PV Modules

Solar Power Industries

Module Type	SPI-M220-60US	SPI-M230-60US
Maximum Power (MP)	220 W	230 W
Voltage at MP (Vmp)	28.75 V	29.46 V
Current at MP (Imp)	7.65 A	7.81 A
Short Circuit (Isc)	8.25 A	8.42 A
Open Circuit (Voc)	36.29 V	36.63 V
Module Efficiency	13.50%	14.10%
Tolerance at MP	-0 watts +5 watts	-0 watts +5 watts
Maximum series fuse rating	15 A	15 A
Maximum system voltage	600/1000 V	600/1000 V

*Measured at STC (Standard Test Conditions): 1000W/m^2, AM 1.5, 25°C

GE Solar

Module Type	GES-P230
Maximum Power (Pmax)	230 W
Power Tolerance	0 watts +5 watts
Open Circuit Voltage (Voc)	37.0 V
Short Circuit Current (Isc)	8.22 A
Maximum Power Voltage (Vmp)	29.8 V
Maximum Power Current (Imp)	7.73 A
Cell Efficiency (Ƞc)	16.2~16.6 %
Module Efficiency (Ƞm)	14.1~14.4 %

PV Modules

Day 4 Energy

	Day 4 60MC-1 (225Watt)	
Module Type		
Power Class	225 W	
Peak Power (Wp)	225 W	
Max. Power Voltage (Vmp)	29.47 V	
Max. Power Current (Imp)	7.62 A	
Open Circuit Voltage (Voc)	36.48 V	
Short Circuit Current (Isc)	8.12 A	

*Measured at STC (Standard Test Conditions): 1000W/m^2, AM 1.5, 25°C


ZOMEWORKS
Chicago
SPORTS BAR
SCOTTSDALE, AZ

PV Modules

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https://www.youtube.com/watch?v=dd2sFN01JmM

http://www.starschool.org/


SQUARE D

Acknowledgements

- All Sponsors & ASU
- Iina Solutions & Mark Snyder Electric
- Michael Funk & Dan O'Neal

120W on 2 Axis Tracking with Battery and Garden lights

ASU ARIZONA STATE UNIVERSITY

Installations in Arizona

ASU Arizona State University

HOA (Prescott) Against Solar Installation

- *"We have denied locating the panels on the roof as requested…" - July 28, 2008. Scott Lee, Director, The Ranch at Prescott Architectural Committee*
- *"We were disappointed that you intend to proceed with the installation of solar roof panels." -- August 23, 2008. Alan Henrickson.*
- *"Further…solar panels have been prohibited and a 'clean roof' policy has been in effect to enhance the upscale environmental aesthetics and property values in this…community…. Unfortunately, state and federal laws now trump CC&R's…. (Another example of intrusive un-checked governmental regulations gone amok.)"*

  -- Bernard and Gerladine Cygan, neighbo

"Big Solar" and its Land Requirements

- The Bureau of Land Management has received applications for more than 130 projects in the desert Southwest that could occupy more than 1 million acres of land.
- A million acres is more than 1,500 square miles.
- If all these projects were built they could supply enough electricity to fuel 20 million homes.

Source: **Fighting Big Solar, Environmentalists clash over paving the desert in order to save the planet . Ronald Bailey, August 12, 2008. http://www.reason.com/news/show/128044.html**

Opposition to “Big Solar”

- **The California-based Alliance for Responsible Energy Policy argues that the push for Big Solar promotes the "permanent destruction of hundreds of thousands of acres of pristine public lands designated for multi-purpose use that belong to the people."**
- **The San Diego-based Desert Protective Council also opposes the construction of a high voltage power line that San Diego Gas & Electric says it needs to transmit renewable power from a solar generation project planned for California's Imperial Valley.**

Source: **Fighting Big Solar, Environmentalists clash over paving the desert in order to save the planet . Ronald Bailey, August 12, 2008. http://www.reason.com/news/show/128044.html**

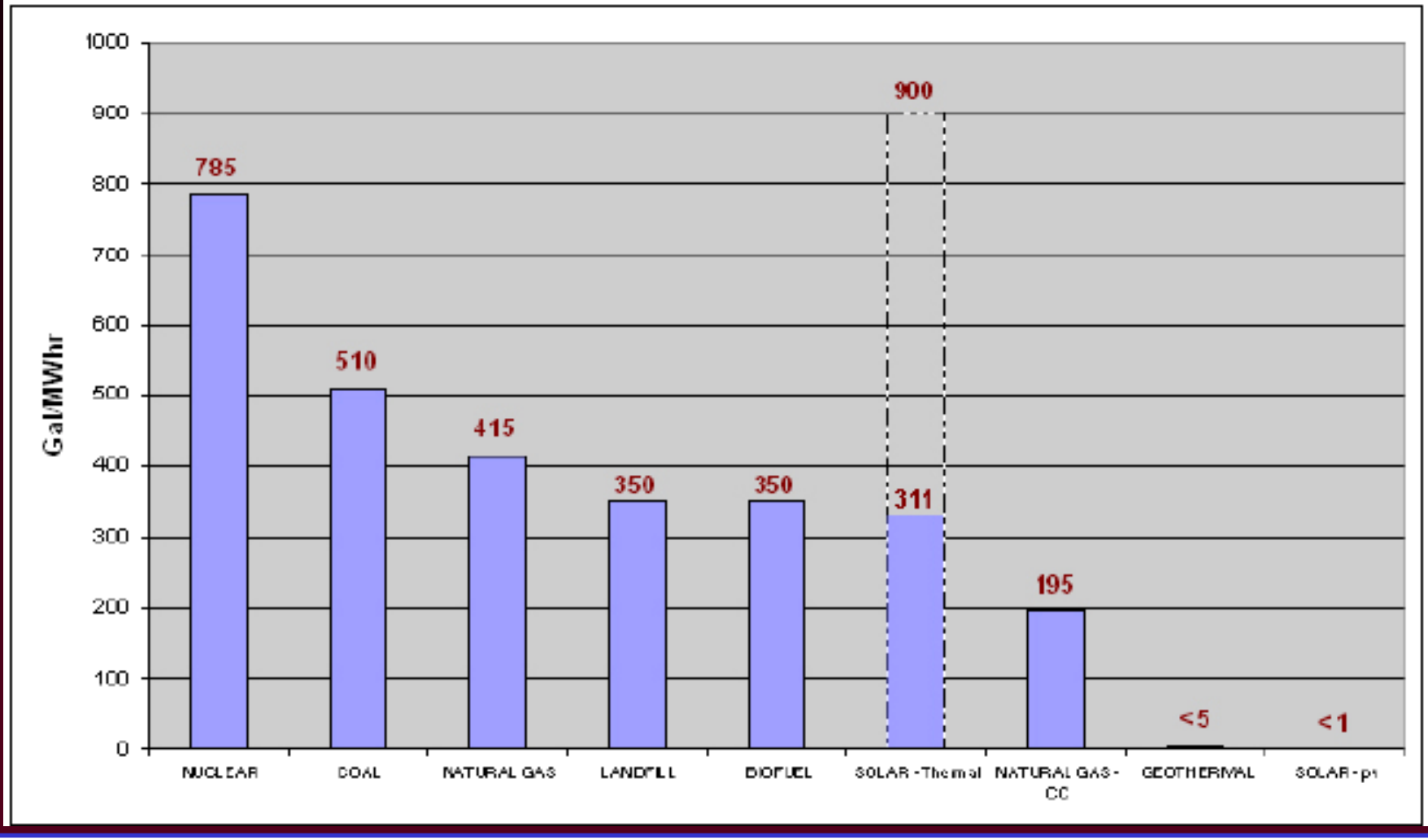
Solar Projects Draws New Opposition – The New York Times

September 24, 2008, on page SPG2 of the New York edition

Central Receiver in Mojave Desert

CSP southwest of Las Vegas

Solar Water Requirement



Source: M.J. Pasqualetti and Scott Kelly, “The Water Costs of Energy in Arizona”, executive summary, Arizona Water Institute

Solar Power at Nuclear Plant

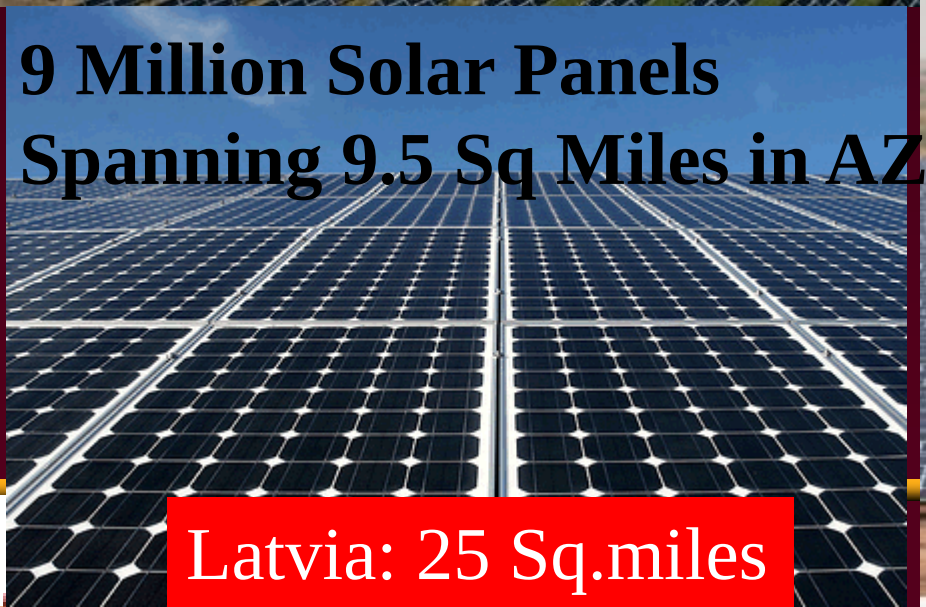
3.9 MW installed at decommissioned Rancho Seco nuclear generating plant SE of Sacramento

CSP at Prison north of Phoenix

Solar Power at Coal Plant

World's Largest Solar Farms

9 Million Solar Panels
Spanning 9.5 Sq Miles in AZ



Latvia: 25 Sq.miles

600 MW

How high can the Solar PVs be?

Highest elevated solar PV flat panel array in the world, topping off at 737 feet above the ground

The new PV installation atop Deutsche Bank's U.S. headquarters in New York City

International Space Station to Receive Solar-Powered Cargo

Whatever posturing or politicking might go on here at ground level, the ISS stands as a beacon of community between the world's spacefaring nations.

Wind Power Fever

World's Largest Wind Turbine

The Vestas V164 has a

- **Rated capacity: 8.0 MW**
- **Overall height: 220 m (722 ft)**
- **Diameter of 164 m (538 ft)**

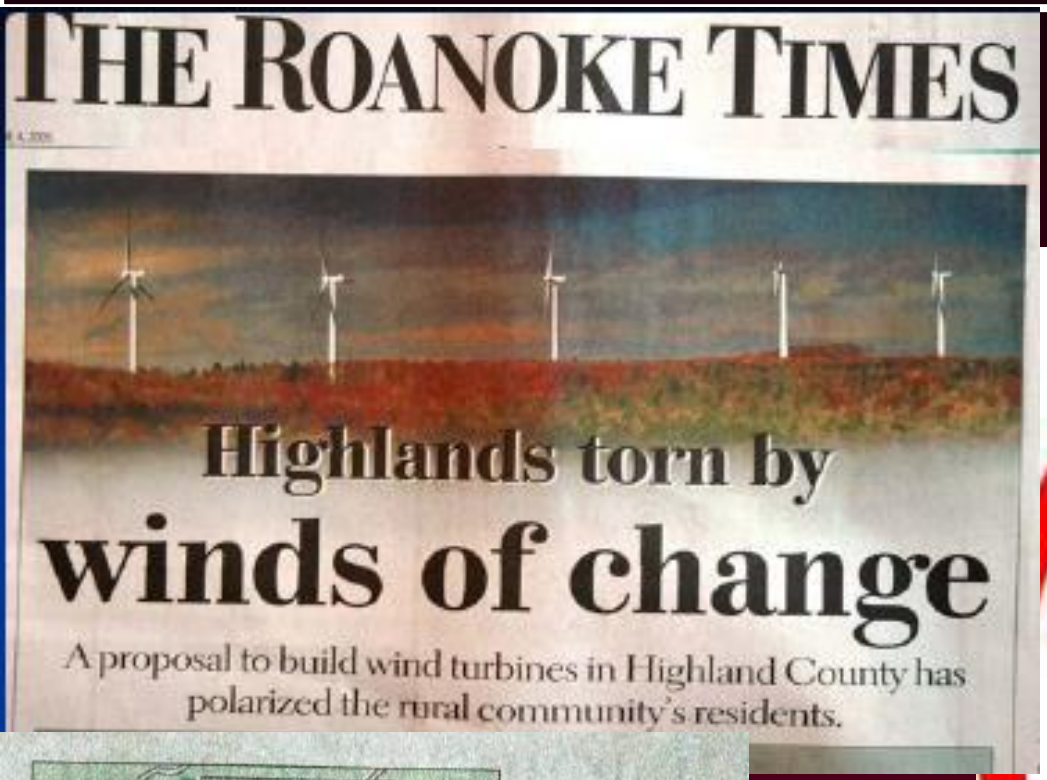
At least five companies are working on the development of a 10 MW turbine.

https://www.youtube.com/watch?v=9H1I2qQbR08

Opposition - Cape Wind

Cape Wind Opponent with Visual Simulation

Opposition – Highland, VA


THE ROANOKE TIMES

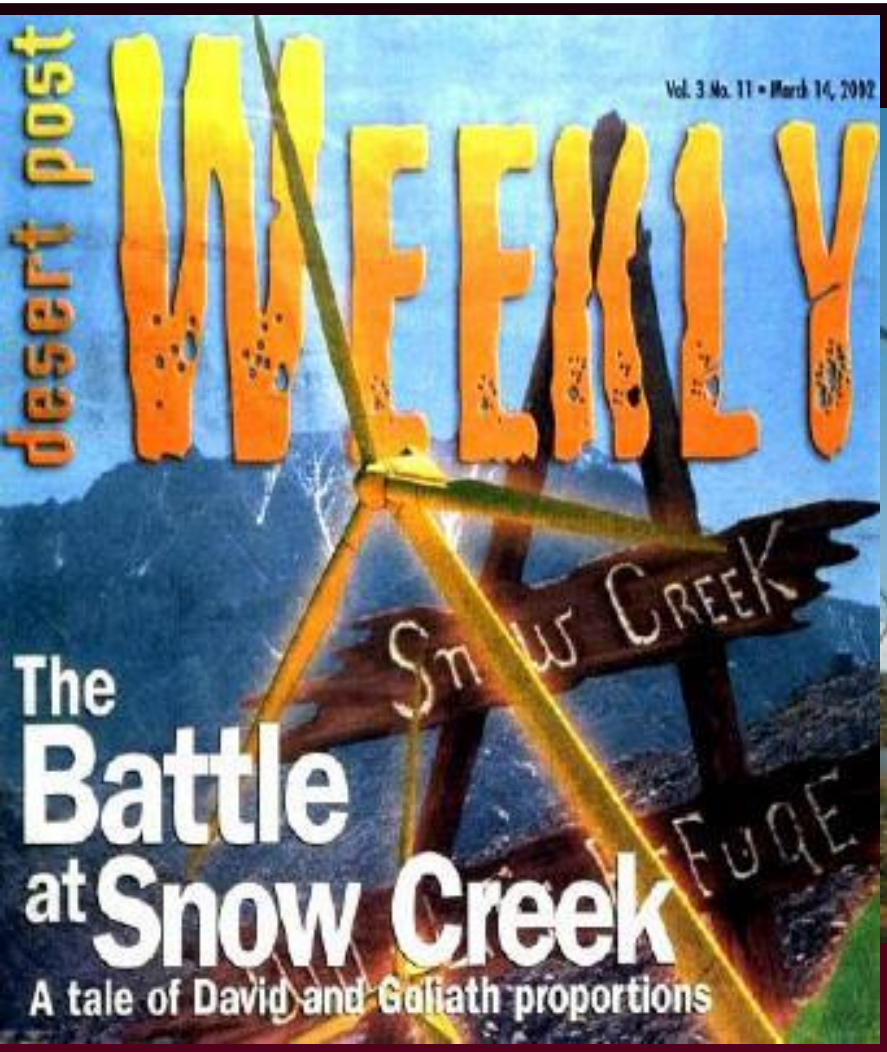
Highlands torn by winds of change

A proposal to build wind turbines in Highland County has polarized the rural community's residents.

June 2005

Visual Impacts – Palm Springs

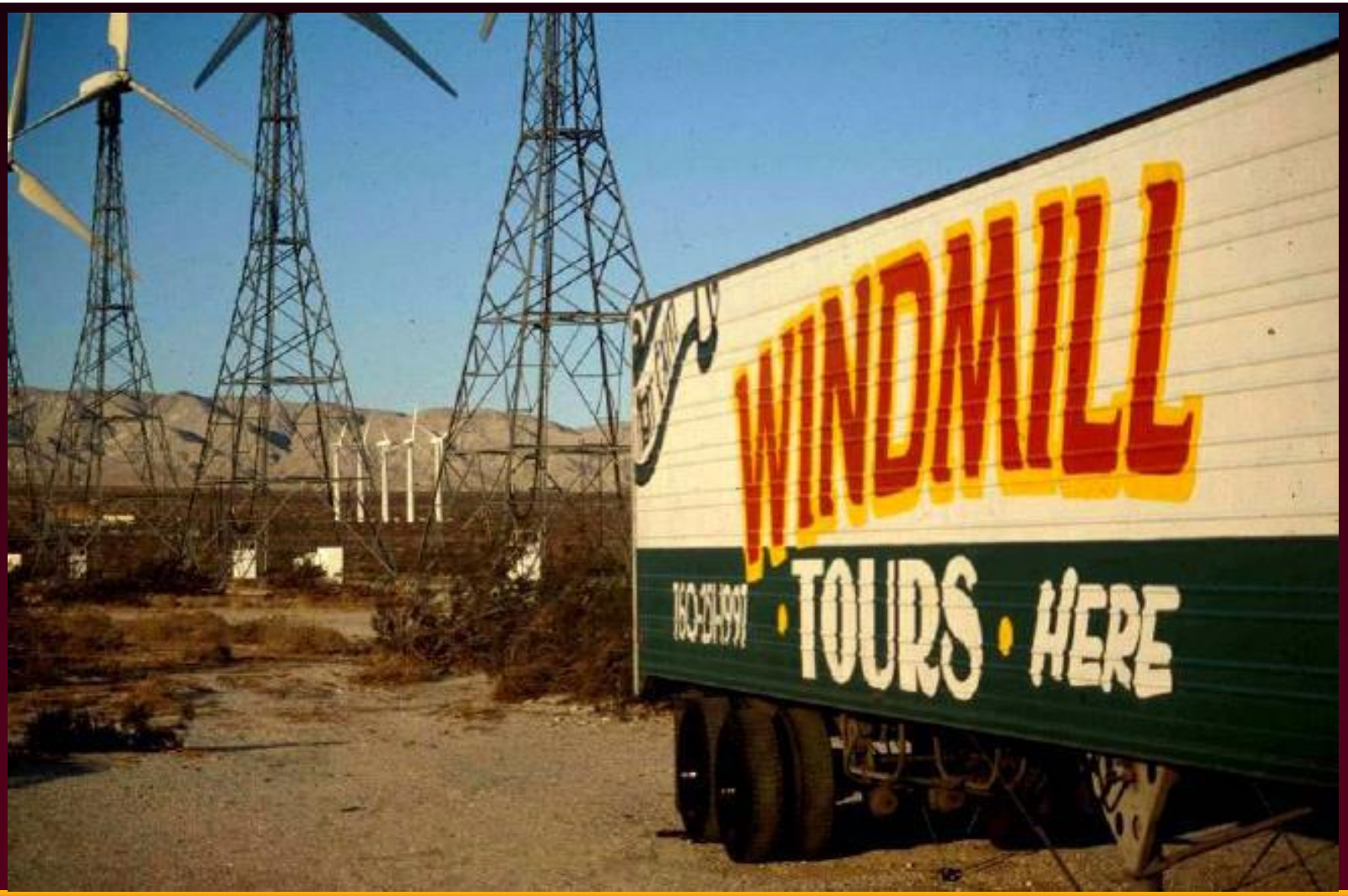
Opposition – Palm Springs



Palm Springs Today

Growing Acceptance of Wind Power – Palm Springs

Wind Farm Tours – Palm Springs

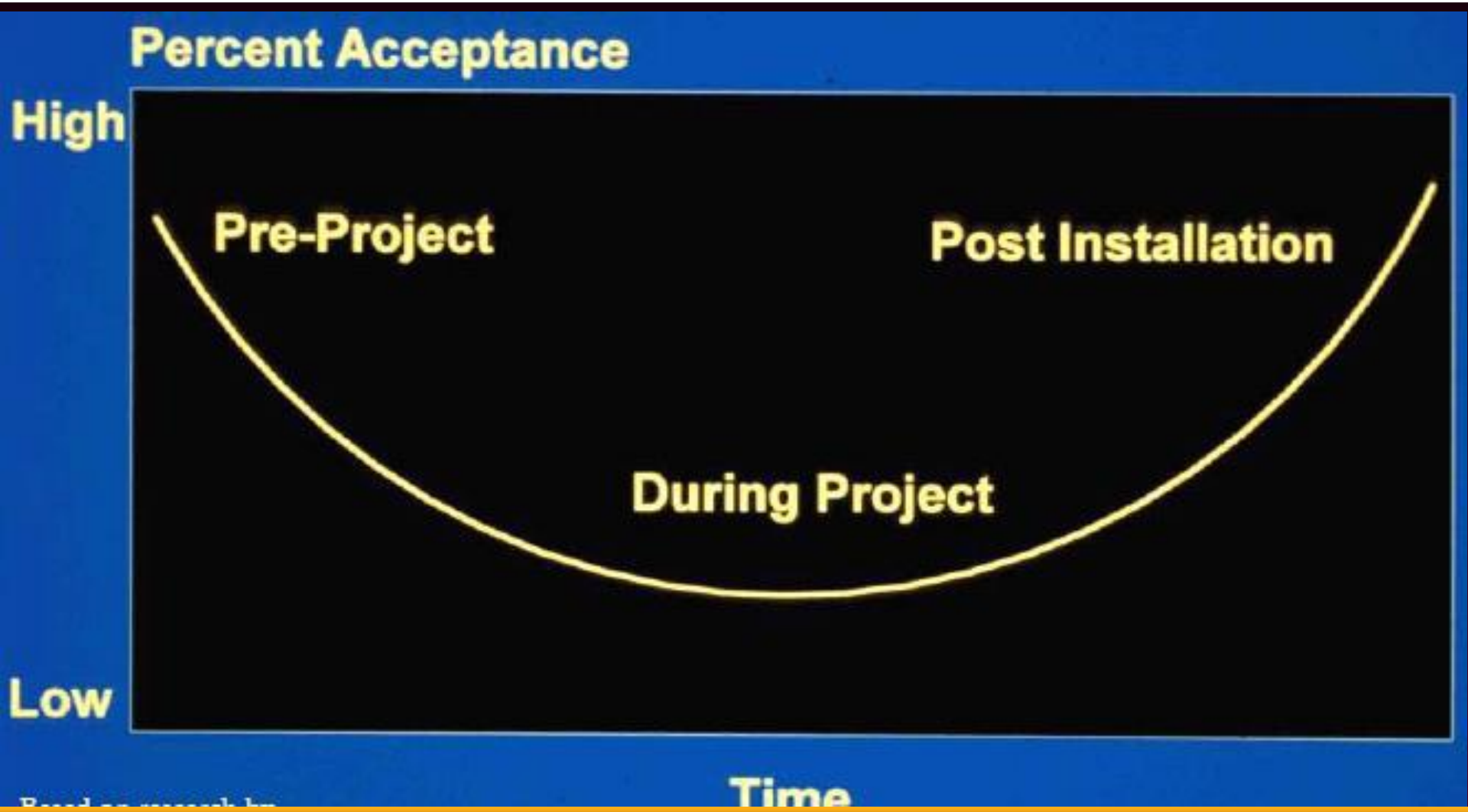


Positive Impact of Wind Farm – Palm Springs

Growing Acceptance – Palm Springs

Palm Springs Transformed !

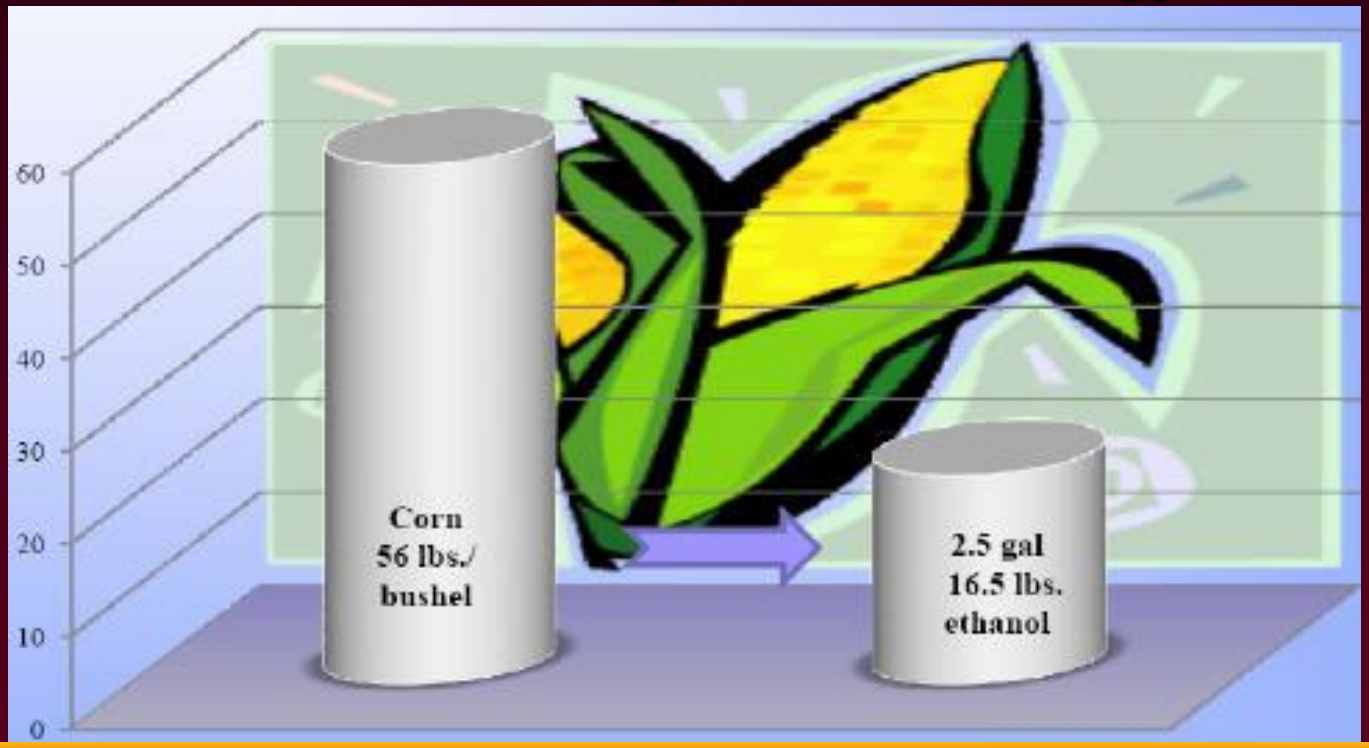
Sequence of Acceptance



Bio-Fuel Energy Systems

Kernel Yield

- 97 % of Corn Biomass is waster
- Only 30 % Kernel is Oil
- 1 Plant = 1.2 oz of Gas Equivalent Energy



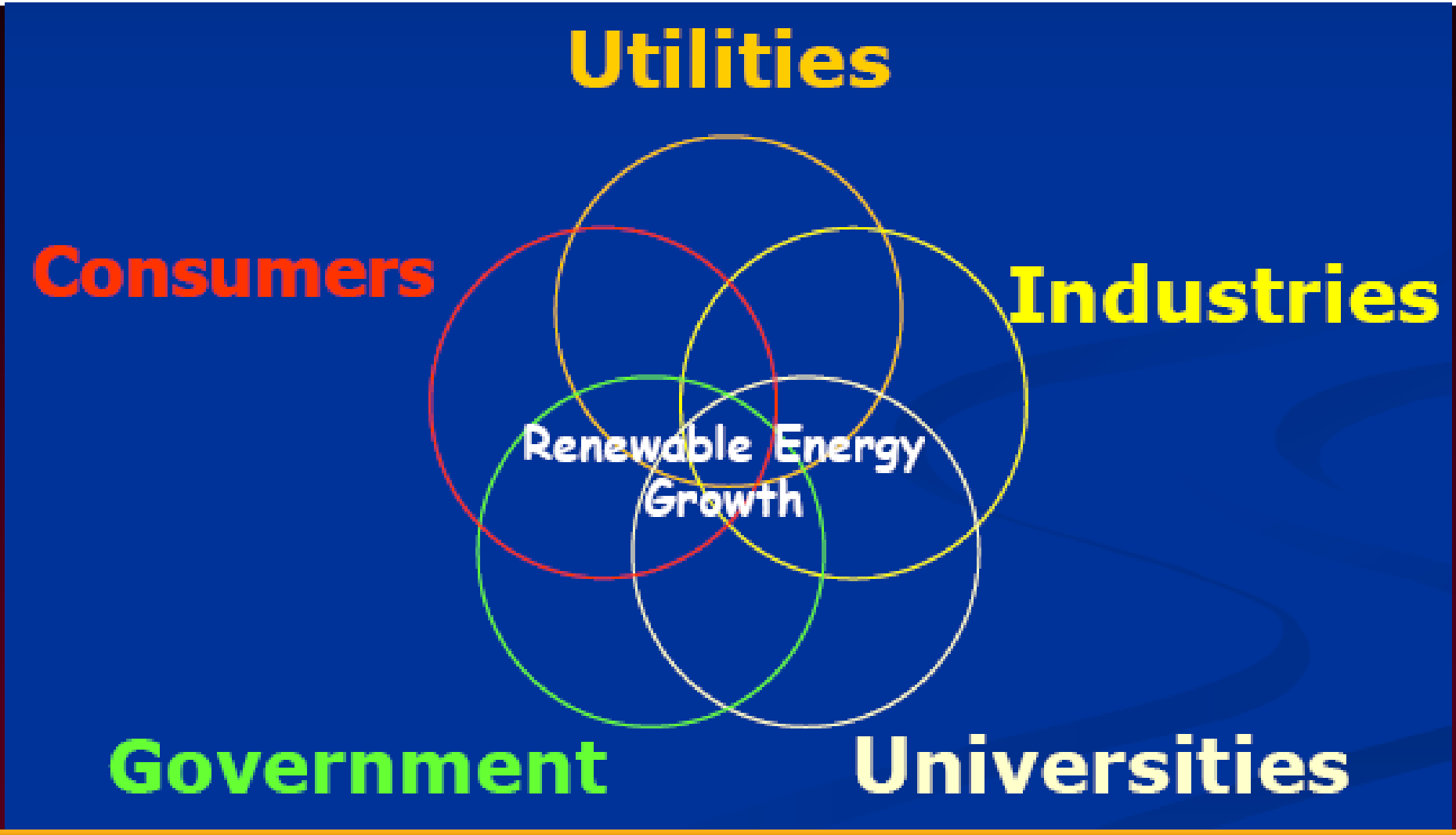
U.N. Report on Bio-Fuels

- Bio-fuel production threatens the availability of adequate food supplies by diverting land and other productive resources away from food crops.
- Bio-fuel crops require the best land, lots of water and environmental-damaging chemical fertilizers.

Why not Corn Ethanol?

Parameter	Corn Ethanol
1. Water footprint	Consumes 12 tons of water per gallon
2. Earth footprint	Requires 50% of US cropland for 35 B gallons
3. Biomass yield	Low – 98% of the biomass is waste
4. Energy fuels	Low – only 64% the energy of gasoline
5. Net energy yield	Zero
6. Sustainable	Not sustainable – water, land LNG and coal

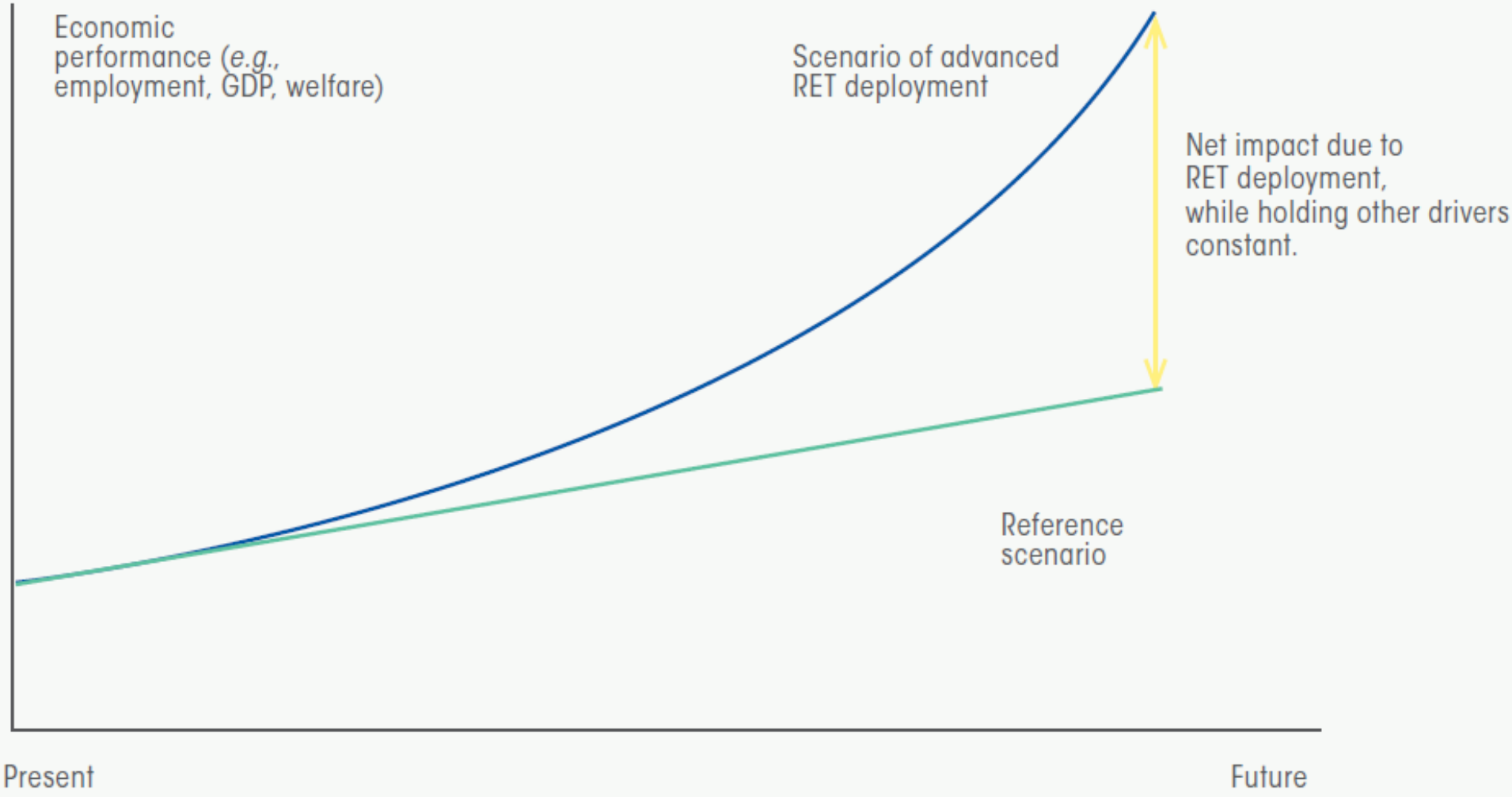
Work Collectively for the Common Goal



Typical Segments of RES Value Chain

Segment of Value Chain	Project Planning	Manufacturing	Installation	Grid Connnection	Operation and Maintenance	De-commissioning
Supporting Processes	Policy Making					
	Financial Services					
	Education					
	Research & Development					
	Consulting					

Net Impact of advanced RET Deployment



Take Away Message