Wilmot Library

## Utility Rebates

- Tucson Electric Power
  - Electric
    - Residential \$3.00/watt
    - Commercial \$2.50/Watt
  - Thermal (Proposed)
    - \$750 + 25% of SRCC rating
    - \$1,475 for Active Indirect System

# Wilmot Library

- Arizona's energy demands climbing fast
- Federal Support?

Peak Load Growth (MW)



	R & D expenditures from 2002-2007
Nuclear	\$6.2 Billion
Fossil Fuel	\$3.1 Billion
Renewable Energy	\$1.4 Billion

Total	84,296	93,609	103,003	113,389
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	Tax expenditures from 2002-2007
Fossil Fuel	\$13.7 Billion
Renewable Energy	\$2.8 Billion

# Wilmot Library

- Small fraction of the land in the Southwest could produce all of our energy needs
- Why Renewables Now ?
- Price volatility & Fossil Fuels
  - Soaring GHG emissions from electricity generation
- Energy expenditures leaving the state
  - 60% money Arizona residents spent on energy left the state in 2000



# Wilmot Library

- Financing
  - New Construction or Remodel
    - Construction loan
    - Mortgage
  - Existing Home
    - Home Equity Line
    - Refinance
  - Savings
  - 3<sup>rd</sup> Party Financing

# SAMPLE Price Chart for Residential Solar

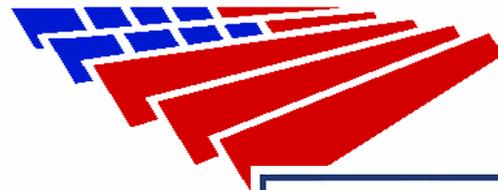
<u>System Size in DC</u>	<u>Actual Output in AC</u>	<u>KWh Per Year</u>	<u>Total System Cost without incentives</u>	<u>TEP Rebate</u>	<u>State Tax Credit</u>	<u>Federal Tax Credit</u>	<u>Net Project Cost</u>	<u>Estimated Payback Period</u>
<b>1.52 KW = 1520 Watts</b>	<b>1.08 KW = 1080 Watts</b>	2562	\$13,081	-\$4,560	-\$1,000	-\$2,000	<b>\$5,521</b>	15.0 years
<b>2.47 KW</b>	<b>1.75 KW</b>	4163	\$18,423	-\$7,410	-\$1,000	-\$2,000	<b>\$8,013</b>	13.2 years
<b>3.04 KW</b>	<b>2.16 KW</b>	5124	\$21,388	-\$9,120	-\$1,000	-\$2,000	<b>\$9,268</b>	12.7 years
<b>4.56 KW</b>	<b>3.24 KW</b>	7686	\$30,254	-\$13,680	-\$1,000	-\$2,000	<b>\$13,574</b>	12.5 years
<b>6.08 KW</b>	<b>4.32 KW</b>	10248	\$40,023	-\$18,240	-\$1,000	-\$2,000	<b>\$18,783</b>	12.8 years
<b>6.84 KW</b>	<b>4.86 KW</b>	11530	\$44,514	-\$20,520	-\$1,000	-\$2,000	<b>\$20,994</b>	12.8 years
<b>8.55 KW</b>	<b>6.07 KW</b>	14412	\$54,434	-\$25,650	-\$1,000	-\$2,000	<b>\$25,784</b>	12.6 years

# Golf Links Library

- Doug Crockett & Bruce Plenk

TUCSON

SOLAR AMERICA CITY



Committed to a  
Sustainable Solar Future



Partnership Program with  
Department of Energy



# Golf Links Library

- City of Tucson very active in solar
- \$200,000 grant from the U. S. Department of Energy (DOE) over the next 2 years.
- \$353,000 matching funds to increase solar installations in the Tucson area.
- Additional technical assistance provided by the New Mexico State Southwest Region Experiment Station and other DOE laboratories.



# Valencia Library

- Dr. Joseph Simmons
- Jason Vollen



THE UNIVERSITY  
OF ARIZONA®



# Valencia Library

- AzRISE is composed of faculty, staff and students from the Colleges of:
  - ▶ Engineering
  - ▶ Science
  - ▶ Optical Science
  - ▶ Architecture
  - ▶ Agriculture
  - ▶ Business

Technology  
R & D



**AZRISE**  
Arizona Research Institute for Solar Energy

# Valencia Library

- **What Solar Offers:**
  - **Abundant, renewable supply of energy**
  - **Greenhouse gas reduction (1GW of solar electricity saves 400,000 tons of CO<sub>2</sub> emission annually)**
  - **Only source of energy that could impact global climate change**
  - **Low water consumption**
  - **Economic growth for Arizona**
  - **Energy independence**
  - **Energy source is free**
  - **Low maintenance, low toxic waste**
  - **No radiation liability**



# Valencia Library

- **What needs to be done for Widespread Adoption :**
  - **Reduce the cost of PV to \$1,500/kW installed**
  - **Increase the efficiency to above 20%**
  - **Improve concentrator system technologies**
  - **Develop a national electrical power grid**
  - **Develop multiple storage methods**



# Valencia Library

- Solar Decathlon: <http://www.solardecathlon.org/>
  - 20 schools (international) compete on the DC Mall to operate a house on solar energy for 2 weeks
  - UA team was selected to compete in 2009
    - Architecture, AzRISE, Engineering students
    - Southwestern solar house design
    - Innovative designs for heating/cooling



# Nanini Library

- ACC Commissioner Bill Mundell
- Denise Smith, Tucson Electric Power



# Nanini Library

## Arizona Corporation Commission

- **Regulates utilities**
- **“4<sup>th</sup> branch of government”**
  
- **Renewable Energy Standard (RES)**
- **15% renewable energy by 2025**
- **Provides market stability**
  
- **Upcoming Election for 3 of the 5 Seats!**

# Nanini Library

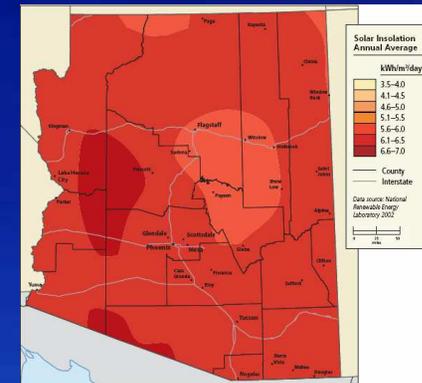
- *Renewables Portfolio Standards*
  - 15% by 2025
  - Residential cap at \$0.35 monthly surcharge
  - Affected utility implementation plans
  - Renewable energy credit – 1 REC/ 1 kWh
  - Generate \$1.2 billion in revenue through 2025
  - 3,000 permanent jobs by 2020
  - Reduce GHG emission by 400,000 tons

# Nanini Library

- **REST Benefits**

- **Positive Environmental Benefits**

- Reduce Greenhouse Gases (GHG)
- Impact Climate Change
- Reduce Water Usage for Power Plants



- **More cost effective utilization of energy infrastructure**

- **Improved energy security**

- Reduced fuel consumption at generators help mitigate change in fuel prices
- Reduced load on T&D can improve grid reliability

- **More Exposure for Renewable Energy**

# Nanini Library

- **Net Metering**
- August 28, 2007 ACC decision that electric distribution utilities adopt PURPA standard on Net Metering
- “Each electric utility shall make available upon request net metering services to any electric consumer that the electric utility serves”
- Rulemaking process for draft rules has begun



# Nanini Library

- SunShare Program
  - TEP was first utility in Arizona to offer a rebate program for customer solar installations
  - Collected extensive maintenance data from systems (Sandia Lab)
  - Offered solar systems at cost until '06
  - Environmental Benefits



# Nanini Library

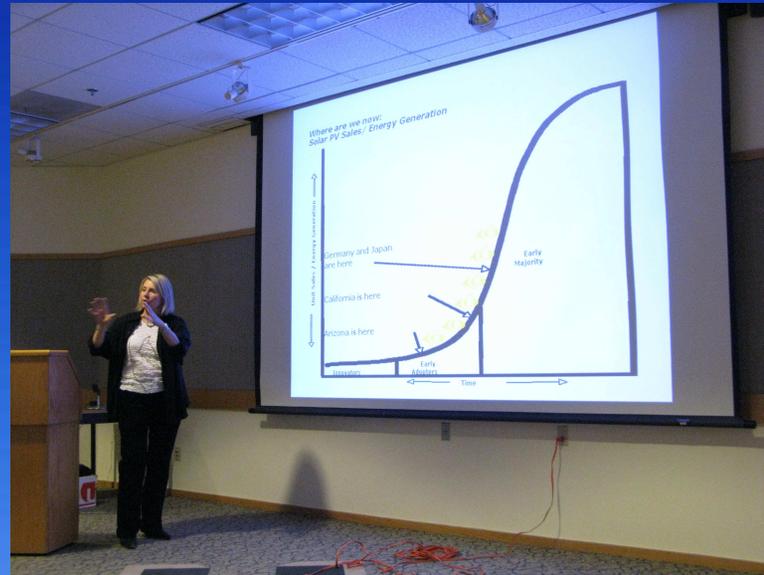
- **GreenWatts™**
- Unique “green power” program
- Customers receive these green credits by subscribing to the program and paying a little extra on their electric bill each month
- Revenues are distributed back to the community for solar projects
- Environmental Benefits



Final Presentation – Main Library – May 14, 2008

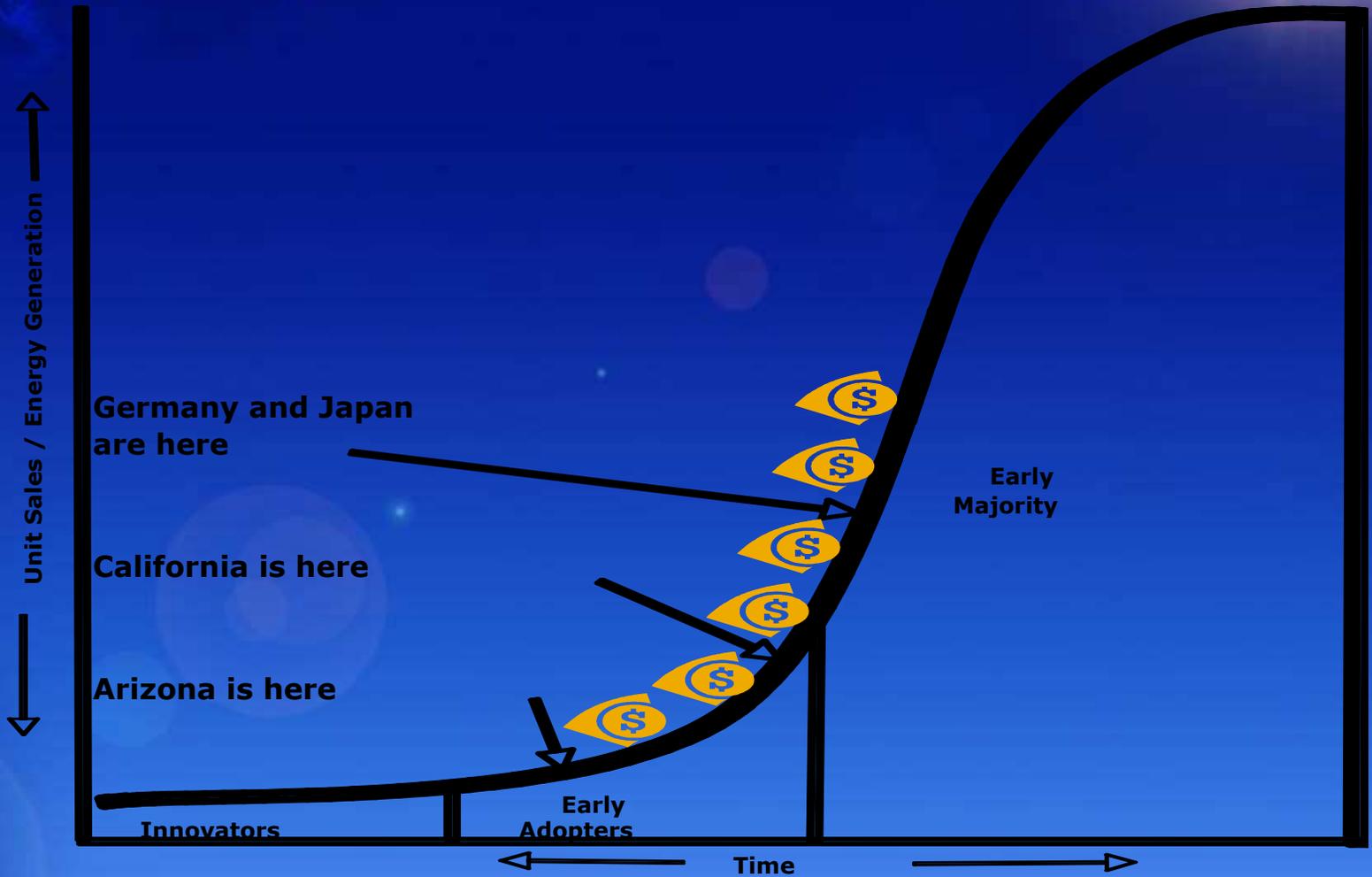
## “The Potential of the Solar Industry”

- Tom Alston, Solar Alliance
- Valerie Rauluk, Venture Catalyst



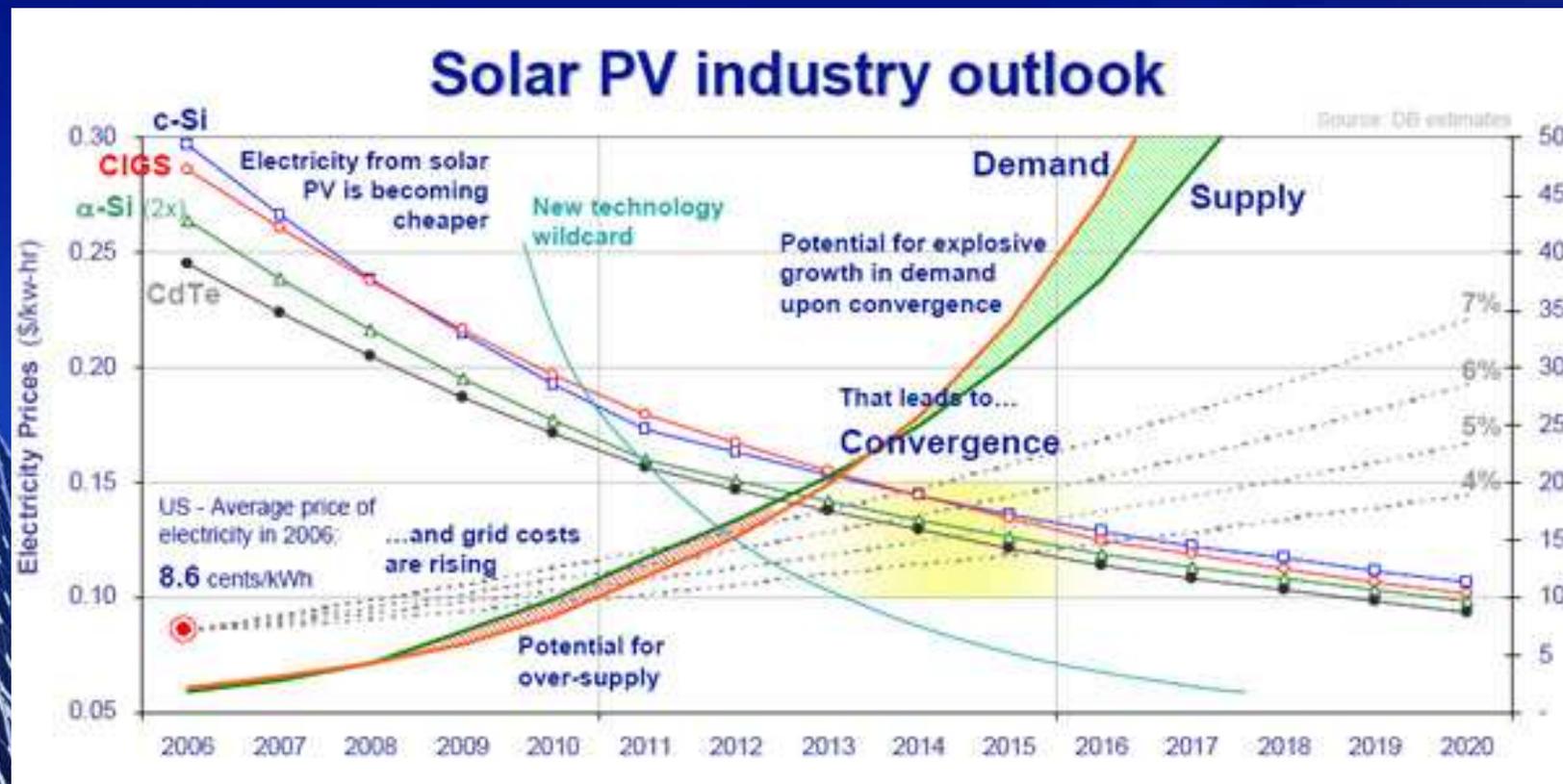
# Venture Catalyst

**Where are we now:  
Solar PV Sales/ Energy Generation**



# Venture Catalyst

# Solar Technology Wave



Source: Deutsche Bank Securities

# Next Steps

- Large volume Distributed PV in nonresidential applications
  - Economies of scale for cost reductions
- Development of Comprehensive Financing for residential applications
- PV & Family of PV technologies (PV/ CPV/ HCPV) in large scale generation projects
- Distributed solar thermal in residential applications

# Thanks!

- Our presenters
- Sarajeon Harwood & Patrick McGinnis
- Lon Huber
- Congresswoman Giffords
- and YOU!!!

