



THE VOTE SOLAR INITIATIVE

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BRINGING SOLAR INTO THE MAINSTREAM

EPA

May 16, 2006

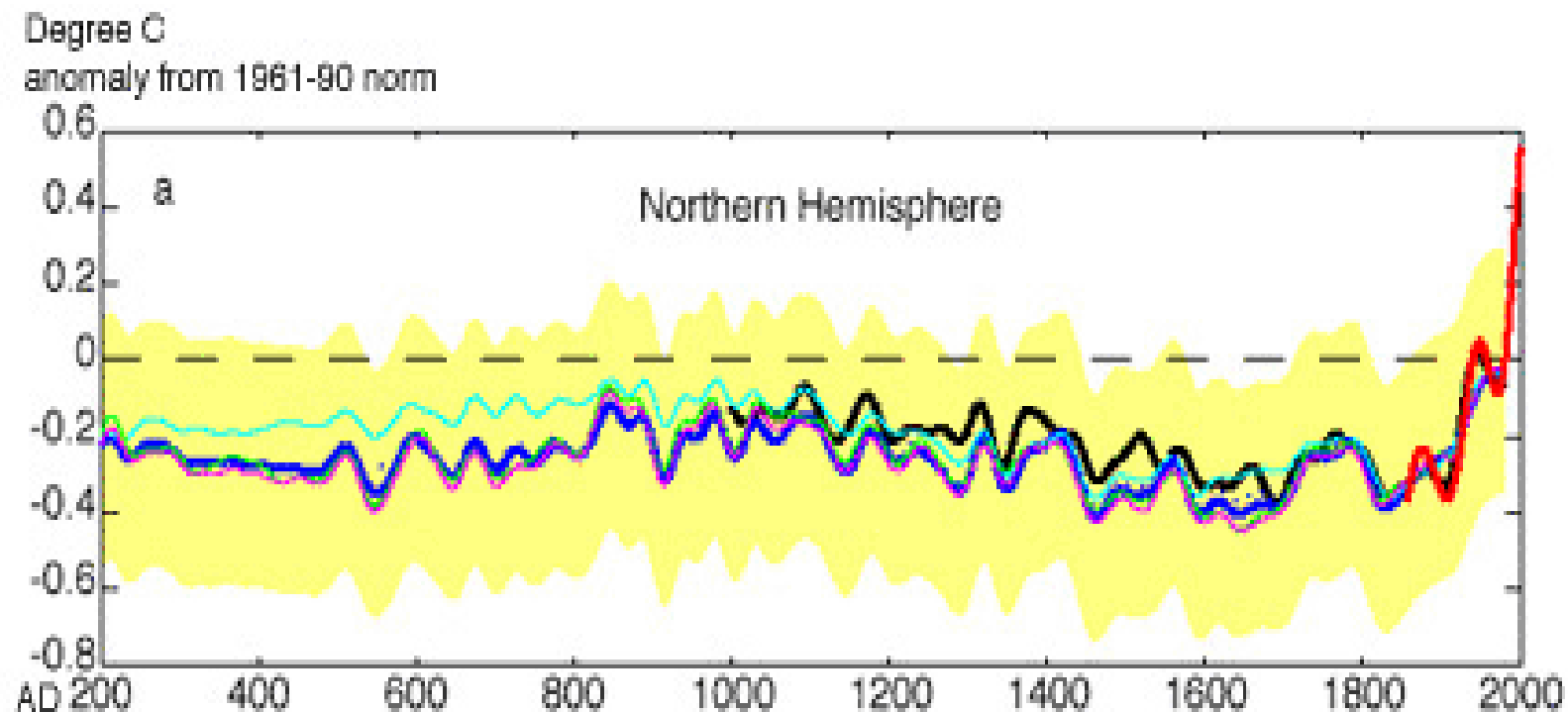
The Next 40 Minutes

- Why solar?
- Macro solutions.
- Micro solutions.

WHY SOLAR

- Environment and Public Health
 - Electricity generation single largest cause of global warming
 - Public health benefits—fossil fuel emissions kill
- Adds Value for all Ratepayers
 - Resource diversification
 - Transmission capacity
 - Peak demand reduction

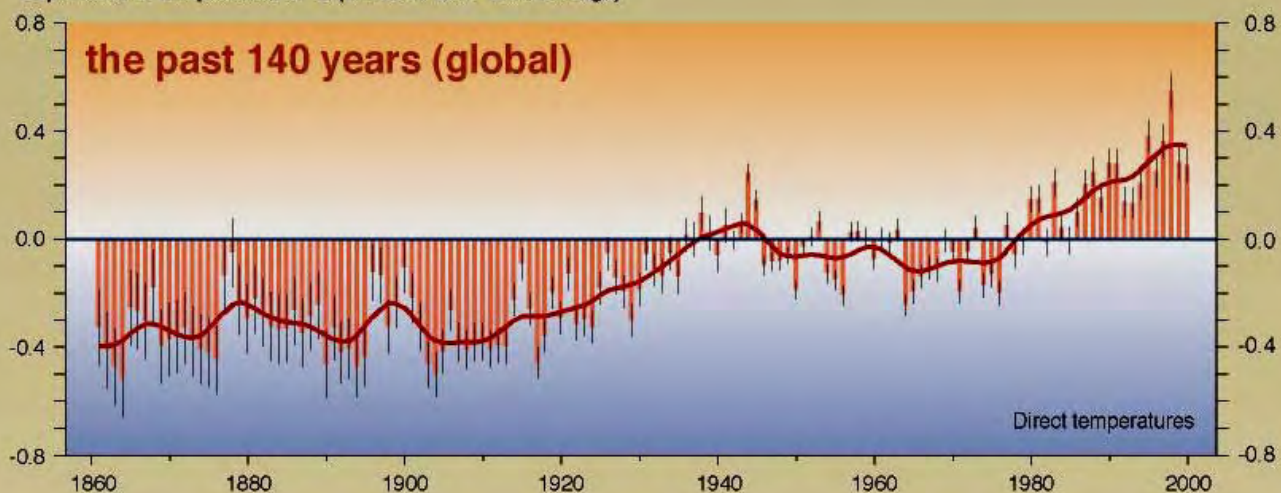
Temperature AD 200-2000



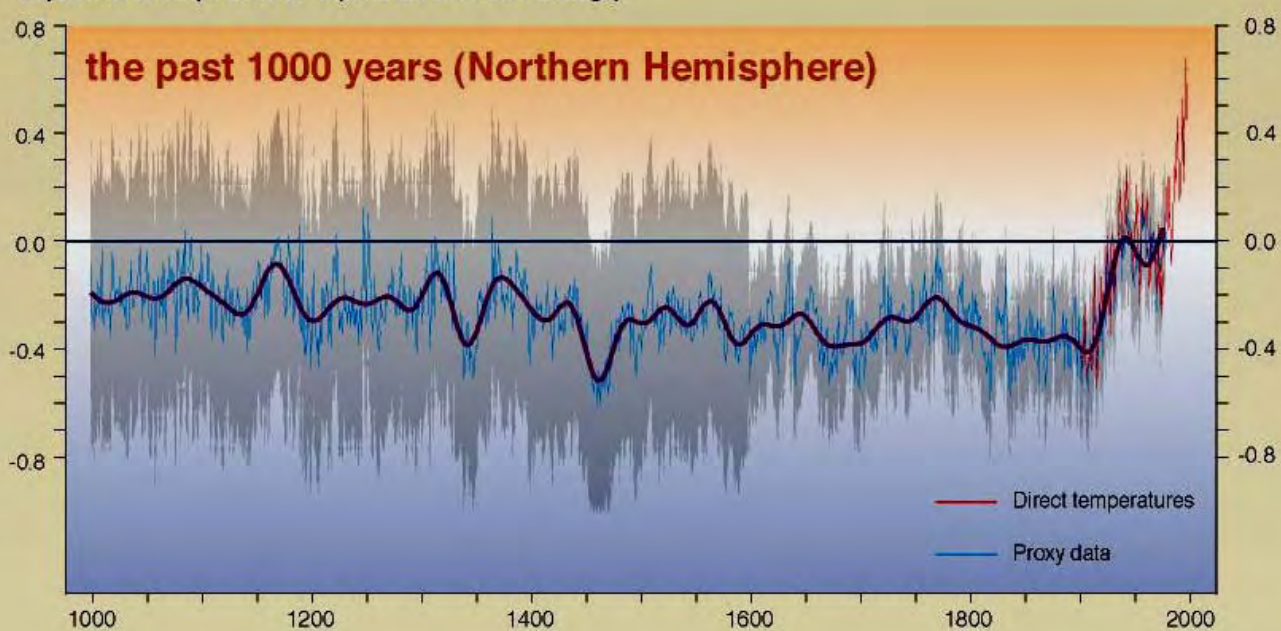
Temperatures AD 200-2000, from proxy temperature indicators and direct measurement (red), showing rise from long-term cooling trend. Mann & Jones, *Geophys. Research Letters*, 2003.

Variations of the Earth's surface temperature from

Departures in temperature in °C (from the 1961-1990 average)



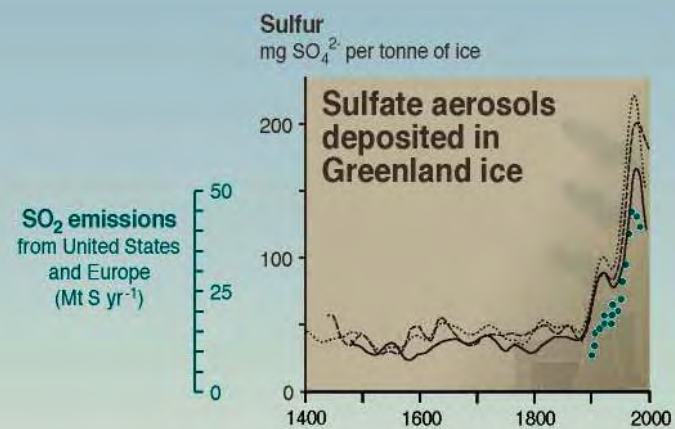
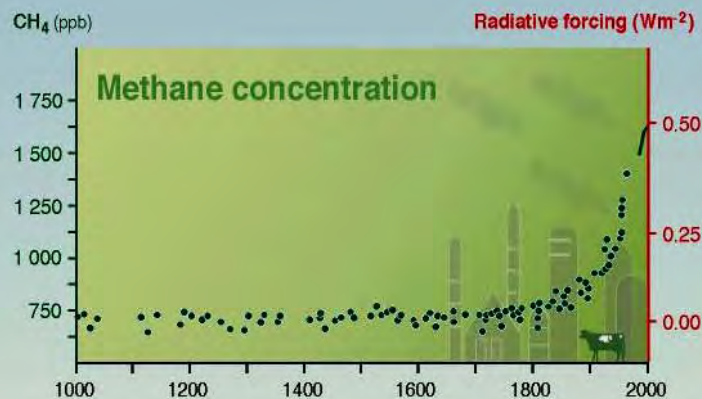
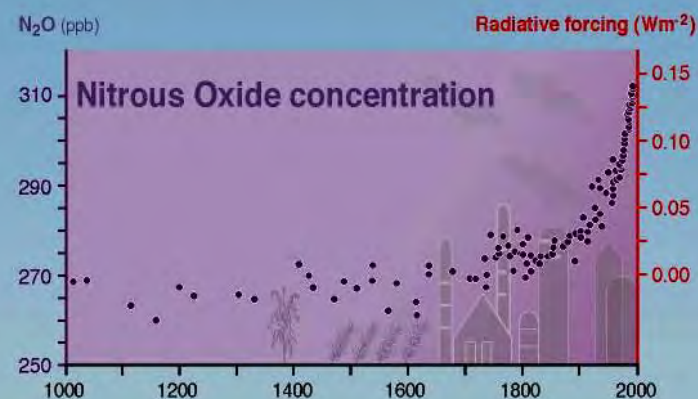
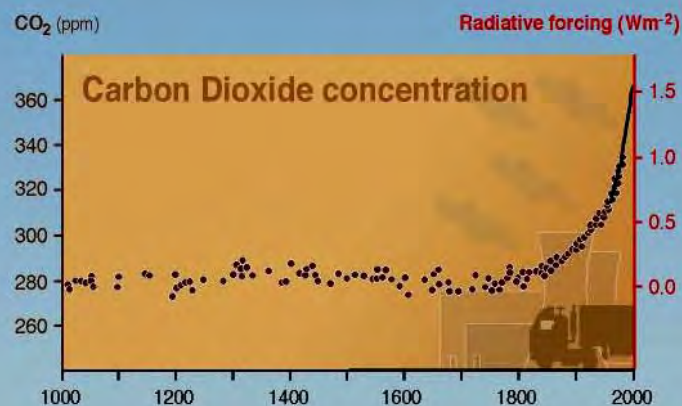
Departures in temperature in °C (from the 1961-1990 average)



SYR - FIGURE 2-



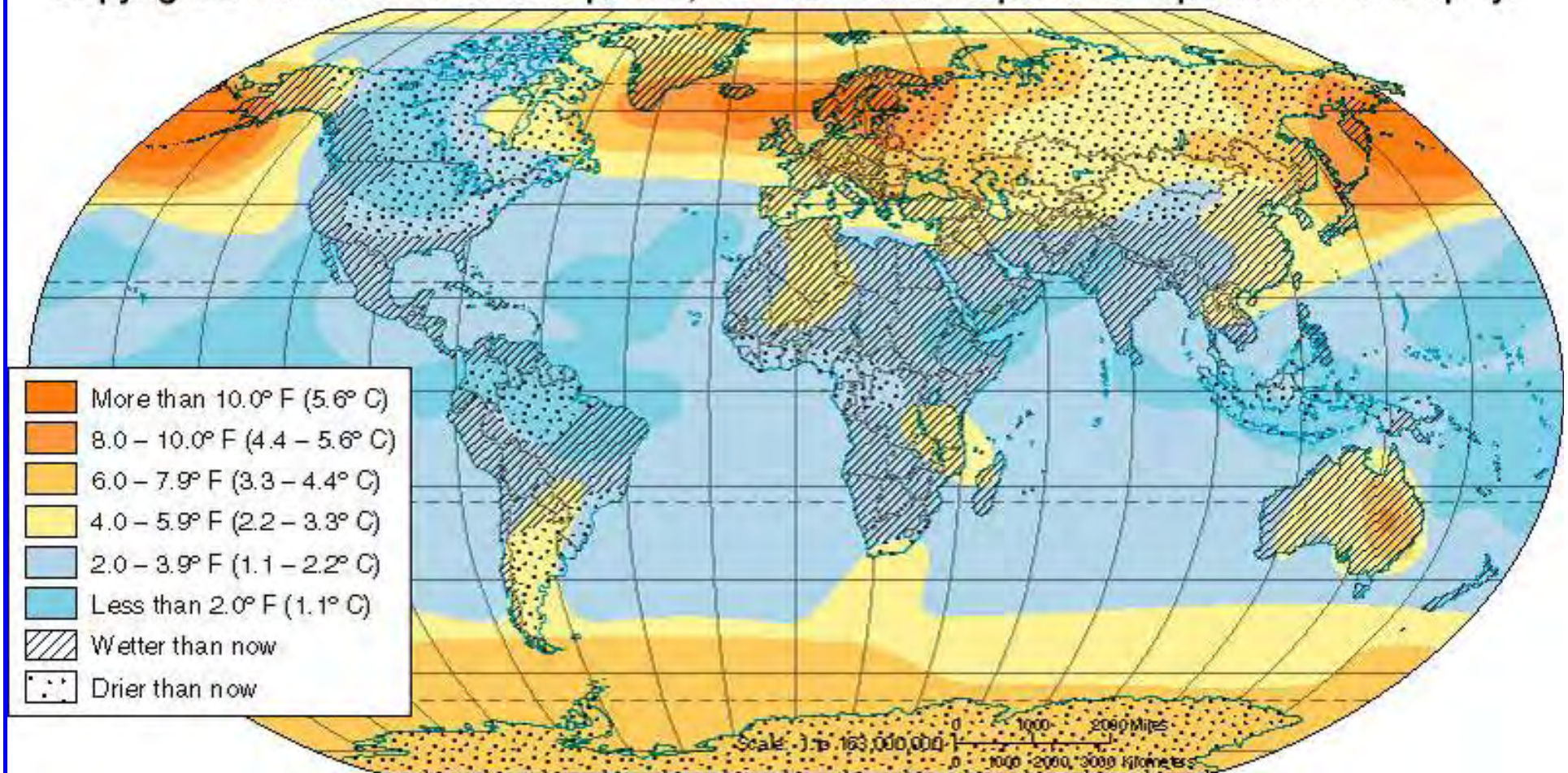
Indicators of the human influence on the atmosphere during the Industrial era



SYR -
WG1 F

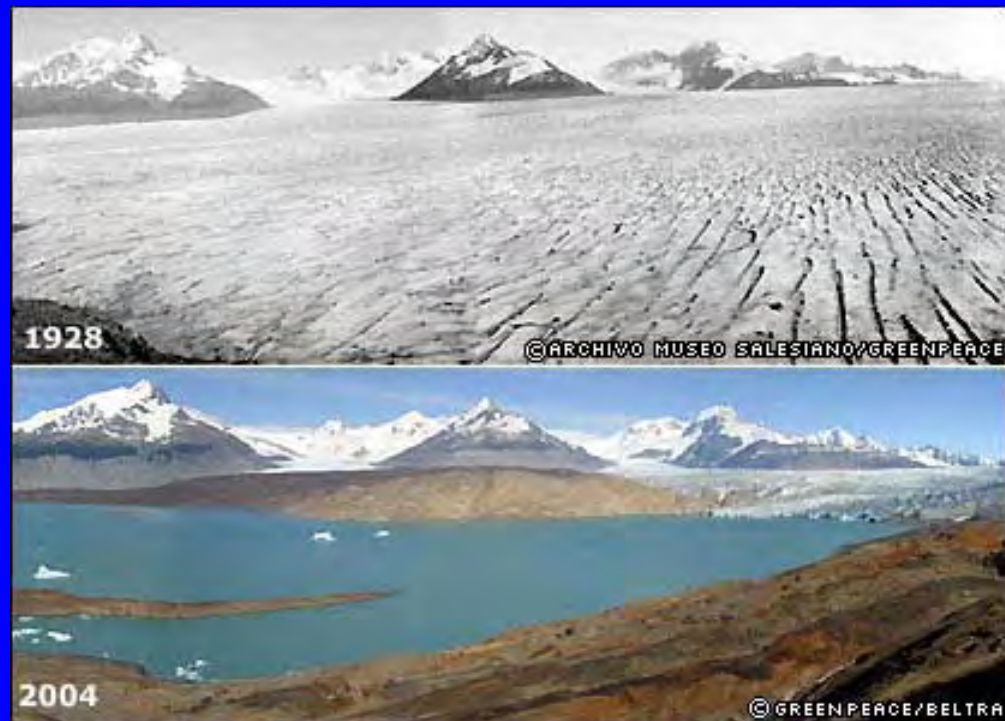
Predicted Changes in Climate by 2050

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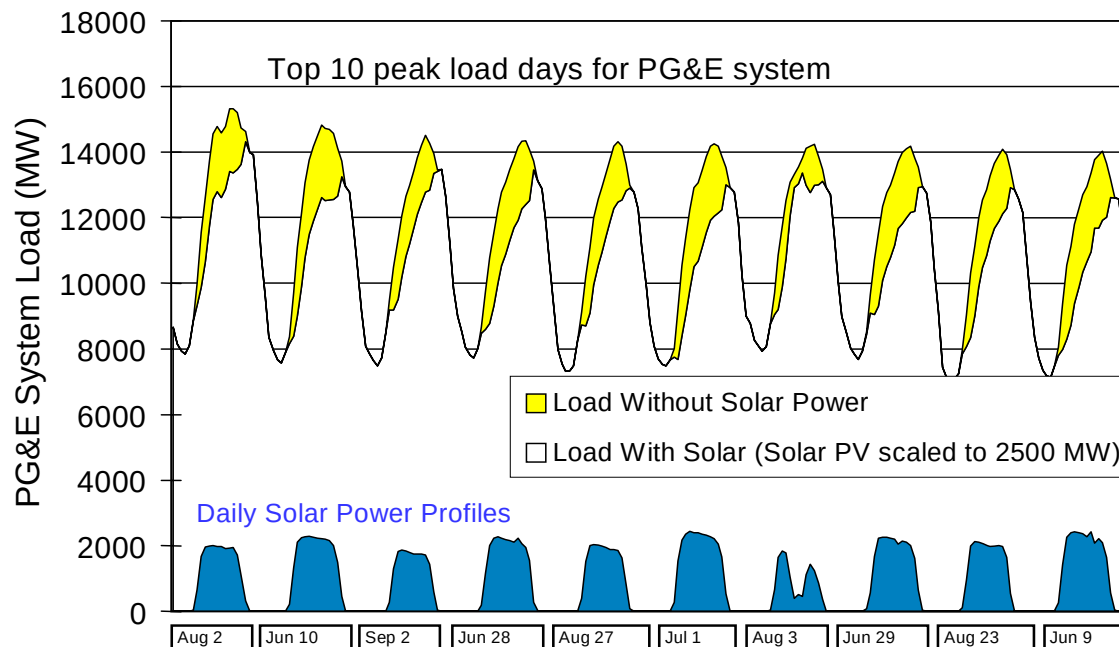
Upsala Glacier

Argentina's Upsala Glacier was once the biggest in South America, but it is now disappearing at a rate of 200 m per year.



Peak Demand Reduction

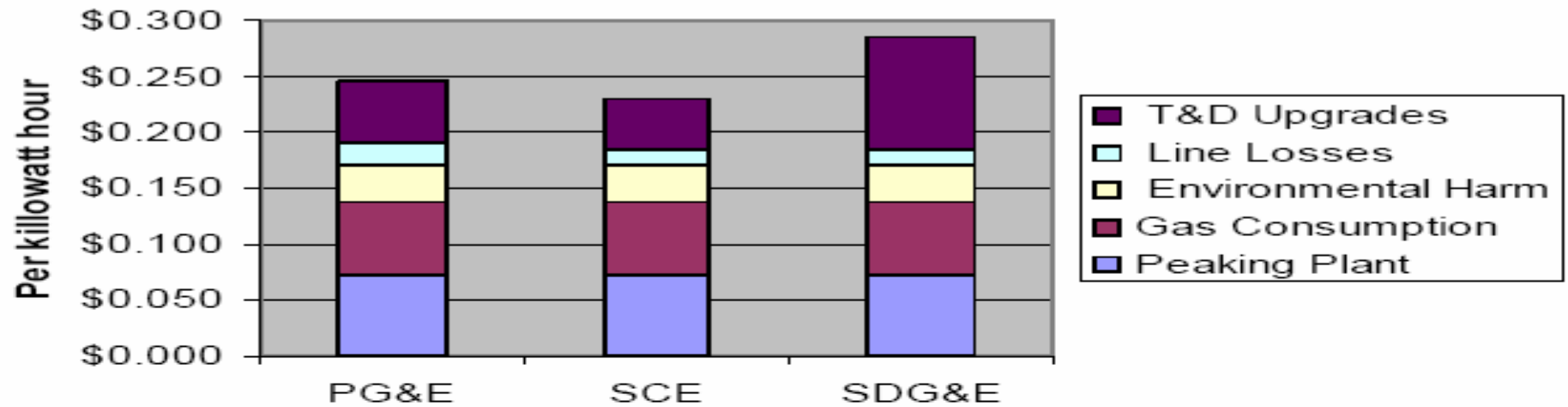
Solar Provides Peak Demand Reduction



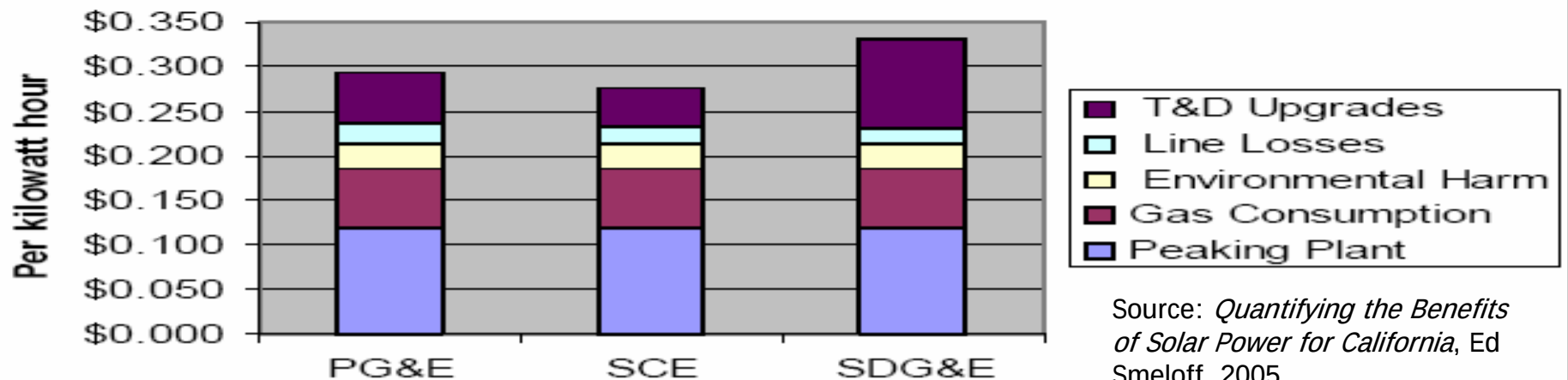
Source: PG&E Report "The Value of Photovoltaics in the Distribution System" 1995. This figure uses actual PG&E system-wide demand data and actual output from PG&E's 500-kW solar power plant in Kerman, CA.

Value of Solar—Avoided Costs

**Costs Avoided by Solar Power On-Peak
(Scenario 1- Utility Peaker)**

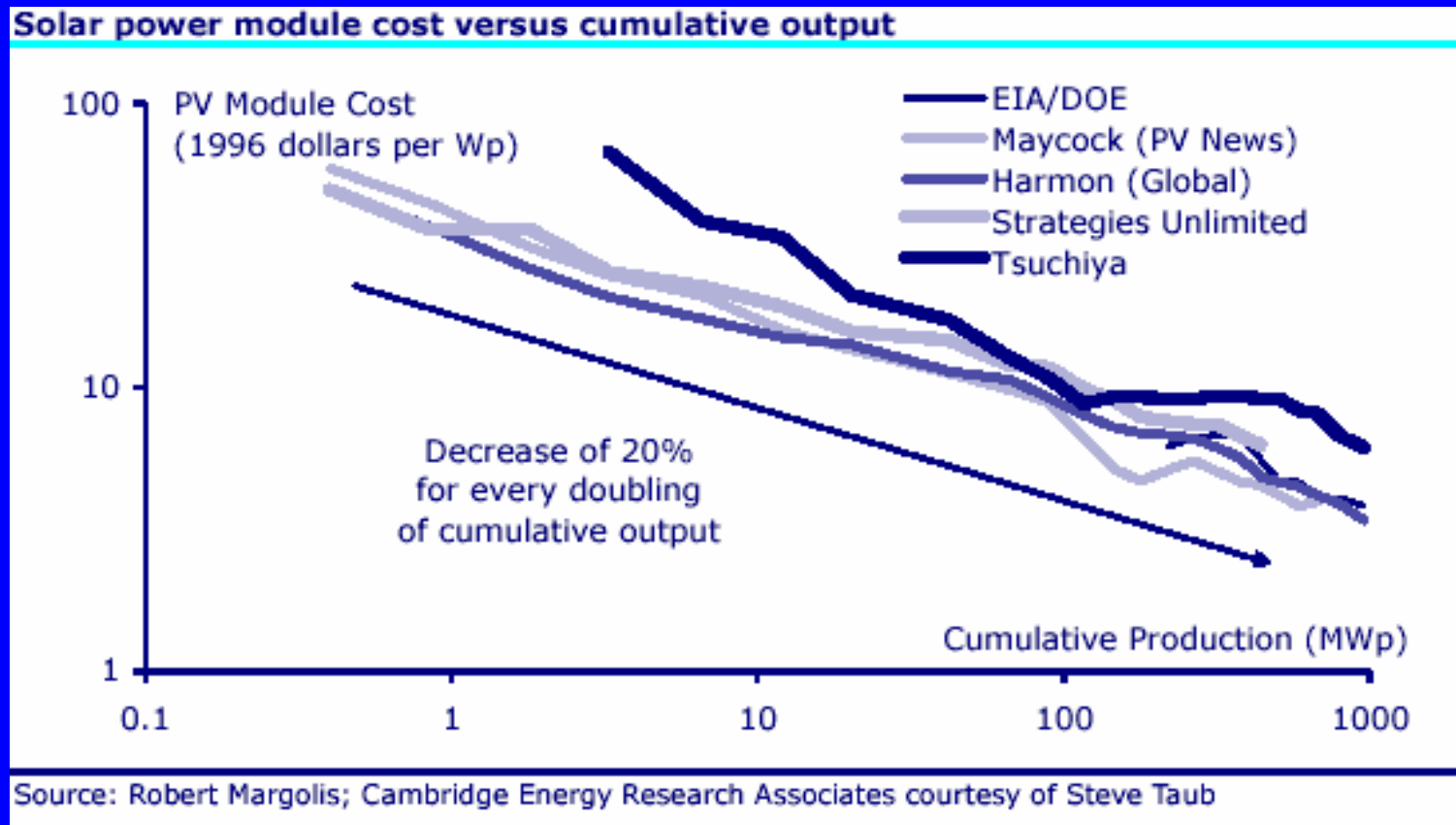


**Costs Avoided by Solar Power On-Peak
(Scenario 2 - Merchant Peaker)**



Source: *Quantifying the Benefits of Solar Power for California*, Ed Smeloff, 2005.

Every time cumulative demand for solar doubles, the cost goes down by about 20 %

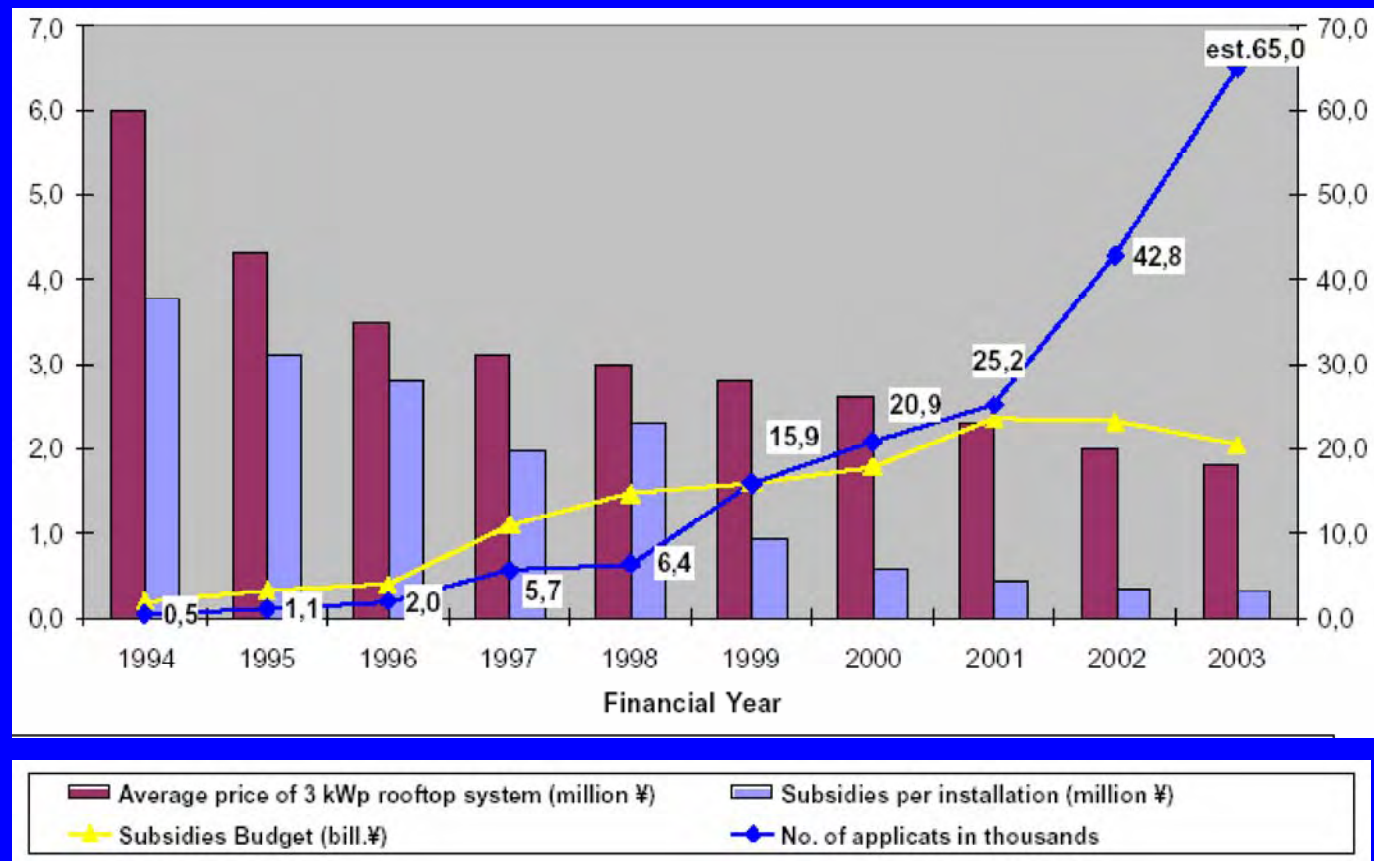


Sales of Integrated Circuits

YEAR	UNIT PRICE	MILITARY PERCENTAGE
1962	\$50.00	100%
1963	\$31.30	94%
1964	\$18.50	85%
1965	\$8.33	72%
1966	\$5.05	53%
1967	\$3.32	43%
1968	\$2.33	37%

Source: Denis Hayes

Japan: \$1B, 10 years= Self-Sustaining Industry

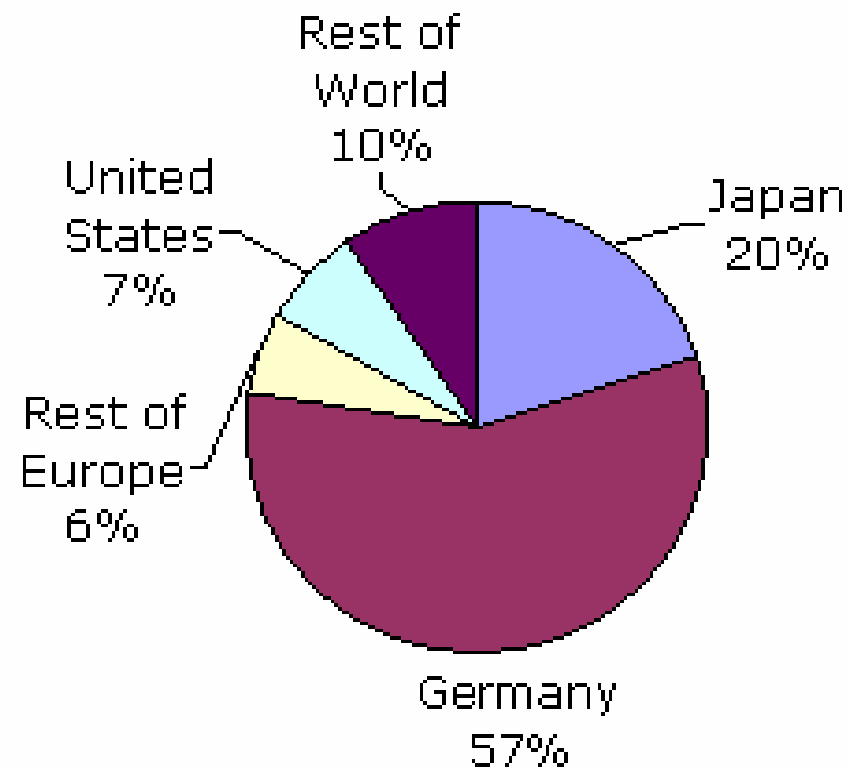


Source: PV Status Report

2005 Growth in Solar Market

- World total: 1460 MW, 34% increase
- Germany: 837 MW, 53% increase
- Japan: 292 MW, 14% increase
- US: 110 MW, 32% increase

PV Installations in 2005 Regional Megawatt Breakdown



TOTAL: 1,460 MW

Source: Solarbuzz LLC

Key Elements for Solar Success

- Financial Incentives—The Engine
 - Public Benefit Funds
 - Tax Incentives
 - RPS with solar carve-out
 - Building local demand
- Regulatory Infrastructure—The Road
 - Access to the grid (interconnection standards)
 - Net Metering
 - Rate Design

Public Benefit Fund

- Established in 19 states
- Funded by surcharge
- Funds energy efficiency and renewable energy

Tax Incentives

- 14 states have some form
- Can apply to personal or corporate
- Advantage: no need to appropriate \$
- Fed ITC—push for extension.

RPS with Solar Carve-Out

- Renewable Portfolio Standard most popular policy to incentivize renewable energy
- Regular RPS does not help solar
- 6 states and Washington DC

Interconnection Standards

- Remove arbitrariness
- Make transparent
- Allows for standardized equipment
- Lowers costs by eliminating unnecessary interconnection studies, metering requirements, standby charges, or fees

Net Metering

- Allows system owners to get credit for excess generation fed into grid
- Rationalizes relationship between grid's needs and DG's attributes
- Makes solar systems effectively 25% cheaper
- Adds value to ratepayers
 - Peak shaving
 - Lower energy costs

Rate Design

- Time-of-Use tariffs with no demand charges
 - Appropriately rewards solar for contributions during peak
 - Allows system owners to enjoy economic benefit of production

Rate Design

In 2004, 51% of solar capacity installed in the United States was in Pacific Gas & Electric (PG&E) territory, while Southern California Edison (SCE), a utility with comparable load size and number of customers, comprised only 18%. Why the difference?

Same building, three locations



Assumptions	
Installed costs	\$7.50 / W
Self-Gen Rebate	\$3.50 / W
Federal tax rate	34 %
State tax rate	9 %
Federal tax credit	10 %
State tax credit	7.5 %

Utility Rates	SCE (GS-2)	SDG&E (AL-TOU)	PG&E (A6)
Daily Service Charge	\$ 11.00	\$ 2.66	\$ 0.49
<u>DEMAND (per kW)</u>			
Summer Peak Demand	\$ 8.39	\$ 11.58	\$ -
Summer Part Peak Demand	\$ 2.08	\$ -	\$ -
Summer Other Demand	\$ 5.78	\$ 4.80	\$ -
Winter Peak Demand	\$ -	\$ 3.83	\$ -
Winter Part Peak Demand	\$ -	\$ -	\$ -
Winter Other Demand	\$ 5.78	\$ 4.80	\$ -
<u>ENERGY (per kWh)</u>			
Summer Peak Energy	\$ 0.233	\$ 0.108	\$ 0.298
Summer Part Peak Energy	\$ 0.088	\$ 0.081	\$ 0.138
Summer Off-Peak Energy	\$ 0.075	\$ 0.081	\$ 0.086
Winter Peak Energy	\$ 0.095	\$ 0.107	\$ 0.151
Winter Part-Peak Energy	\$ 0.095	\$ 0.081	\$ 0.151
Winter Off-Peak Energy	\$ 0.075	\$ 0.081	\$ 0.101
Payback	8.5 years	10.8 years	6.6 years
IRR	9.6 %	6.8 %	13.2 %

Result can be the difference between making the capital investment "cut" or not

Building Local Demand

- Incentivize solar locally
 - Financial Incentives
 - Requirements—New construction
 - Permitting process
 - San Diego's Expedite Program
- Municipal projects

Why Municipal Buildings?

- Large scale means cheaper installations
- Long-term, cheap capital
- High visibility
- Popular with elected officials

Key selling points

- Cost-effective/revenue positive
- Price hedge
- Smart fiscal policy
- Tangible stand for the environment

Strategies

- Bundle With Energy Efficiency
- Third Party Solar Services

GETTING TO VICTORY: A BROAD COALITION

- Chamber of Commerce
- San Francisco Labor Council
- American Lung Association
- Senior Action Network
- Environmental community
- African-American community
- Church groups
- 90% of SF elected officials



Moscone Center--675 kW



Source: PowerLight Corp





AFTER AND BEFORE

New T-5's (left)

Old incandescents (right)

Project Savings

- Solar energy generated: 825,000 kWh
- EE savings: 4,500,000 kWh
- Total energy savings: 5,425,000 kWh

- Annual utility bill savings: \$639,000*

* 12 cents kWh average

Revenue Positive

- Total project cost: \$7.4 million
- Annual utility bill savings: \$639,000
- Annual debt service*: -\$429,000
- TOTAL ANNUAL SAVINGS: \$210,000

* Assumes 20 yrs at 5.5%

EE Opportunity Key

- Most important part of pro-forma is determining the potential savings from energy efficiency.
- Plug that into a cash-flow model to determine how much solar can be subsidized.
- Need political will to aggregate across account.

FINANCING

- Bond
- Development Authority
- Private
- 3rd party solar services

Third Party Solar Services

- California Power Authority
- San Diego Unified School District
- Whole Foods
- Staples



How This Works

- A third party designs, installs, and owns a solar system on your roof
- You sign a 15-25 year contract to buy the metered output

Why This Works

- Model takes advantage of federal and state tax benefits not available to municipalities (non-taxpaying entities)
- Ultimate owner is someone with a tax burden to shed

Benefits

- Eliminates financing concern
- Shifts performance risk from customer to provider
- Ensures maximum production

What's Hot?

- CA-Million Solar Roofs Program
 - 10 yr, ~\$3 billion, 3,000 MW
- NJ-RPS expansion
 - -1,500 MW
- AZ-EPS expansion
 - 2,000 MW potential
- NM, TX, NJ, CO, PA, NV
- Federal Investment Tax Credit.



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