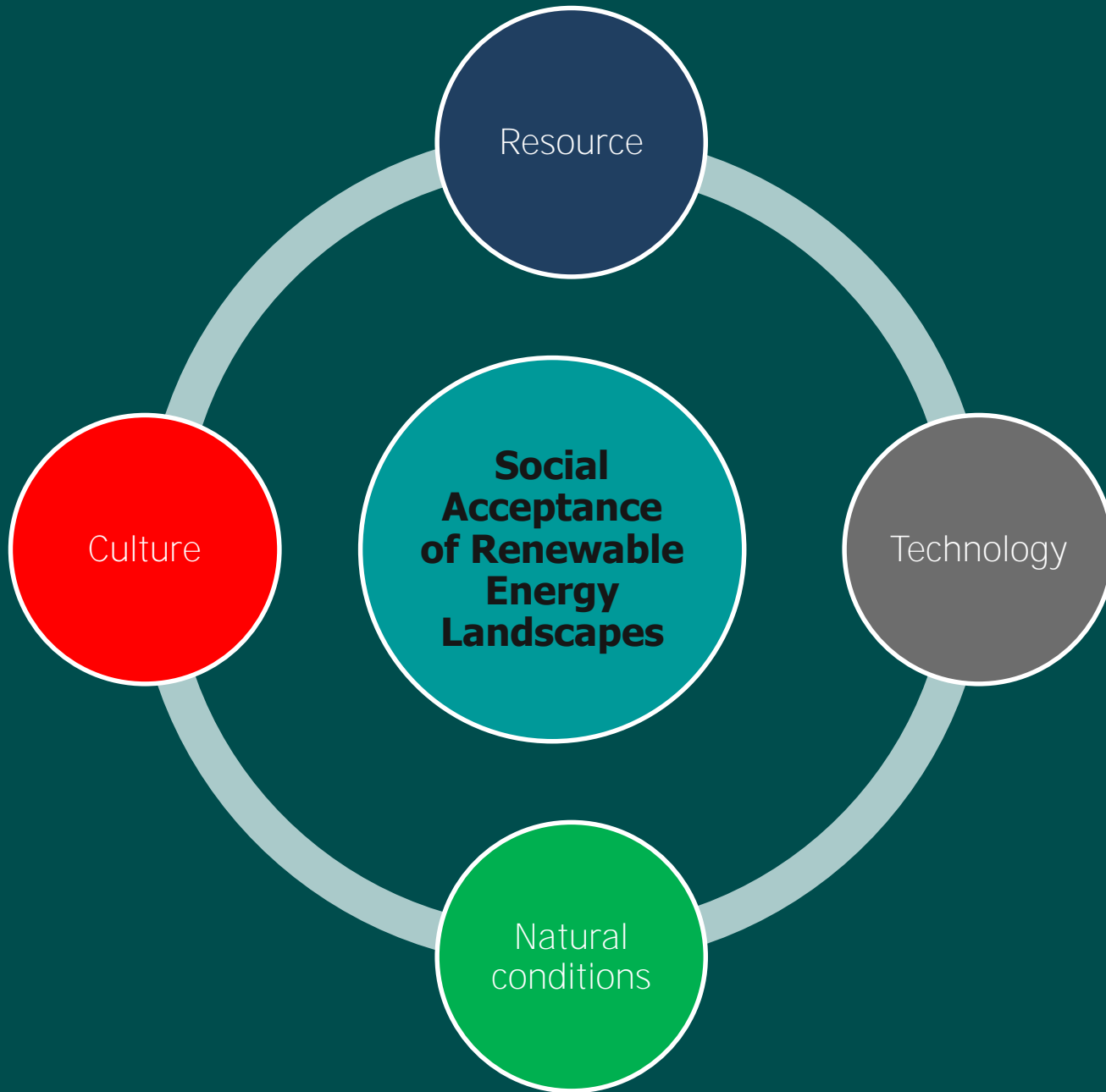




# Social Acceptance of Renewable Energy

Martin J. Pasqualetti, Professor, School of Geographical Sciences and Urban Planning  
Senior Sustainability Scientist, Global Institute of Sustainability  
Arizona State University  
[Pasqualetti@asu.edu](mailto:Pasqualetti@asu.edu)



Resource

Culture

**Social  
Acceptance  
of Renewable  
Energy  
Landscapes**

Technology

Natural  
conditions

# Resource

## Geothermal

- Site specific
- Low efficiency
- Large well field
- Thermal cycle
- Baseload power
- Cooling water

## Solar

- Site flexible
- Low energy density
- Stationary
- No emissions
- No water

## Wind

- Site specific
- Sensitive to diameter
- Sensitive to wind speed
- Movement
- No emissions
- No water

# Technology

## **Geothermal**

- Flash system
- Binary system
- Emission control
- Waste water

## **Solar**

- PV vs CSP
- Stationary
- Tracking
- Heliostat op
- Cell material
- Storage type

## **Wind**

- Height
- Diameter
- Blade design
- Finish

# Natural Conditions

- Topography
- Vegetation
- Climate
- Wildlife
- Water depth (wind)

# Culture

- History of settlement
- Density of population
- Land use and tenure
- Public perceptions
- Economic returns
- Quality of life
- Community values

# Geothermal



# Resistance to Geothermal: Recreation

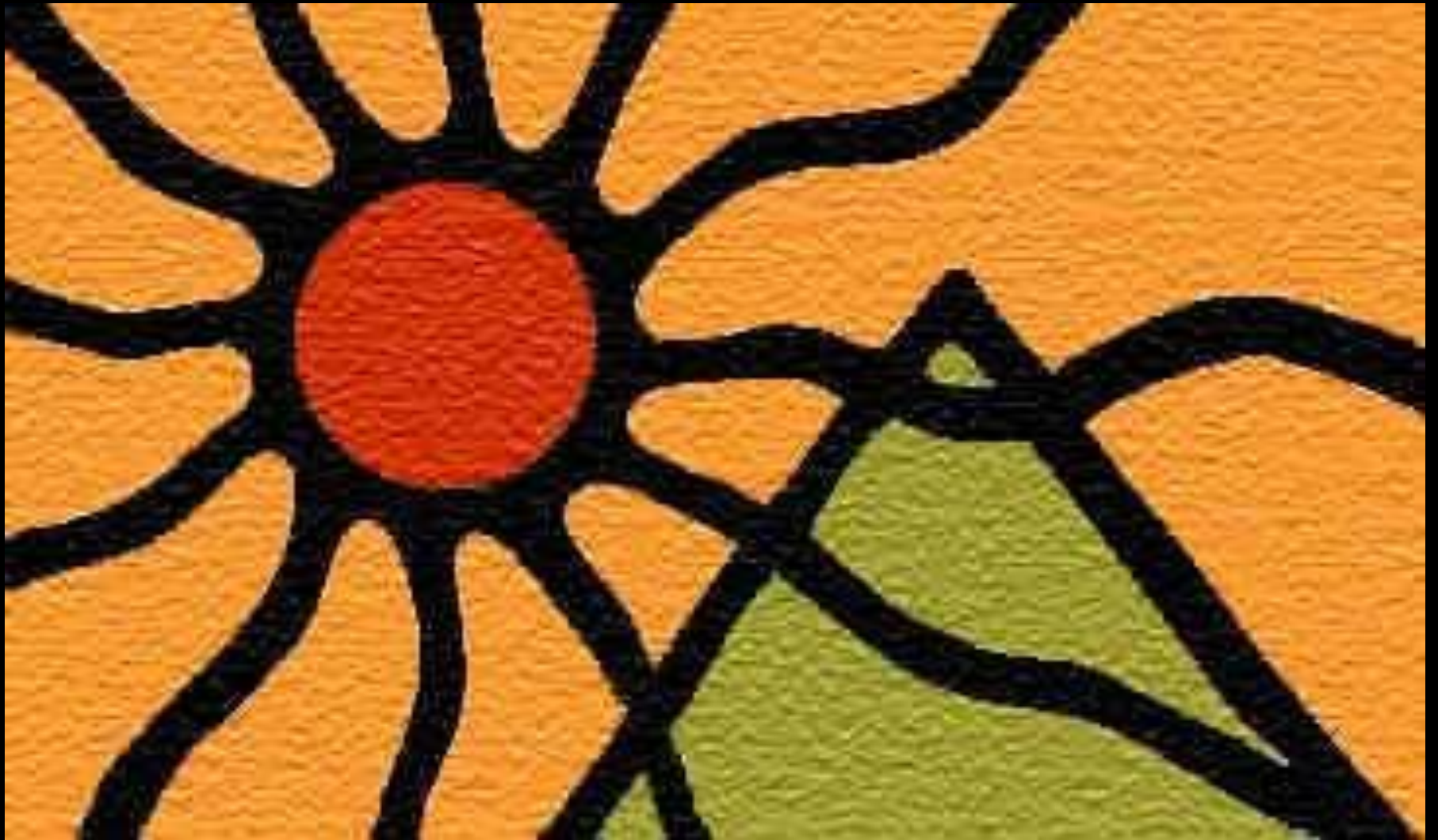




# Resistance to Geothermal: Agriculture



# Solar Energy



# The New York Times

## Solar Projects Draw New Opposition



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

# Claim: “Big Solar” uses land

- **The push for Big Solar promotes the permanent destruction of hundreds of thousands of acres**

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>

# “TRIBE SUES TO BLOCK DESERT SOLAR PROJECT; PROTESTERS GATHER IN OCOTILLO TO OPPOSE ONE OF WORLD'S LARGEST SOLAR PROJECTS”

— East County Magazine, Nov 17, 2010

“To me,  
genocid  
tribal w  
culture.

“All this  
electricity and  
who ge  
us.”



<http://www.eastcountymagazine.org/node/4801>





# WIND POWER IN VIEW

ENERGY LANDSCAPES IN A CROWDED WORLD

*martin j. pasqualetti, paul gipe, robert w. righter*



Canada



Australia



France



England





# Scots Expressing Love for Wind Power



Source: <http://www.auchencorth.org.uk/>. PEPA (Penicuik Environment Protection Association ) was formed by residents of Penicuik, Carlops and Howgate communities to protect Auchencorth Moss near Penicuik from EON's proposal to build 18 x 2.5 MW wind turbines

# Isle of Lewis, Scotland

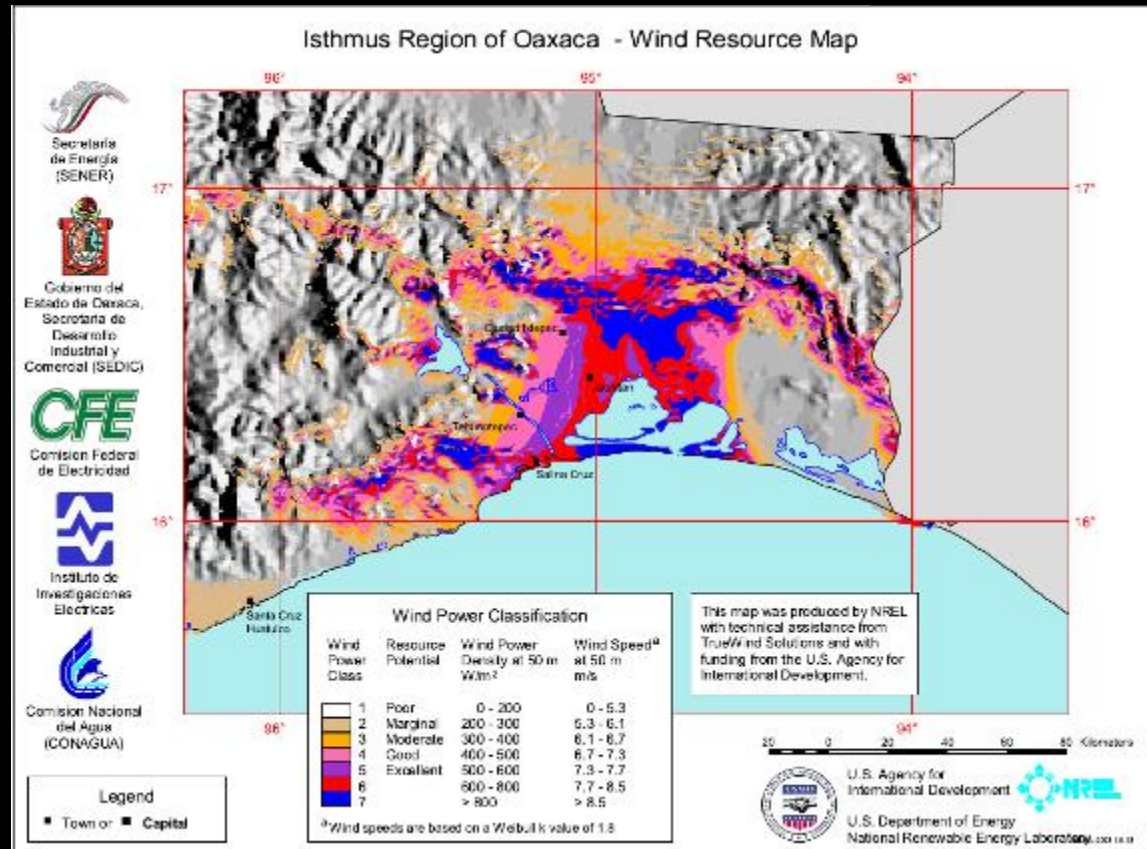
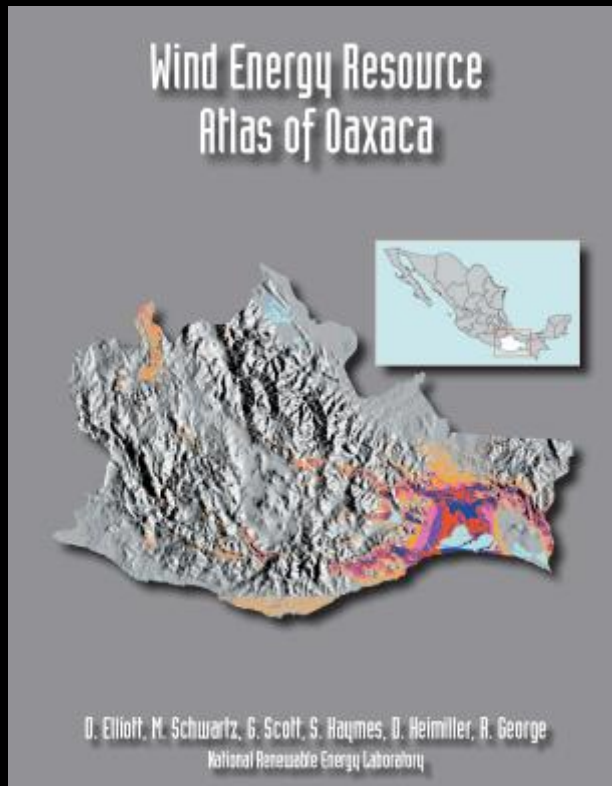


**NO  
WIND  
FACTORY**



**ON LEWIS**

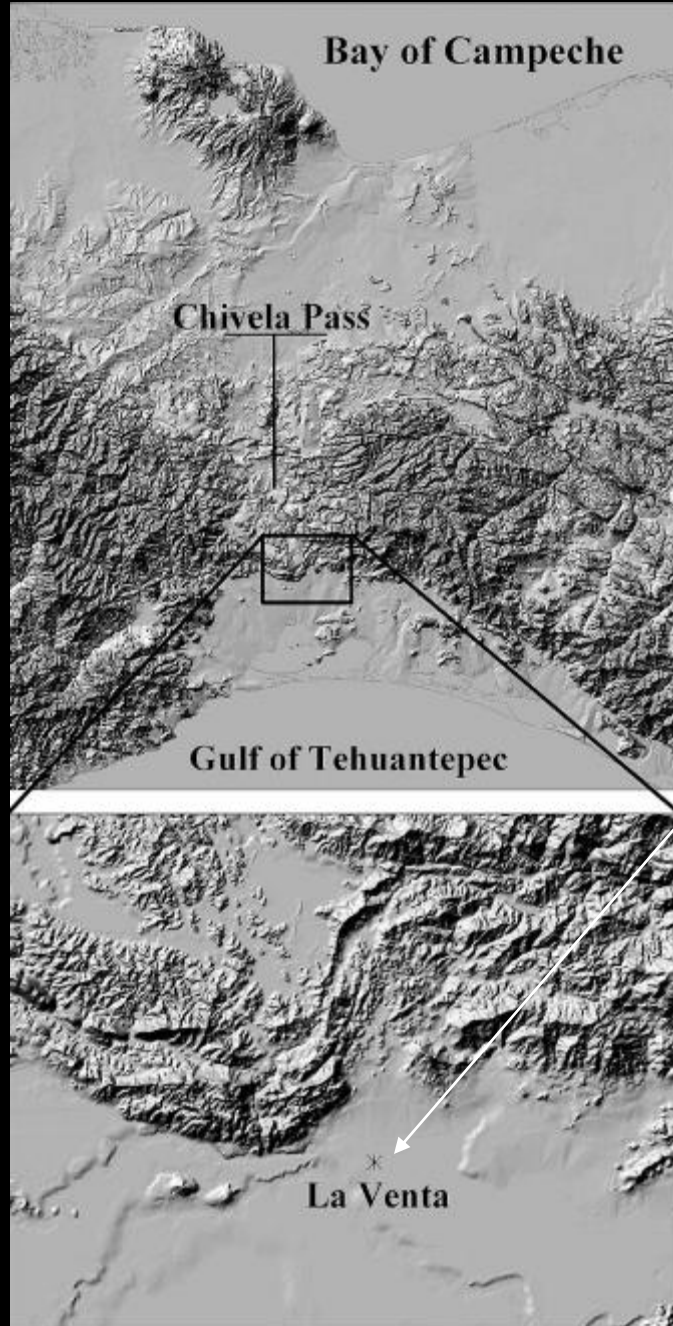
# Wind in Oaxaca, Mexico



Source: NREL/TP-500-34519

M.J. Pasqualetti. Opposing Wind Energy Landscapes: A Search for Common Cause. *Annals of Association of American Geographers*. July (forthcoming)

# Chivela Pass region and La Venta



Source: [http://www.yachana.org/reports/mex07/uploaded\\_images/IMG\\_9388-721217.JPG](http://www.yachana.org/reports/mex07/uploaded_images/IMG_9388-721217.JPG)

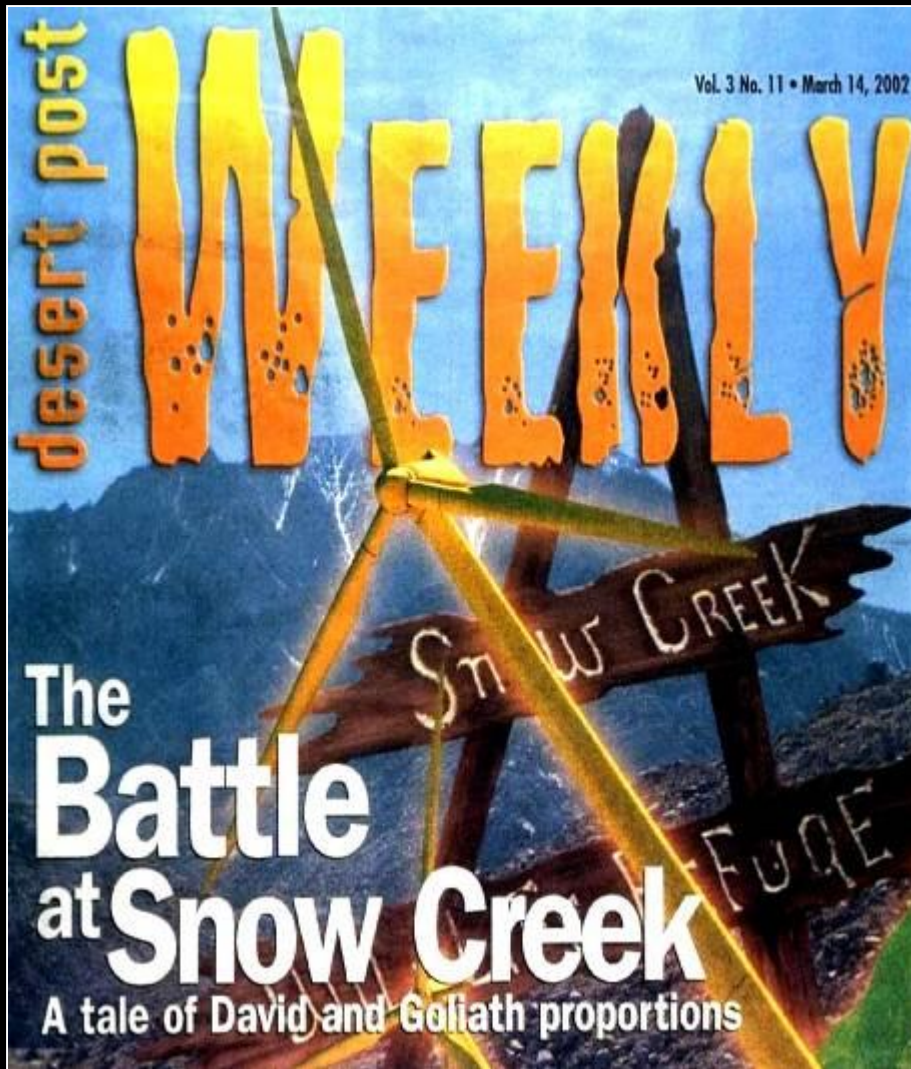
Studies show that La Venta has some of the best winds in the world, with constant steady winds of 9 to 14 meters per second while most places only have 2 to 5 mps.

# Resistance to Wind Projects in Oaxaca



Source: Assembly in Defense of Land and Territory. Protests in Juchitan against wind companies. <http://www.anarkismo.net/article/9779>

# Opposition - Palm Springs

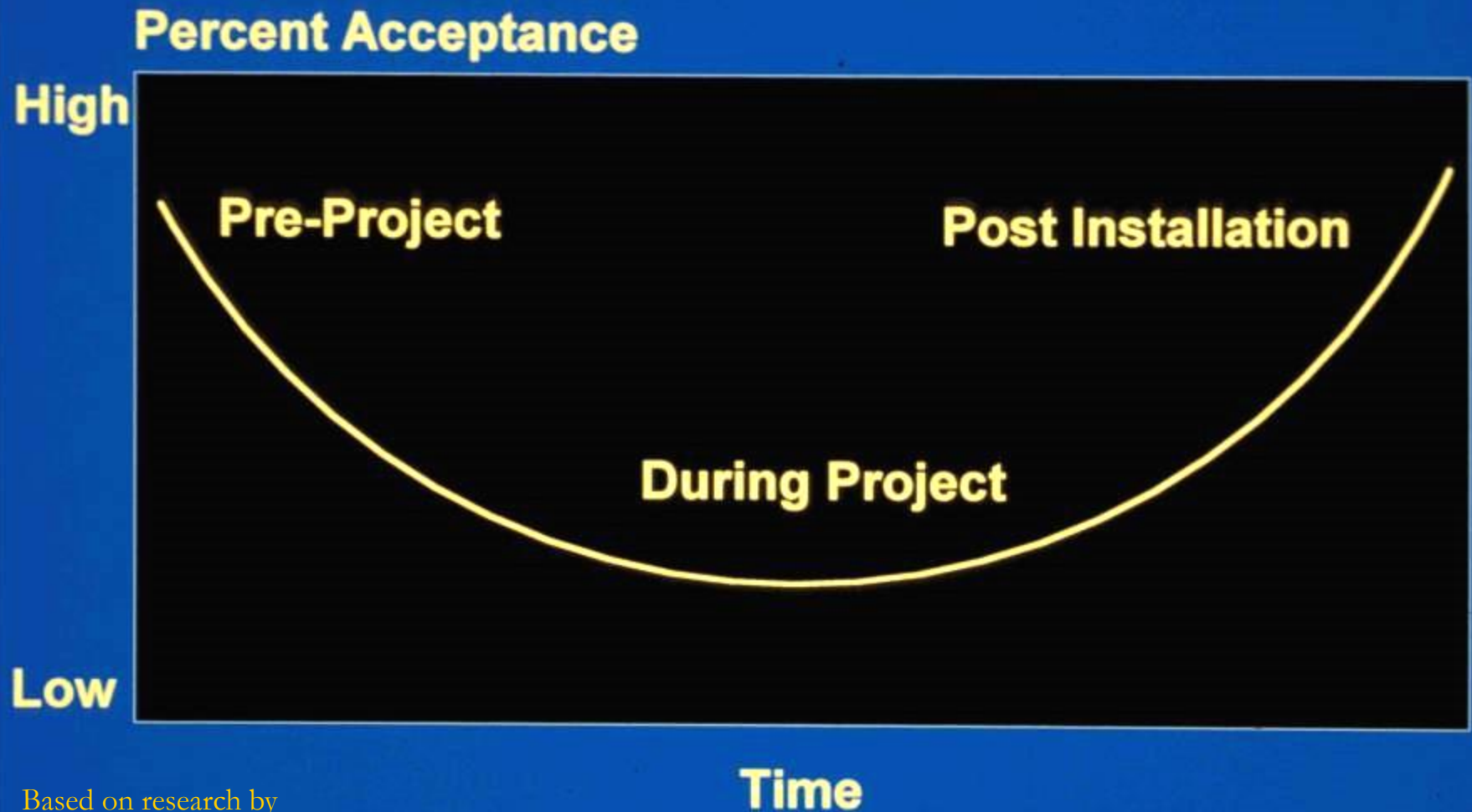


# Growing Acceptance



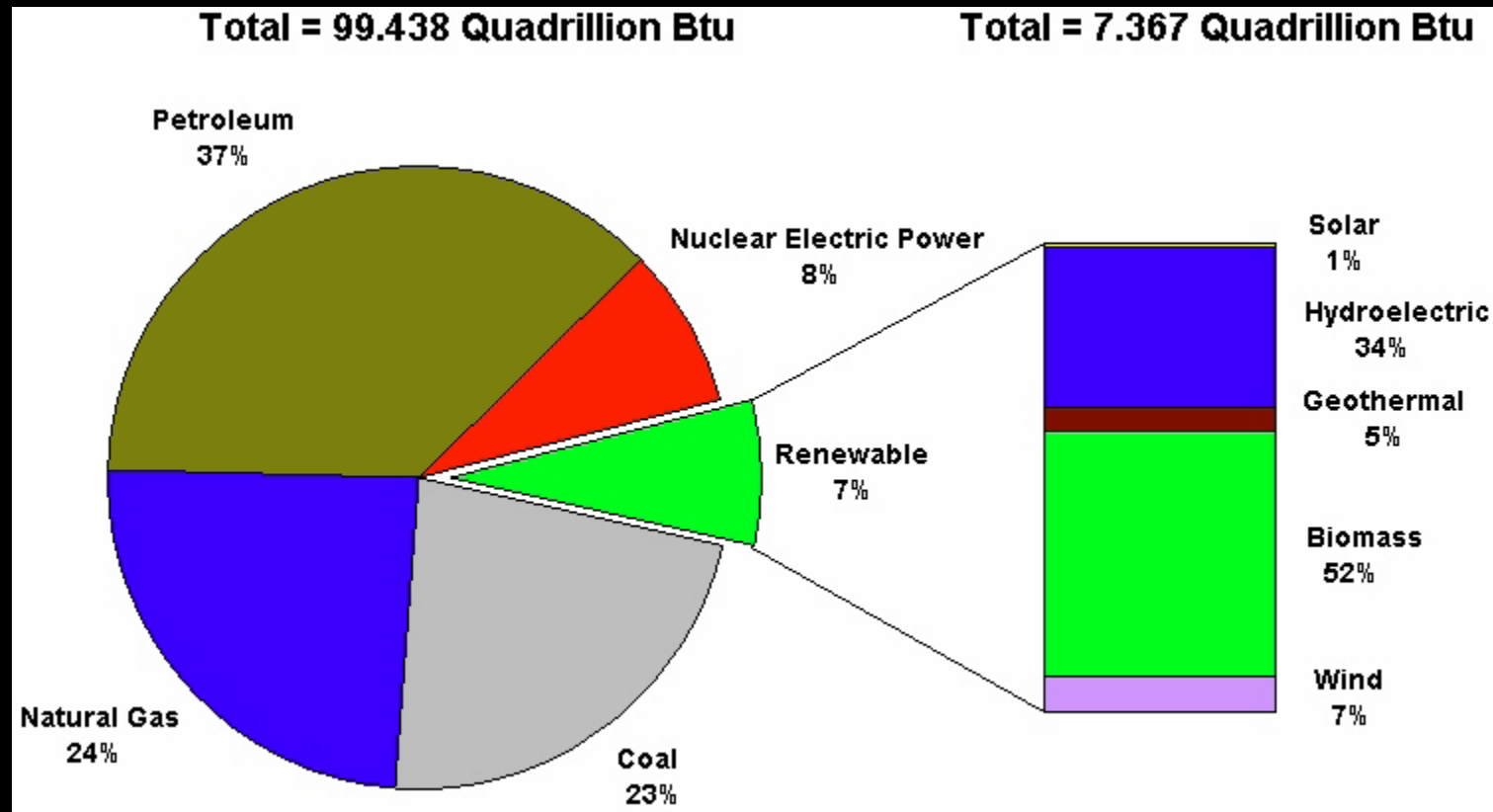


# Sequence of Acceptance



Based on research by  
Maarten Wolsink

# Renewable Energy is Minor at Present



Source: U.S. EIA [http://www.eia.gov/cneaf/solar.renewables/page/rea\\_data/rea.pdf](http://www.eia.gov/cneaf/solar.renewables/page/rea_data/rea.pdf)

# Moving the Needle

## Reality Check

- **Limited Penetration – RE is a small contributor**
- **Inertia - an existing system is already in place**
- **Profits – existing approach makes money**
- **Status quo – introducing RE suggest change**
- **Technology – conventional reserves are growing**
- **Population – people are everywhere**
- **Differences – Approaches cannot be the same**
- **Finite resources – conventional won't last forever**

# World Oil Production (History + Projections) (Barrels/day)

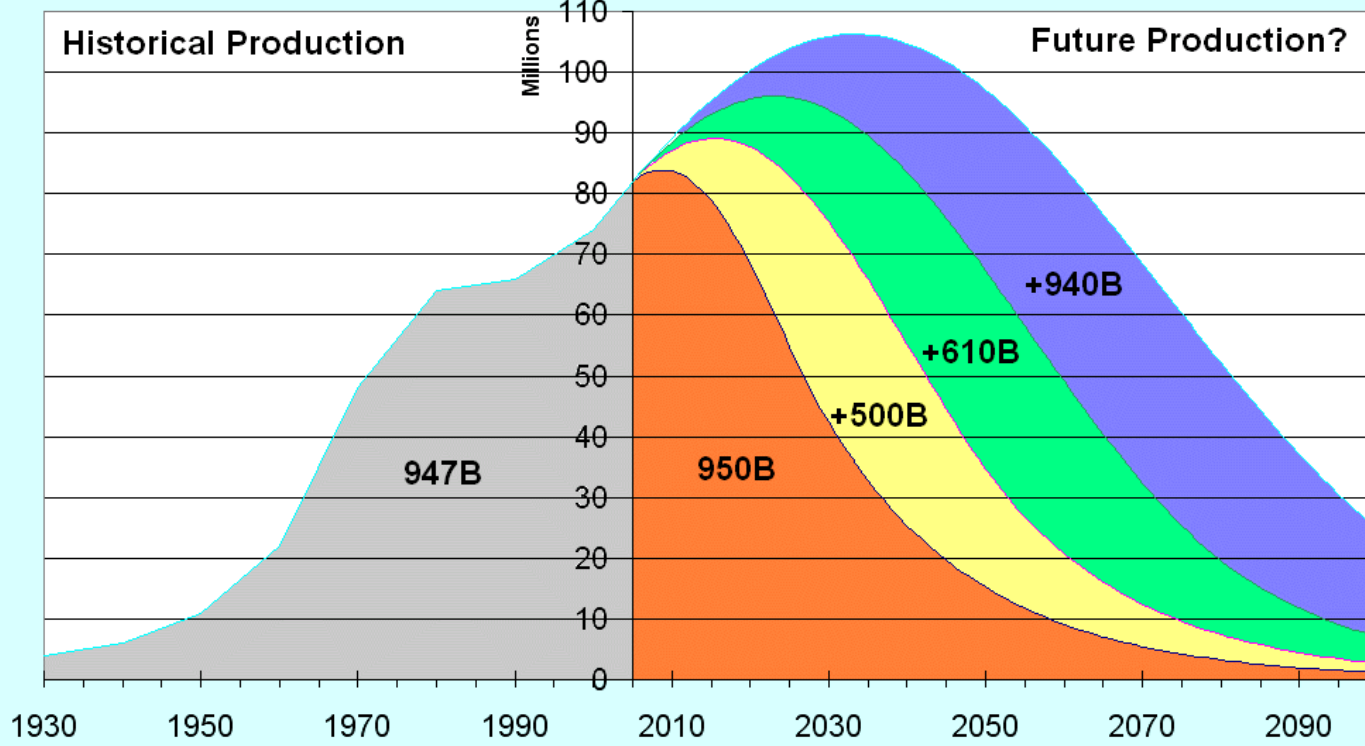
Peaks 2010-2035

World consumed ~960 Billion barrels: 1930-2004

~0.95, 1.45, 2.06, 2.95 trillion barrels remaining

Transition: 2% growth curve to 5% decay curve

- Campbell: 0.953Tb left, 2010 peak at 83mb/d
- Harper: 1.45tb left, 2015 peak at 89mb/d
- USGS 50% - 2.06tb left, 2024 peak at 97mb/d
- USGS 5%: 2.949tb left, 2033 peak at 106mb/d



Even the most optimistic estimates for future fossil fuels do not solve the problem

How Do We “Move the  
Needle” to a Renewable  
Energy Future?

# Moving the Needle

## Short and Long Term

- **Short-term**
  - **Avoid unnecessary conflicts**
  - **Make it profitable**
- **Long-term**
  - **Make it simple to accept and implement**
  - **Work to change policy (and policy-makers)**
  - **Remove competitive subsidies to conventional fuels**
  - **Educate** (e.g. stakeholders, policy makers, and the public)

# Moving the Needle

## Educate

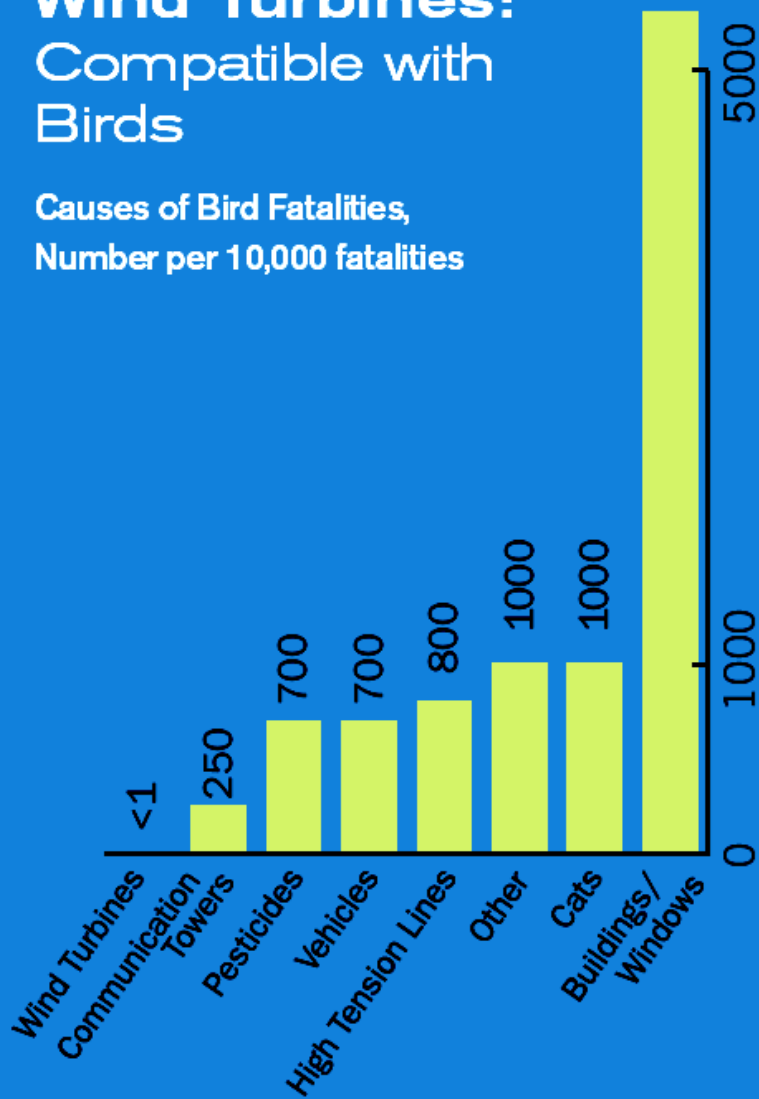


Saving the  
small  
family  
farm in  
Illinois.

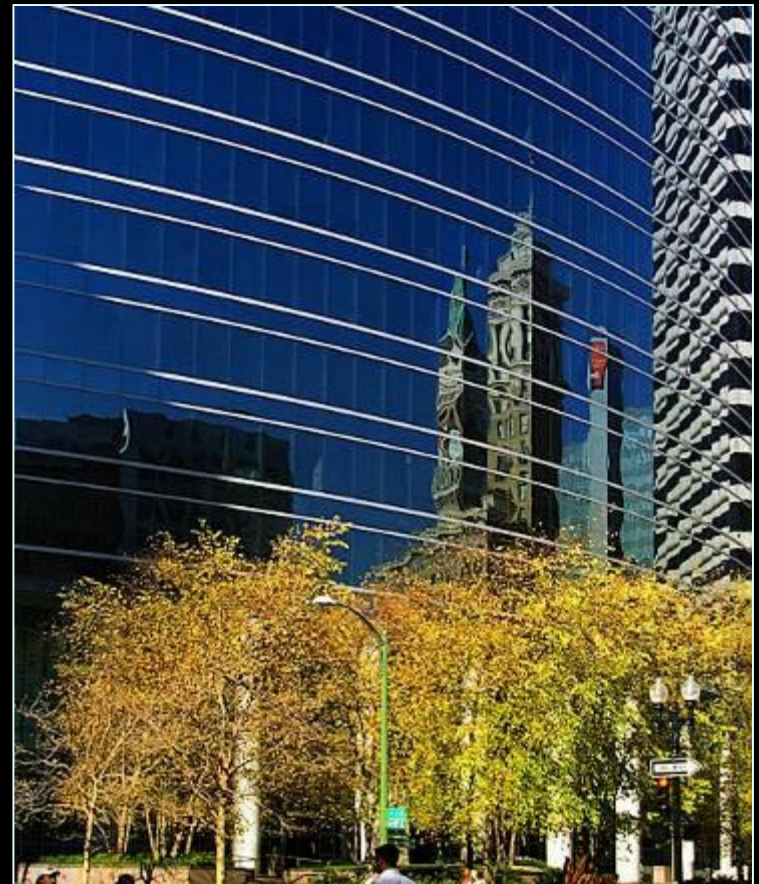
*An  
example  
of NIMBY  
becoming  
PIMBY*

# Wind Turbines: Compatible with Birds

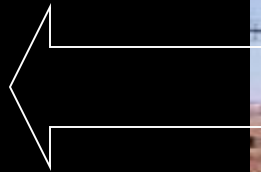
Causes of Bird Fatalities,  
Number per 10,000 fatalities



Data Sources: Erickson et al., 2002. Summary  
of Anthropogenic Causes of Bird Mortality.







For the entire fuel cycle, solar energy & coal use comparable amounts of land

# The growing costs of fossil fuels

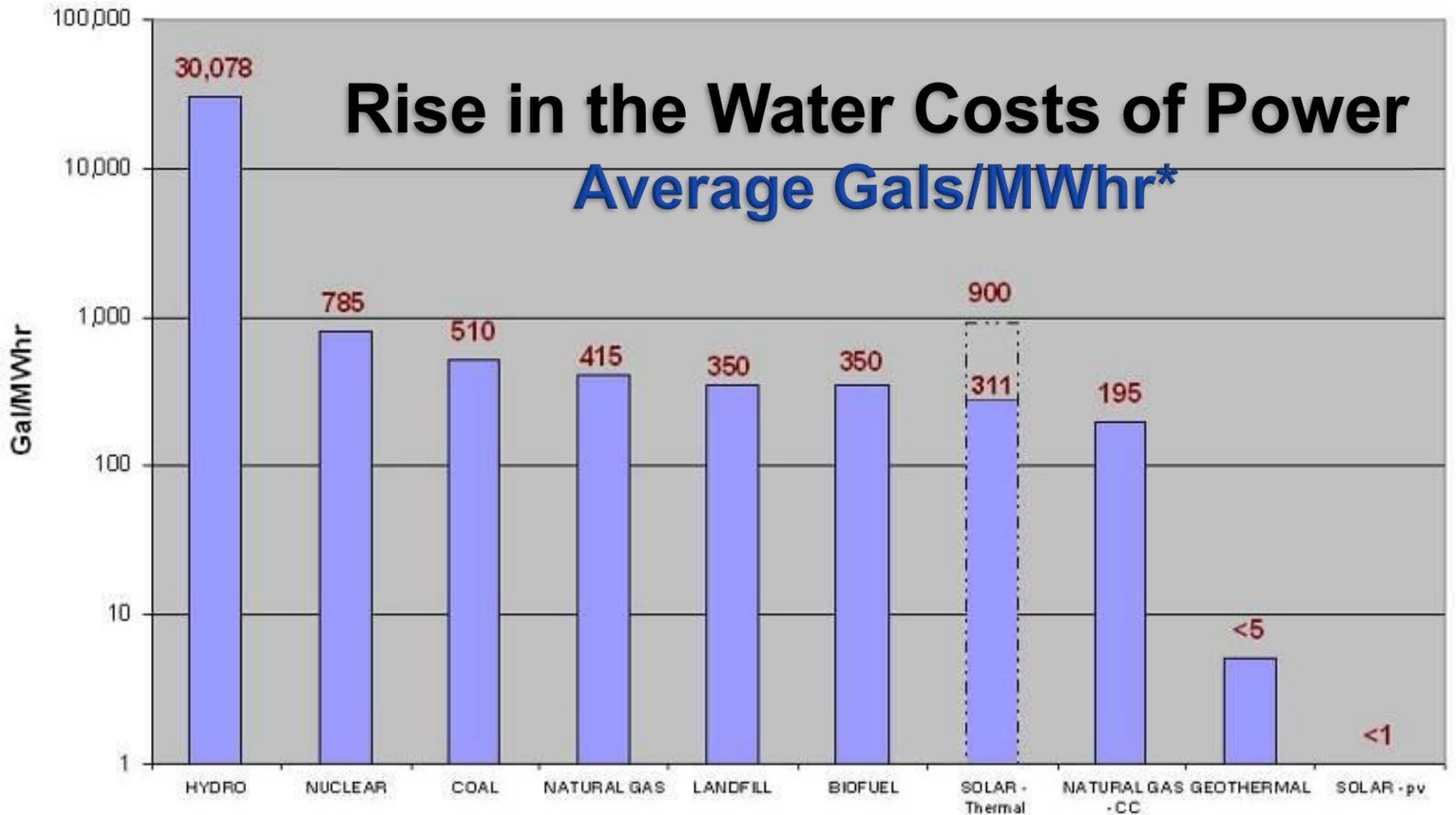


# Water Use in Arizona



# Rise in the Water Costs of Power

## Average Gals/MWhr\*



\* For Arizona power consumption. Note logarithmic scale. First-sale only.

Sources: M.J. Pasqualetti. The Water Bargain of Solar and Wind Energy. 2011. In *The Water-Energy Nexus in the Western United States*, ed by Douglas Kenney (in press); Christopher Scott and M.J. Pasqualetti. Energy and Water Resources Scarcity: Critical Infrastructure for Growth and Economic Development in Arizona and Sonora. *Natural Resources Journal*, 50 (3) : 645-682.

# Moving the Needle

## Motivate

- **Carrots**

- **Make it profitable**
- **Make it easier**
- **Make it acceptable**

- **Sticks**

- **Make polluters pay**
- **Publicize failures and costs**

Moving the Needle

Mitigate

**Understand problems and offer solutions**

Best Management Practices for  
**Reducing Visual Impacts of  
Renewable Energy Facilities**  
on BLM-Administered Lands

First Edition - 2013



[https://webapps.anl.gov/file\\_transfer/downloads?guid=c652d53e-2a6c-5a54-b606-a3a4caddec2f](https://webapps.anl.gov/file_transfer/downloads?guid=c652d53e-2a6c-5a54-b606-a3a4caddec2f)

Web site good 3-10 Oct 2013

From this....

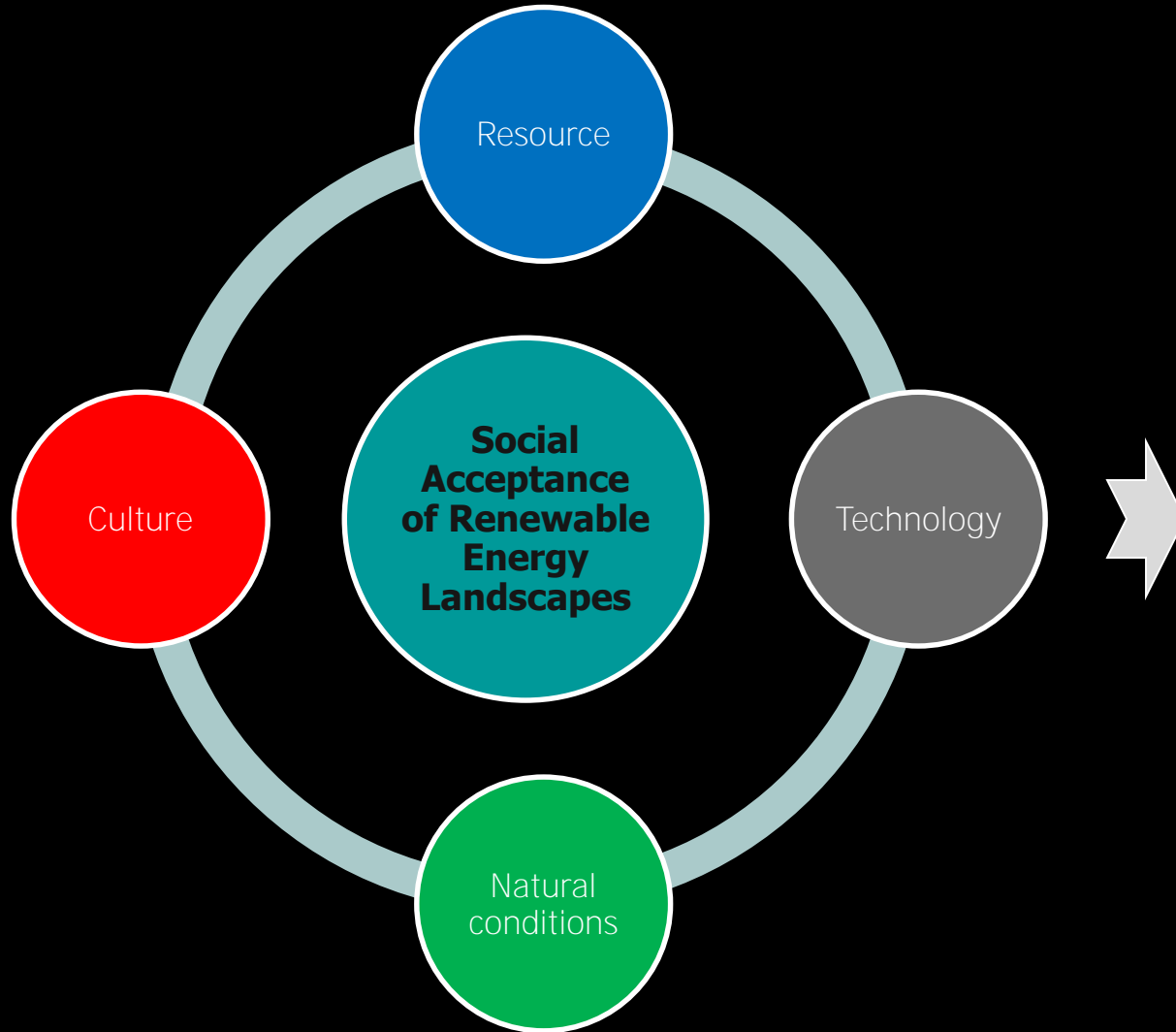




....to this



# The Future of Renewable Energy Will Require Recognizing that.....



Energy is a social issue  
with a technical component,  
not the other way around