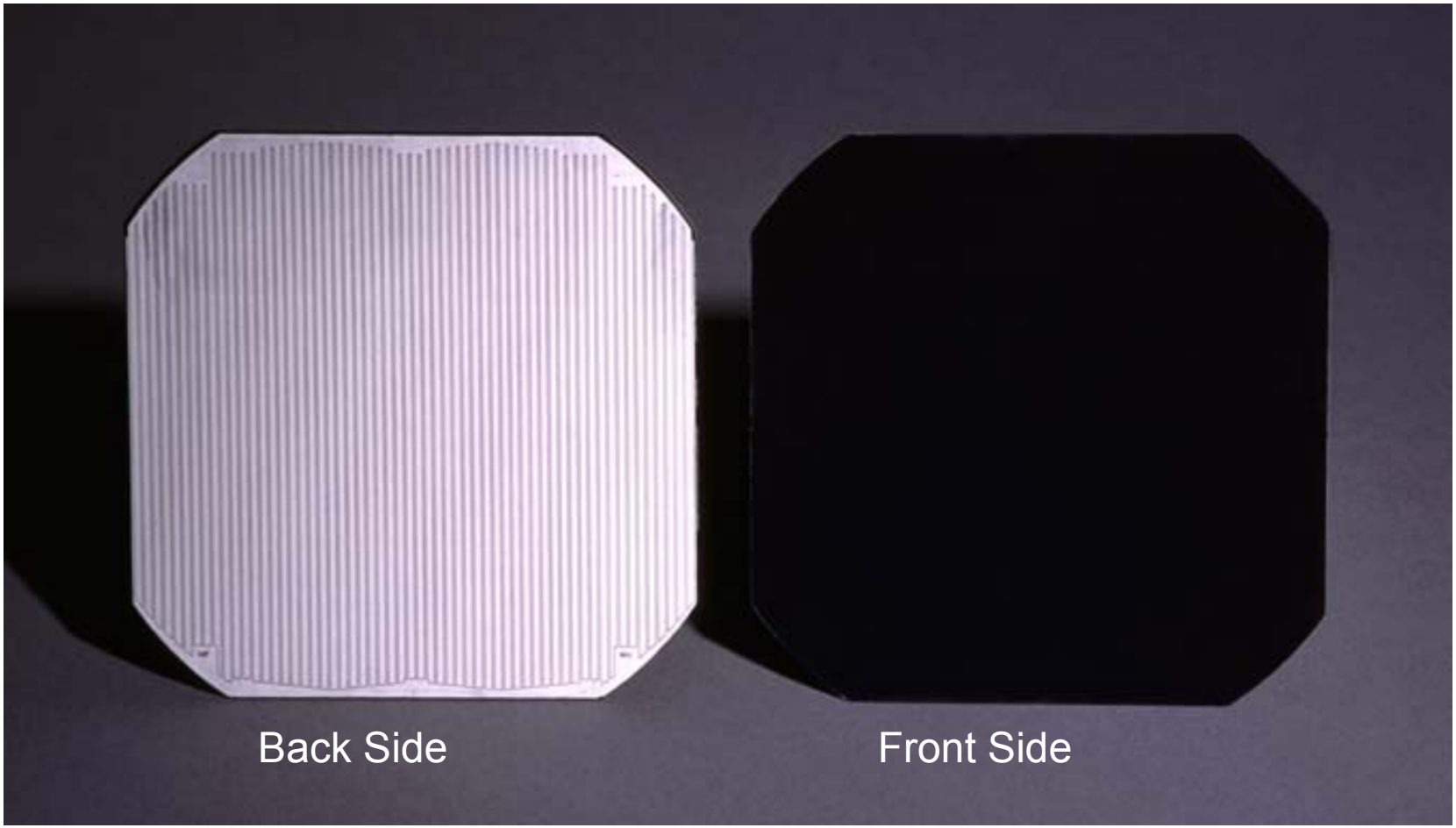
Solar PV :
Hot Prospects for the Philippines

Migs Trinidad
Country Director of Finance

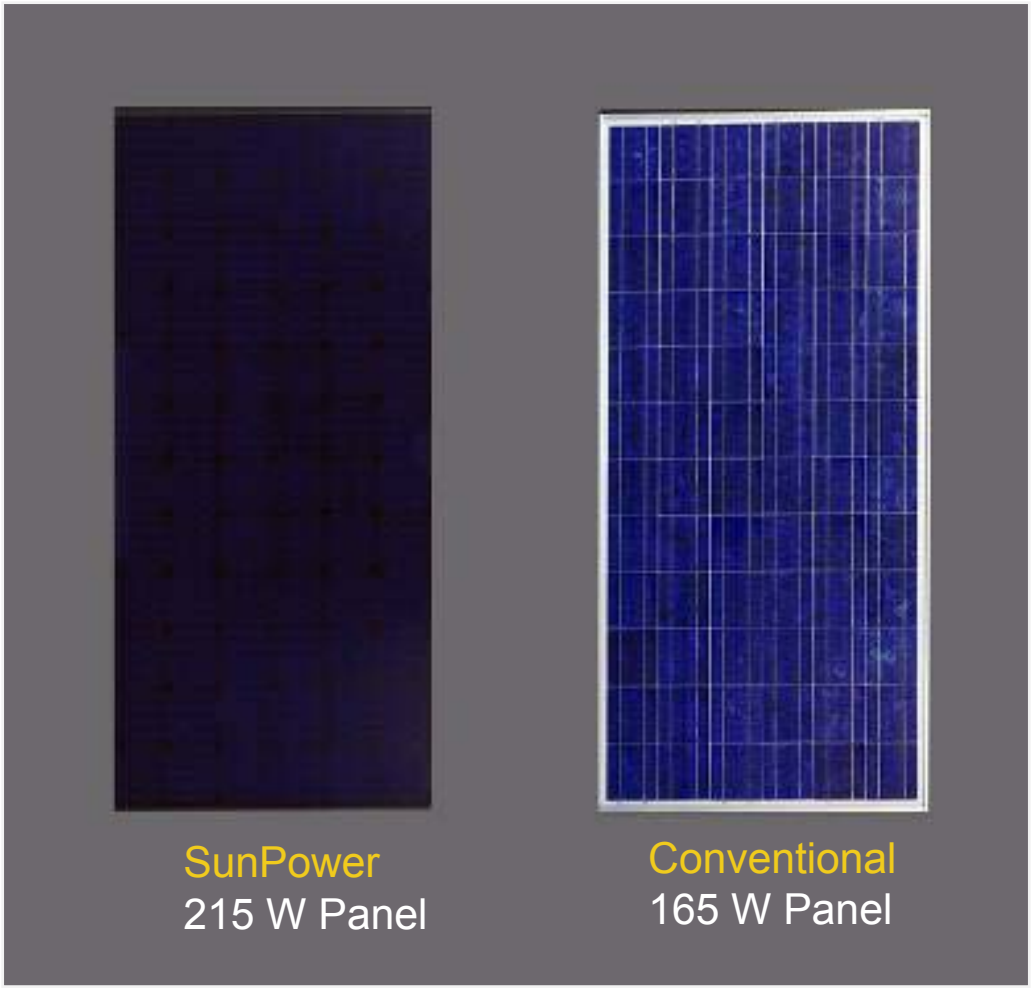
January 30, 2007

Solar Cell

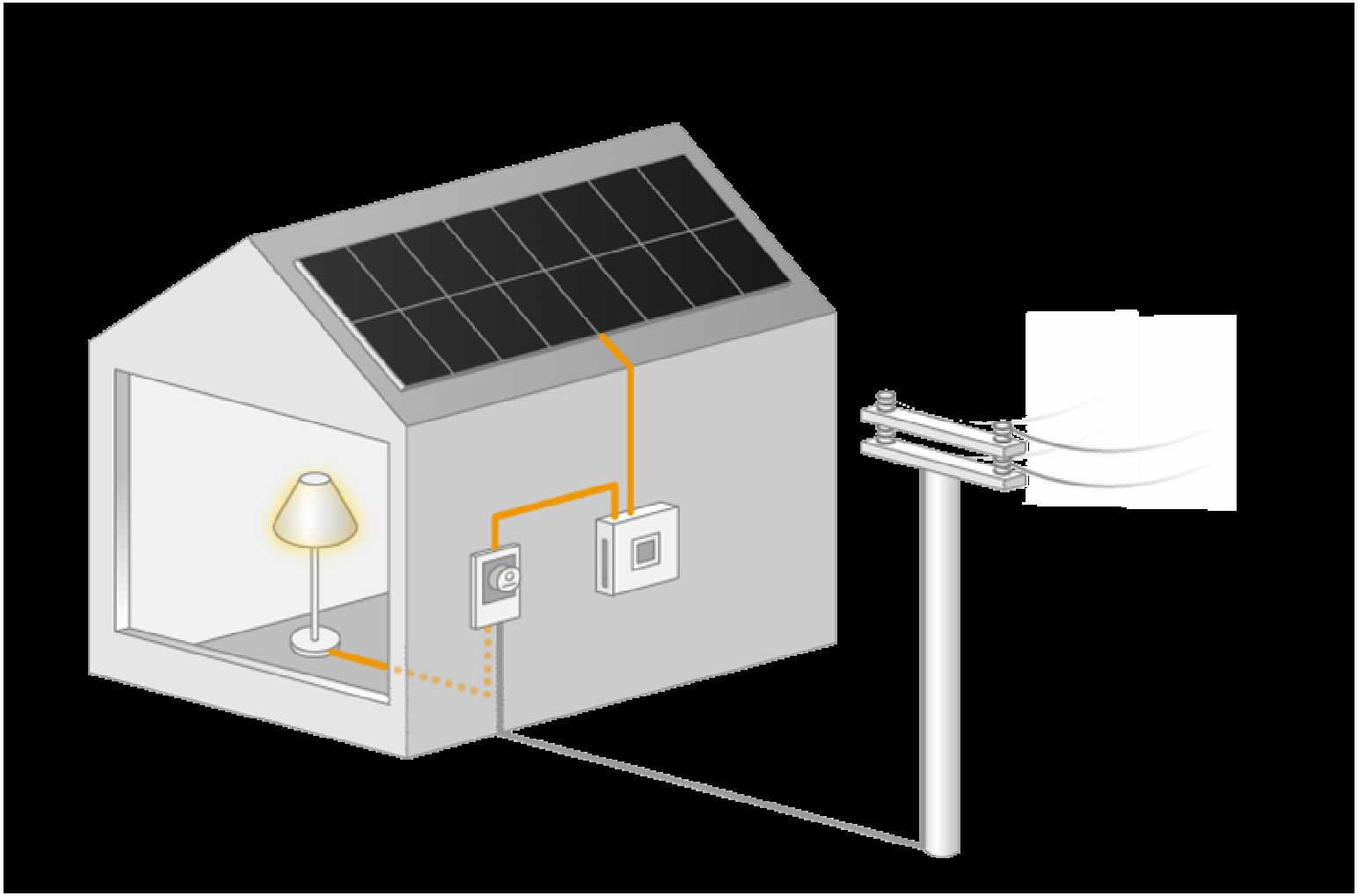


Solar Panel

- Up to 50% more power
- Or, same power, smaller footprint
- Uniformly black, attractive
- Highest energy delivered per square meter



Typical Solar Installation



Residential Installation - Retrofit

Residential – New Homes

Commercial & Public

Power Plants

Solar Power Made in the Philippines !!

Power Plants

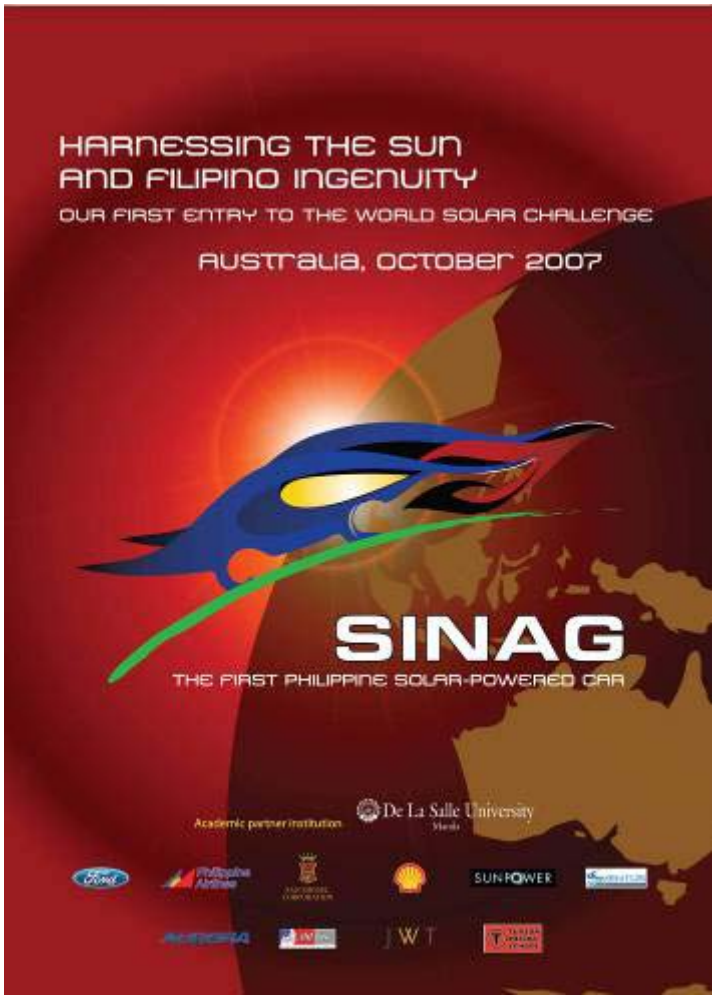
SunPower in the Philippines !!

- *Electrification of School and Community on Pulo Island, Talisay, Batangas*

SunPower in the Philippines !!

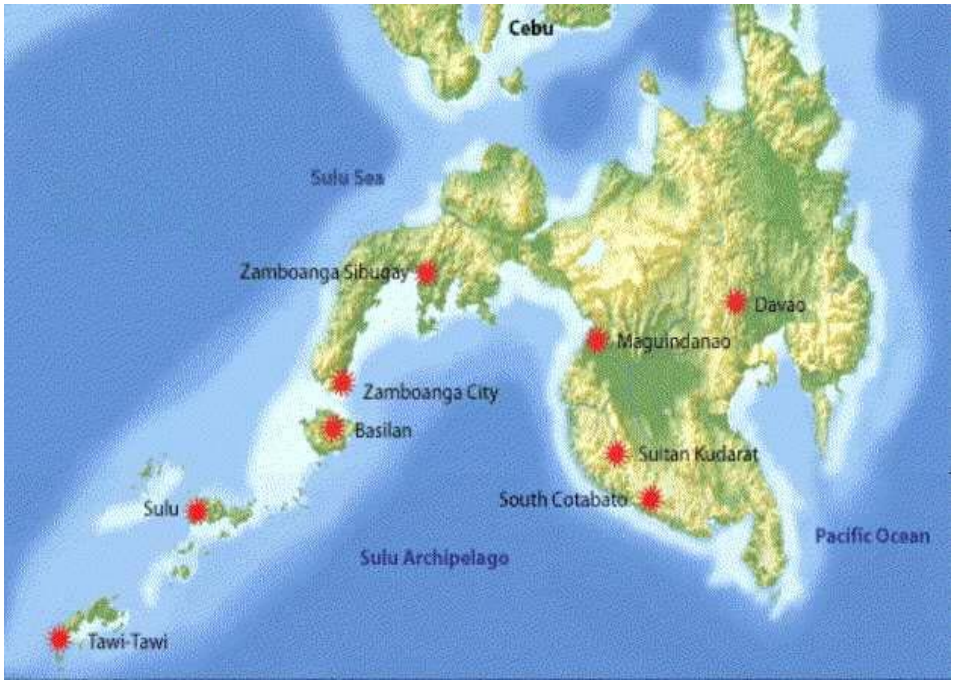
School of the Seas, Bantayan Island, Phils

SunPower in the Philippines !!



SunPower in the Philippines !!

Alliance for Mindanao Off-Grid Renewable Energy (AMORE) Program

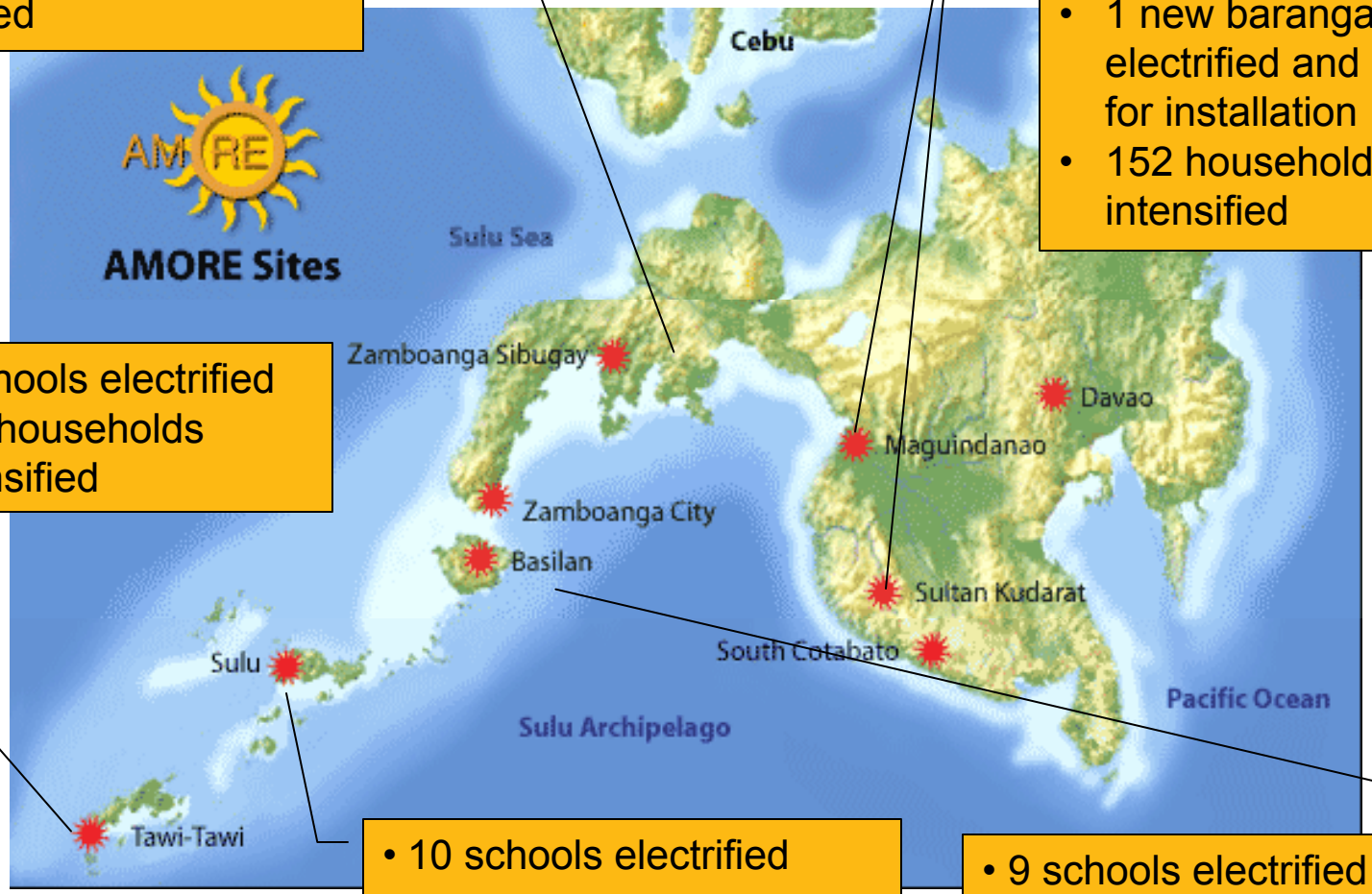


- **Electrification of rural households and educational facilities**
- **Materials & Services donated by SunPower along with matching grant from USAID**

SunPower in the Philippines !!

- 2 new barangays electrified

- 15 schools electrified
- 1 new barangay electrified and 2 others for installation
- 152 households intensified



- 6 schools electrified
- 257 households intensified

- 10 schools electrified

- 9 schools electrified

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Photovoltaic Industry Overview

Global Energy Supply Challenges

- **Global Electricity Market is Huge and Growing**
  - 14 trillion kWh; $1.2 trillion Market in 2005

- **Faces 3 Key Challenges**

  - **Increasing Demand on Non-Renewable Energy Sources**
    - Global Energy demand will increase by another 50% over the next 15 years
    - Much of the growth will be in developing countries
    - China and India alone are predicted to add 3 trillion kWh demand over next 20 years (equivalent to USA today)

  - **2 Billion People World-Wide Do Not Have Access to Electricity Today**

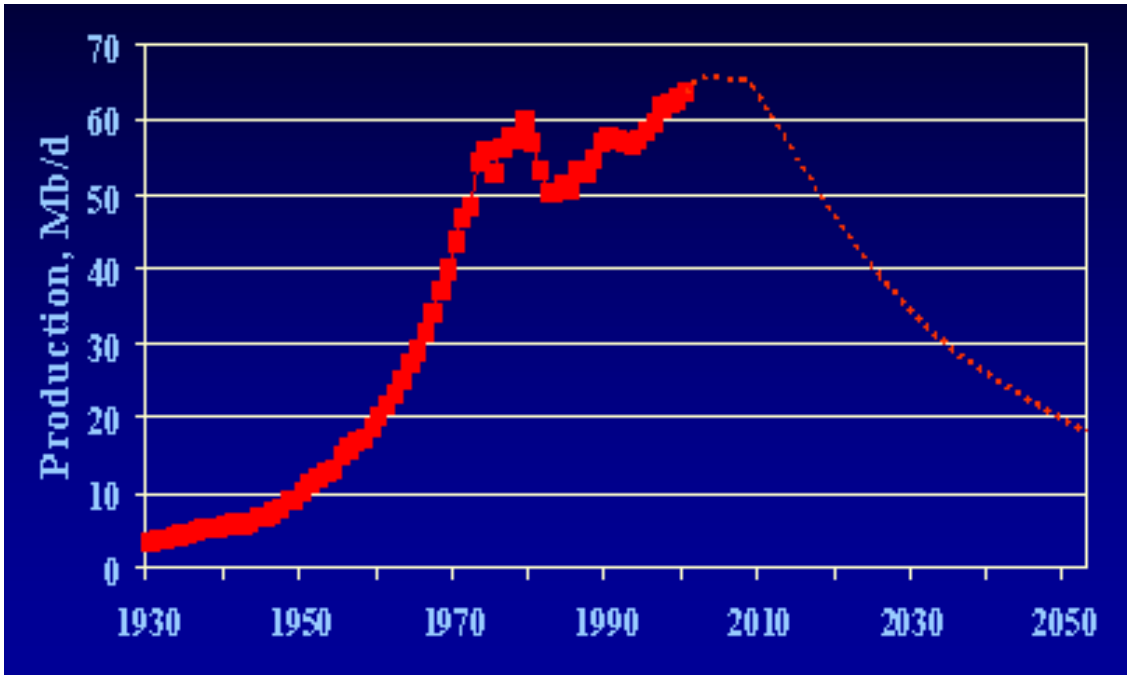
  - **Environmental Concerns with Existing Fossil Fuel Energy Sources**

PV Industry Growth Driver

Traditional Energy is “Running out of Gas”

- Traditional Sources of Energy such as Oil & Gas are approaching peak of production
- Not running out; but will become increasingly costly as reserves are depleted
- Fossil Fuels are increasingly under pressure due to environmental concerns

Oil industry consensus:
production is will peak between 2004 and 2010



Source: C.J.Campbell “World Oil Resources” Dec 2000

Where will the Power Come From

Traditional **sources such as coal / oil**

Supply Concerns:
- Non-renewable
- Increasingly more expensive
- Energy Dependence

Environmental Concerns:
- Largest industrial source of CO_2
- Produces 97% of SO_2 emissions
- Largest Source of Air Pollution

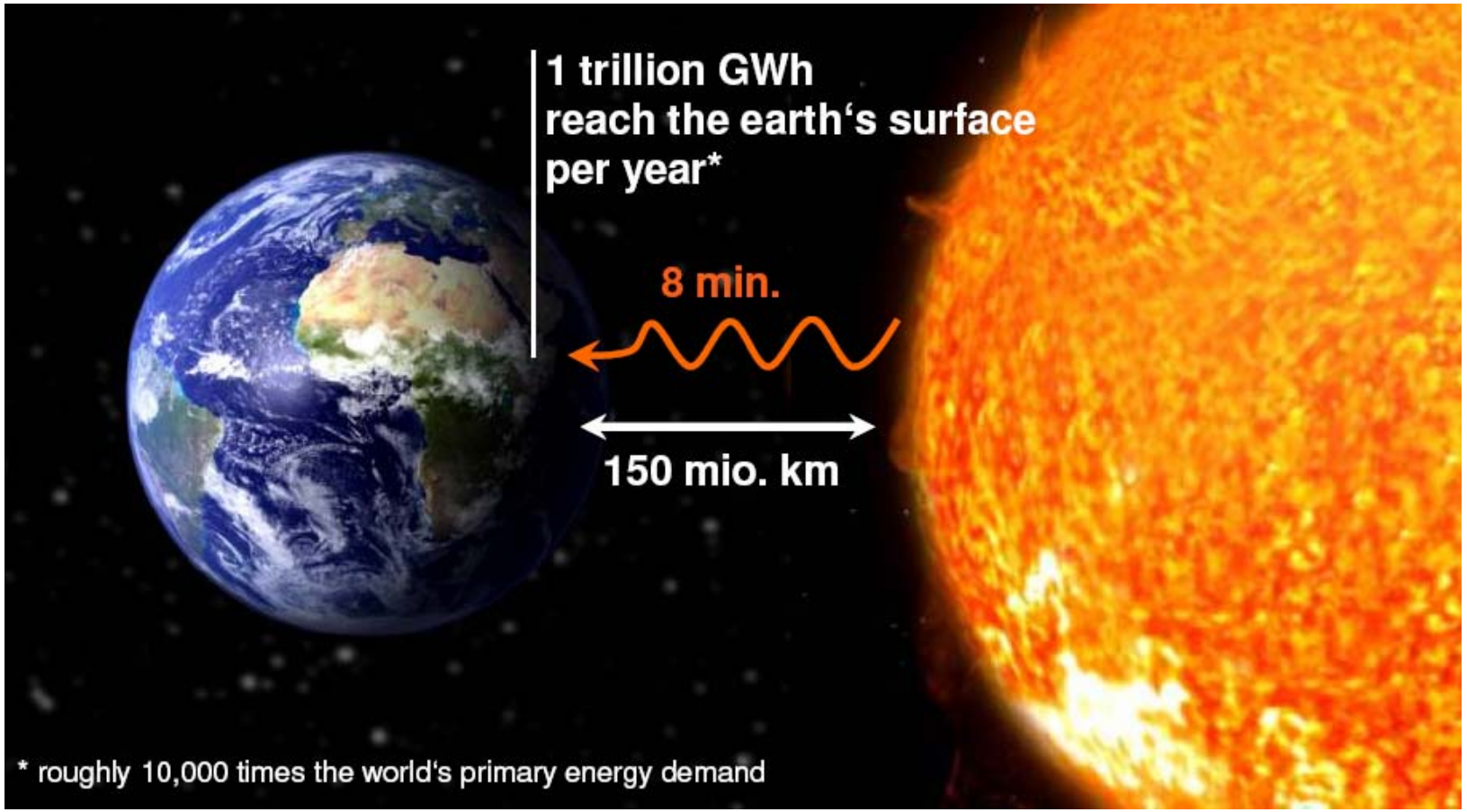
Where will the Power Come From

Nuclear Power Plants

- Would Need to Build 800 new Nuclear Plants (1000MW each) over 15 years
- That is 1/Week!!!
- Not In My Back Yard!
- Safety Concerns

Renewable Energy

Biggest Power Plant..



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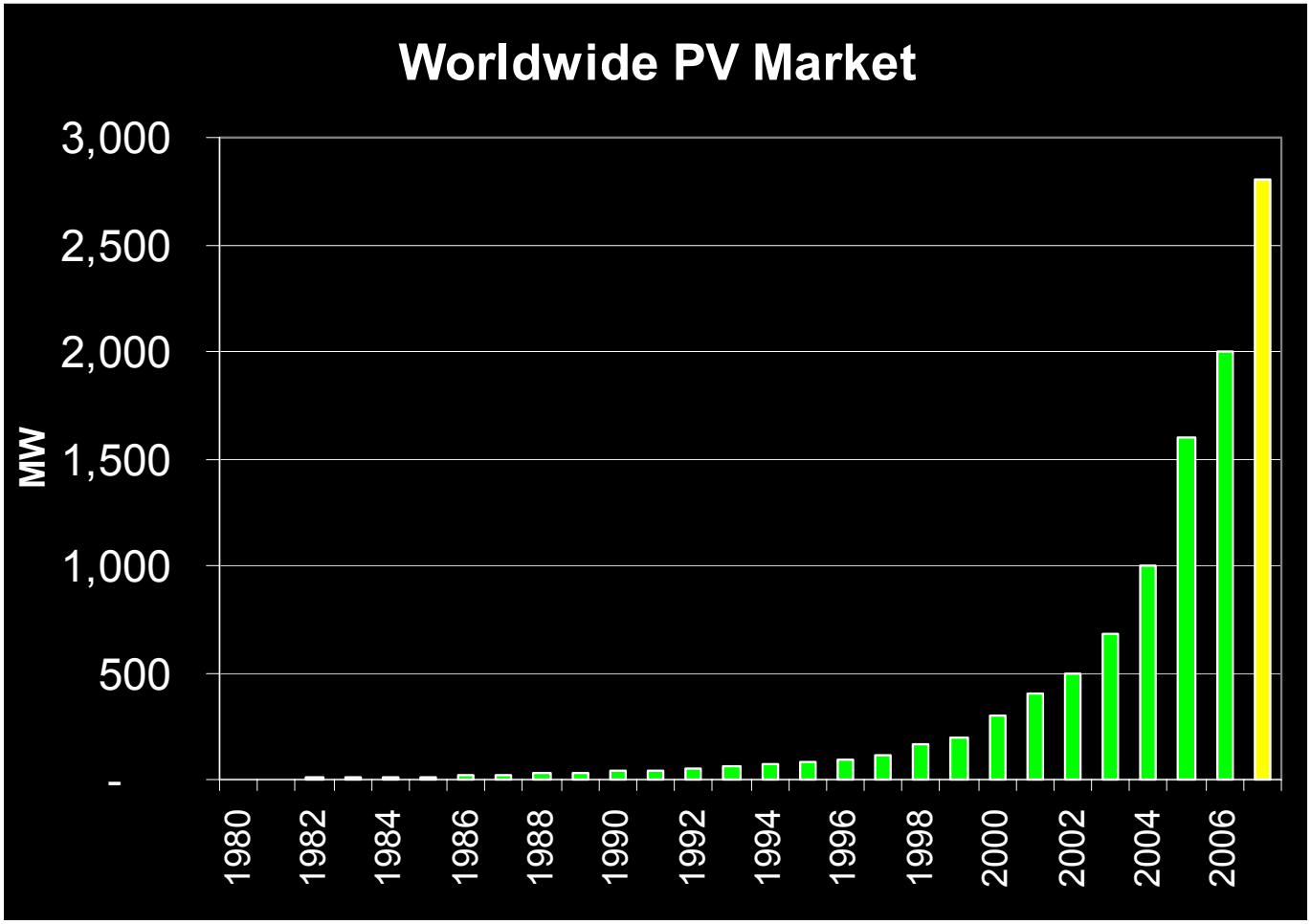
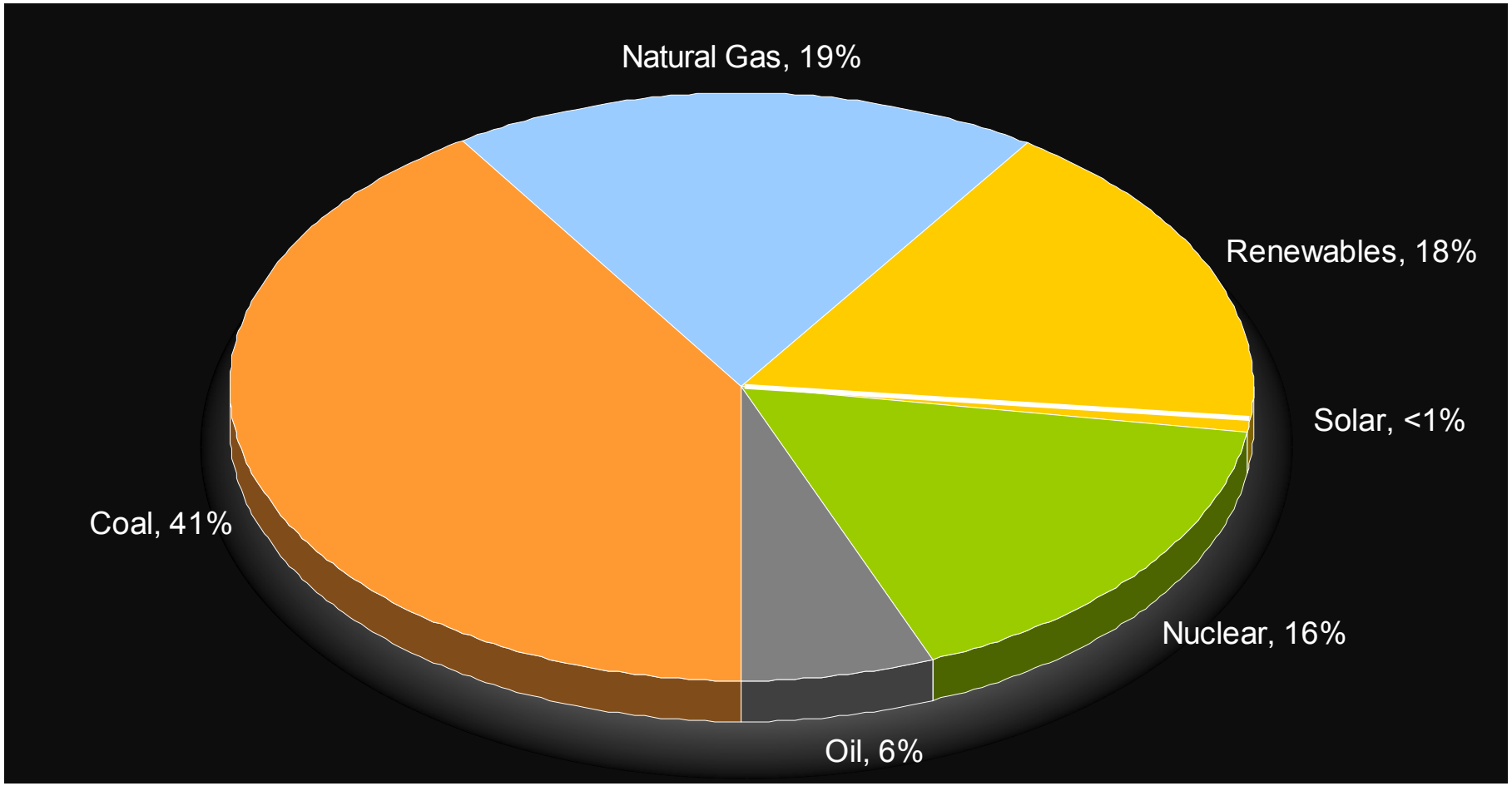
PV Historical Growth



- Market growing at >35% for the last 5 years
- Demand still far ahead of supply
- Fastest Growing Technology Industry in World Today
- Forecast for 2010 is 6,000 to 10,000 MW
- PV is the next Semiconductor Boom

Current Global Energy Mix

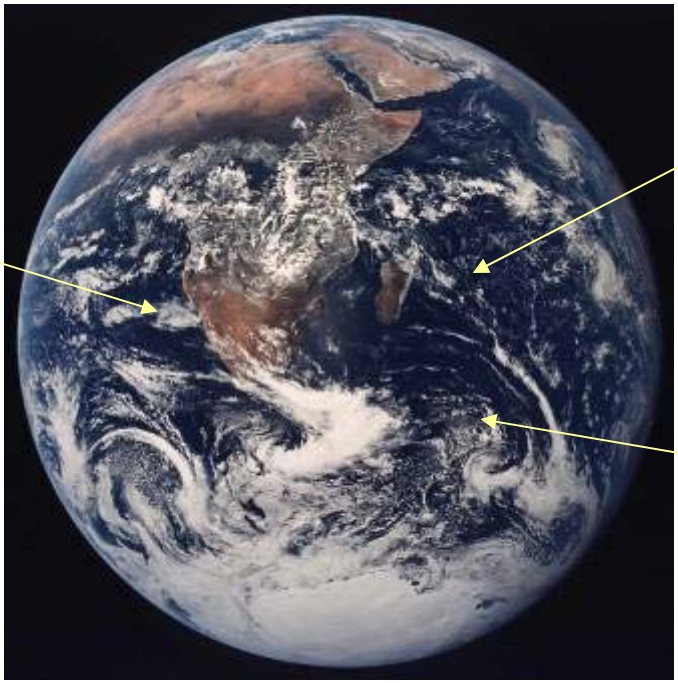


Benefits of Solar Power
(Aside from being Clean Energy)

Benefits of Solar

Unlimited Supply of Energy

– Earth receives enough solar energy to cater for the world's energy needs, and it's free…



Intensity of Sunlight
1 kW per m^2

Diameter of Earth
12,756.3 km

Surface Area
509.6 Million km^2

250.8 Tera Watts

World Electricity = 1.8 Tera Watts

Benefits of Solar

Distributed Generation

- Generate at point of consumption, reduces losses in transmission, and enables remote applications.
- Allows electrification of currently inaccessible populations. 2 billion people do not have access to electricity today.

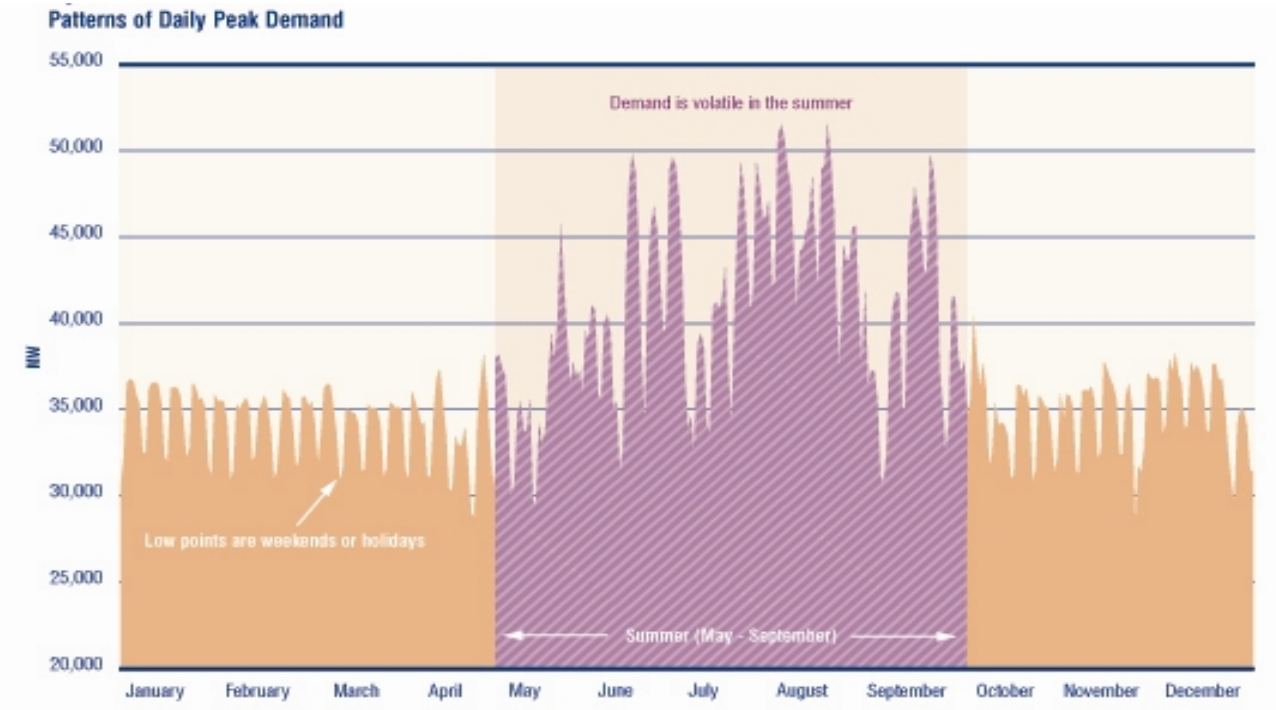
Up to 20% of power generated is lost during transmission from Power plant to the point of use.

A Buddhist monk in Tibet with his new PV module.

Benefits of Solar

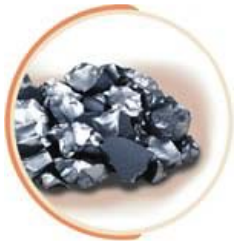
Reduces cost of traditional energy

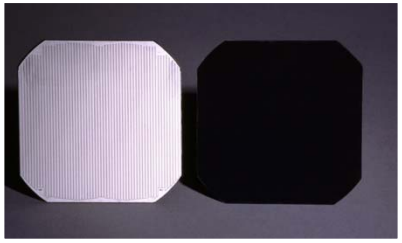
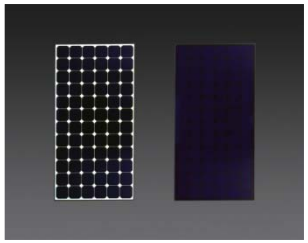
- Solar power production peaks at same time that demand peaks (both daily and annually), allows reducing significant capital expense for new power plants
- Positive Impact of Traditional Power Costs. Japan estimates 4% reduction in traditional power cost due to peak reduction through distributed solar systems



Current PV Challenges

Raw Material Shortage

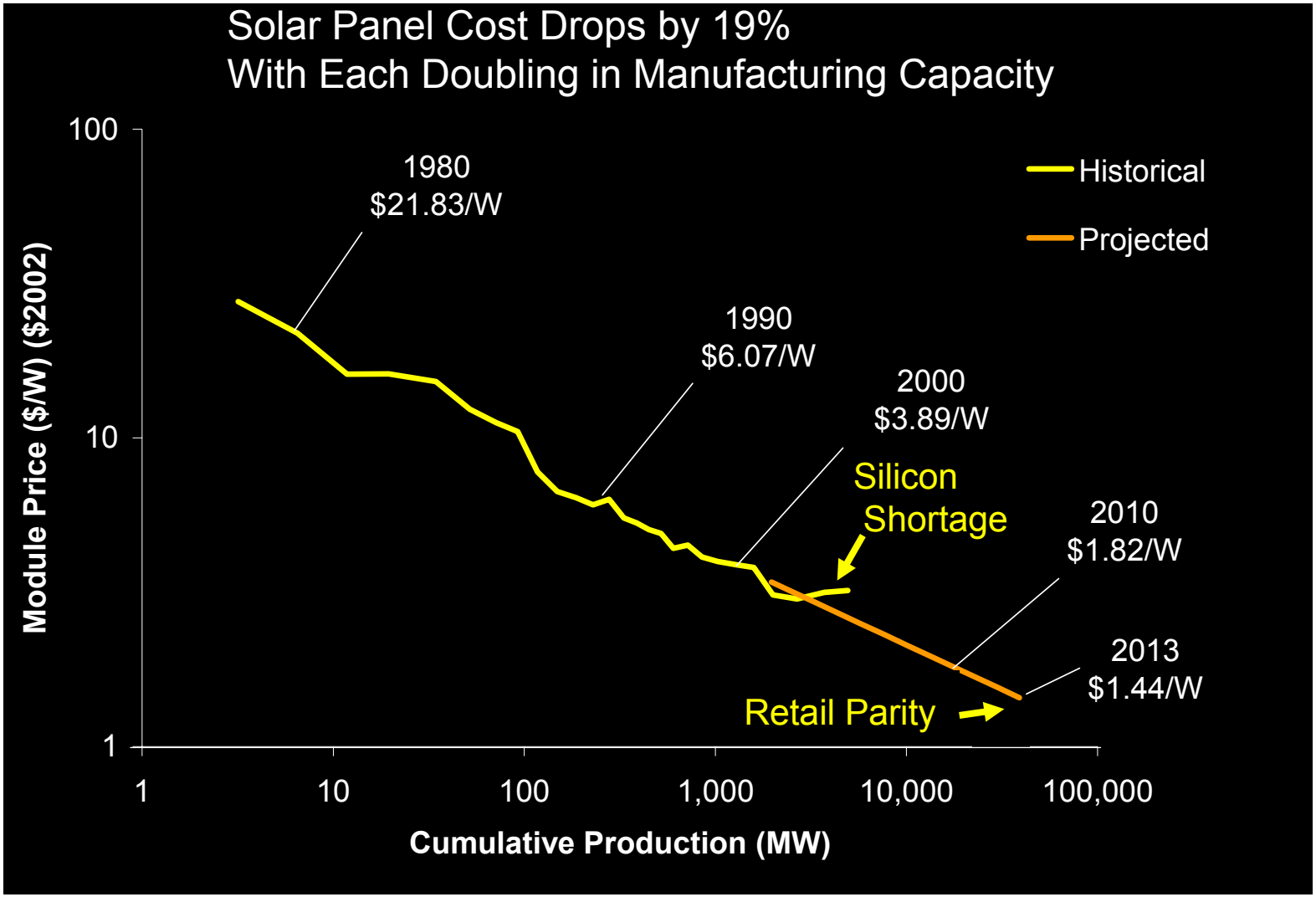



Polysilicon → Ingot → Wafer → Solar Cell → Solar Panel → System

- Shortage of factory capacity to produce Polysilicon
- Drives the cost of PV systems high
- Supply to ease up starting mid 2008
- SunPower has secured long-term supply contracts

Race to Grid Parity (in 2012)



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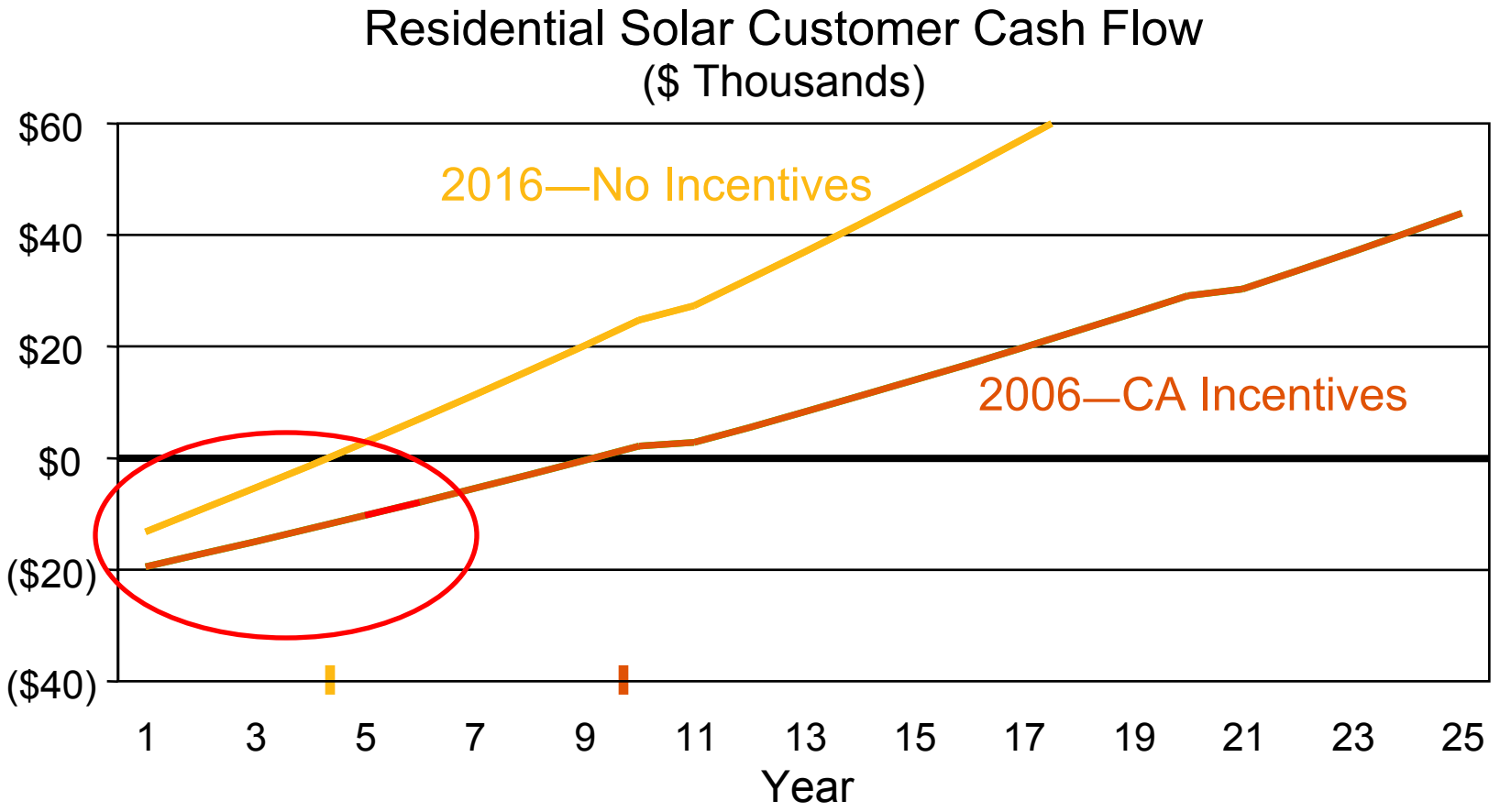
Upfront Cash/Investment (Subsidy Required)



- Makes it not outrightly affordable by the mass market
- Requires creation of financing infrastructure
- Viable where market enjoys subsidy / Incentive Programs

Solar PV : Hot Prospects for the Philippines

What needs to be done!

Philippine Solar Prospects

- The Philippines now has the highest performance solar manufacturing capability in the world, yet a very small PV market today

- Commercial / Residential PV market is small
  - Large, up-front investment needed for Solar Power
  - Little PV support infrastructure

- Yet, Opportunity Exists
  - Rising Electricity Prices
  - Large, remote populations without electricity
  - National Agenda Item

What needs to happen?

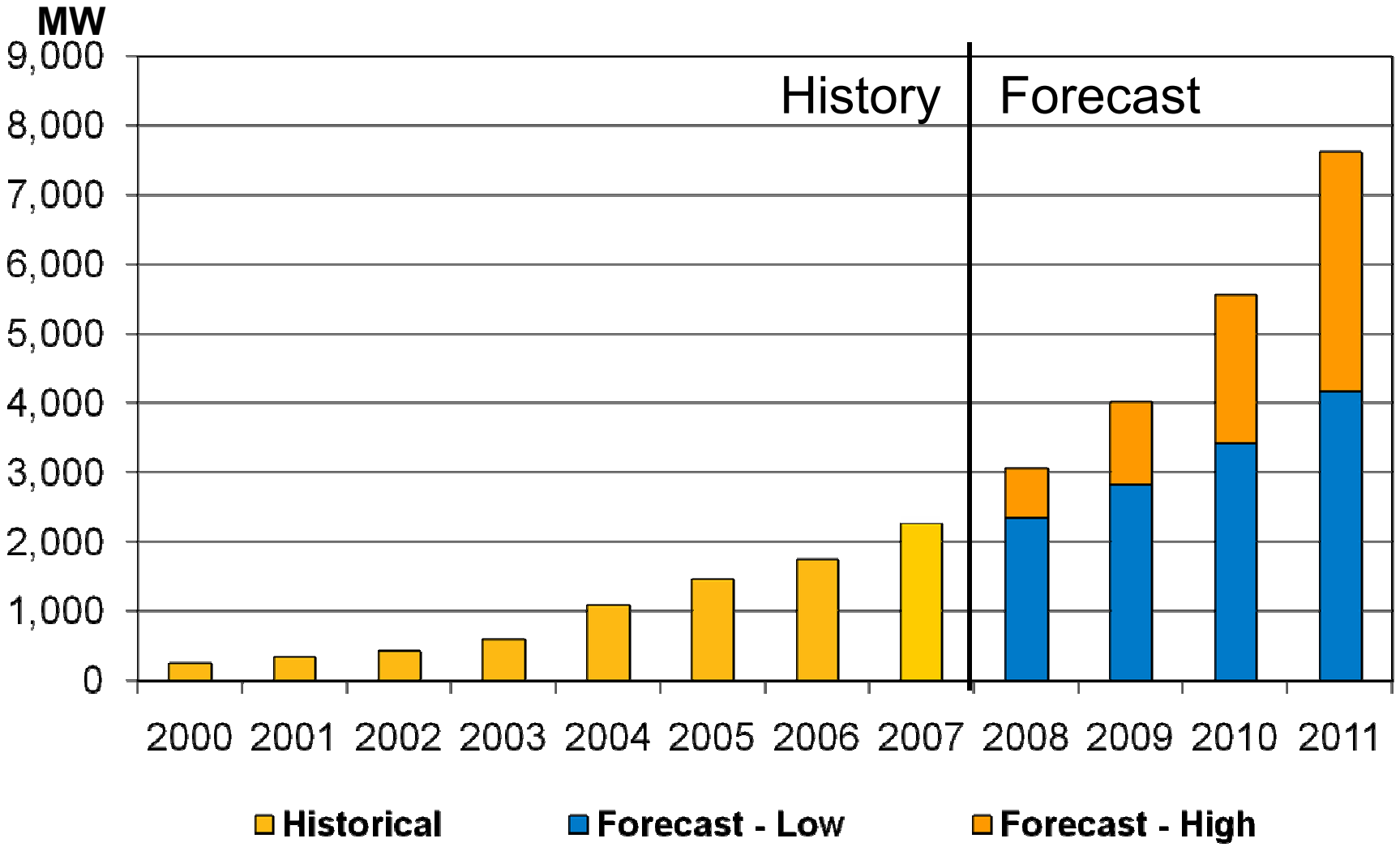
- Implement Programs to Stimulate PV Start-Up/Growth
  - Allow Net Metering for grid connected systems
  - Subsidies / Low-interest loans for small off-grid systems
  - Incentive Programs to Drive Mass Adoption
    - Current types of incentive programs: Net Metering, Feed-in Tariff, Renewable Porfolio Stds. or Tax Credits
- Develop Infrastructure for Grid Connectivity
- Enhance PV Systems Support Infrastructure (Installers & Technicians)
  - Built significant local PV industry Jobs: Module Manufacturing, System Installers

Take Away..

- Solar Energy, while small now, will become an important part of the global energy mix in the near future
- The PV market is experiencing explosive growth
  - Much like the semiconductor industry 30 yrs ago
- The Philippines has an opportunity to capture the “Solar Economy” and capture the “next Semiconductor” growth industry, yet forward looking legislation is needed.


Thank you!

Global Annual Installed Solar Systems



Source: MarketBuzz 2007