

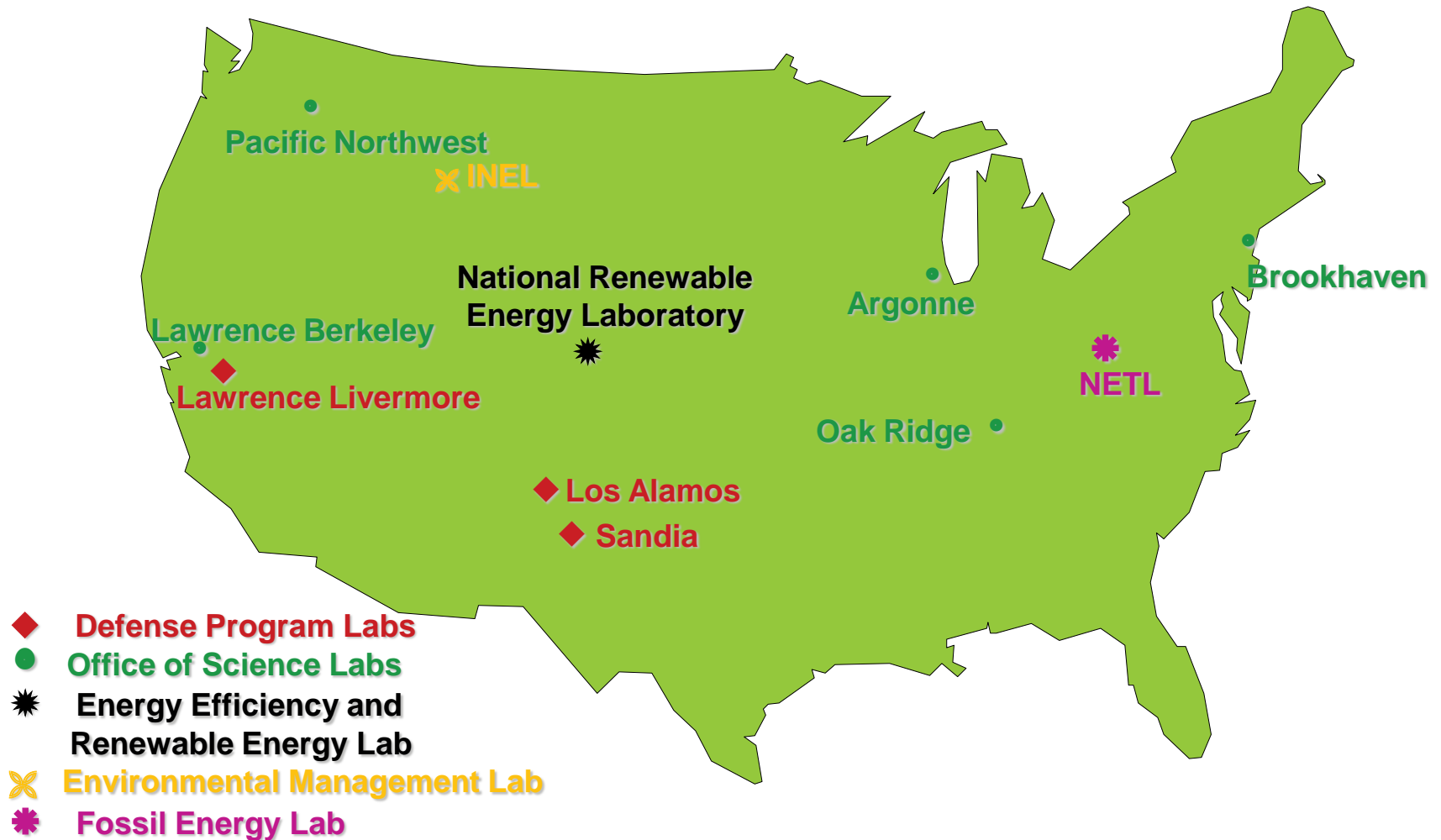


## **Tribal Energy Program 2009 Annual Review**

**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

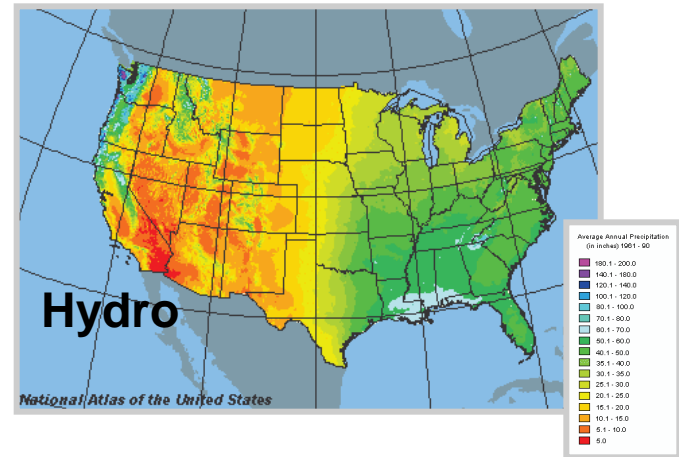
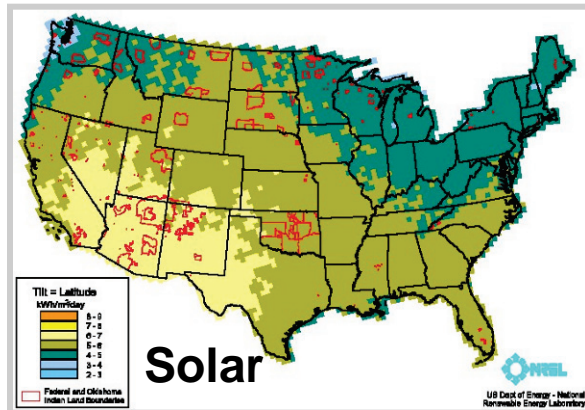
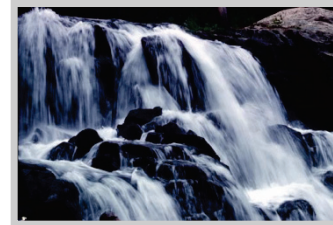
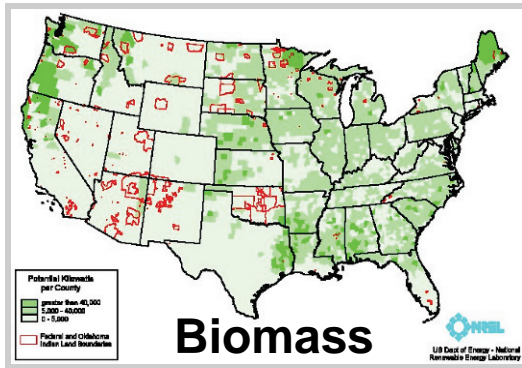
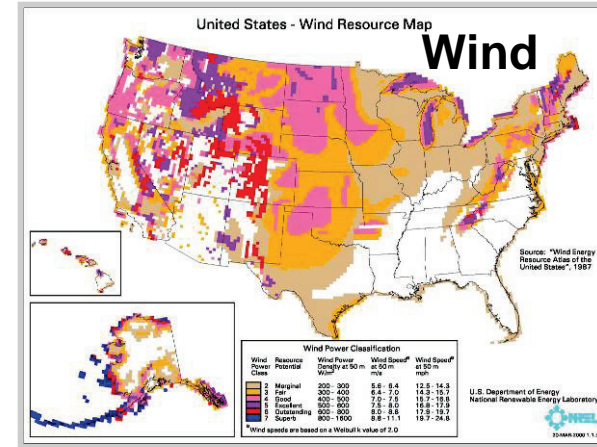
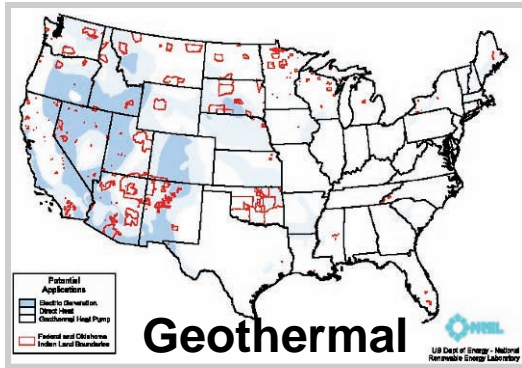
## Cross Cutting

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

**Tribal Energy Program**



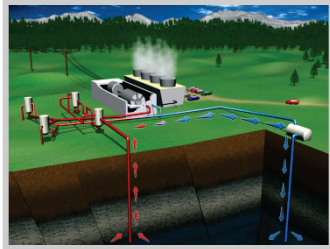
# Renewable Resource Options





# Renewable Technology Options

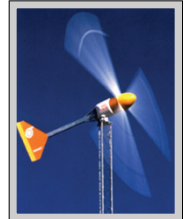
Power



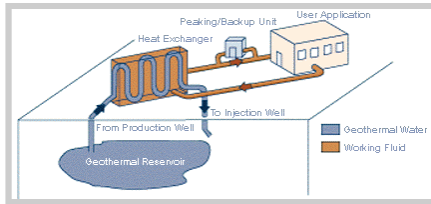
Biomass Heat, Power & Fuels



Small Wind



Direct Use



Diesel Hybrids



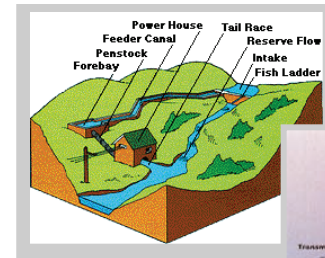
Big Wind



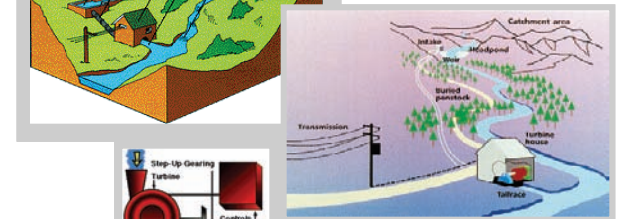
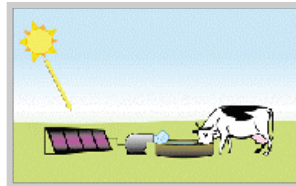
Remote Homes



Small Hydro



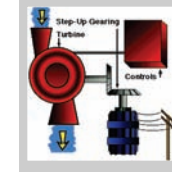
Stock Watering



CS Power & Heat



Buildings



# Energy Efficiency



## 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



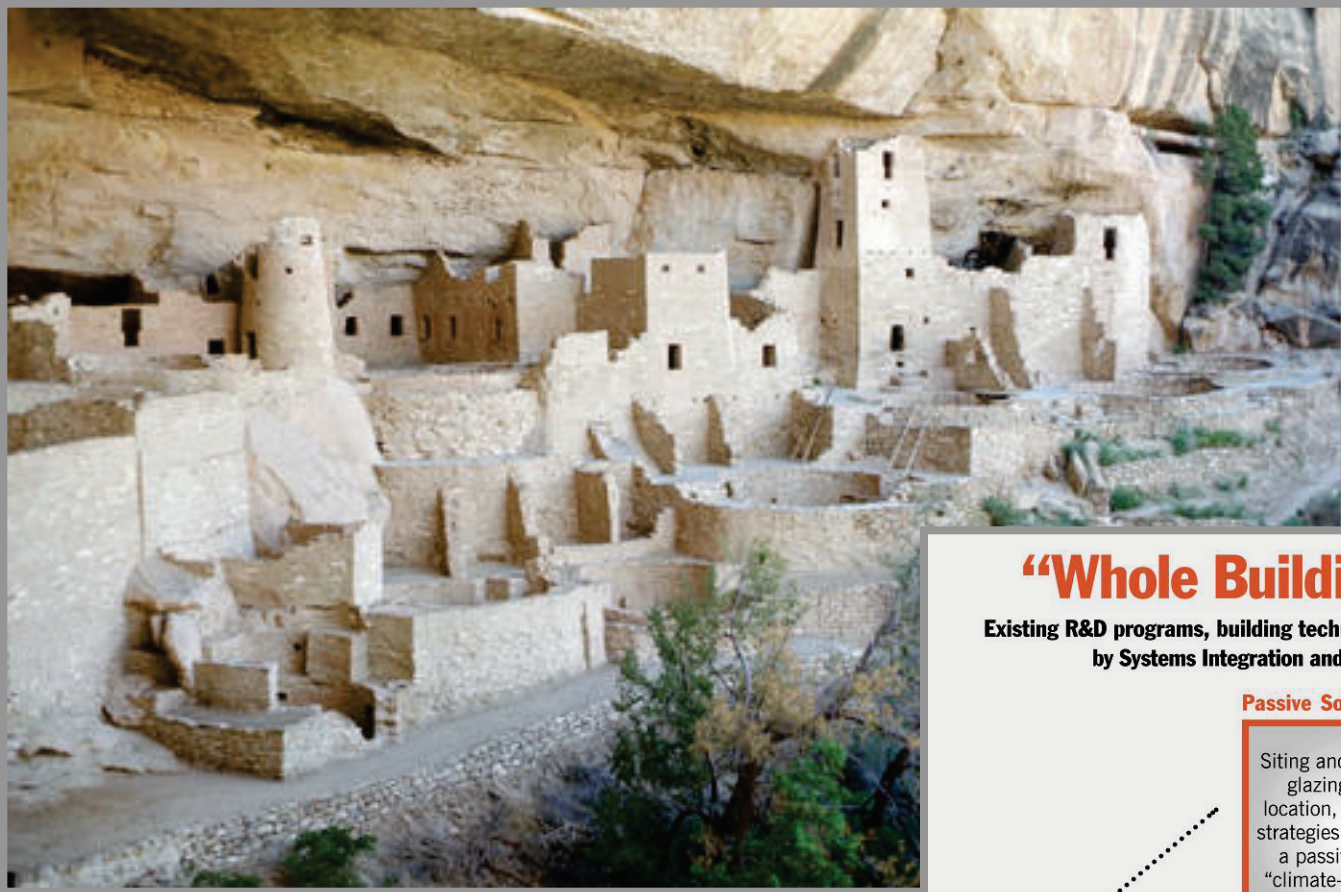
## Efficient Lighting



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







# 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 ( $\leq 10$ kW)

Homes

Farms

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



## Intermediate (10-250 kW)

Village Power

Hybrid Systems

Distributed Power

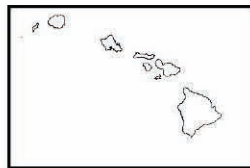
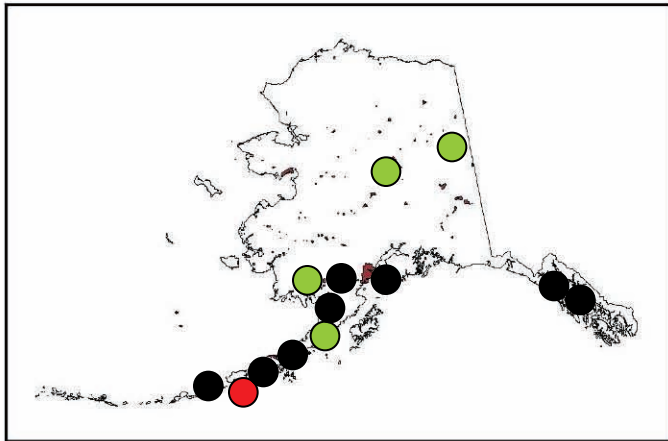
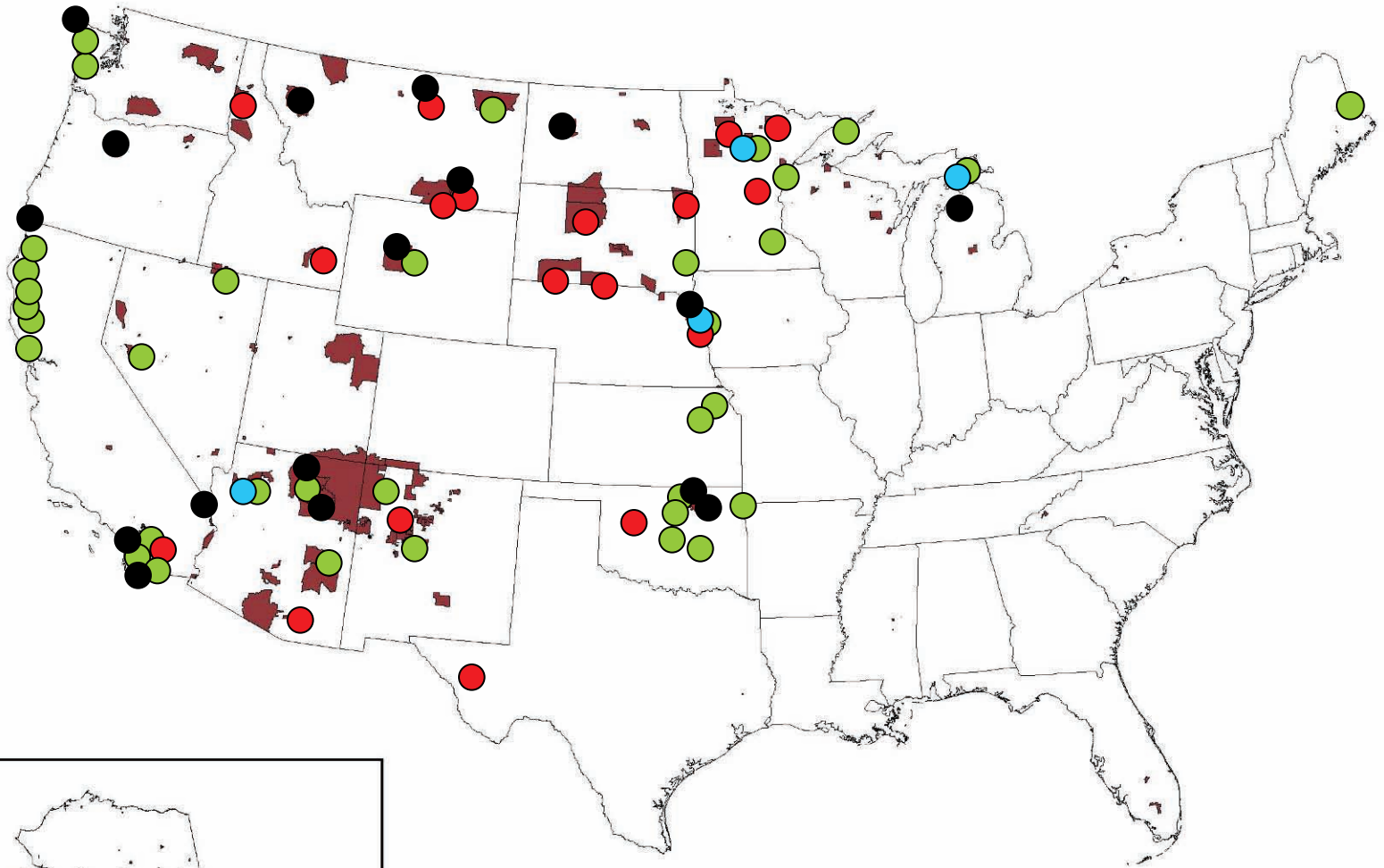


## Large (250 kW – 2+ MW)

Central Station Wind Farms

Distributed Power

# Wind Powering America – Anemometer Loans



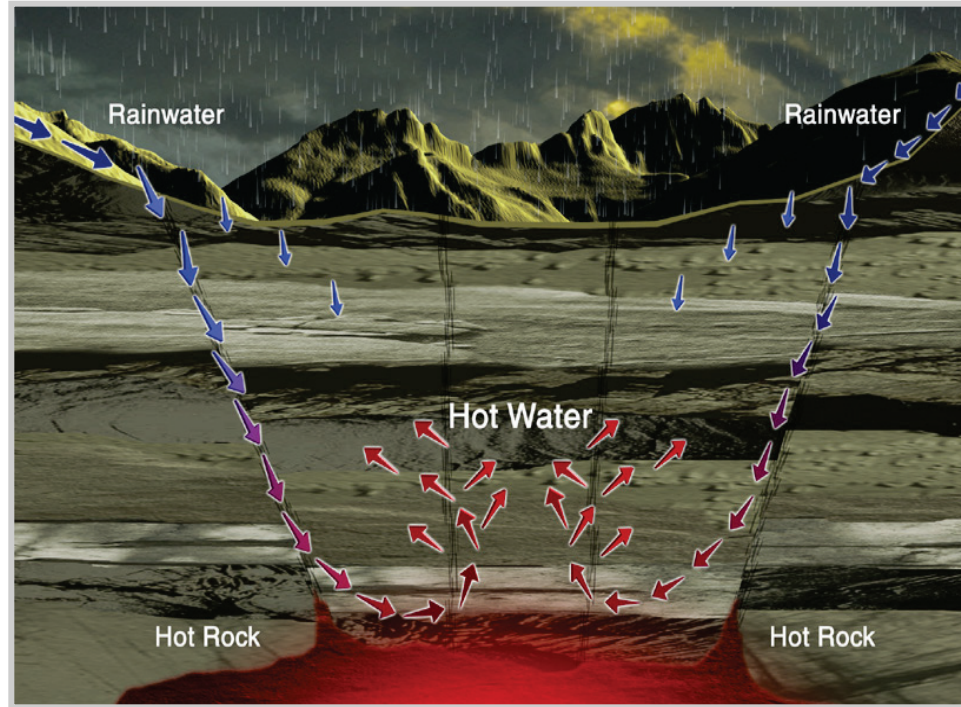
- 20m WPA Monitoring Completed
- 20m WPA Anemometer
- 50m WPA Anemometer
- 50m TEP Anemometer

# Solar

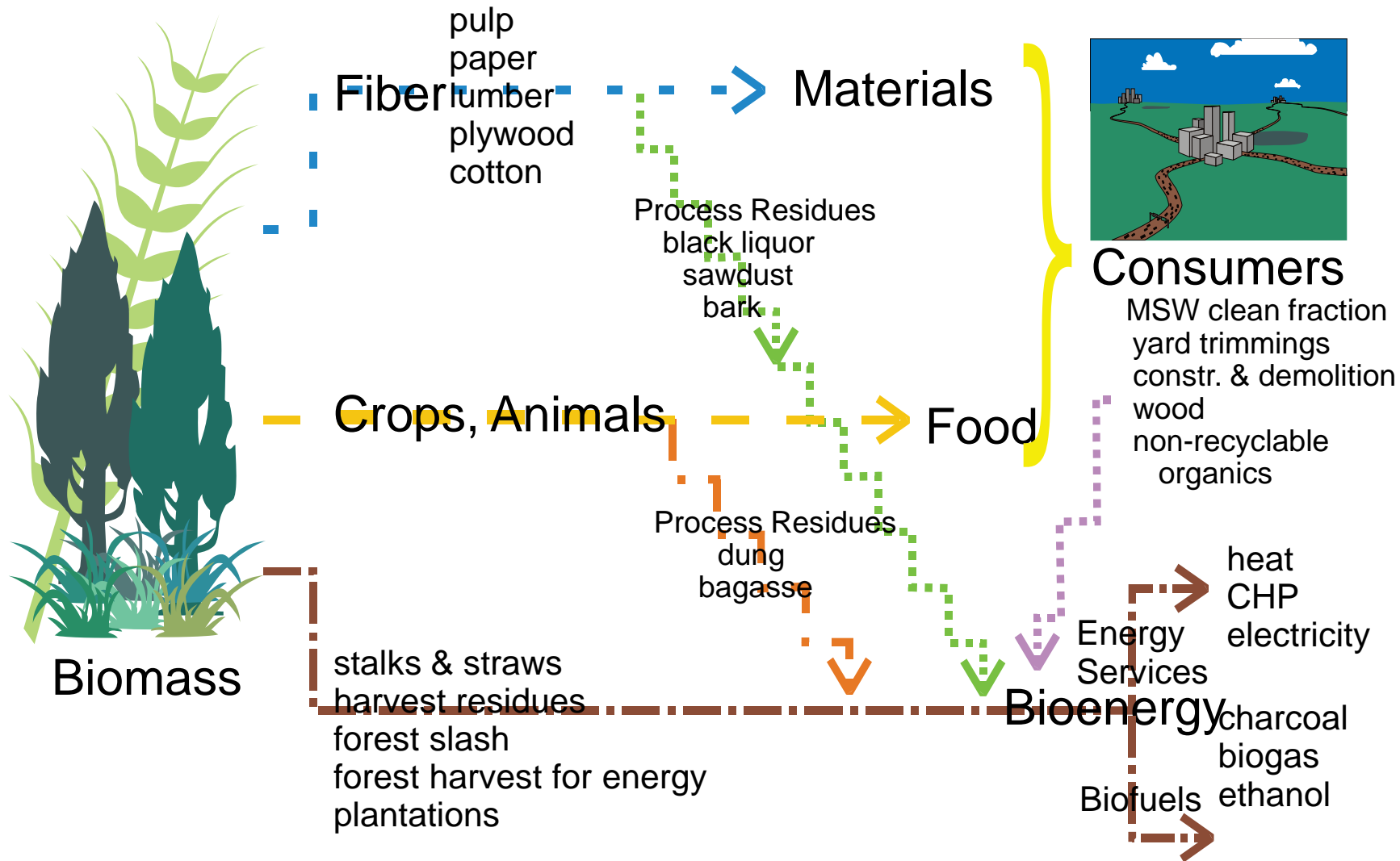




# Geothermal Options



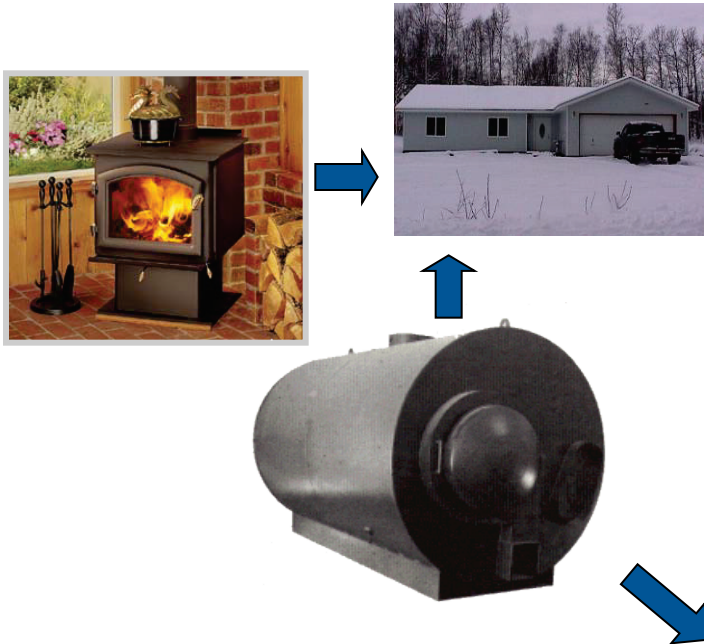
# Biomass & Bioenergy Flows



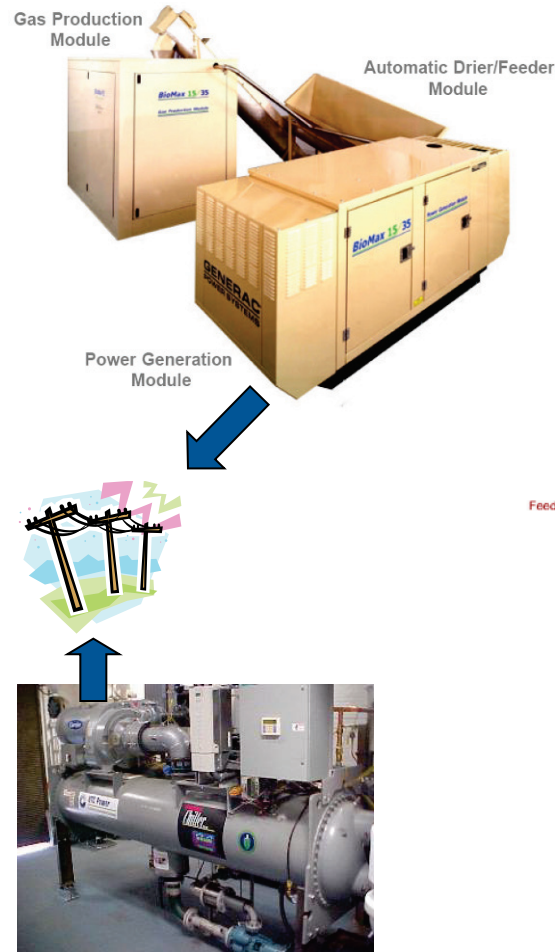


# Bioenergy Opportunities

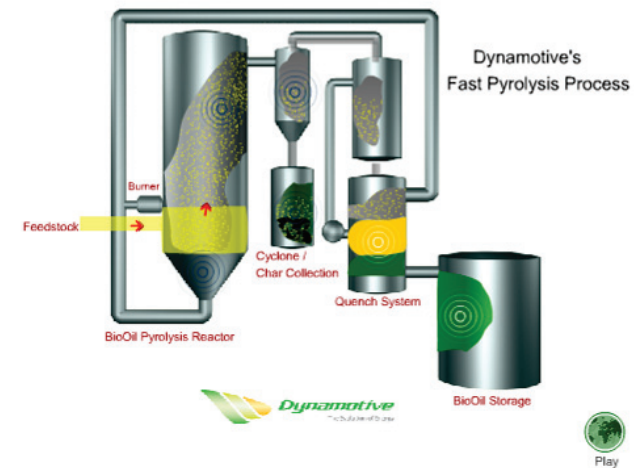
## Heat



## Power

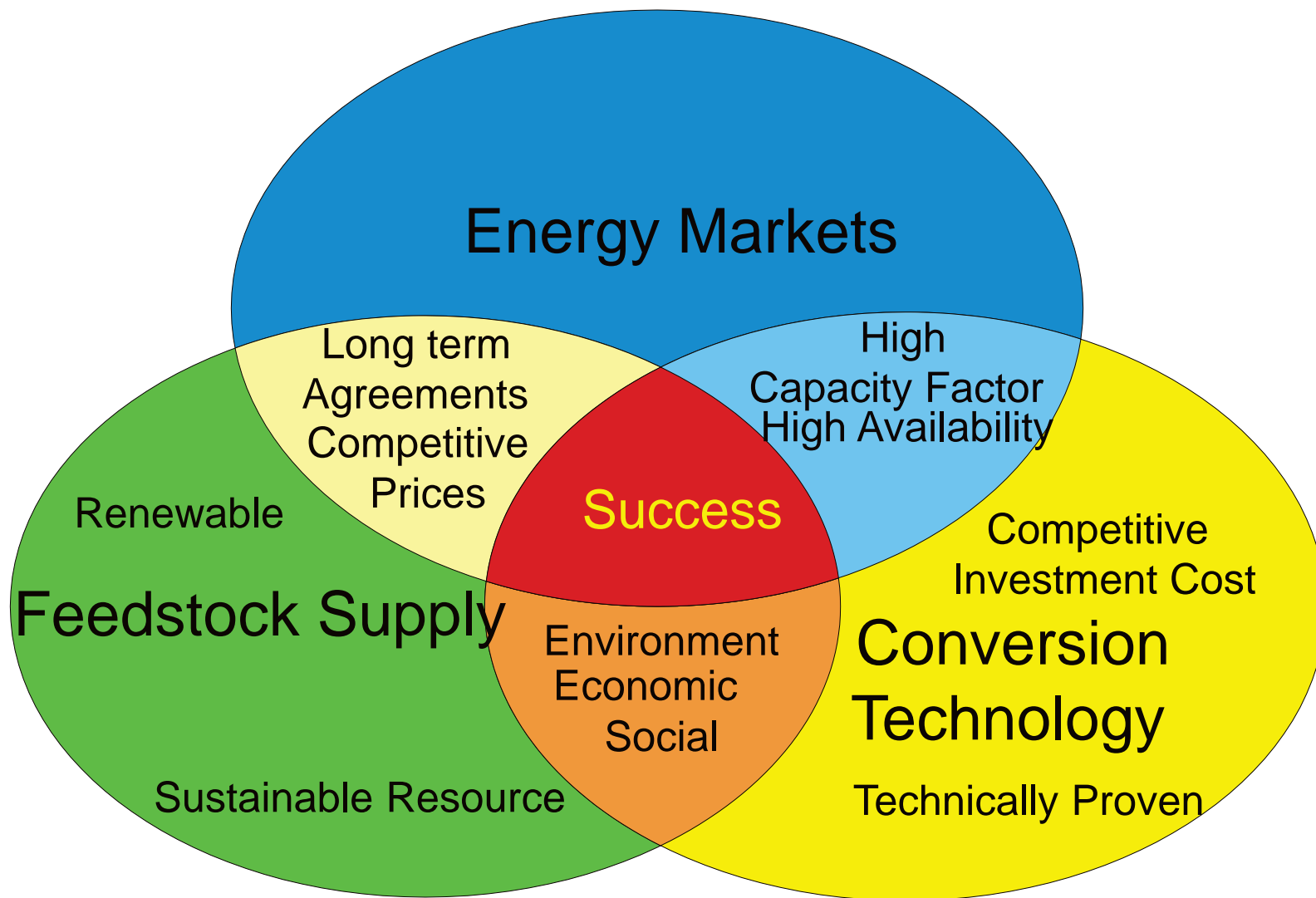


## Fuels



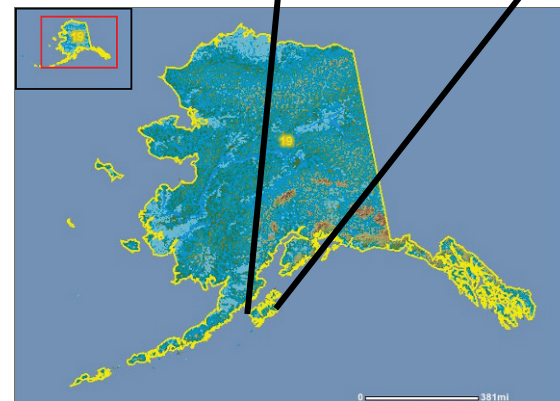


# Bioenergy Project Requirements

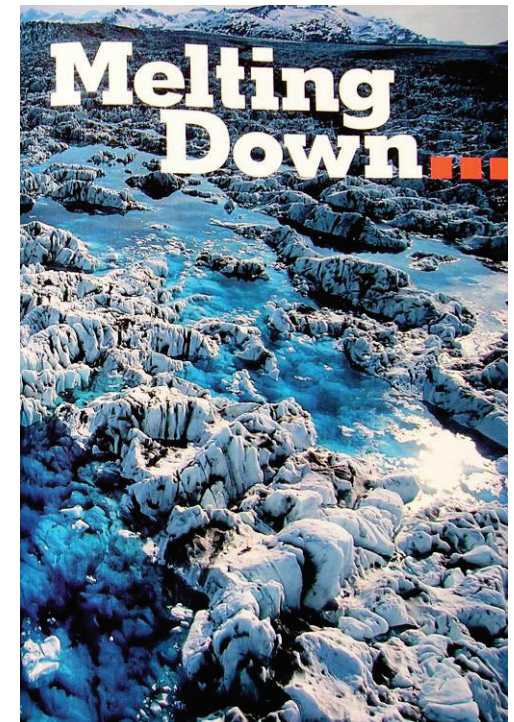
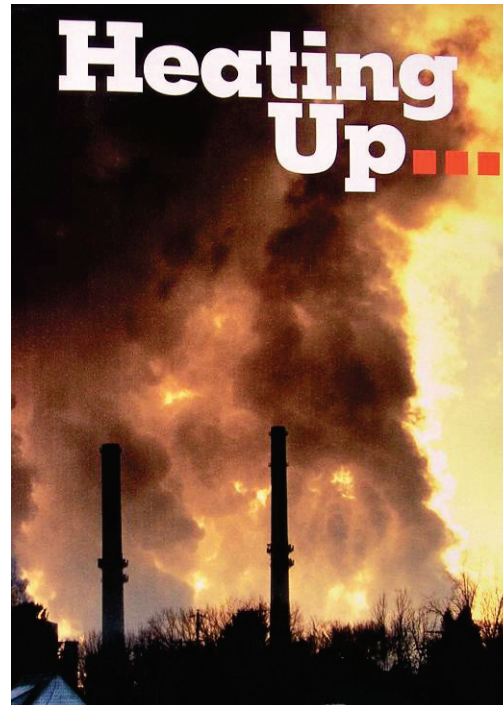
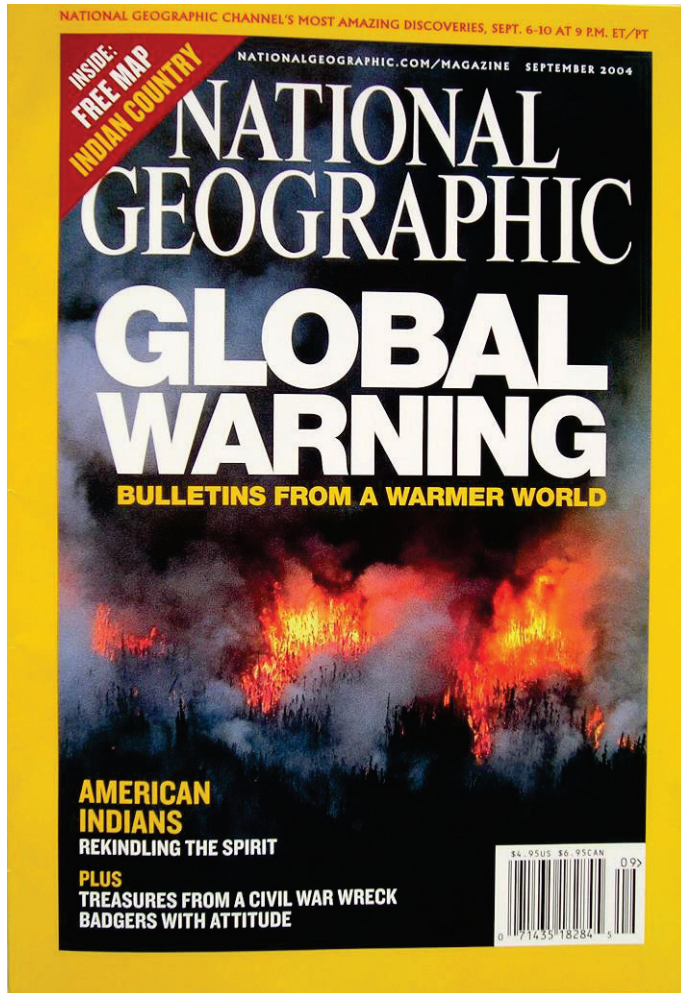


# Small & Micro Hydro Power Options

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



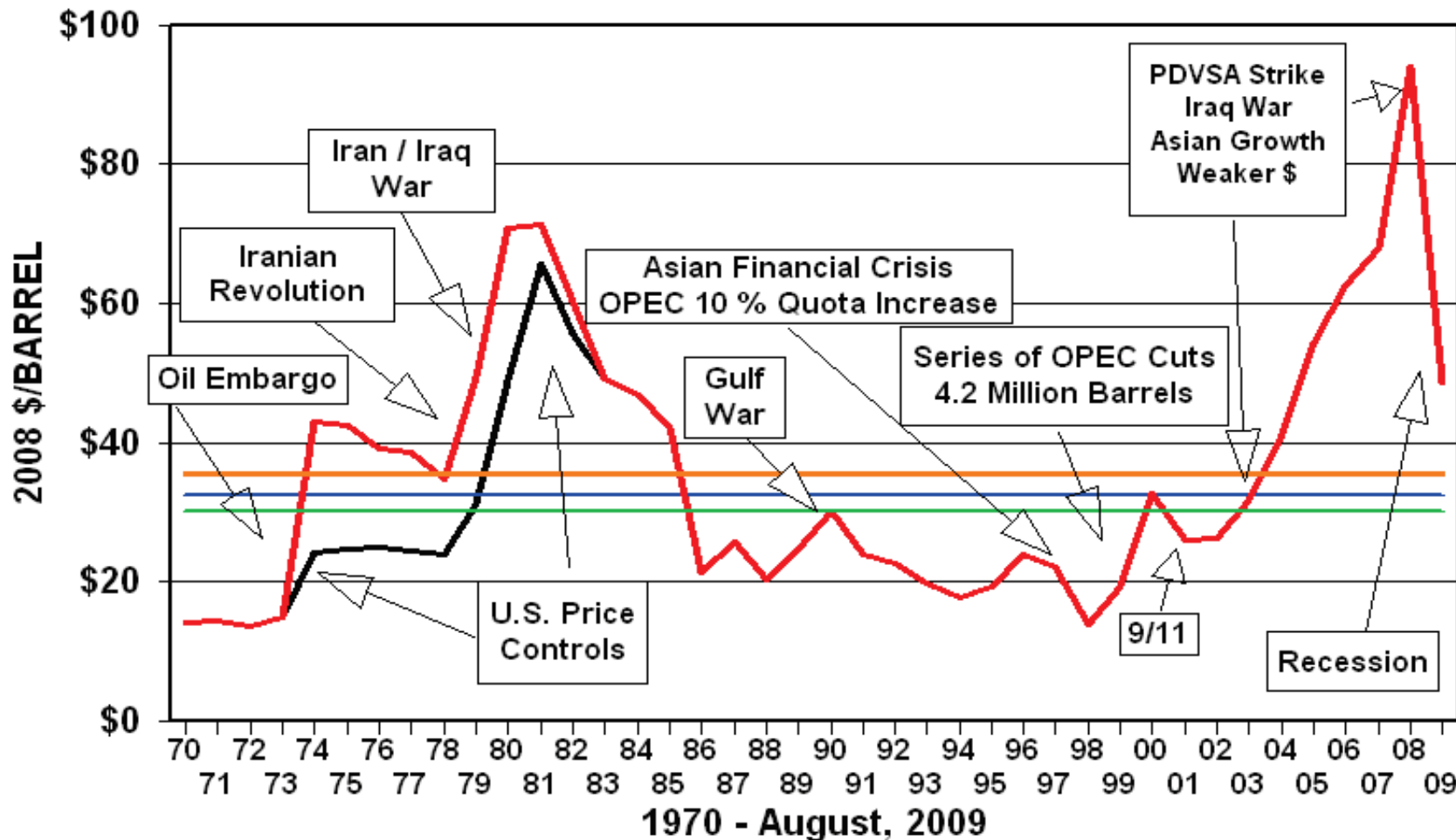
# We Live in a Changing World





# We Live in a Changing World

Crude Oil Prices  
2008 Dollars



WTRG Economics ©1998-2009

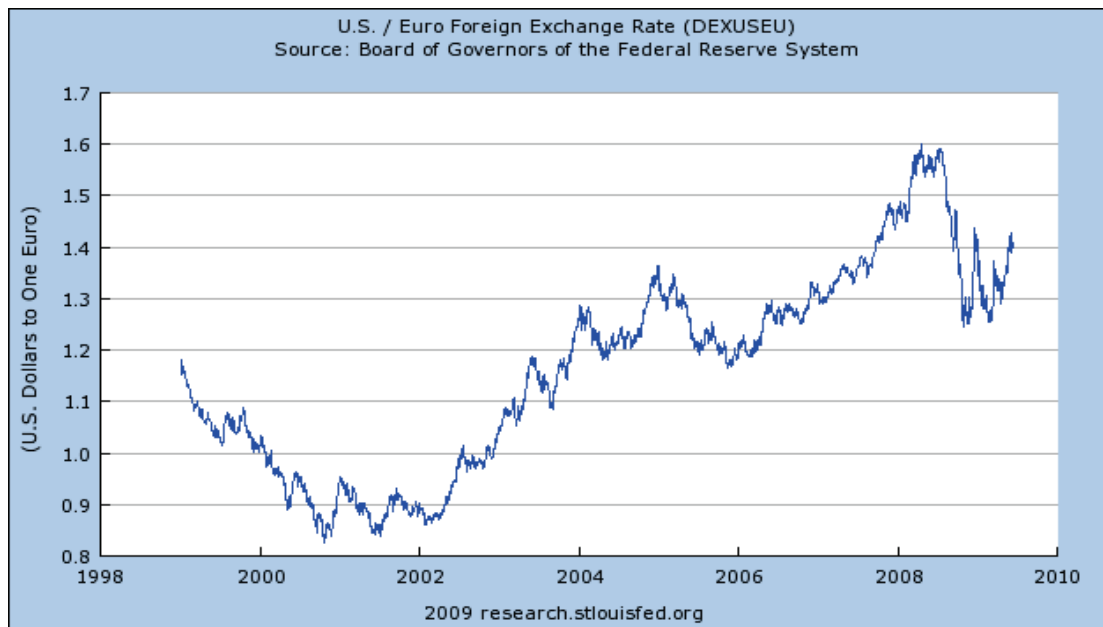
www.wtrg.com  
(479) 293-4081

— U.S. 1st Purchase Price ( Wellhead ) — "World Price" \*  
— Avg U.S. \$32.36 — Avg World \$35.59 — Median World \$30.04

# We Live in a Changing World



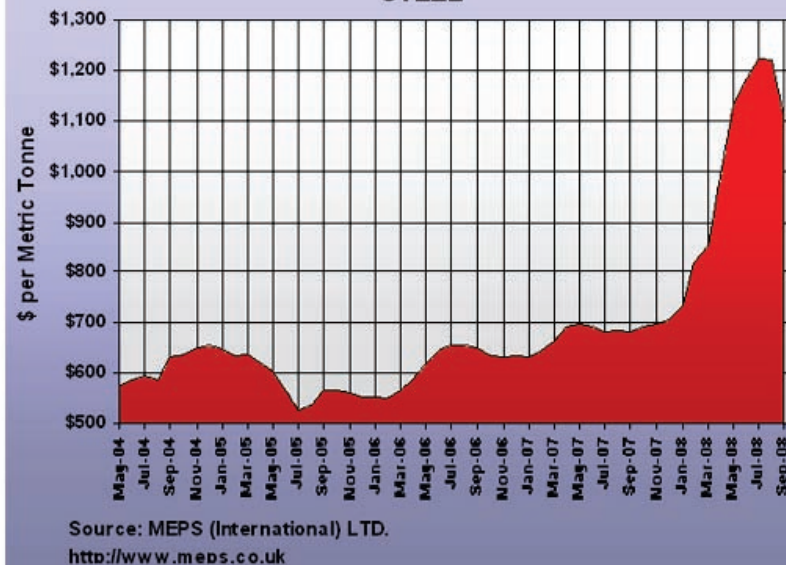
# We Live in a Changing World



5 Year Copper Spot



STEEL





# We Live in a Changing World

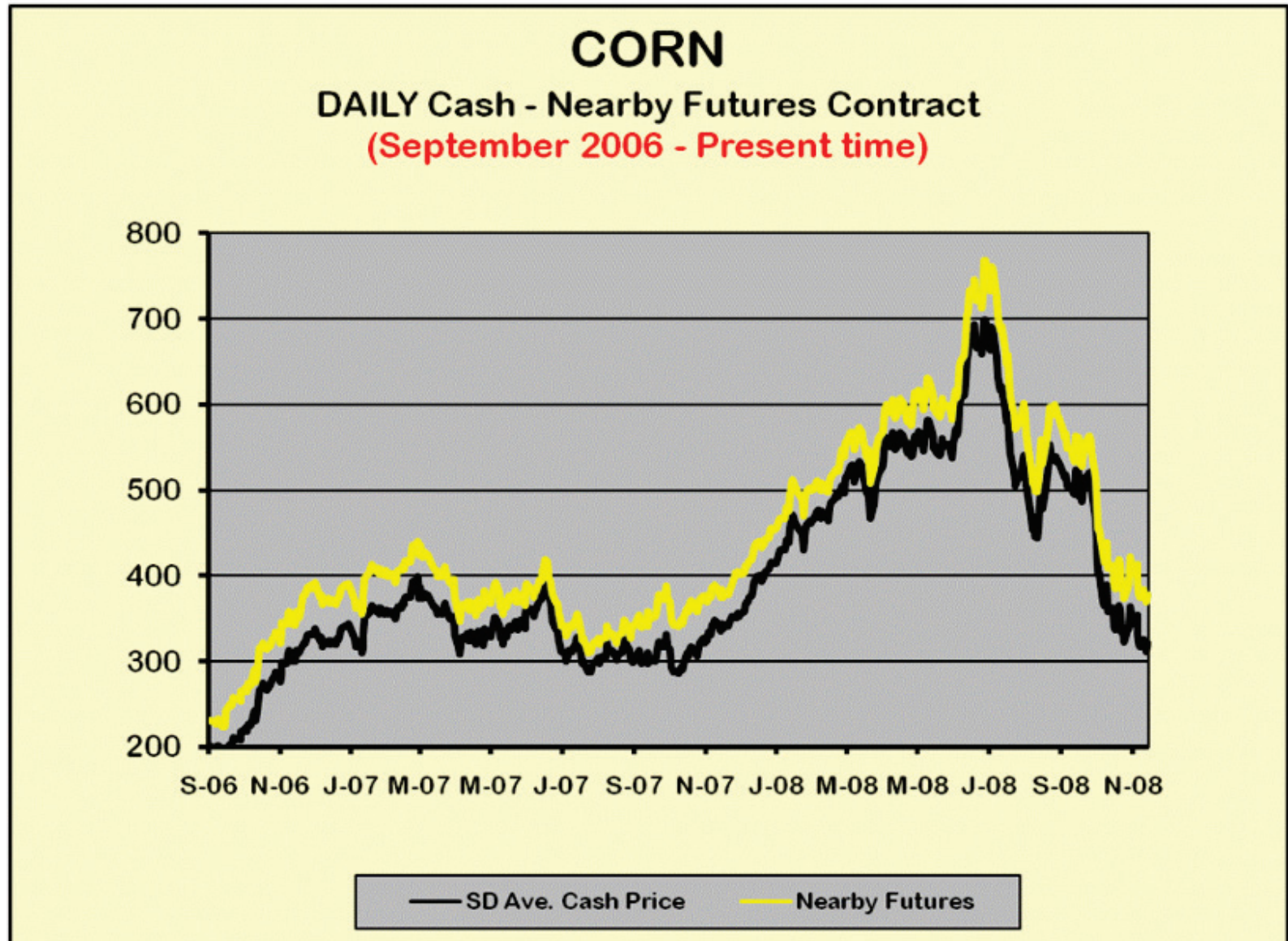
Silicon Metal - 98.5%  
FOB North America  
5 Years - \$/LB



07 Nov, 2003 - 31 Oct, 2008



# We Live in a Changing World



# We Live in a Changing World



## Electricity



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## Fuels

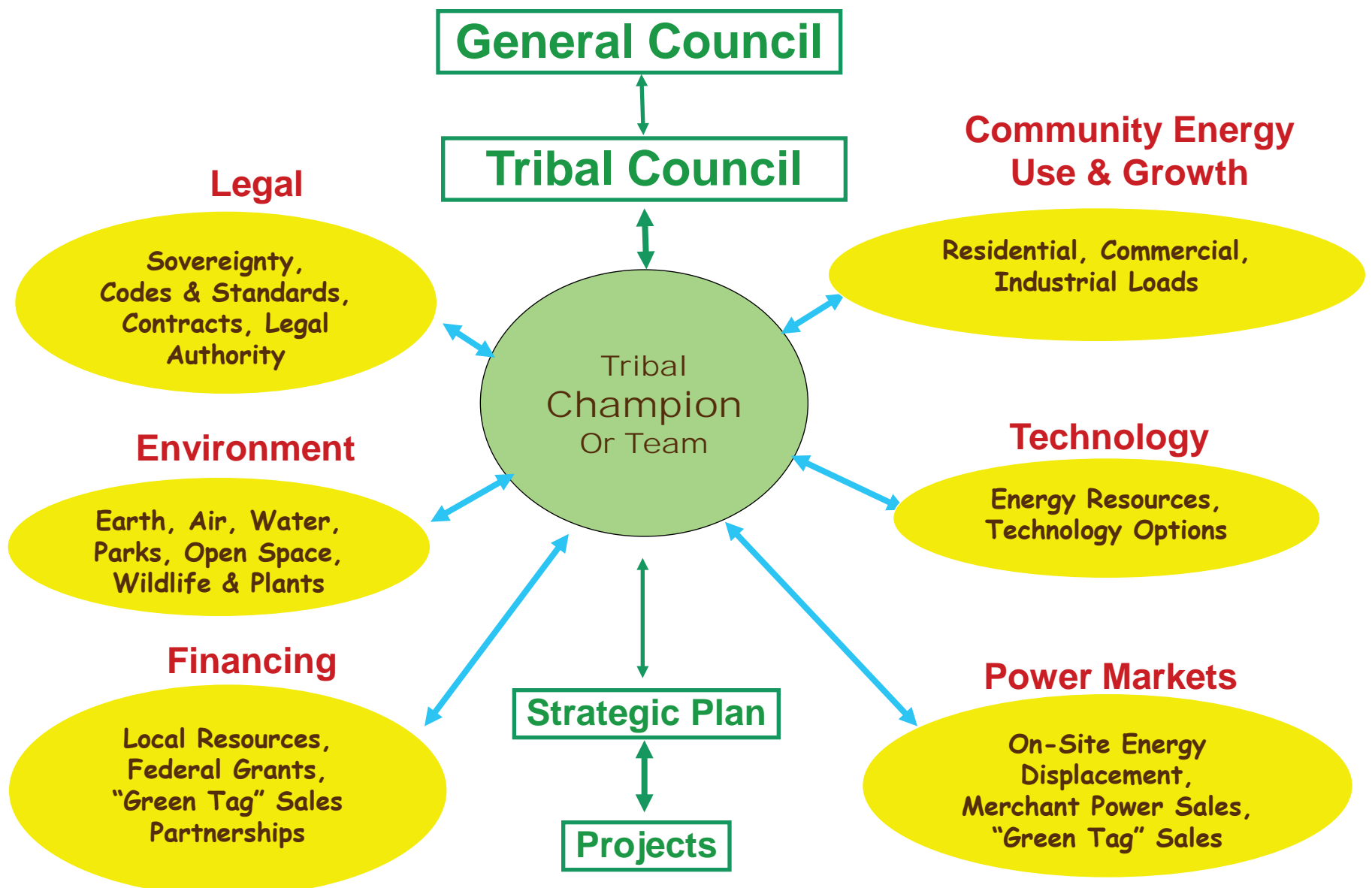
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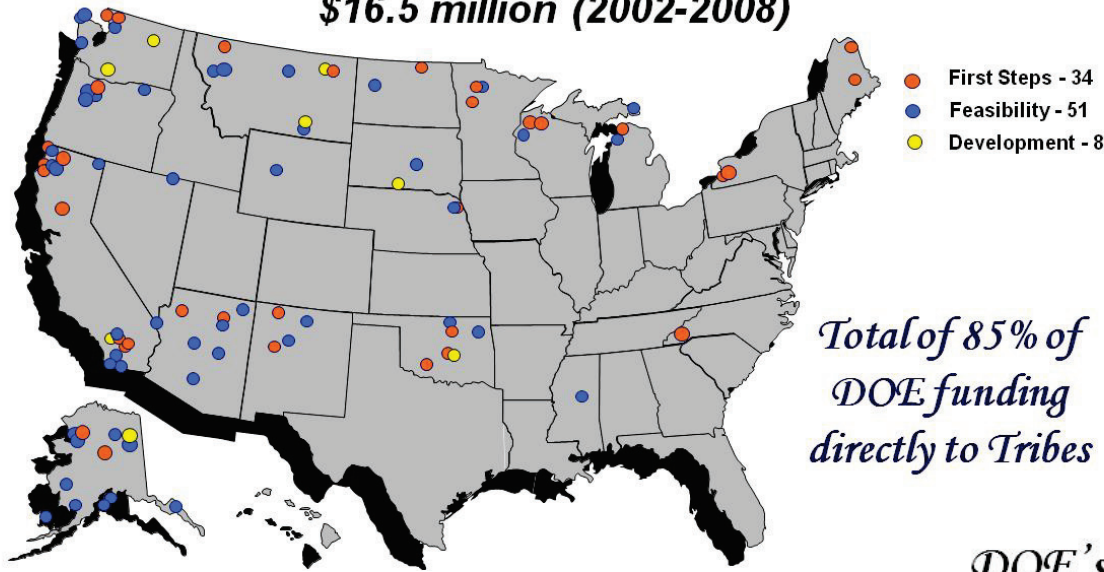
# We Live in a Changing World

## Tribal Energy Security ↔ Tribal Sovereignty



# DOE's Tribal Energy Program

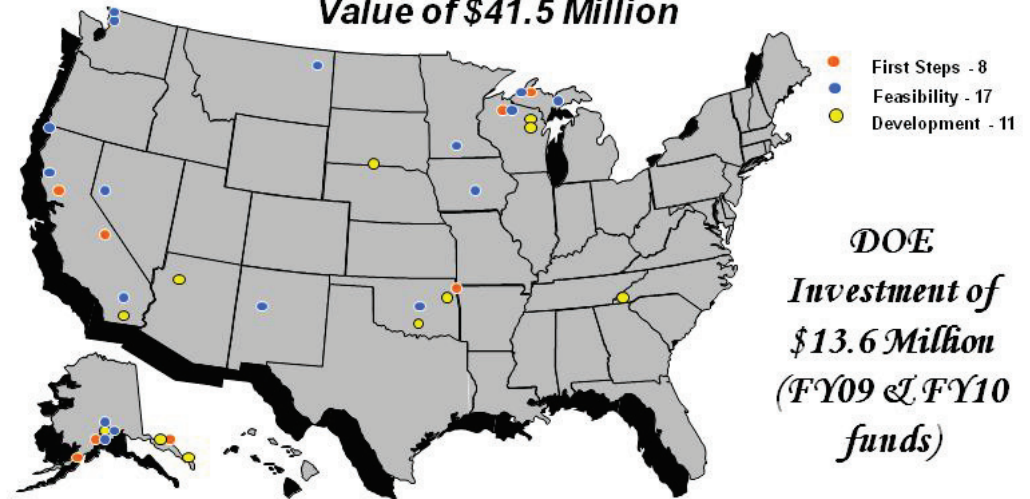
DOE has funded 93 tribal energy projects totaling \$16.5 million (2002-2008)



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



DOE Investment of \$13.6 Million (FY09 & FY10 funds)

Tribes Committing \$27.8 million