



National Renewable Energy Laboratory
Innovation for Our Energy Future

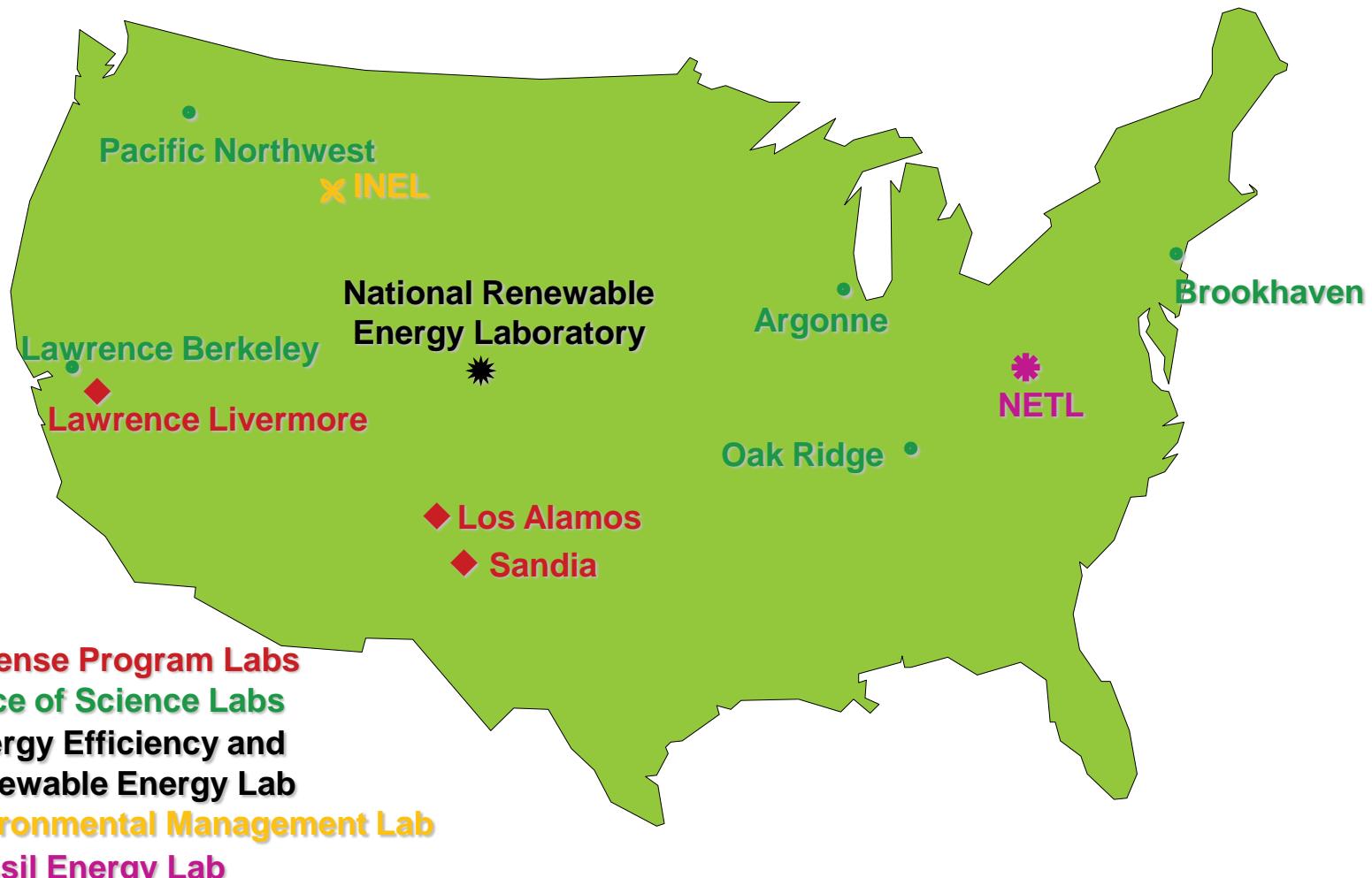


Tribal Energy Program 2009 Annual Review

Roger Taylor

November 16-20, 2009

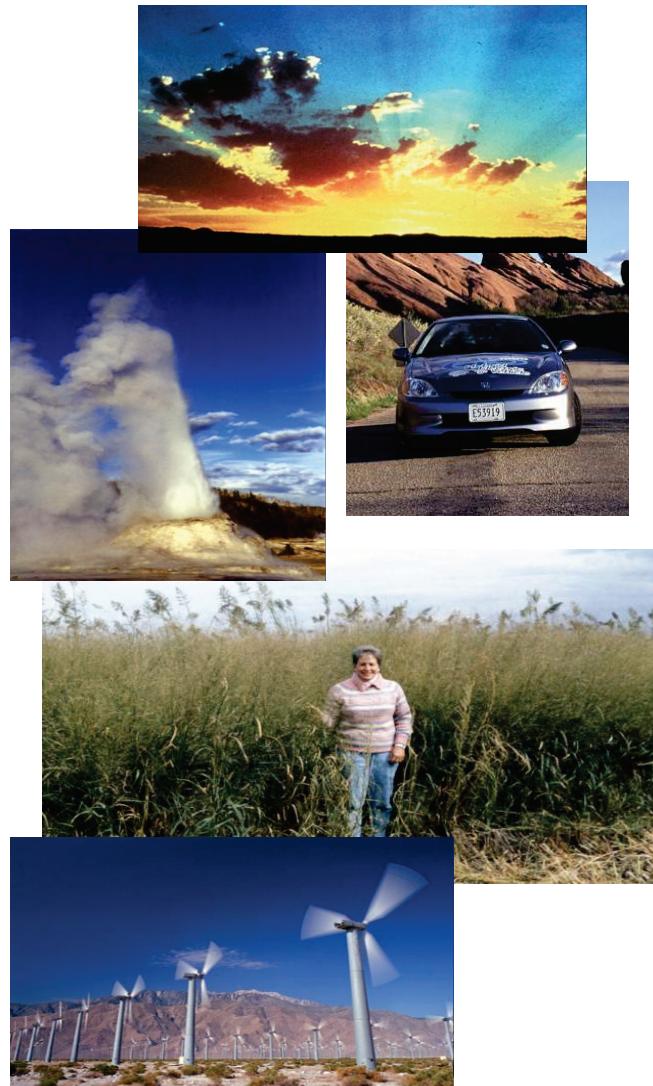
Major DOE National Laboratories



Major NREL Technology & Market Thrusts

Supply Side

Wind Energy
Solar
Photovoltaics
Concentrating Solar
Solar Buildings
Bio-Energy
Power
Biofuels
Geothermal Energy
Hydrogen
Superconductivity
Grid Integration



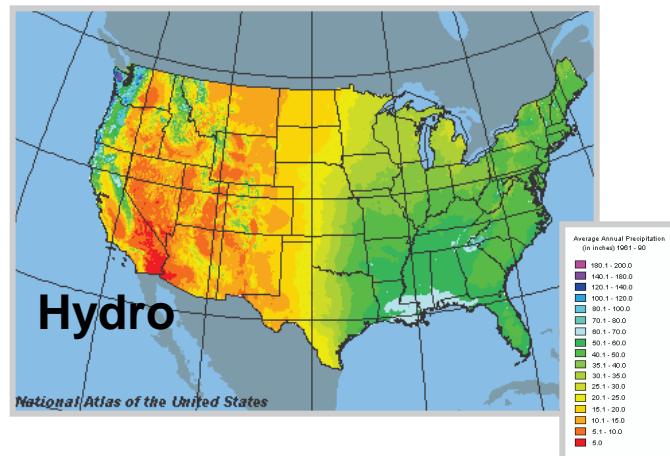
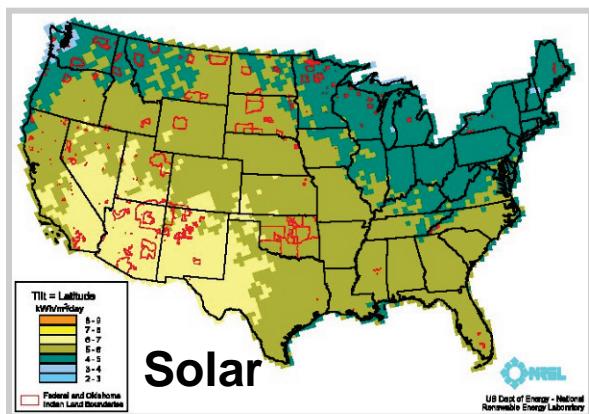
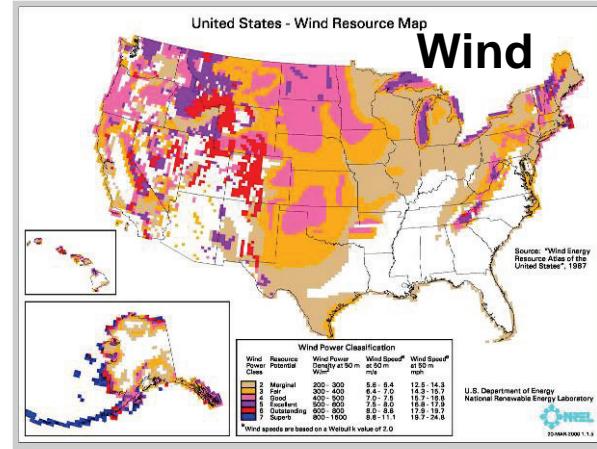
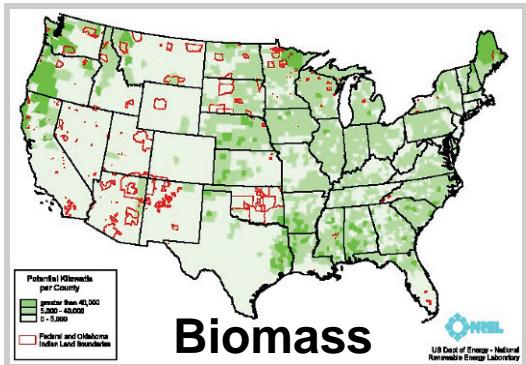
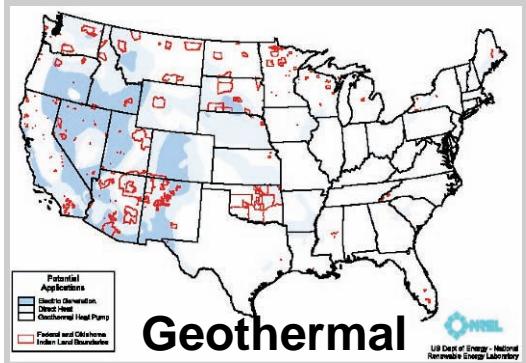
Demand Side

Transportation
Fuels Utilization
Buildings Energy
Technology

Cross Cutting

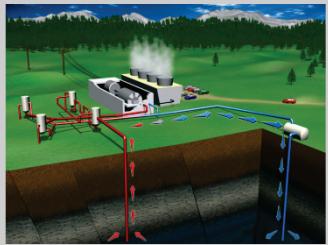
Basic Energy Science
Strategic Energy Analysis
International Programs
Integrated Deployment
FEMP
State & Local Initiatives
Tribal Energy Program

Renewable Resource Options

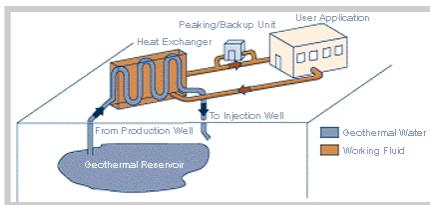


Renewable Technology Options

Power



Direct Use



Remote Homes



CS Power & Heat



Biomass Heat, Power & Fuels



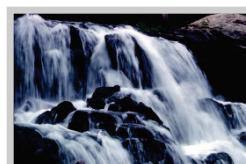
Diesel Hybrids



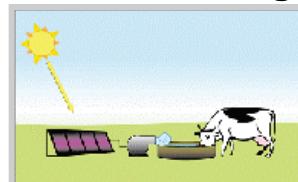
Small Wind



Big Wind



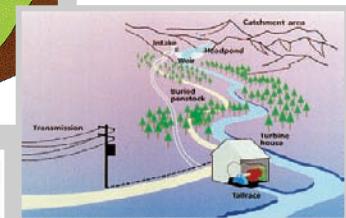
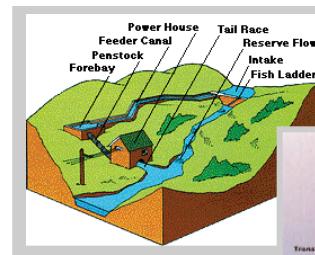
Stock Watering



Buildings



Small Hydro



Energy Efficiency



Efficient Lighting



If every American changed out 5 lights, we'd save \$6 billion/year and the equivalent of 21 power plants.

Energy Star Appliances

Refrigerators – Half as much energy



Clothes Washers – Save up to \$110 per year

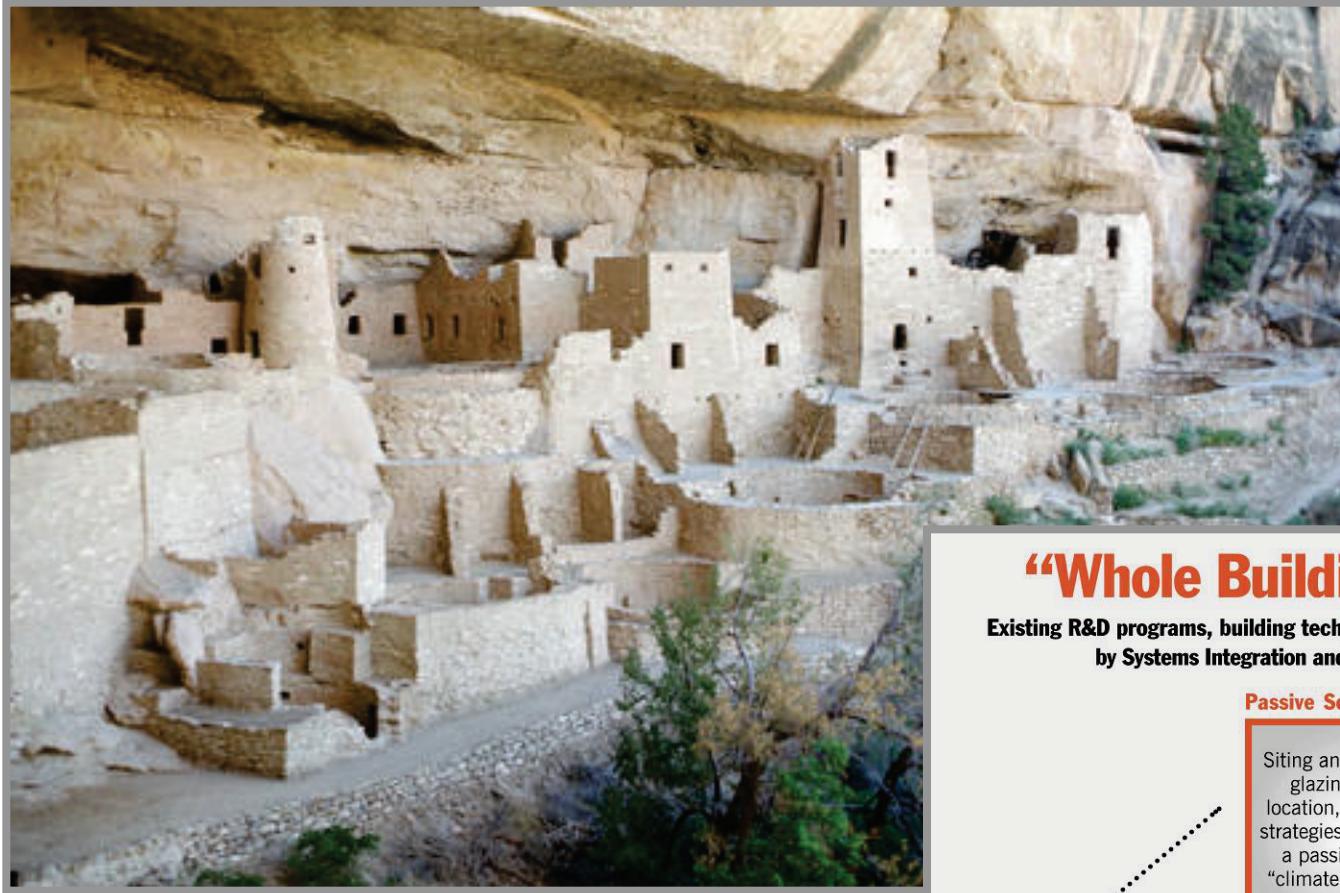


Oil & Gas Boilers – Save up to 10%



Programmable Thermostats – Save up to \$100 per year





Building Design

“Whole Buildings” Strategy:

Existing R&D programs, building technologies, and components tied together by Systems Integration and Computerized Design Tools.

Passive Solar Strategies

Siting and orientation, glazing size and location, and shading strategies contribute to a passive solar, or “climate-responsive,” building.

Advanced Technologies

Energy-saving appliances, advanced energy controls and thermostats, efficient heating and cooling systems, photovoltaics, and solar water heating systems.

Energy-Efficient Materials

Superior building materials, including high-efficiency windows, insulation, brick, concrete masonry, and interior finish products.

Wind Turbine Sizes and Applications



Small (≤ 10 kW)

Homes

Farms

Remote Applications (e.g.
water pumping, telecom
sites, icemaking)



Intermediate (10-250 kW)

Village Power

Hybrid Systems

Distributed Power

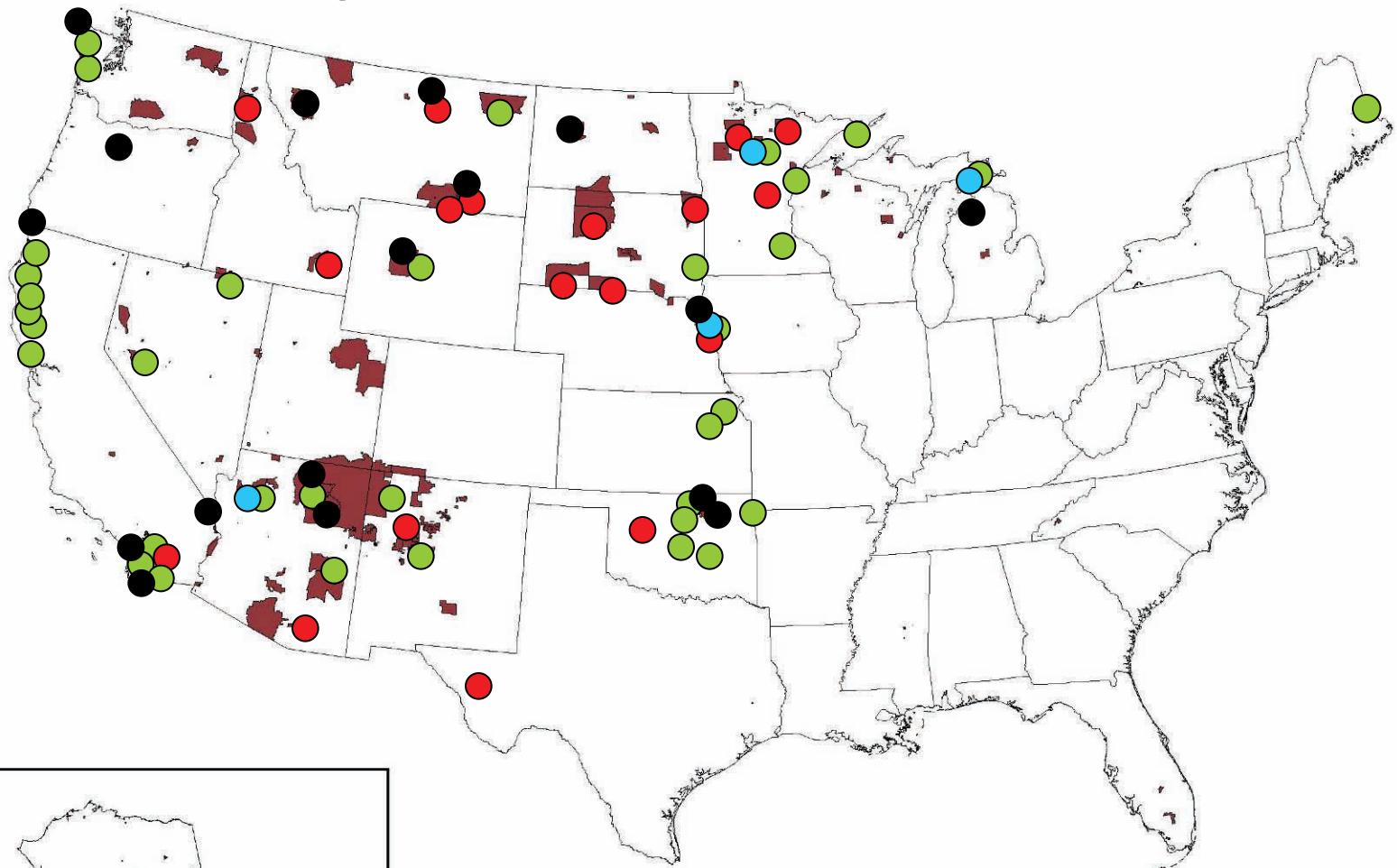


Large (250 kW – 2+ MW)

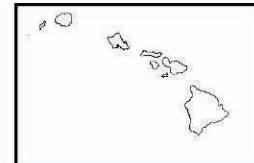
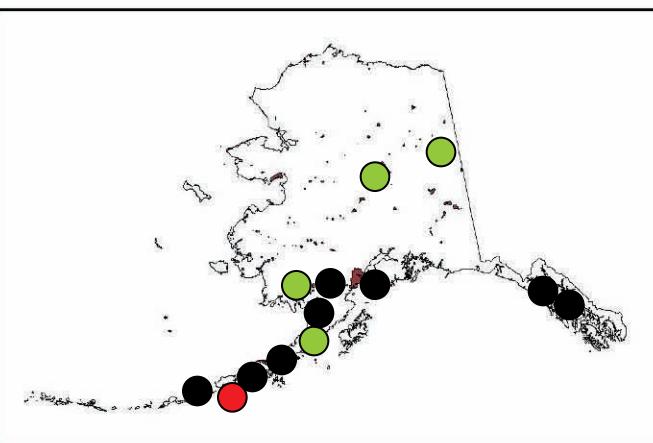
Central Station Wind Farms

Distributed Power

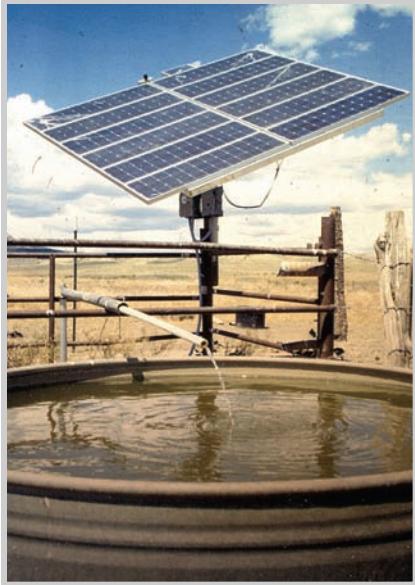
Wind Powering America – Anemometer Loans



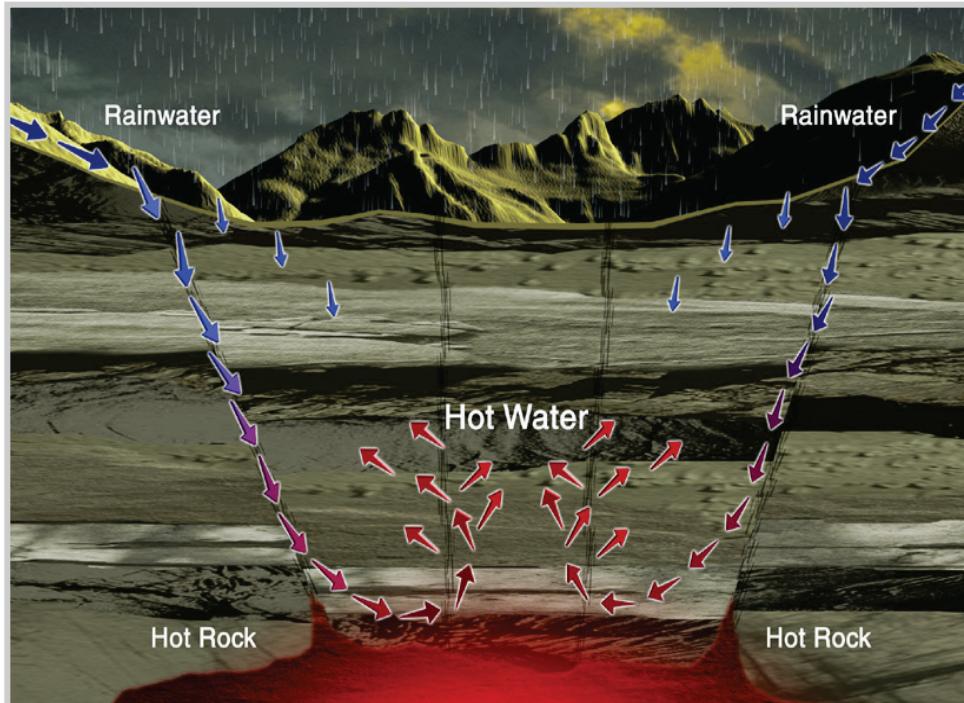
- 20m WPA Monitoring Completed
- 20m WPA Anemometer
- 50m WPA Anemometer
- 50m TEP Anemometer



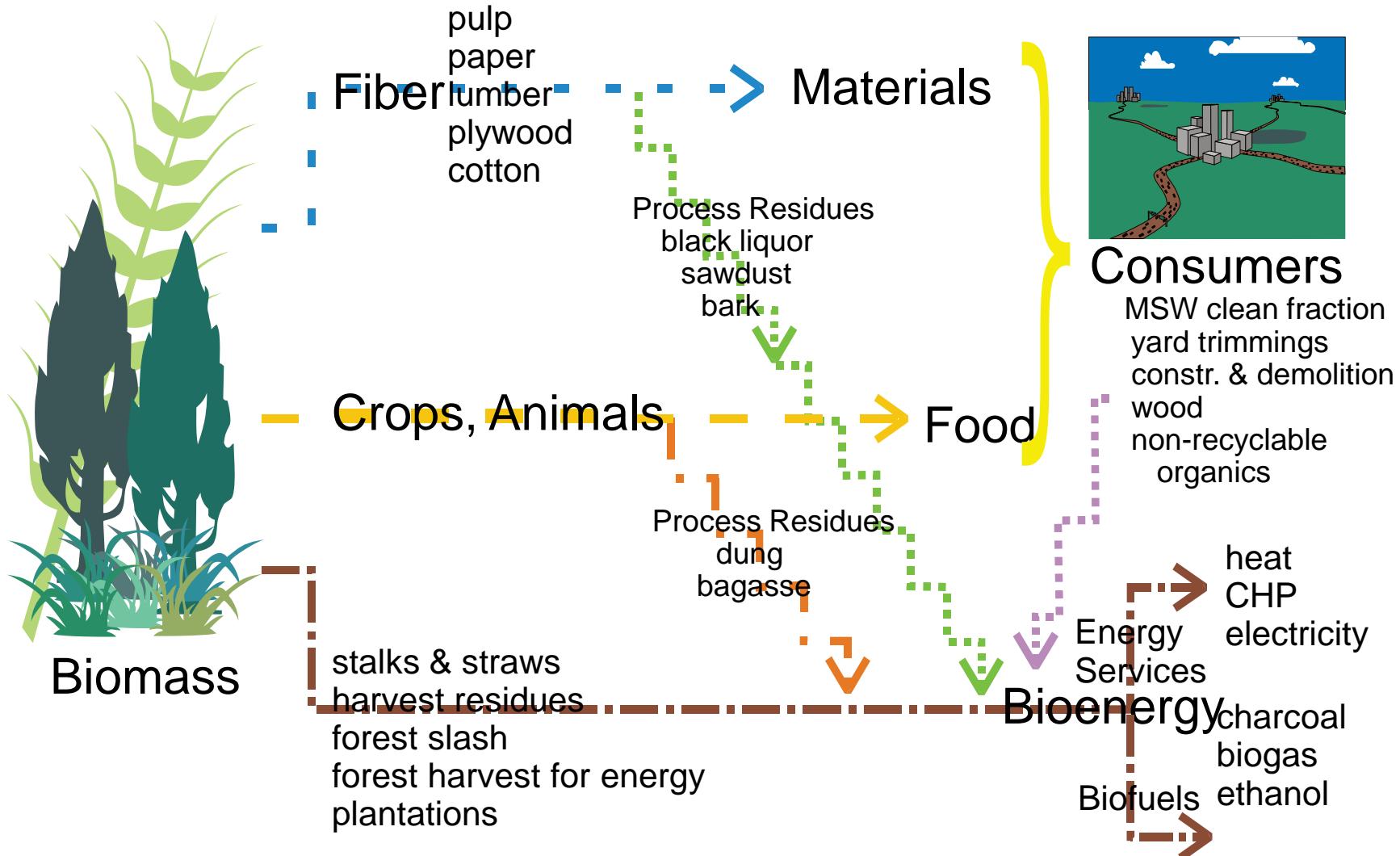
Solar



Geothermal Options

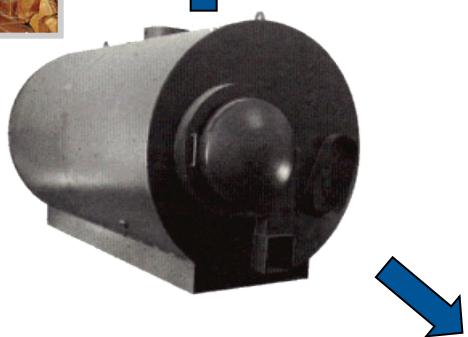


Biomass & Bioenergy Flows

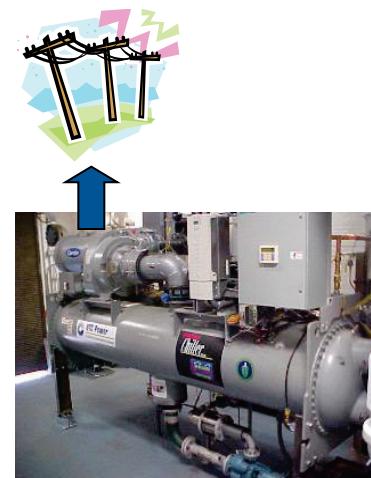


Bioenergy Opportunities

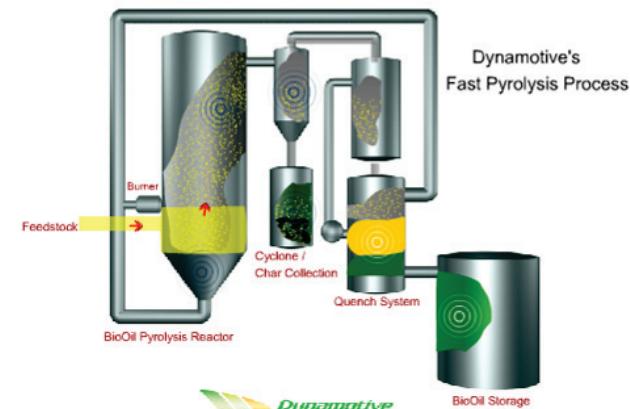
Heat



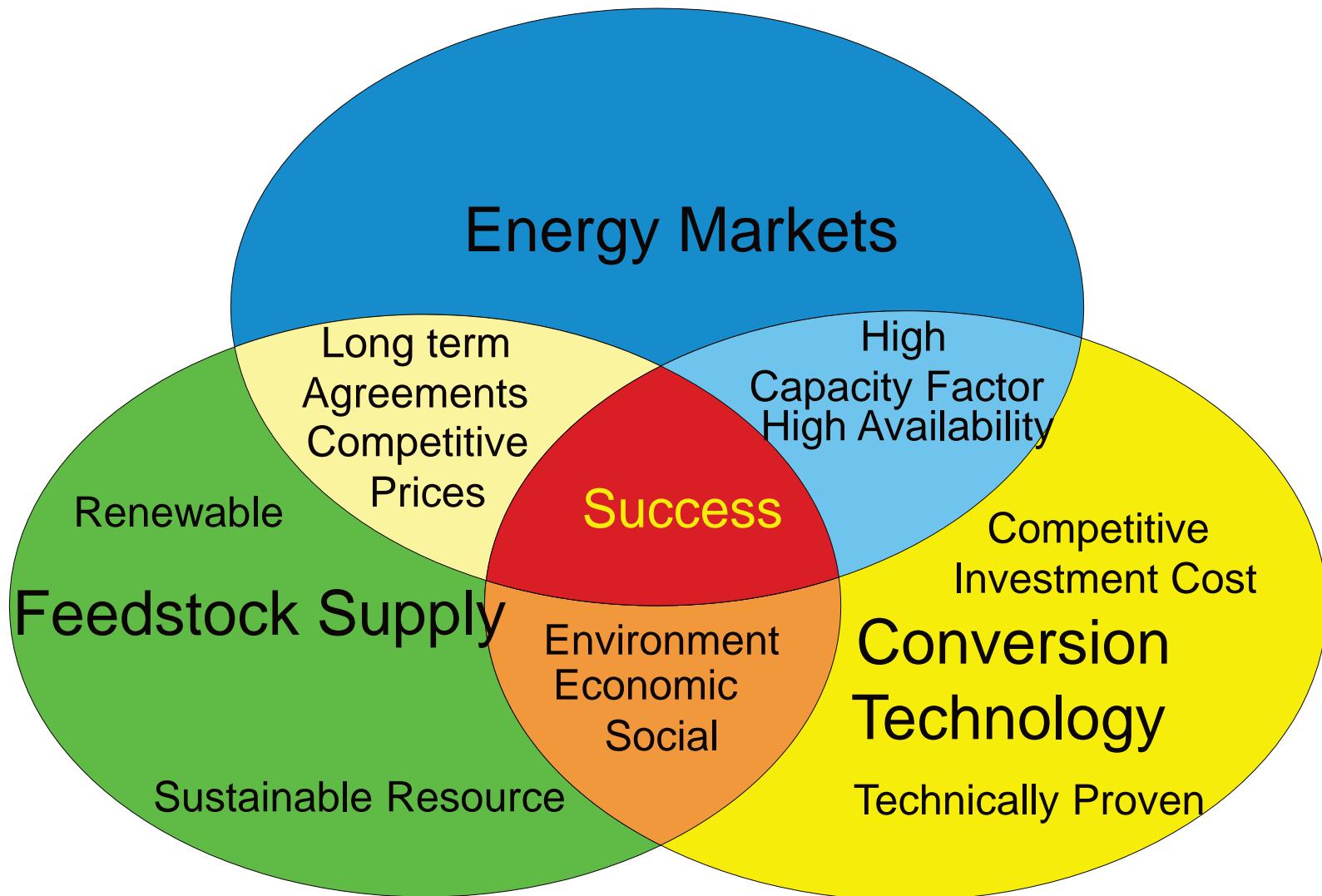
Power



Fuels

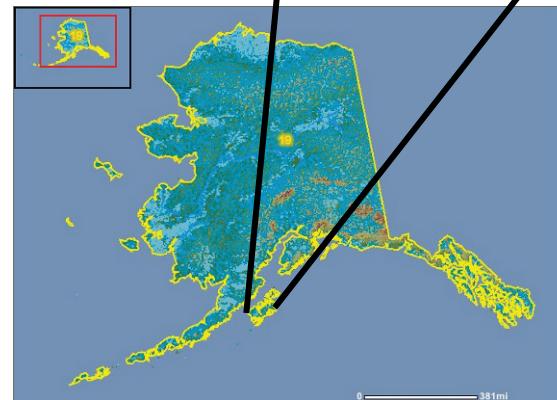


Bioenergy Project Requirements

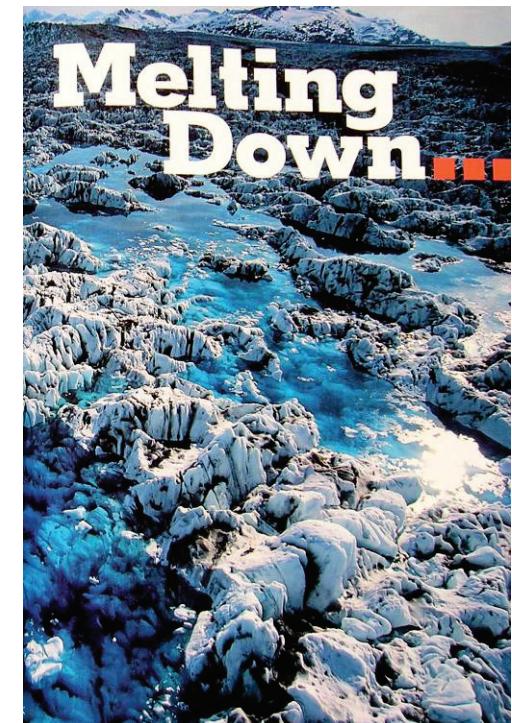
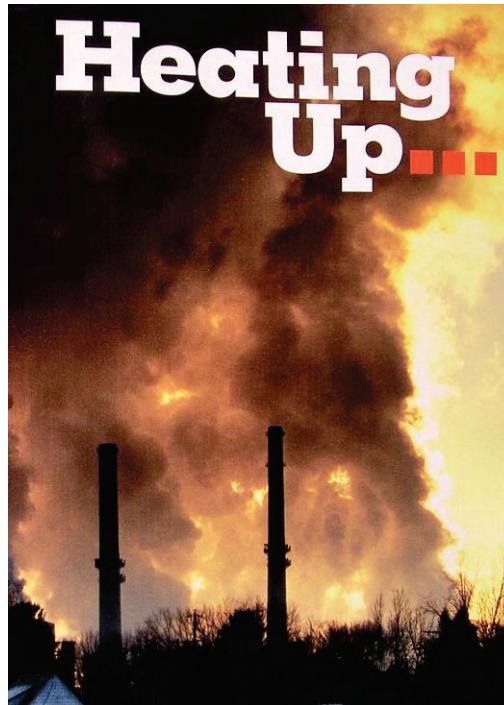
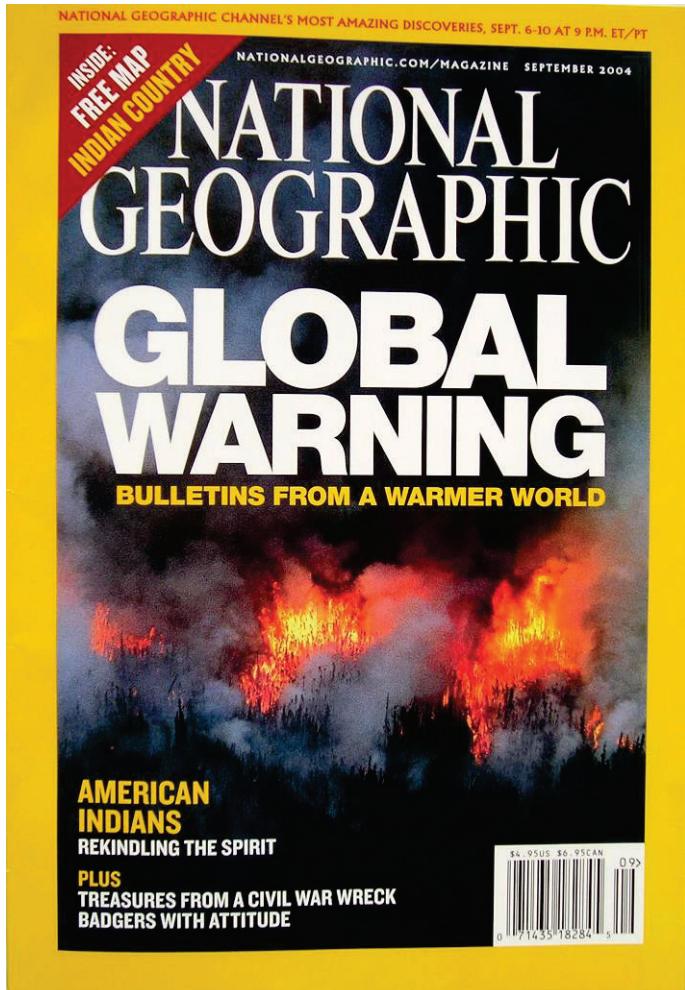


Small & Micro Hydro Power Options

<http://hydropower.inl.gov/prospector/>

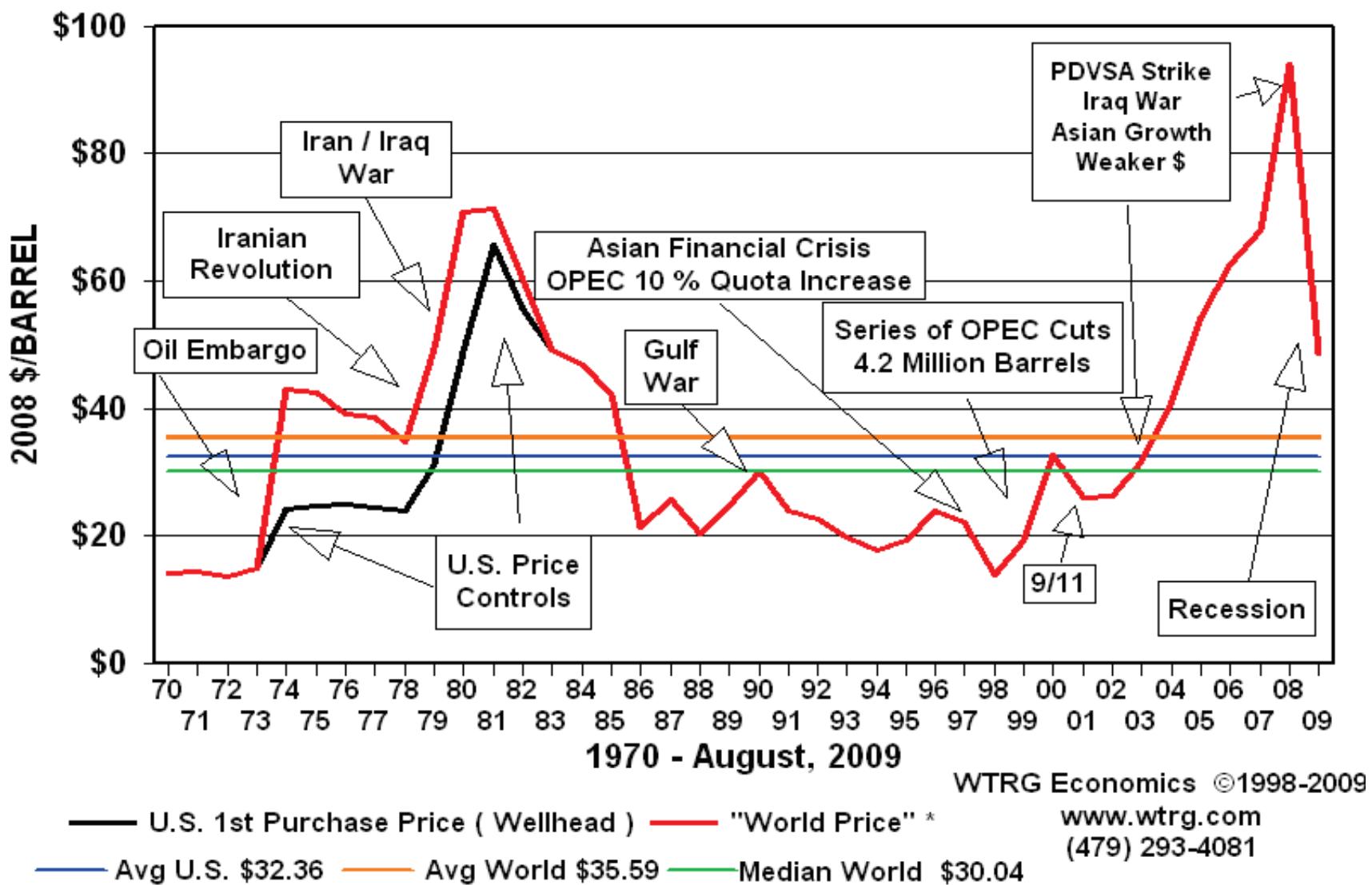


We Live in a Changing World



We Live in a Changing World

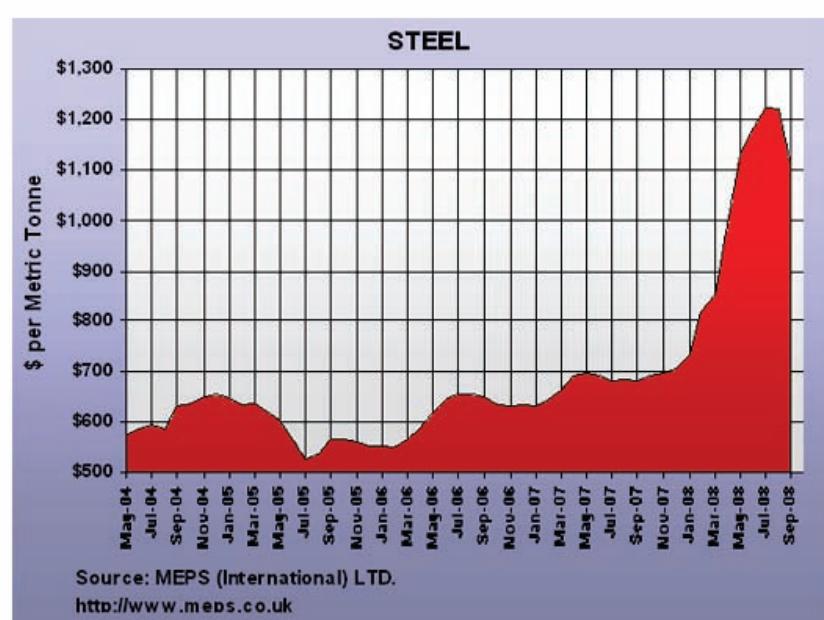
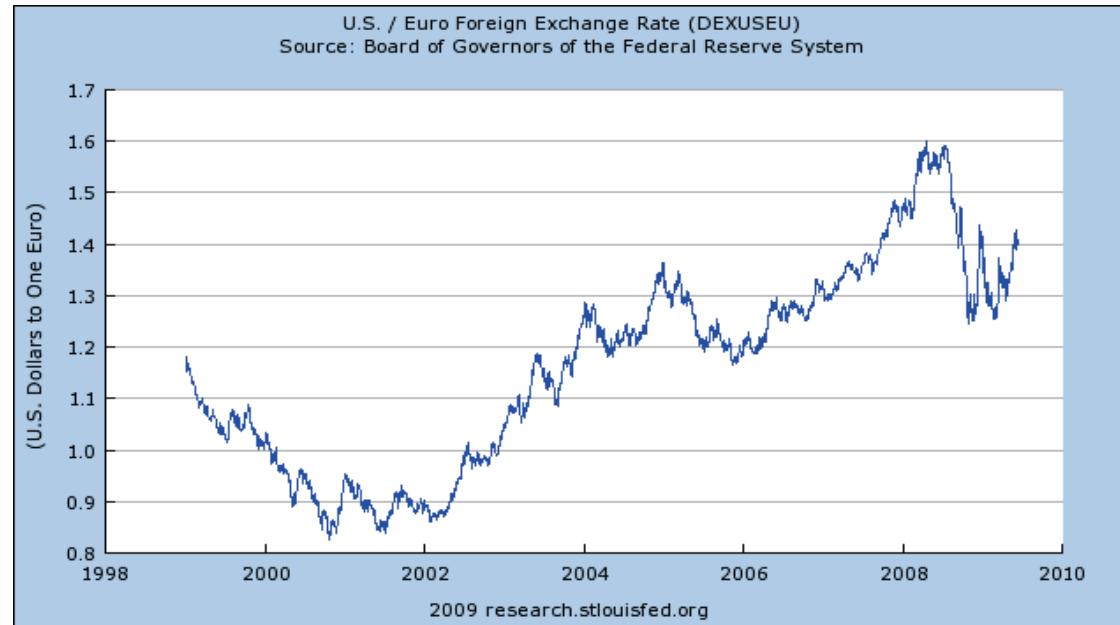
Crude Oil Prices
2008 Dollars



We Live in a Changing World

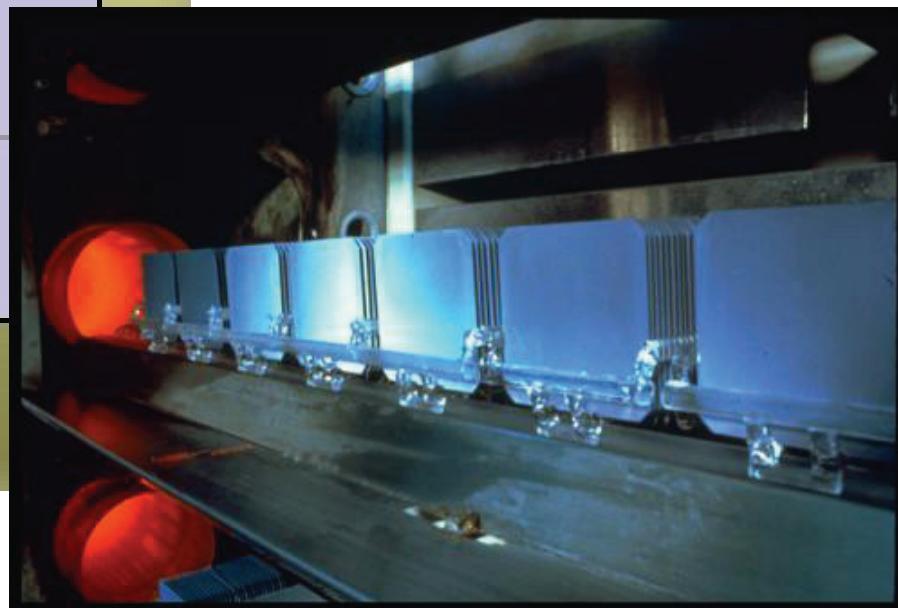


We Live in a Changing World



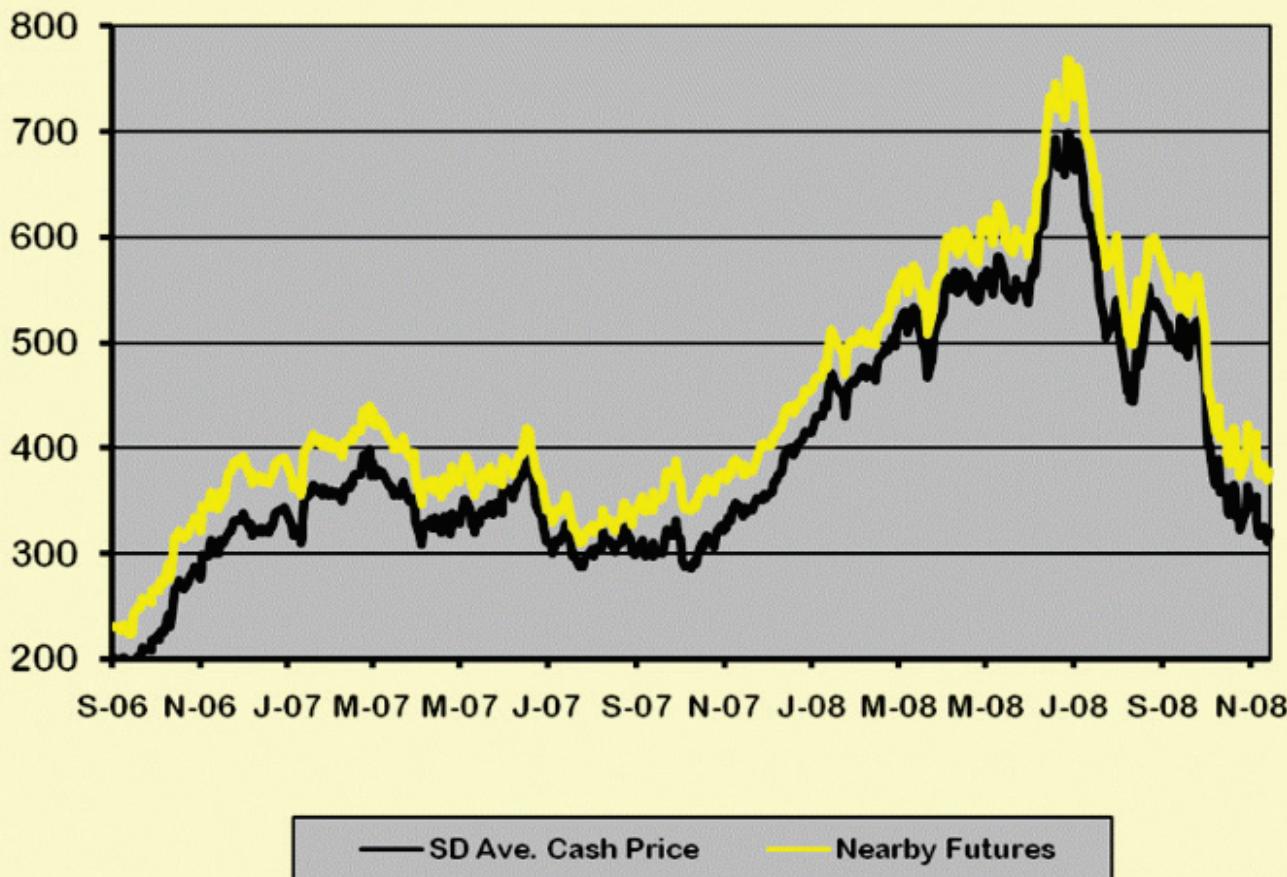
We Live in a Changing World

Silicon Metal - 98.5%
FOB North America
5 Years - \$/LB

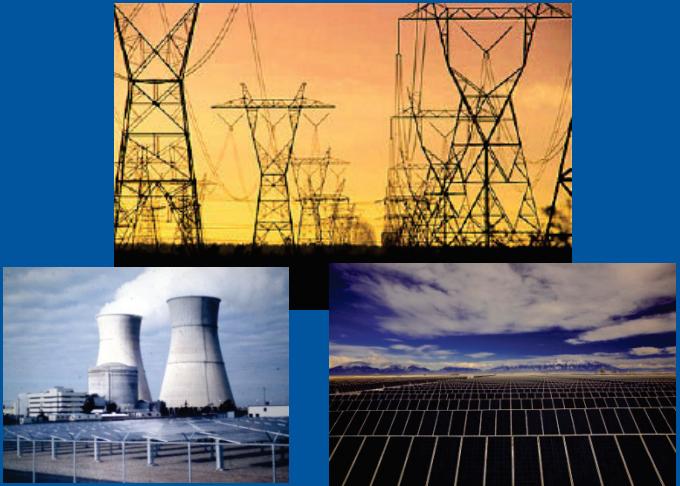


We Live in a Changing World

CORN
DAILY Cash - Nearby Futures Contract
(September 2006 - Present time)



We Live in a Changing World



Electricity



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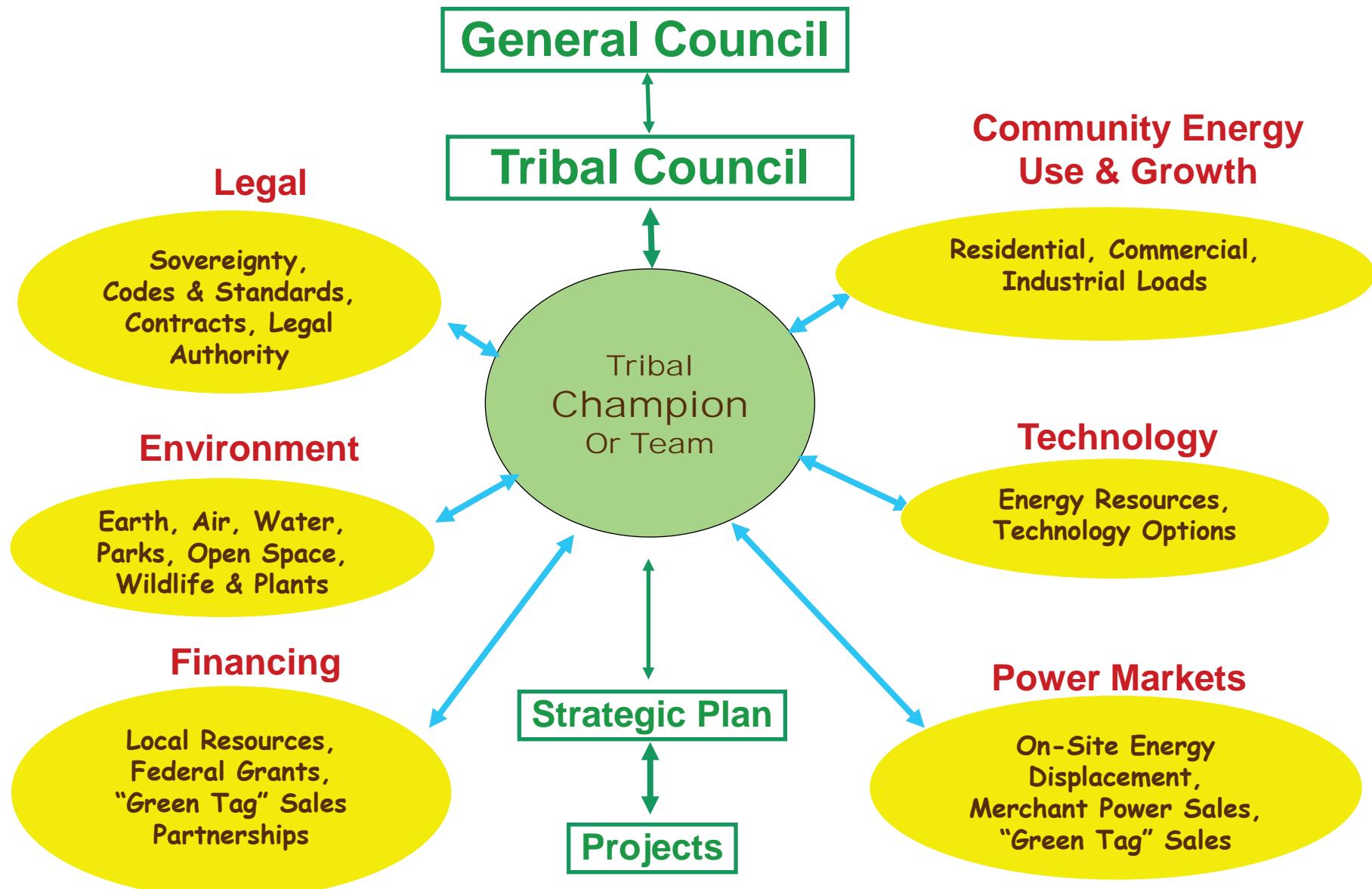
Fuels

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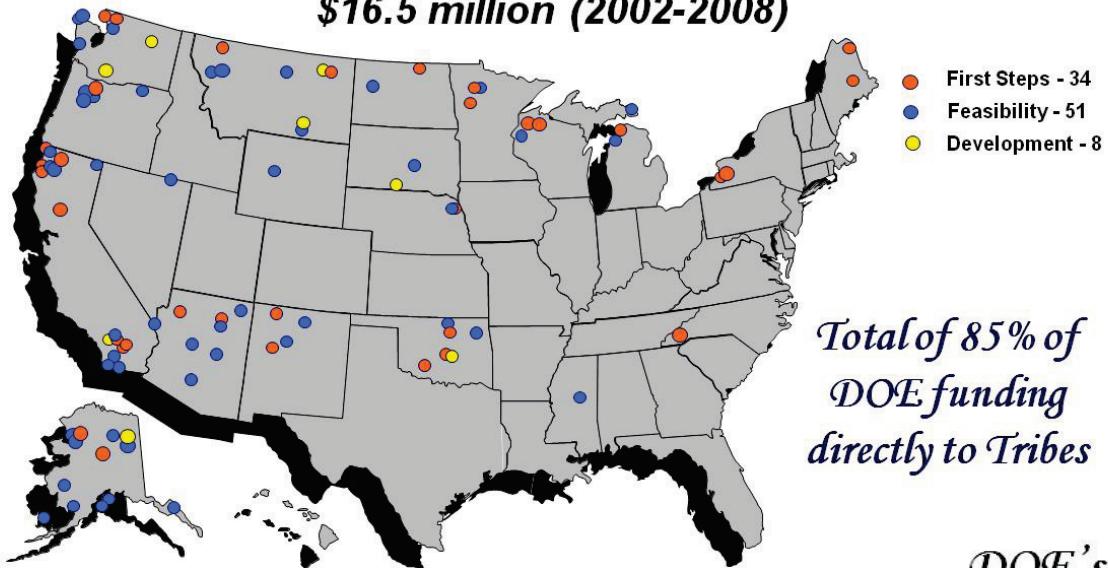
We Live in a Changing World

Tribal Energy Security ↔ Tribal Sovereignty



DOE's Tribal Energy Program

**DOE has funded 93 tribal energy projects totaling
\$16.5 million (2002-2008)**



*Total of 85% of
DOE funding
directly to Tribes*

DOE's Tribal Energy Program
Thirty-six (36) Tribal Energy Projects Selected for Award
Value of \$41.5 Million

