

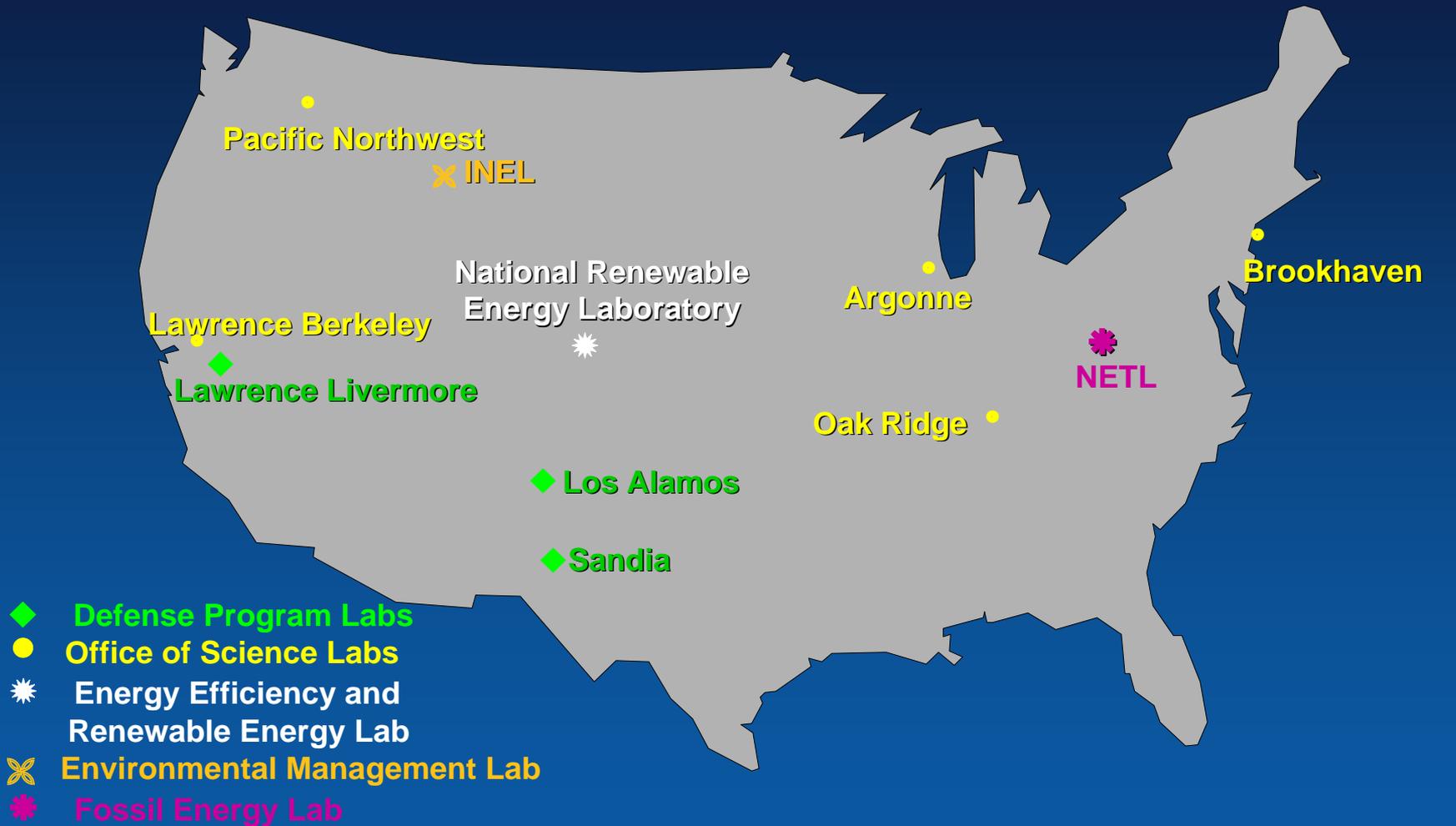
# Tribal Business & Economics Workshop

Roger Taylor

National Renewable Energy Laboratory



# Major DOE National Laboratories



# Major NREL Technology Thrusts

## Supply Side

Wind Energy

Solar Photovoltaics

Concentrating Solar  
Power

Solar Buildings

Biomass Power

Biofuels

Geothermal Energy

Hydrogen

Superconductivity

Distributed Power



## Demand Side

Hybrid Vehicles

Fuels Utilization

Buildings Energy  
Technology

Federal Energy  
Management

Advanced Industrial  
Technologies

## Cross Cutting

Basic Energy Science

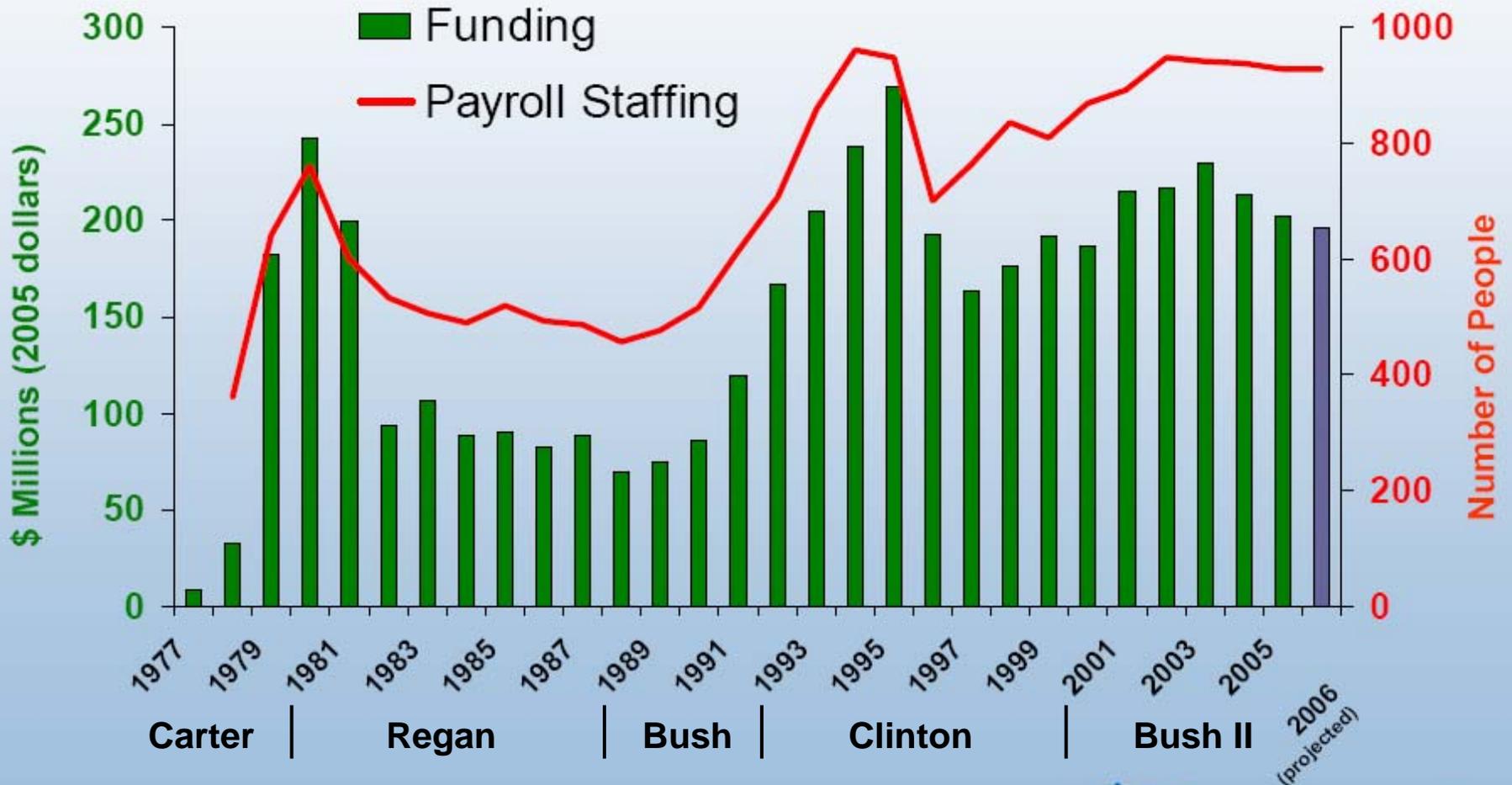
Analytical Studies

International Programs

**Tribal Energy Program**

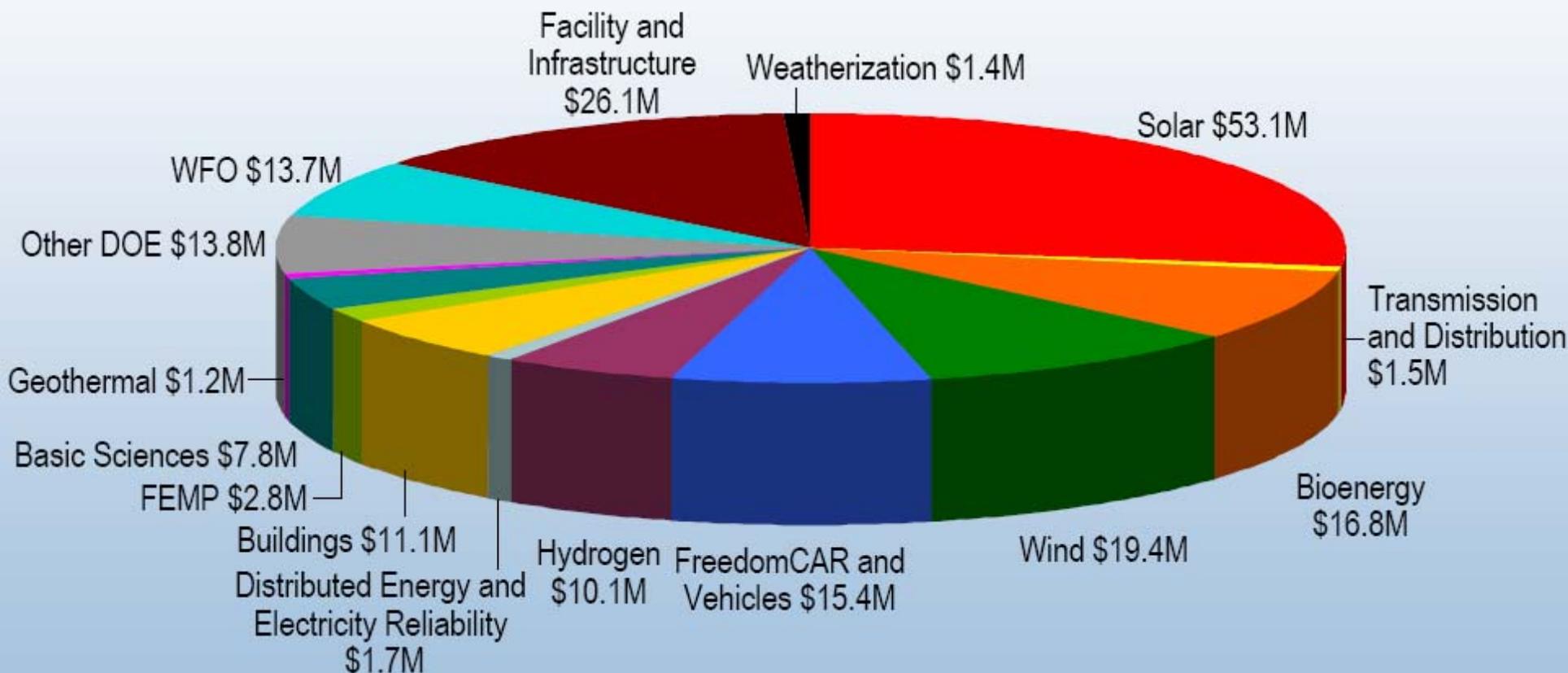
# NREL Funding and Staffing

Funding in 2005 Dollars

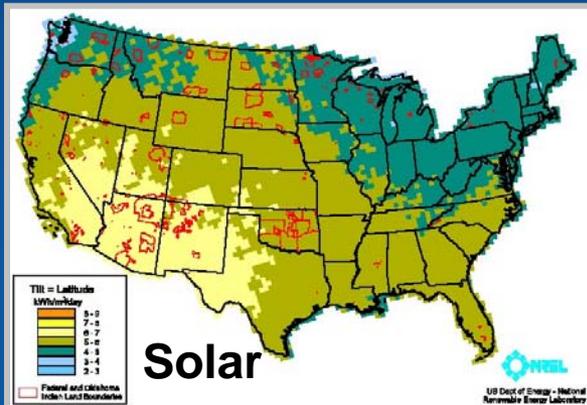
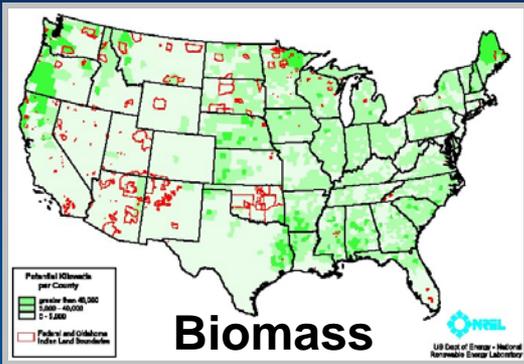
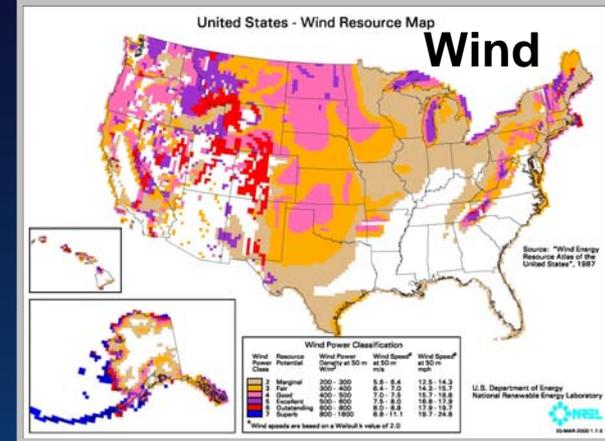
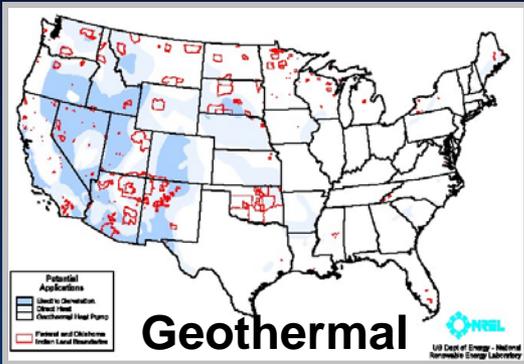


# NREL FY 2006 Program Portfolio

Estimated \$195.9 Million



# Renewable Resource Options



# Renewable Technology Options

## Small Modular Power



Power



## Small Wind



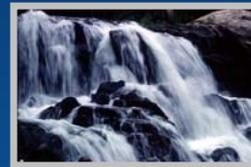
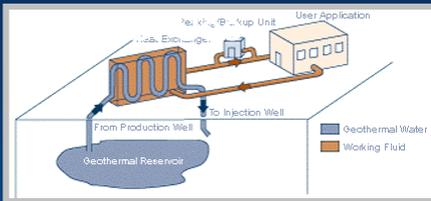
## Diesel Hybrids



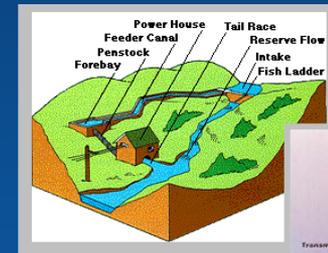
## Big Wind



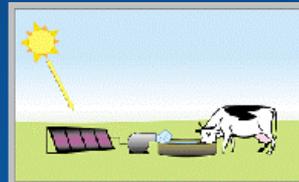
## Direct Use



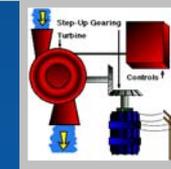
## Small Hydro



## Stock Watering



## PV - Remote Homes



## Process Heat



## Buildings

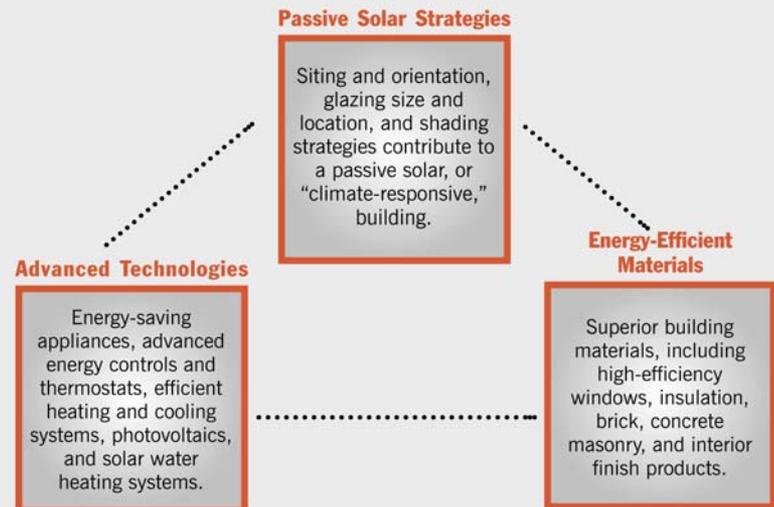


# Building Design



## “Whole Buildings” Strategy:

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



# 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.



# 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

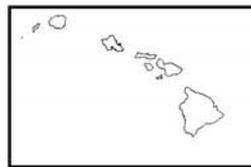
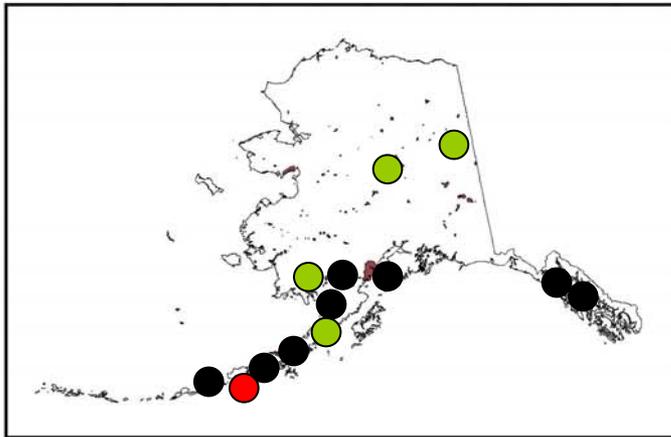
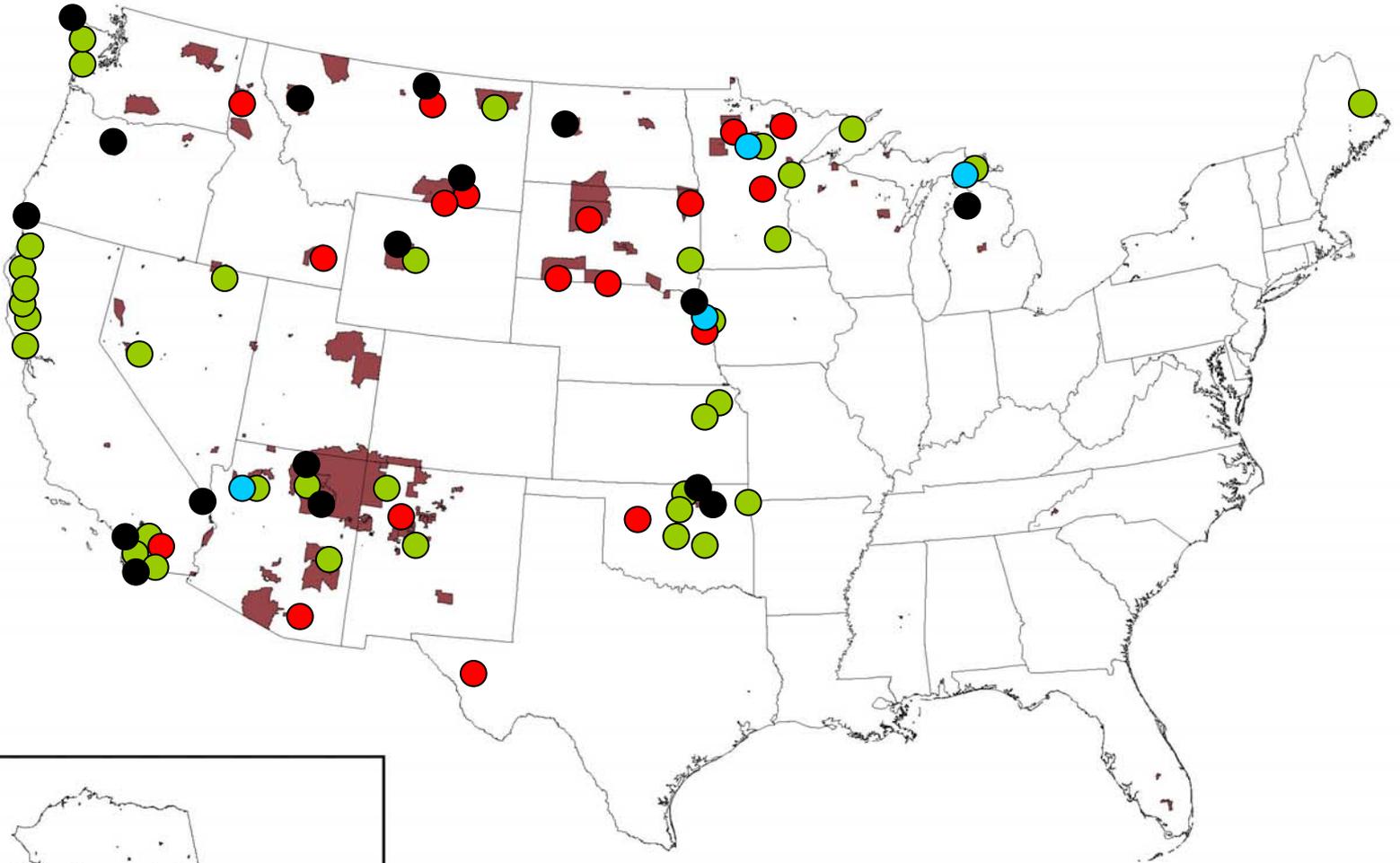


## Large (250 kW – 2+ MW)

Central Station Wind Farms

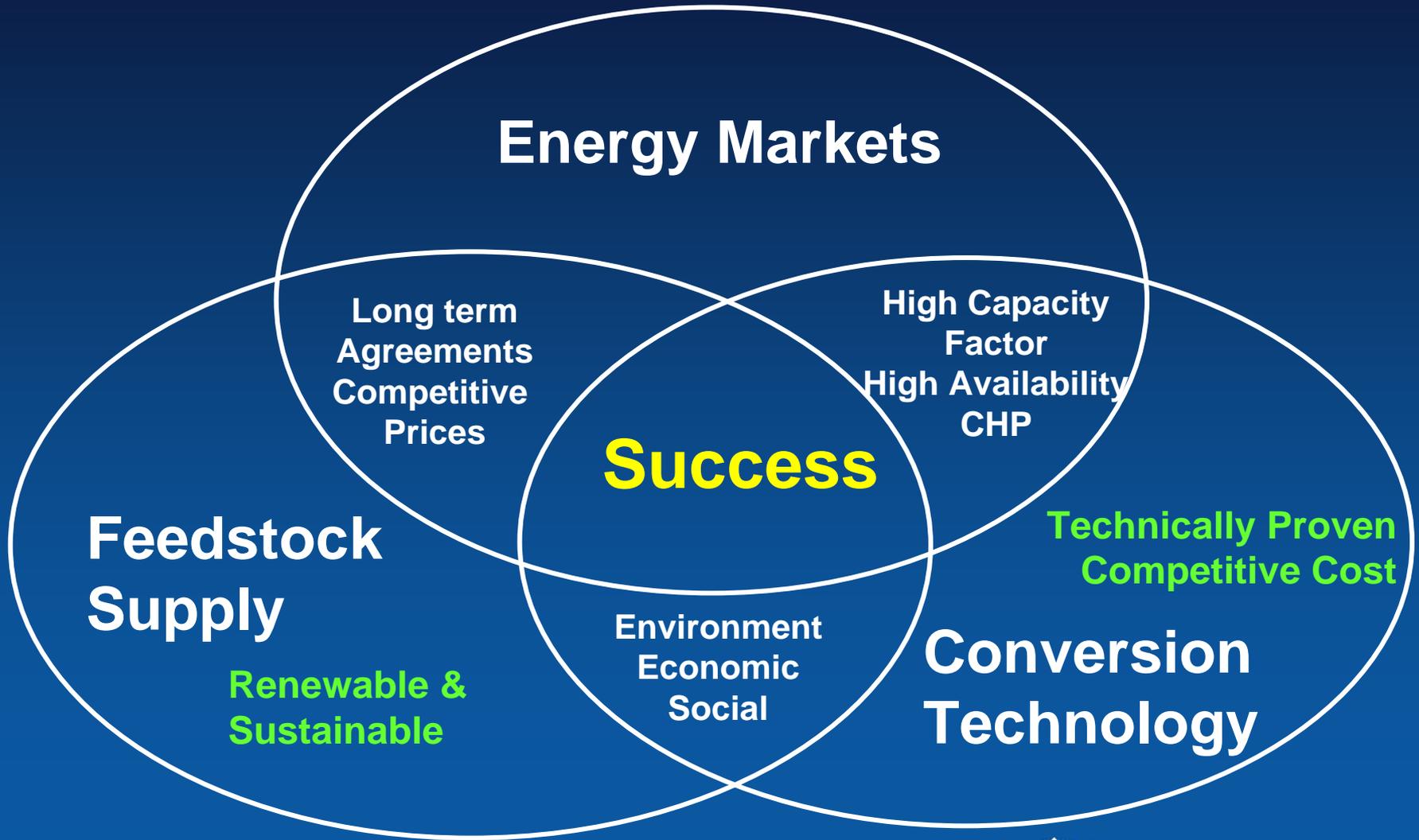
Distributed Power

# Tribal Wind Monitoring Sites

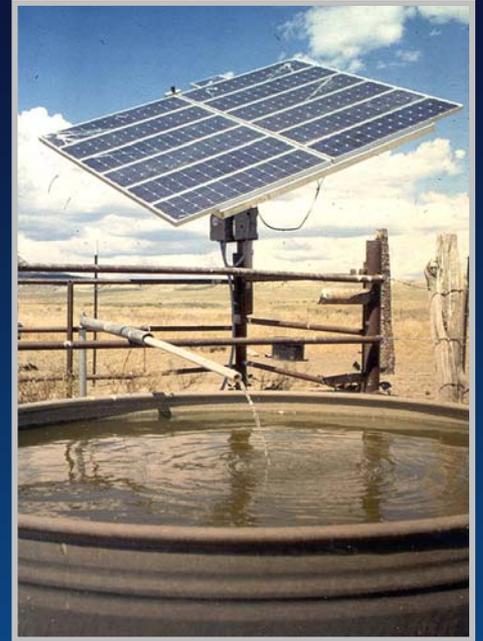


- 20m WPA Monitoring Completed
- 20m WPA Anemometer
- 50m WPA Anemometer
- 50m TEP Anemometer

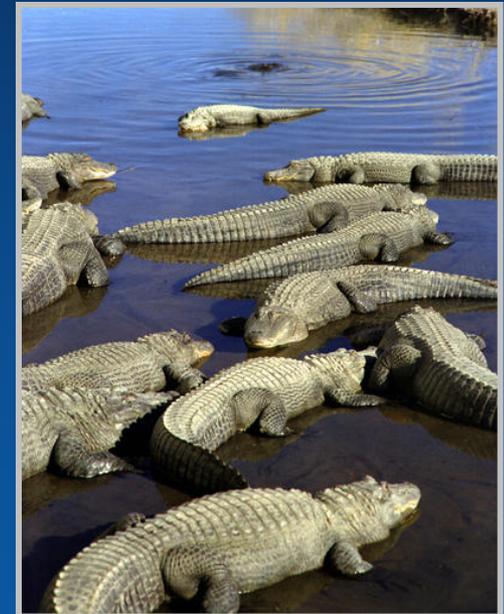
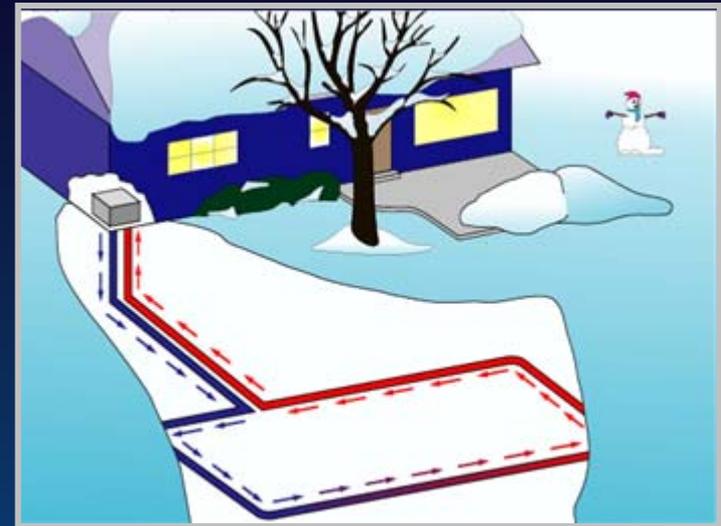
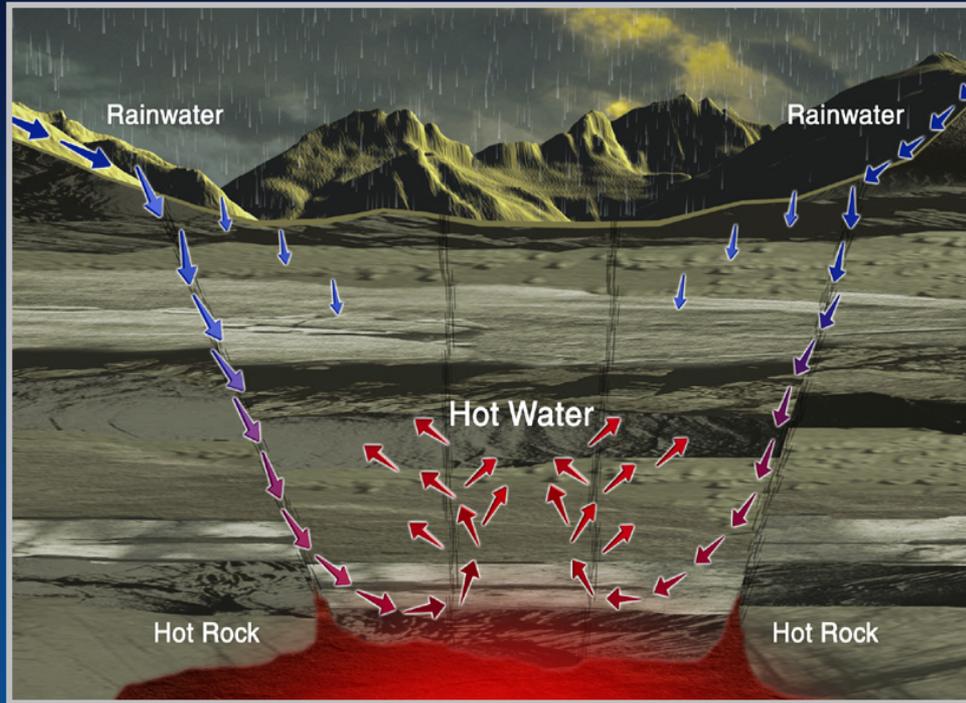
# Bioenergy Criteria for Success



# Solar Options



# Geothermal Options



# Small Hydro Power

**INL** Idaho National Laboratory Search

Home > [Renewable Energy](#) > [Hydropower](#) > [Virtual Hydropower Prospector](#) >

## Virtual Hydropower Prospector

### Region Selector

Click on a region to access the VHP desktop



Alaska 19  
Hawaii 20

**Home**

**Hydropower**

- Advanced Turbine Systems
- Annotated Bibliography
- Environmental Research
- Hydropower Facts
- Research and Development
- Resource Assessment
- Technology Transfer
- Virtual Hydropower Prospector
- Region Selector**
- User Guide (PDF 4.3 MB)
- Pop Enabling
- Data Sources
- Disclaimers

Document Archive  
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Contacts

A-Z Index  
Contact Information  
Staff Directory

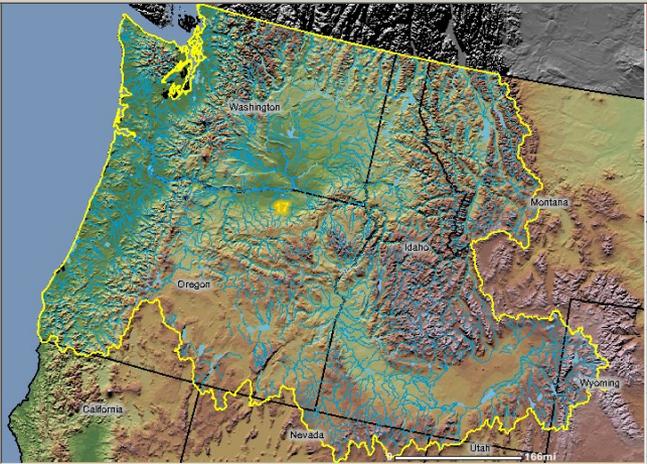
Idaho Cleanup Project

The Idaho National Laboratory is operated for the U.S.

**Refresh Map**

**Legend**

- Water Energy Resource Sites
- Hydrography
- Power System
- Transportation
- Areas & Places
- Land Use



Washington  
Oregon  
California  
Nevada  
Utah  
Idaho  
Montana  
Wyoming  
168mi

Thumbnail Map On/Off

- Zoom In
- Zoom Out
- Pan
- Zoom to Previous
- Full Extent
- Identify
- Find
- Select By Rectangle
- Select By Distance
- Buffer
- Query
- Clear Pins
- Clear Select
- Measure

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

Refresh Map

### Legend

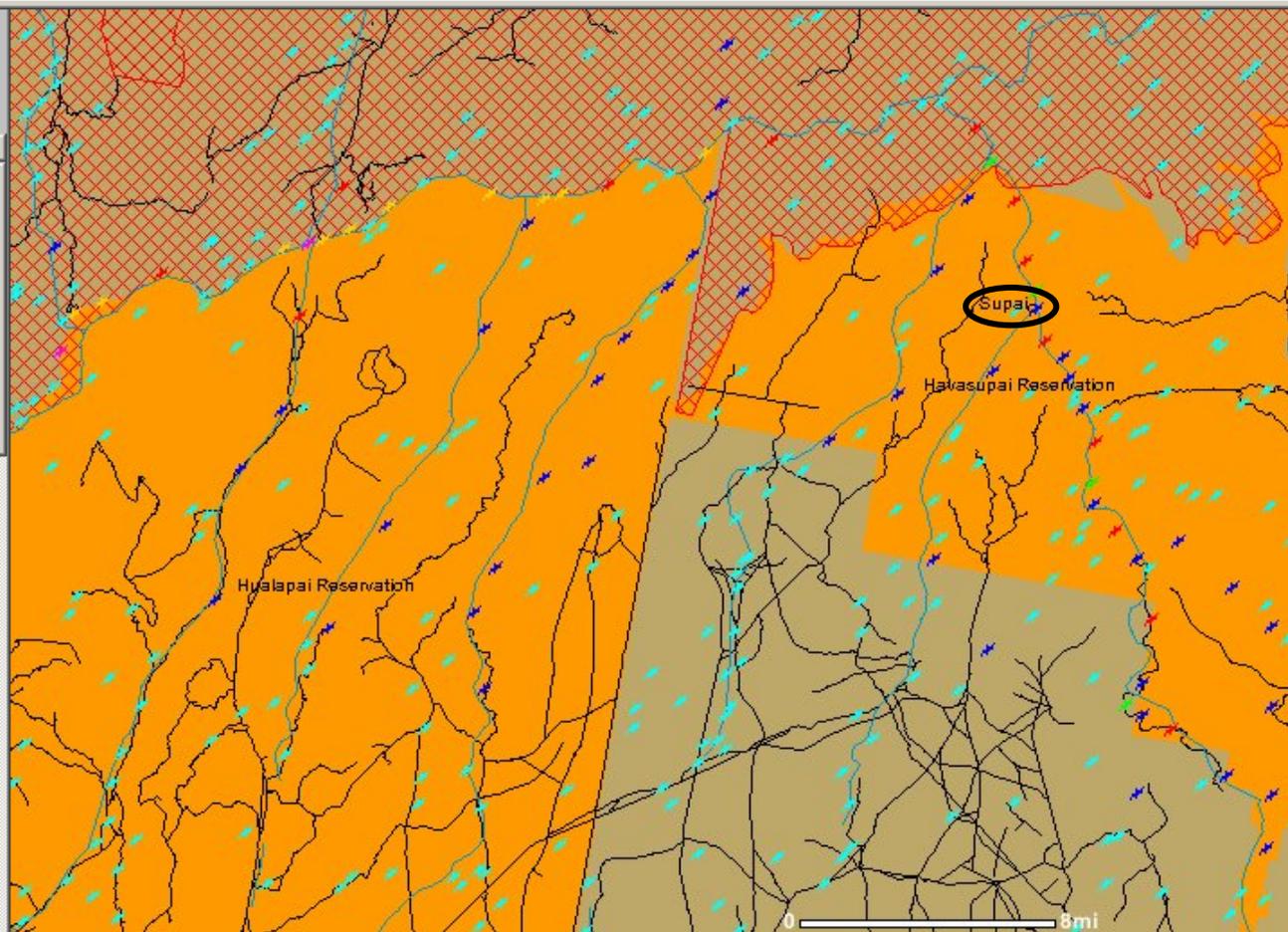
Water Energy Resource Sites

Feature Active  
Select Feature

- High Head High Power
- Low Head High Power
- High Head Low Power
- Low Power Conventional
- Low Power Unconvention
- Microhydro

Hydrography  
Power System

Feature Active



#### Active Layer - High Head/Low Power

Rec	Power Class	Power Potential (MW)	Hydraulic Head (ft)	Flow Rate (cfs)	Federally Excluded	Environmentally Excluded	Nearest Rd. (mi)	Nearest RR (mi.)	Nearest Population (mi)	Nearest Powerline (mi)	Nearest Substation (mi)	Nea Power (r
1	High Head/Low Power	0.463	34.91	156.44	N	N	1.611	999999	0.073	999999	999999	999

Information  
Map On/Off

Zoom In

Zoom Out

Pan

Zoom to Previous

Full Extent

Identify

Find

Select By Rectangle

Select By Distance

Buffer

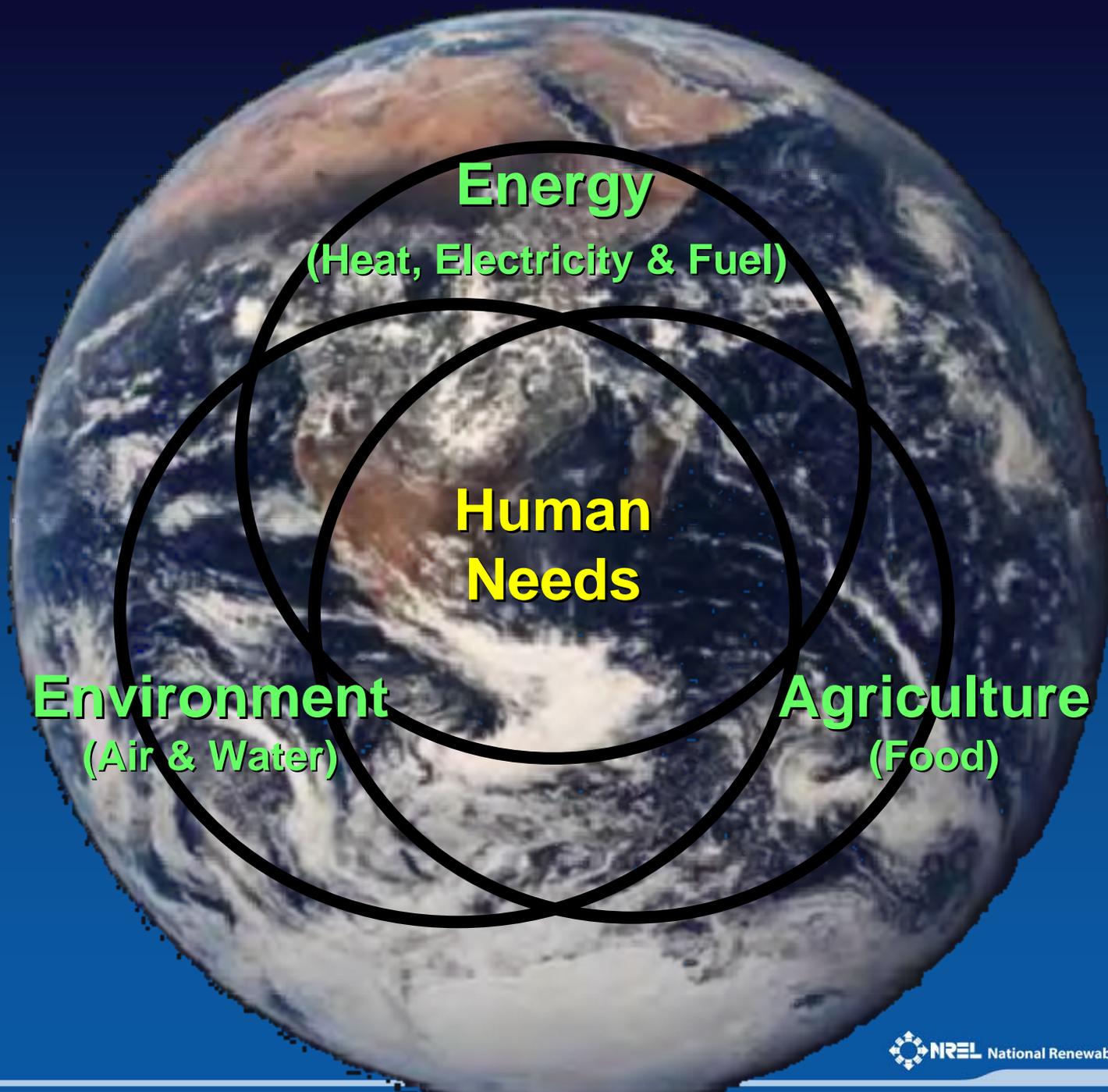
Query

Clear Pins

Clear Select

Measure

Print



**Energy**

(Heat, Electricity & Fuel)

**Human  
Needs**

**Environment**

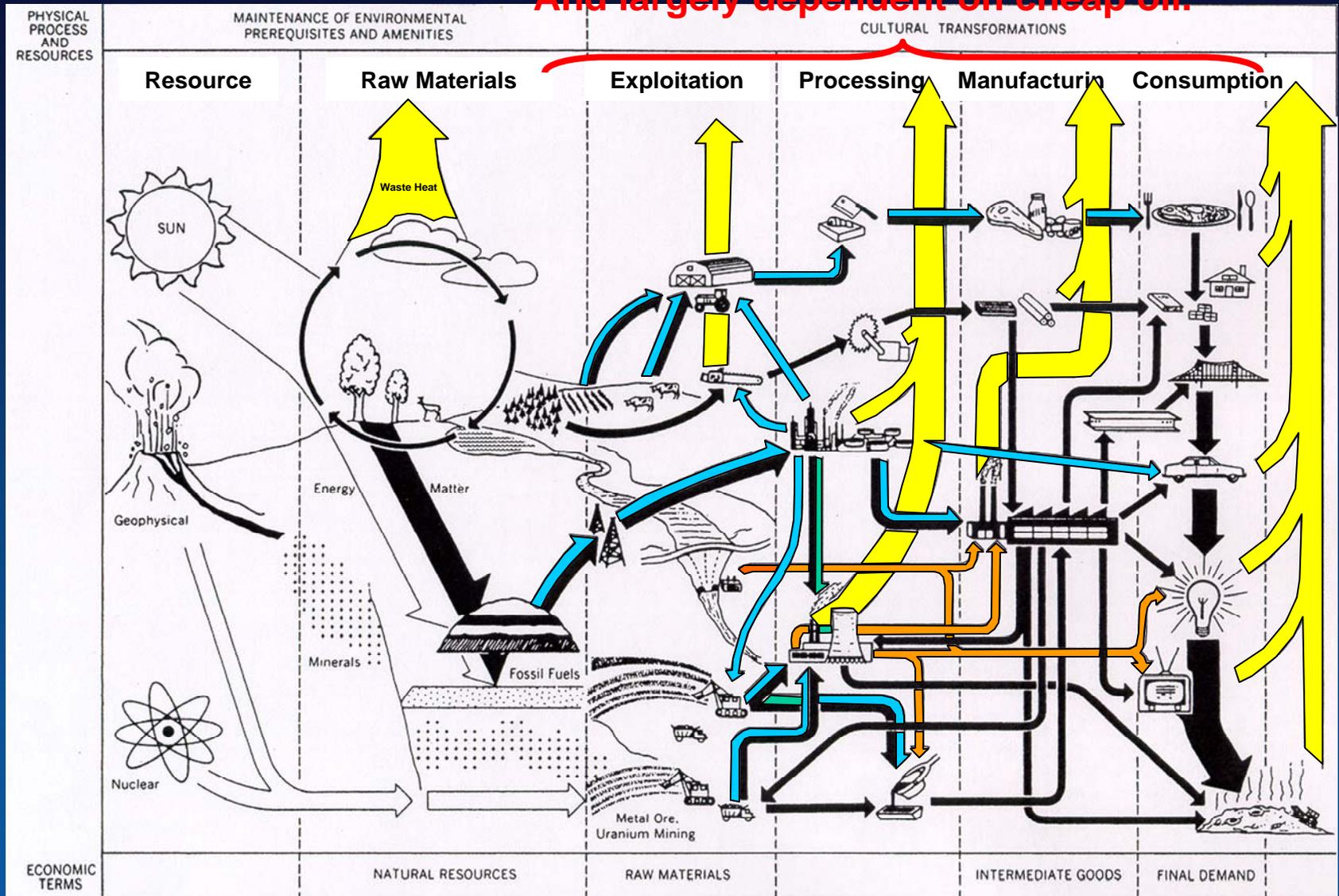
(Air & Water)

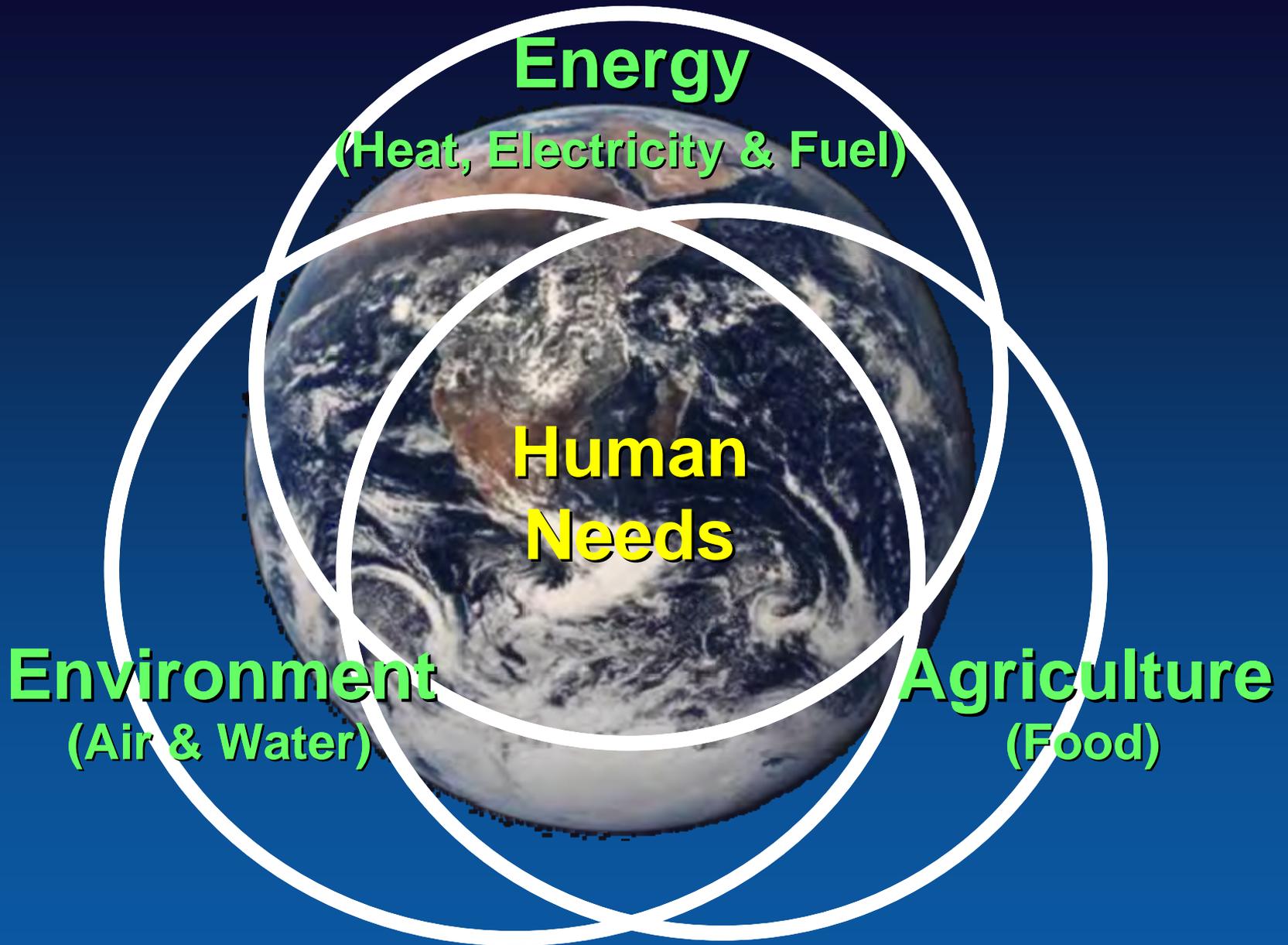
**Agriculture**

(Food)

# Where the global economy is very complex

And largely dependent on cheap oil.





Are we already exceeding the carrying-capacity of the planet?

# Tribal Energy Security & Sovereignty Through Local Self-Sufficiency

## Economic Dependence

Oil Imports  
Fuel at the Pump  
National Grid  
Coal-based Power  
Water Transport  
Foreign Manufacturing  
Agro-Industry

“He who has the gold,  
makes the rules.”



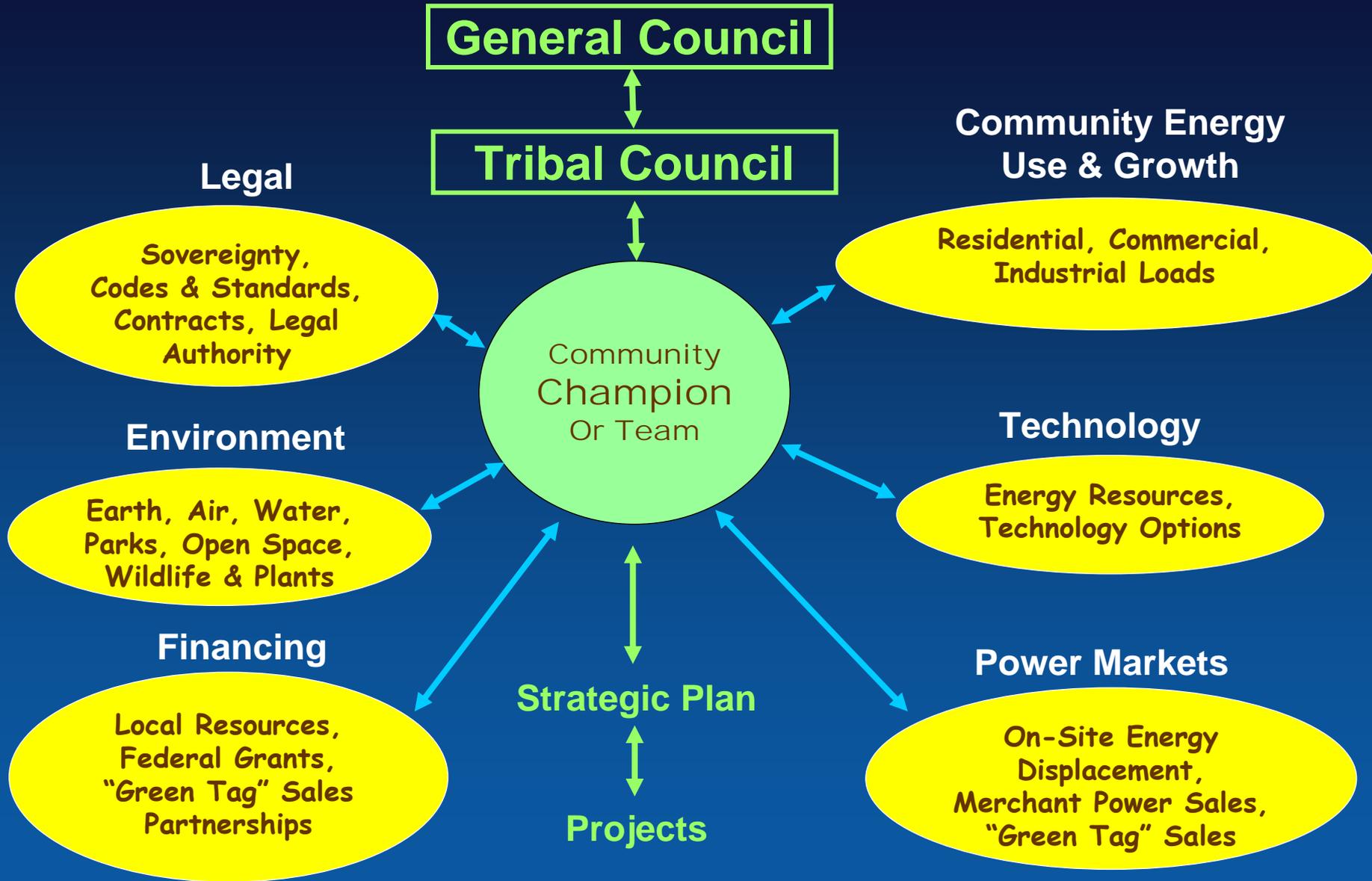
## Community Independence

Self sufficiency  
Food  
Energy  
Water  
  
Skill Rebuilding  
Local Production  
Regional Sourcing

Sufficiency & Enoughness  
Human Satisfaction

“Community of Cooperation”

# The Community Energy Development Challenge





**Energy**  
(Heat, Electricity & Fuel)

**Tribal  
Community  
Solution**

**Environment**  
(Air & Water)

**Agriculture**  
(Food)