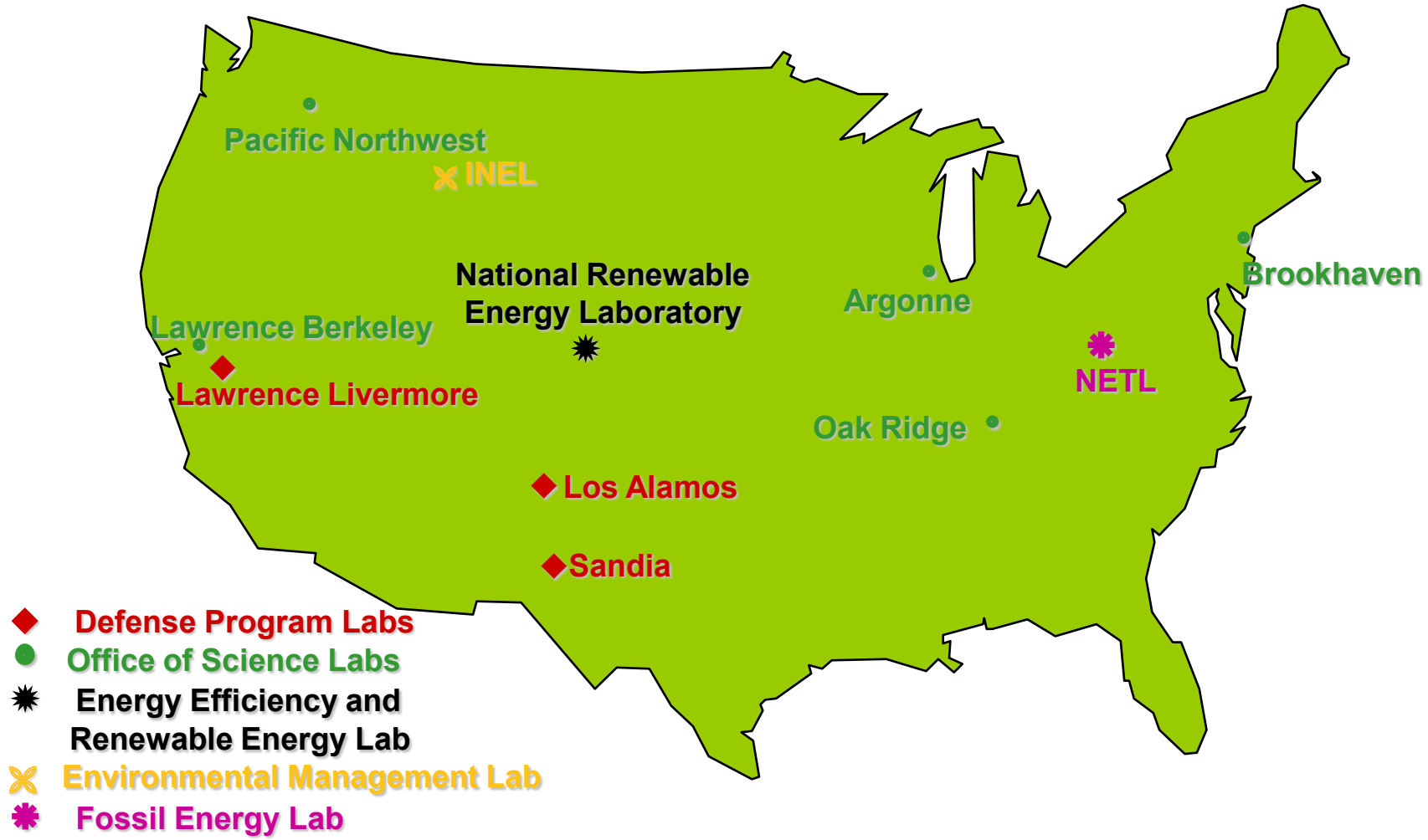
National Renewable Energy Laboratory
Innovation for Our Energy Future

Tribal Energy Program 2008 Annual Review

Roger Taylor

November 17, 2008

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

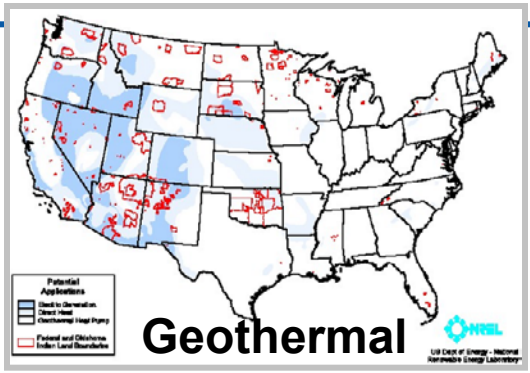
Demand Side

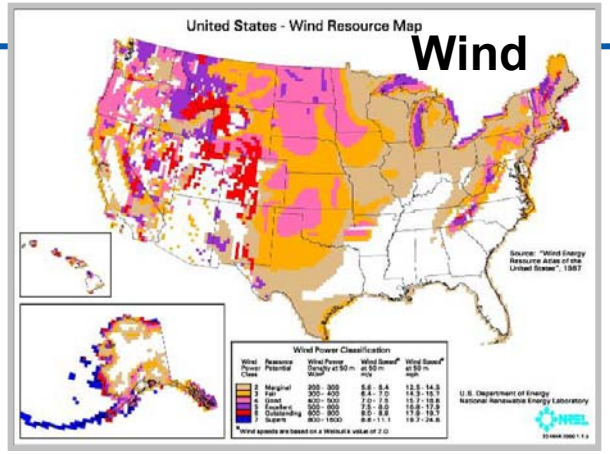
- Hybrid Vehicles
- Fuels Utilization
- Buildings Energy Technology
- Federal Energy Management
- Advanced Industrial Technologies

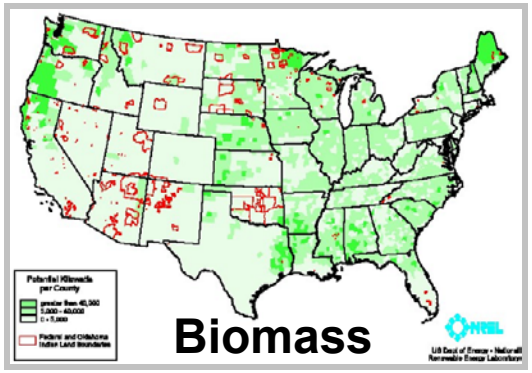
Cross Cutting

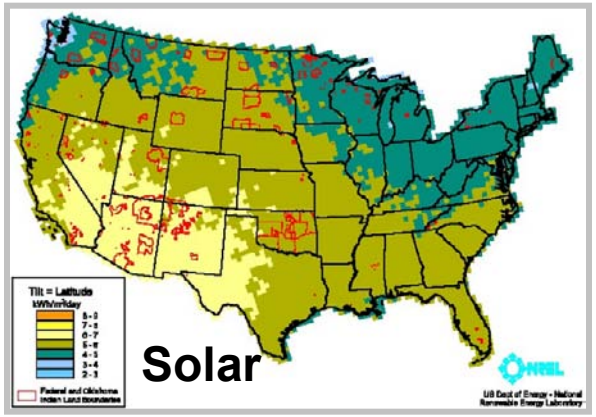
- Basic Energy Science
- Analytical Studies
- International Programs
- **Tribal Energy Program**

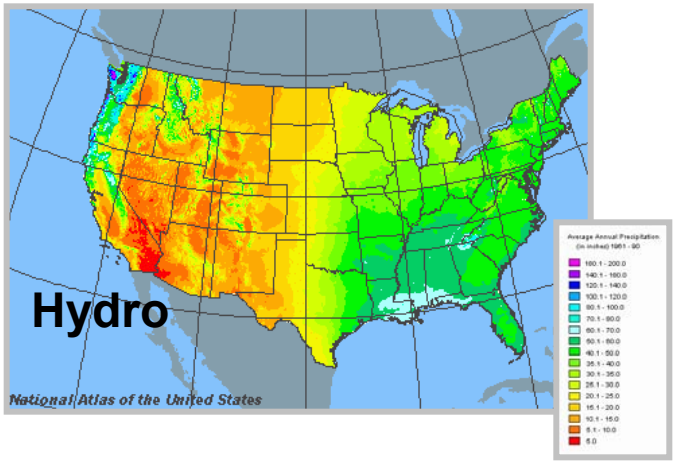
Renewable Resource Options









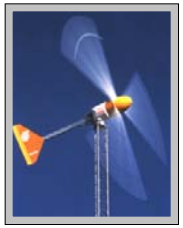


Renewable Technology Options

Power

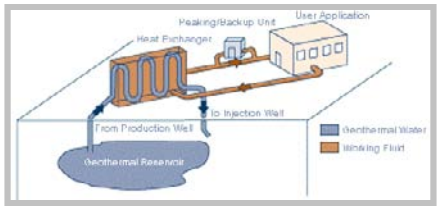
Biomass Heat, Power & Fuels

Small Wind



Diesel Hybrids

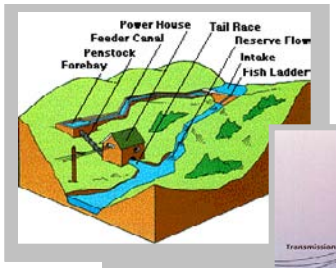
Direct Use

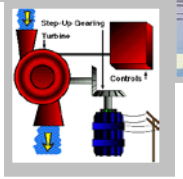


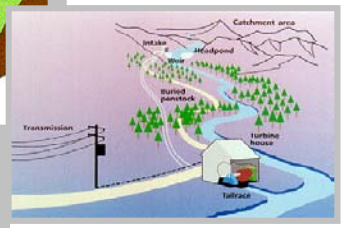
Big Wind

Remote Homes

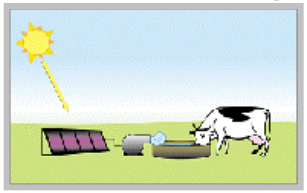
Small Hydro







Stock Watering



CS Power & Heat

Buildings

Energy Efficiency

Energy Star Appliances

Refrigerators – Half as much energy

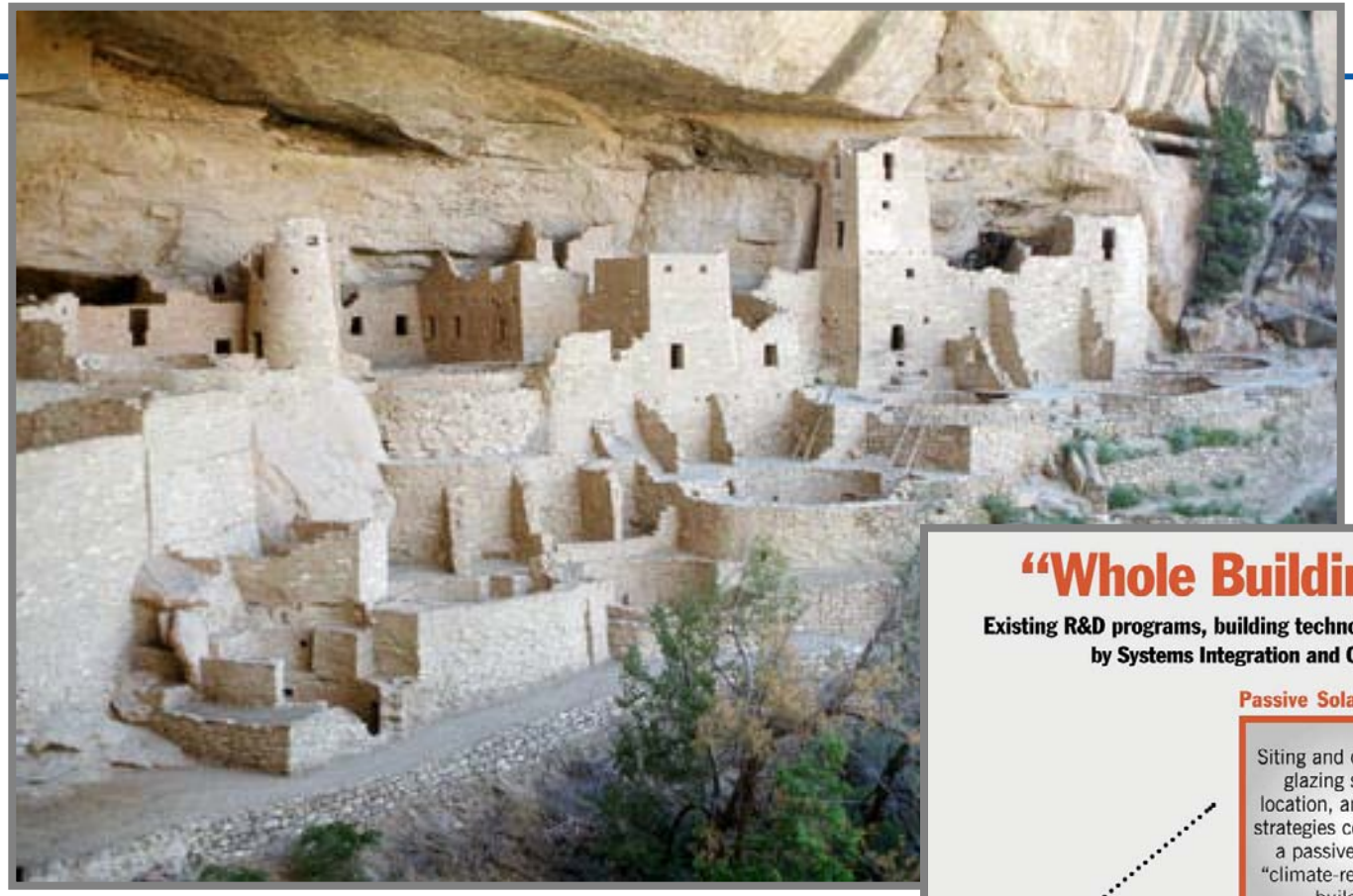
Clothes Washers – Save up to $110 per year

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 (≤10 kW)

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

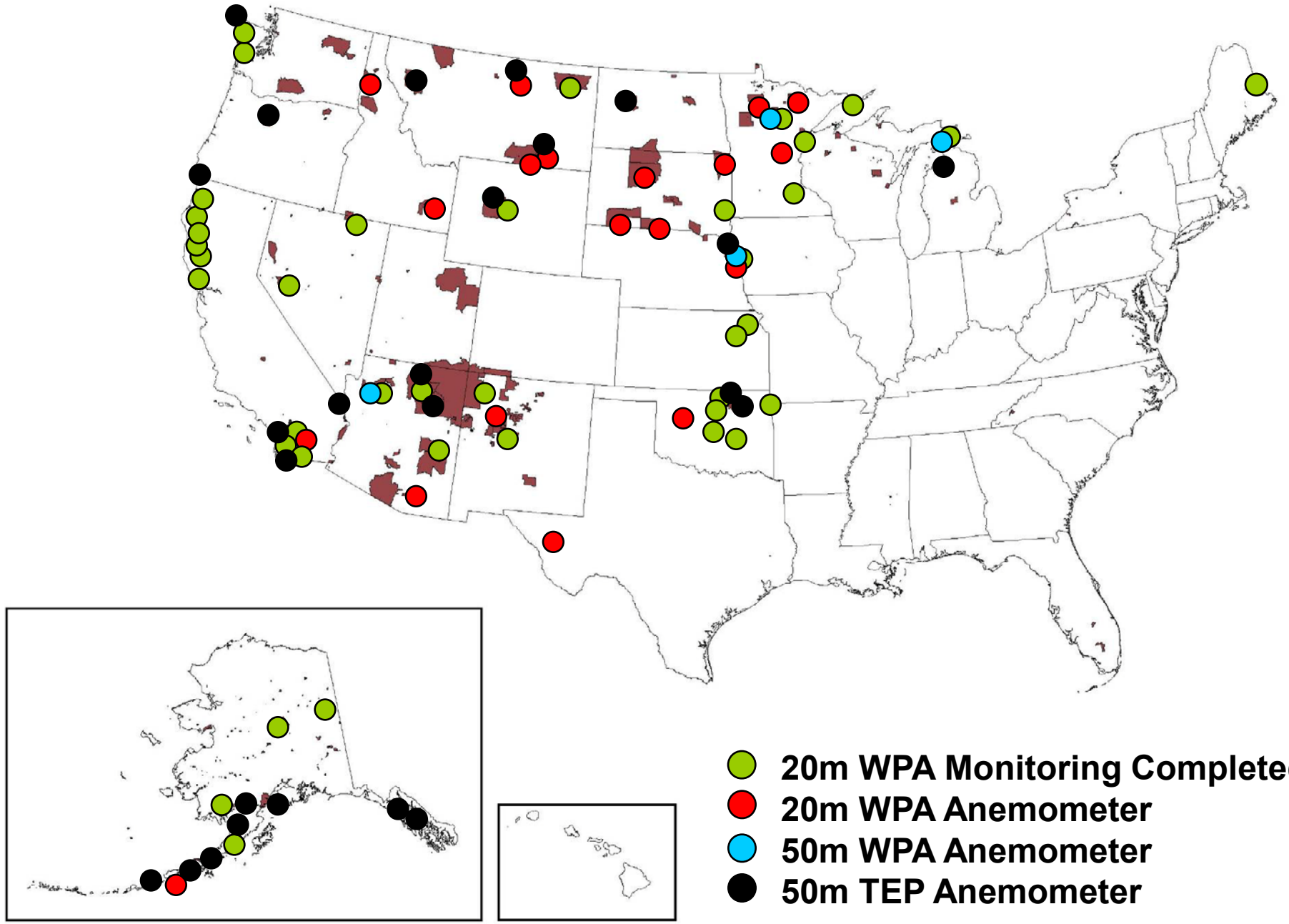
Intermediate (10-250 kW)

- Village Power
- Hybrid Systems
- Distributed Power

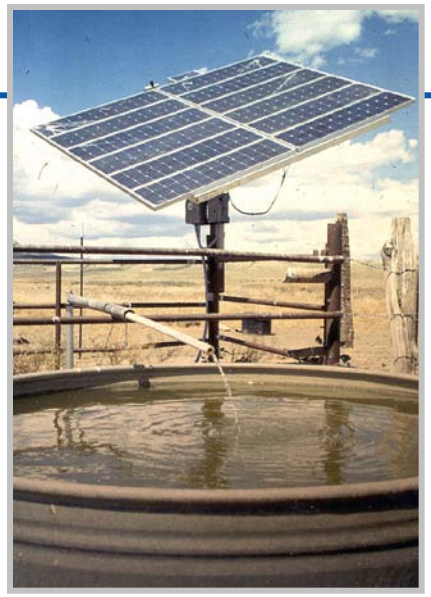
Large (250 kW – 2+ MW)

- Central Station Wind Farms
- Distributed Power

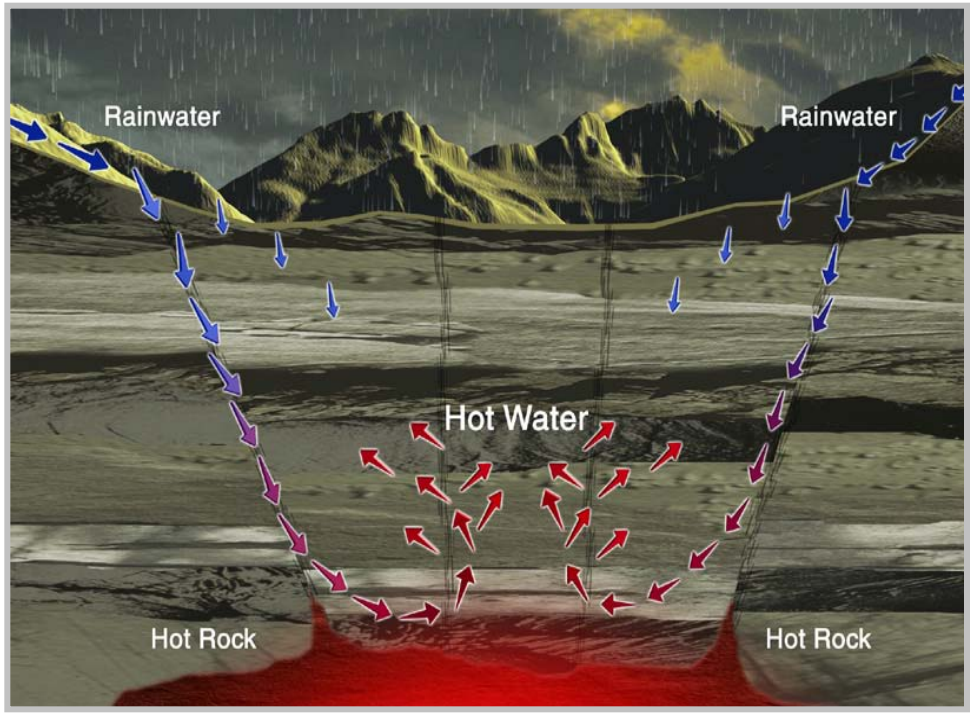
Tribal Wind Monitoring Sites



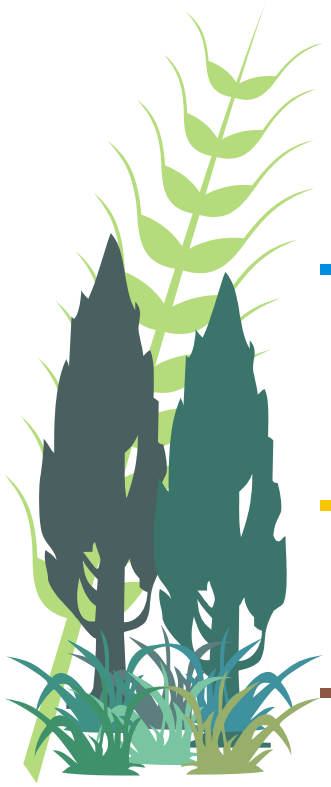
Solar



Geothermal Options



Biomass & Bioenergy Flows



Biomass

Fiber

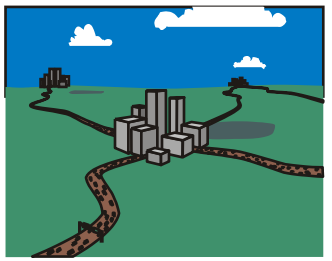
pulp
paper
lumber
plywood
cotton

Materials

Process Residues
black liquor
sawdust
bark

Crops, Animals

Food



Consumers

MSW clean fraction
yard trimmings
constr. & demolition wood
non-recyclable organics

Process Residues
dung
bagasse

stalks & straws
harvest residues
forest slash
forest harvest for energy plantations

Bioenergy

Energy Services

heat
CHP
electricity

Biofuels

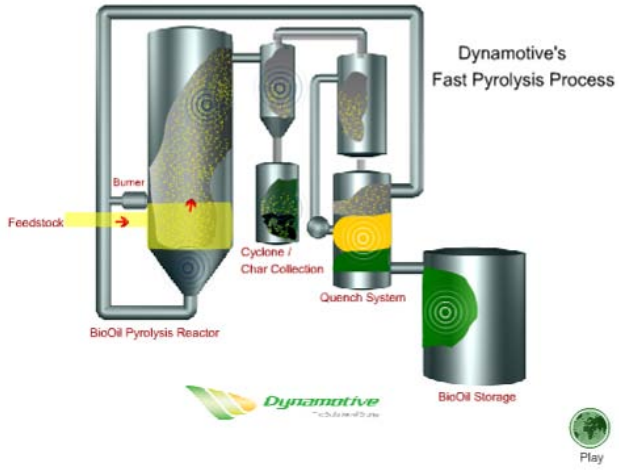
charcoal
biogas
ethanol

Bioenergy Opportunities

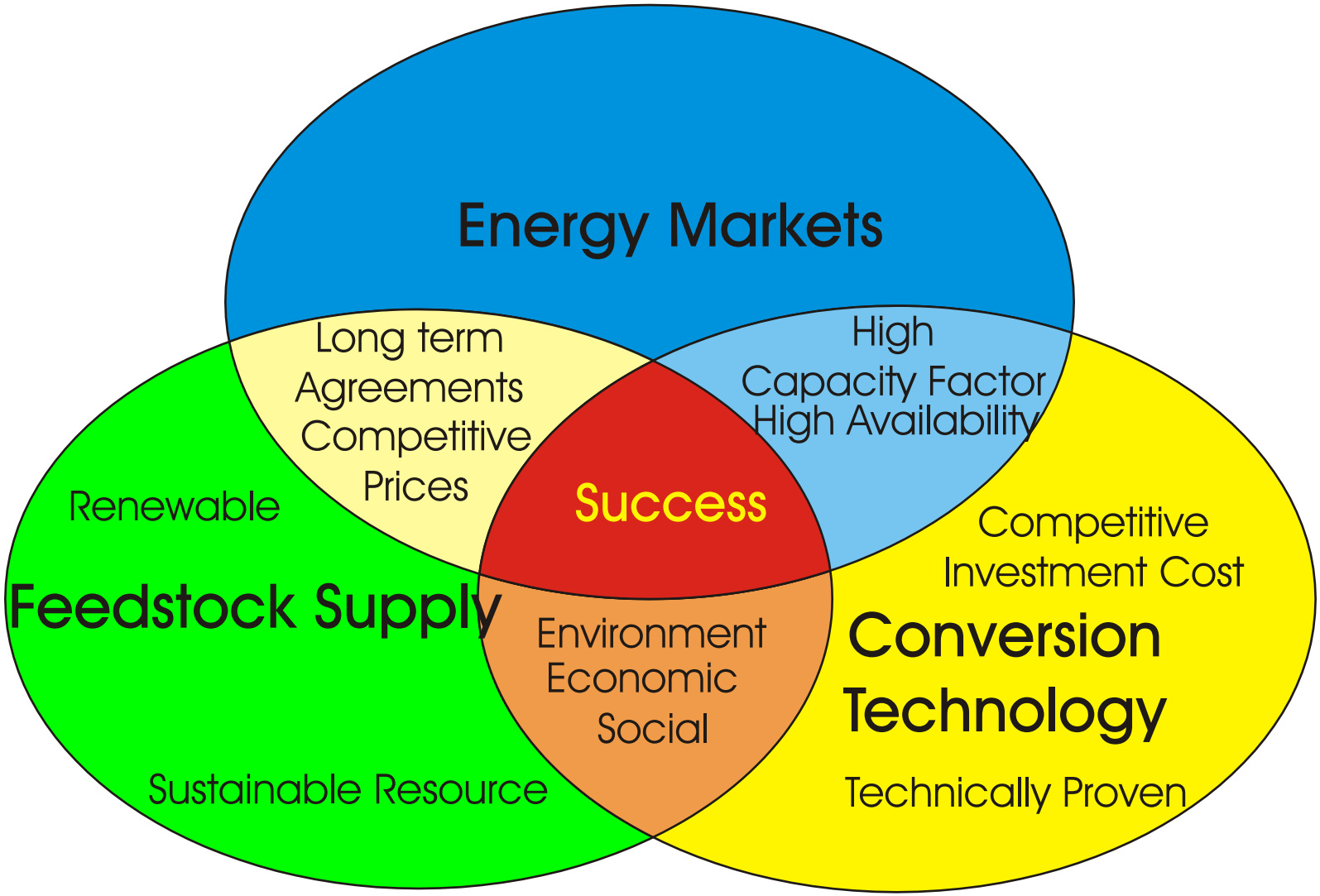
Heat

Power

Fuels



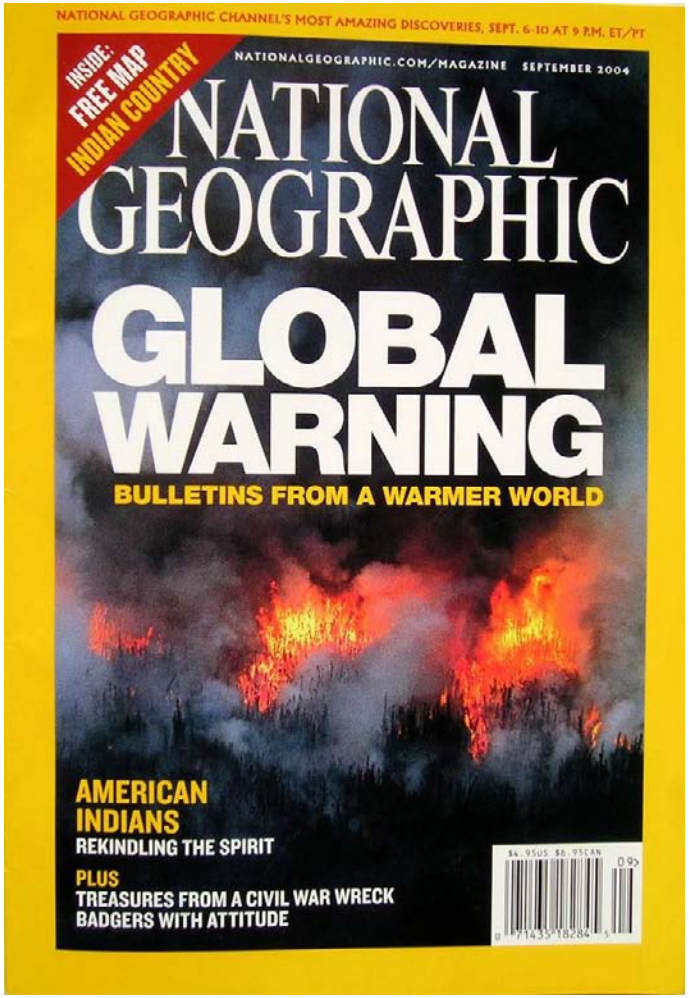
Bioenergy Project Requirements

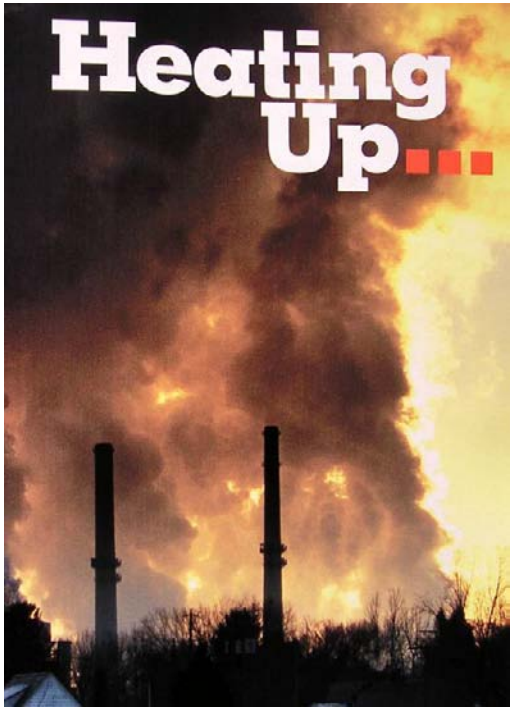


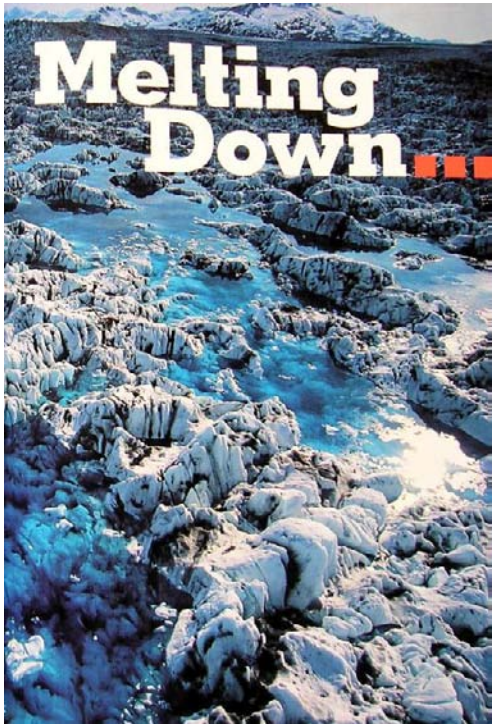
Small & Micro Hydro Power Options

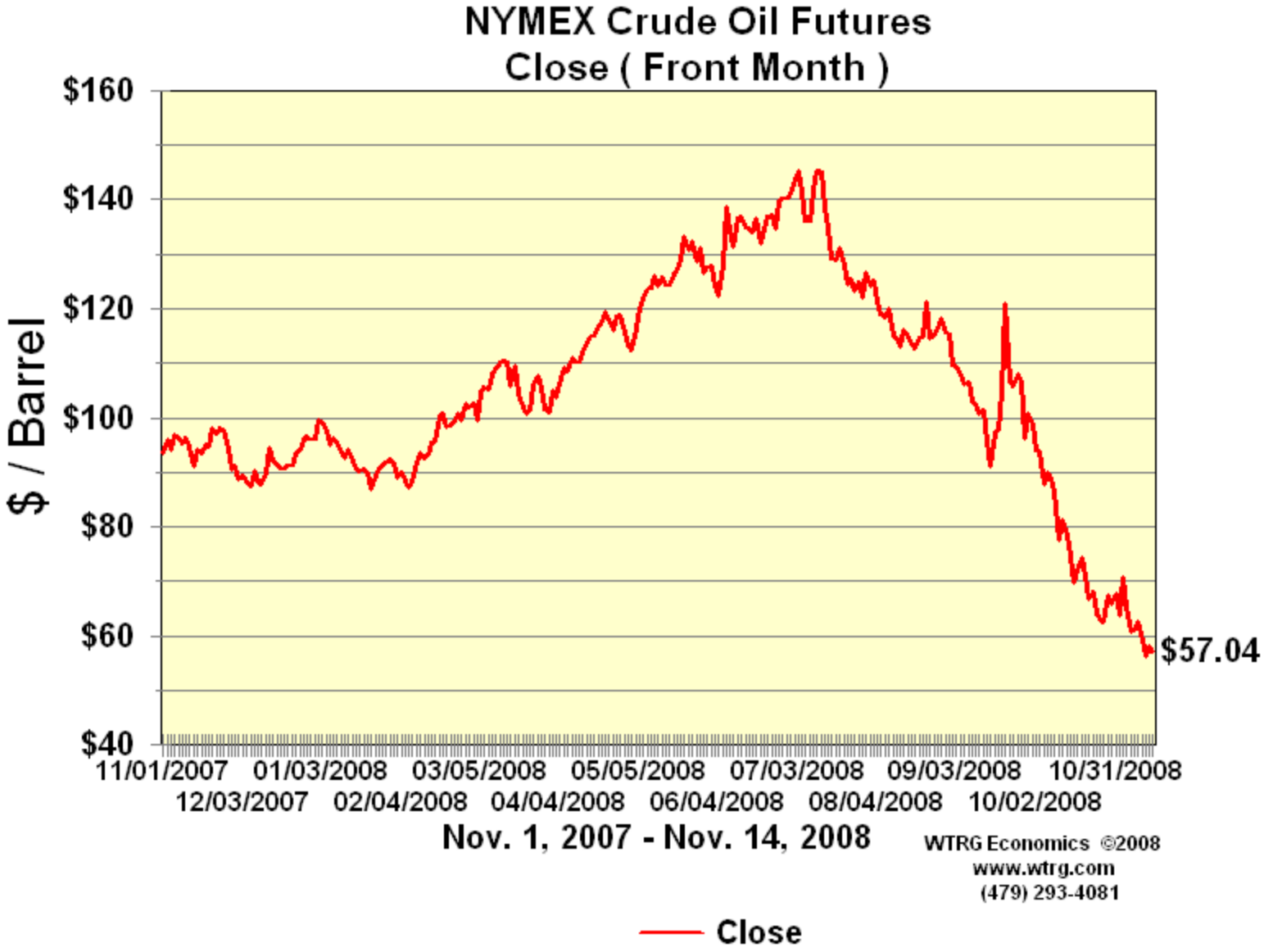
http://hydropower.inl.gov/prospector/

We Live in a Changing World








NYMEX Crude Oil Futures
Close (Front Month)
$160
$140
$120
$100
$80
$60
$40
$ / Barrel
$57.04
11/01/2007
12/03/2007
01/03/2008
02/04/2008
03/05/2008
04/04/2008
05/05/2008
06/04/2008
07/03/2008
08/04/2008
09/03/2008
10/02/2008
10/31/2008
Nov. 1, 2007 - Nov. 14, 2008
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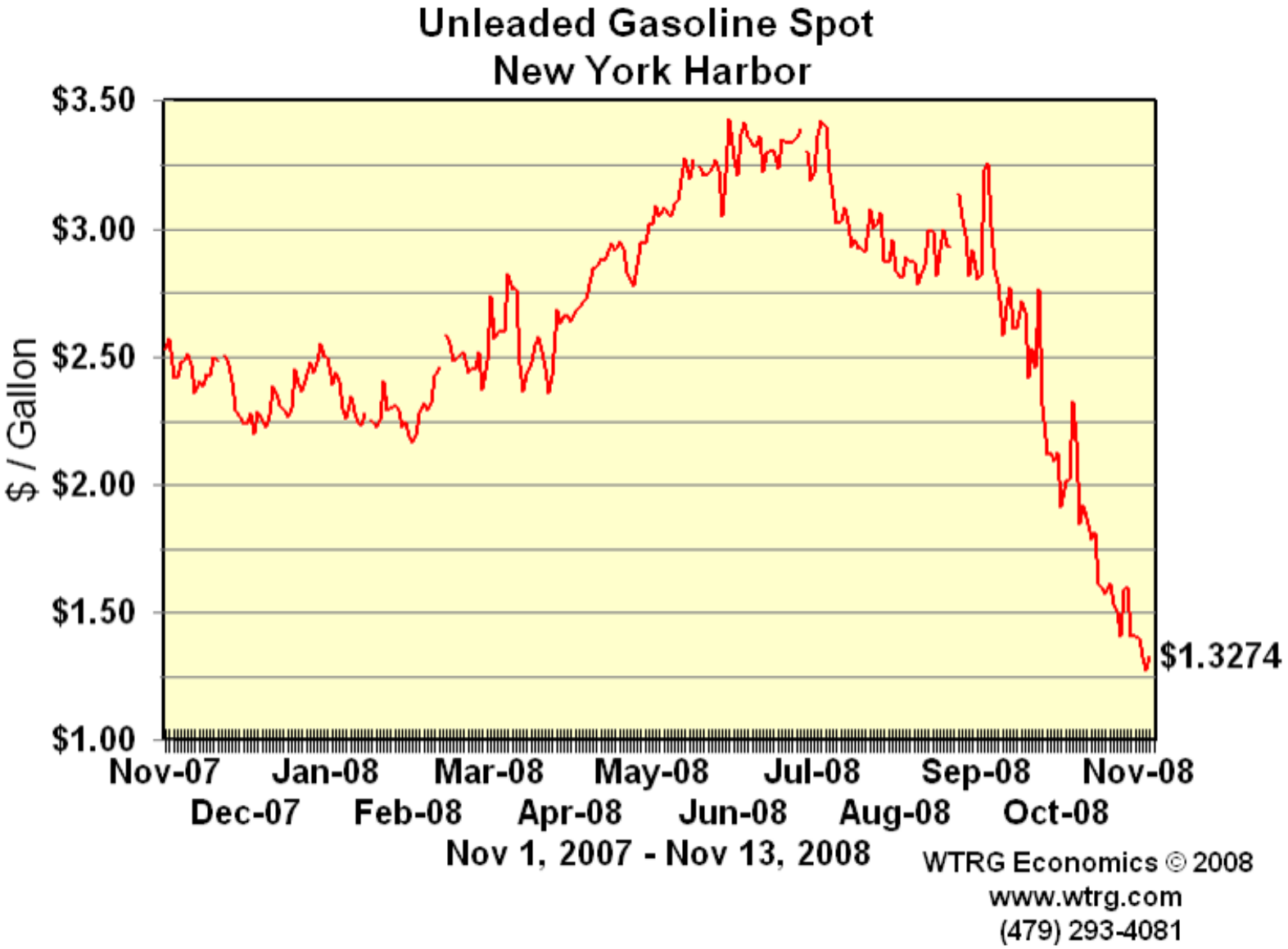
Close


Unleaded Gasoline Spot
New York Harbor
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$ / Gallon
$1.3274
Nov-07
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Nov 1, 2007 - Nov 13, 2008
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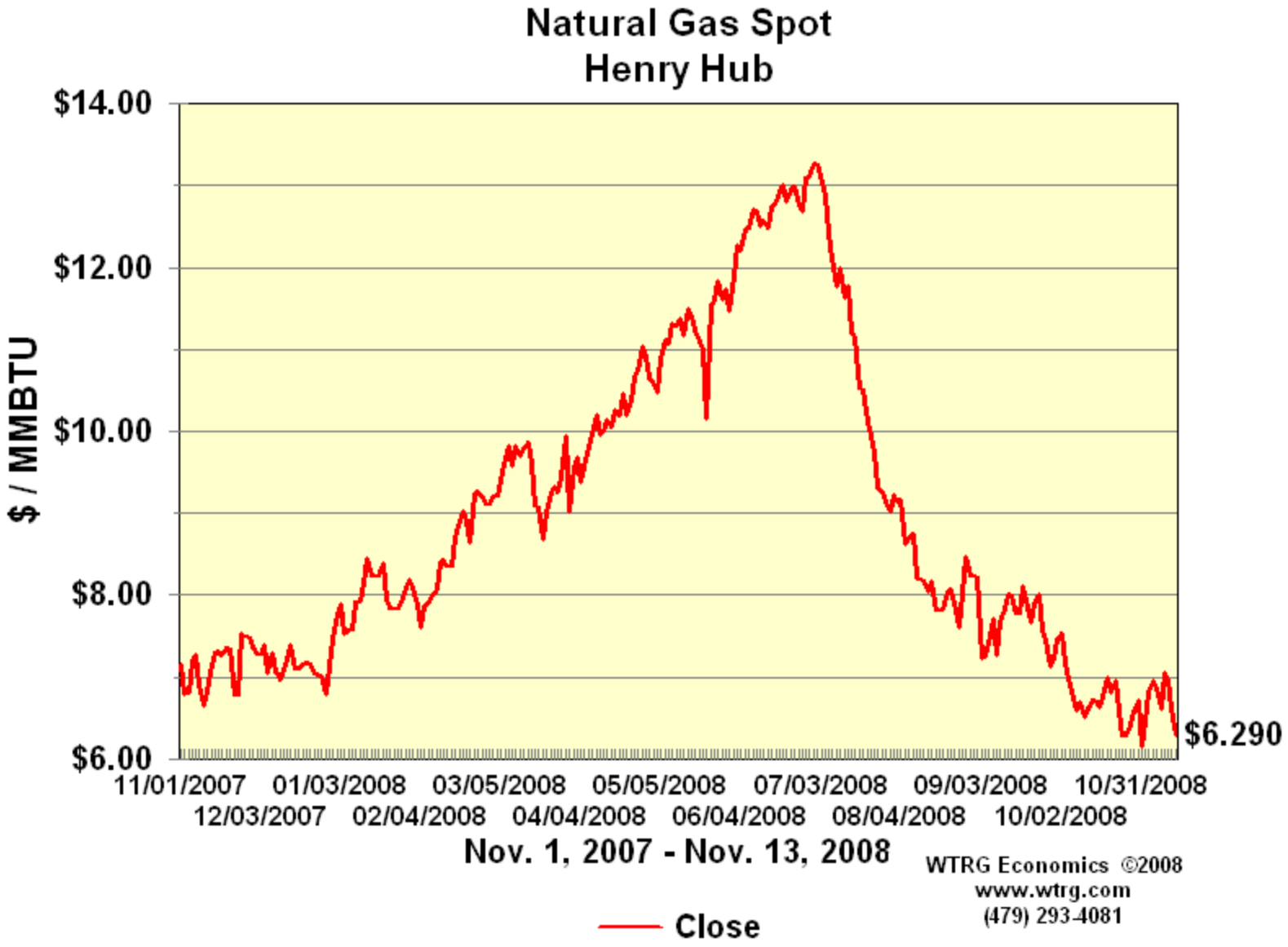
Natural Gas Spot
Henry Hub
$14.00
$12.00
$10.00
$8.00
$6.00
$ / MMBTU
$6.290
11/01/2007
12/03/2007
01/03/2008
02/04/2008
03/05/2008
04/04/2008
05/05/2008
06/04/2008
07/03/2008
08/04/2008
09/03/2008
10/02/2008
10/31/2008
Nov. 1, 2007 - Nov. 13, 2008
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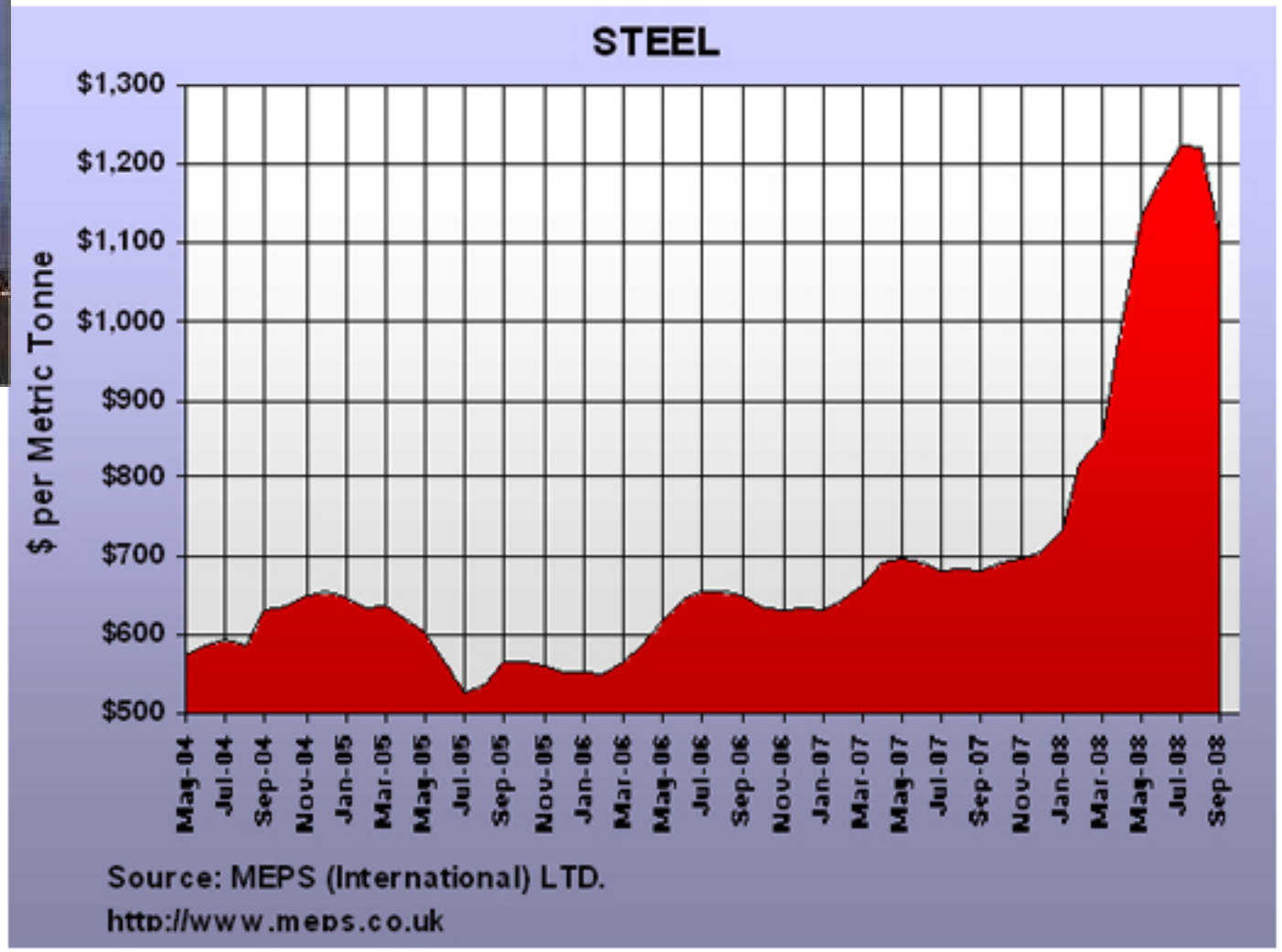
CORN

DAILY Cash - Nearby Futures Contract

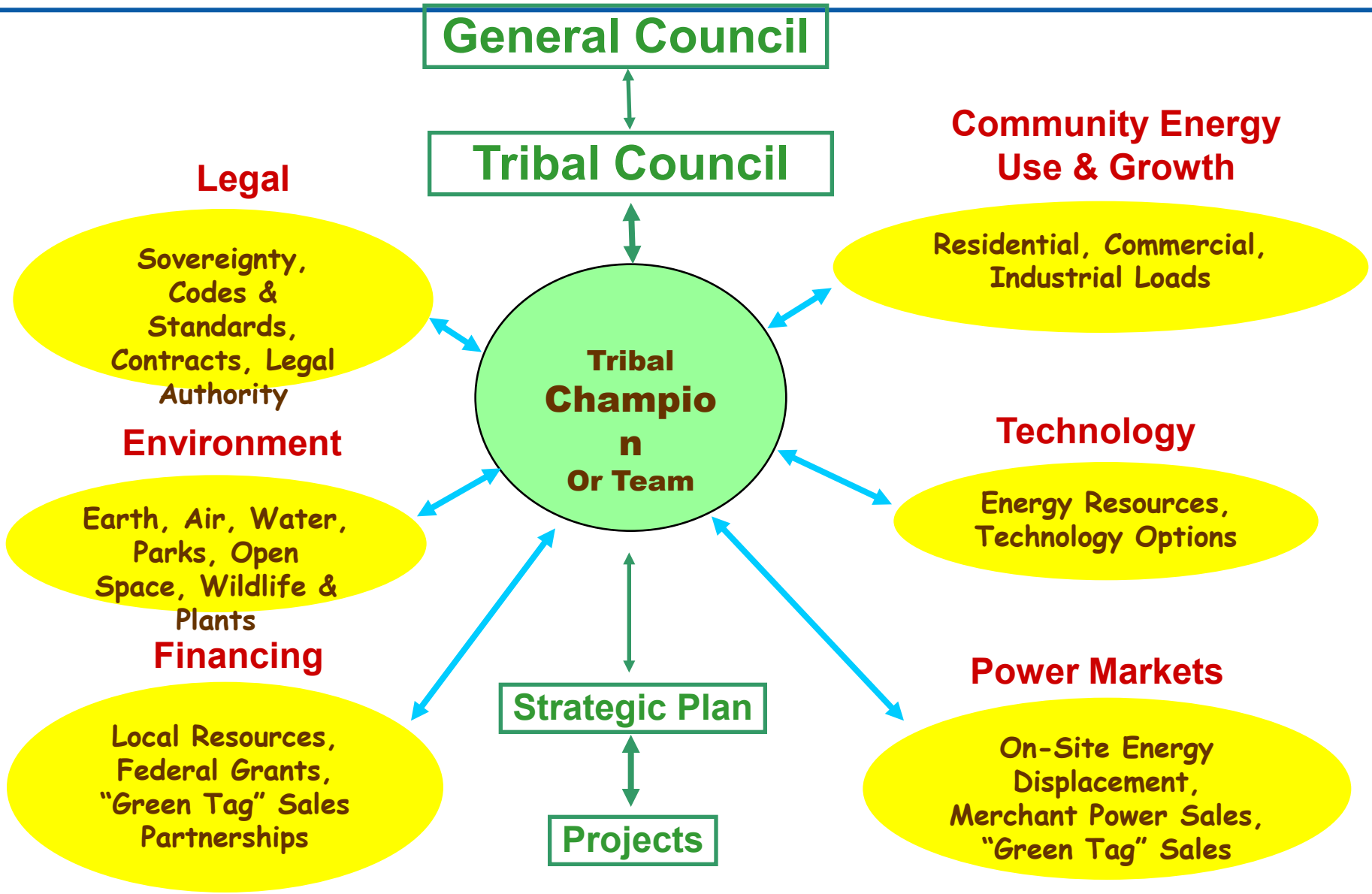
(September 2006 - Present time)


STEEL
$ per Metric Tonne
$1,300
$1,200
$1,100
$1,000
$900
$800
$700
$600
$500
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Source: MEPS (International) LTD.
http://www.meps.co.uk

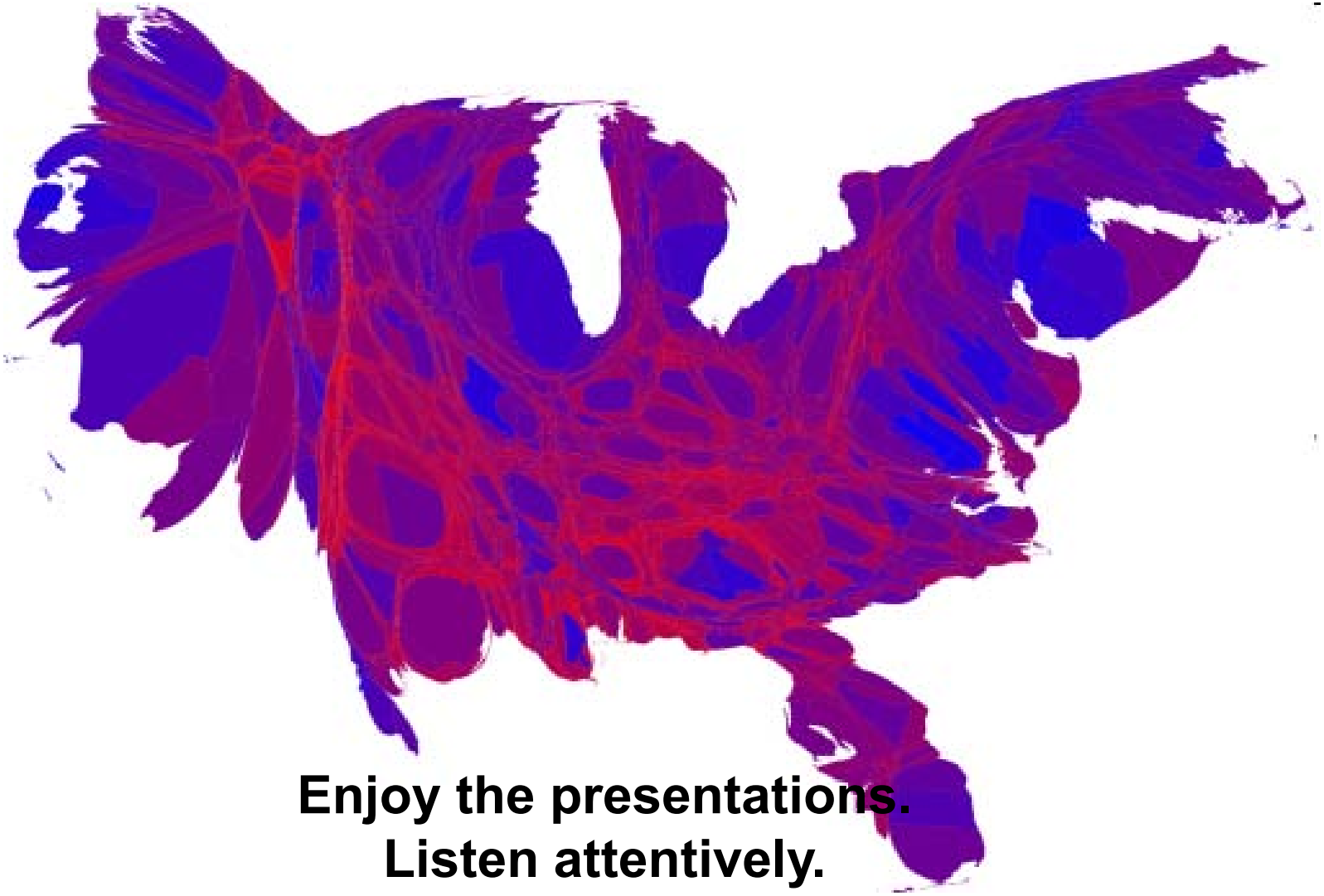

5 Year Copper Spot
USD / lb
5.000
4.000
3.000
2.000
1.000
0.000
Nov03
May04
Oct04
May05
Nov05
Apr06
Oct06
Apr07
Sep07
Mar08
Sep08
www.kitco.com


Silicon Metal - 98.5%
FOB North America
5 Years - $/LB
2.00
1.50
1.00
0.50
Metalprices.com
07 Nov, 2003 - 31 Oct, 2008

Tribal Energy Security => Tribal Sovereignty



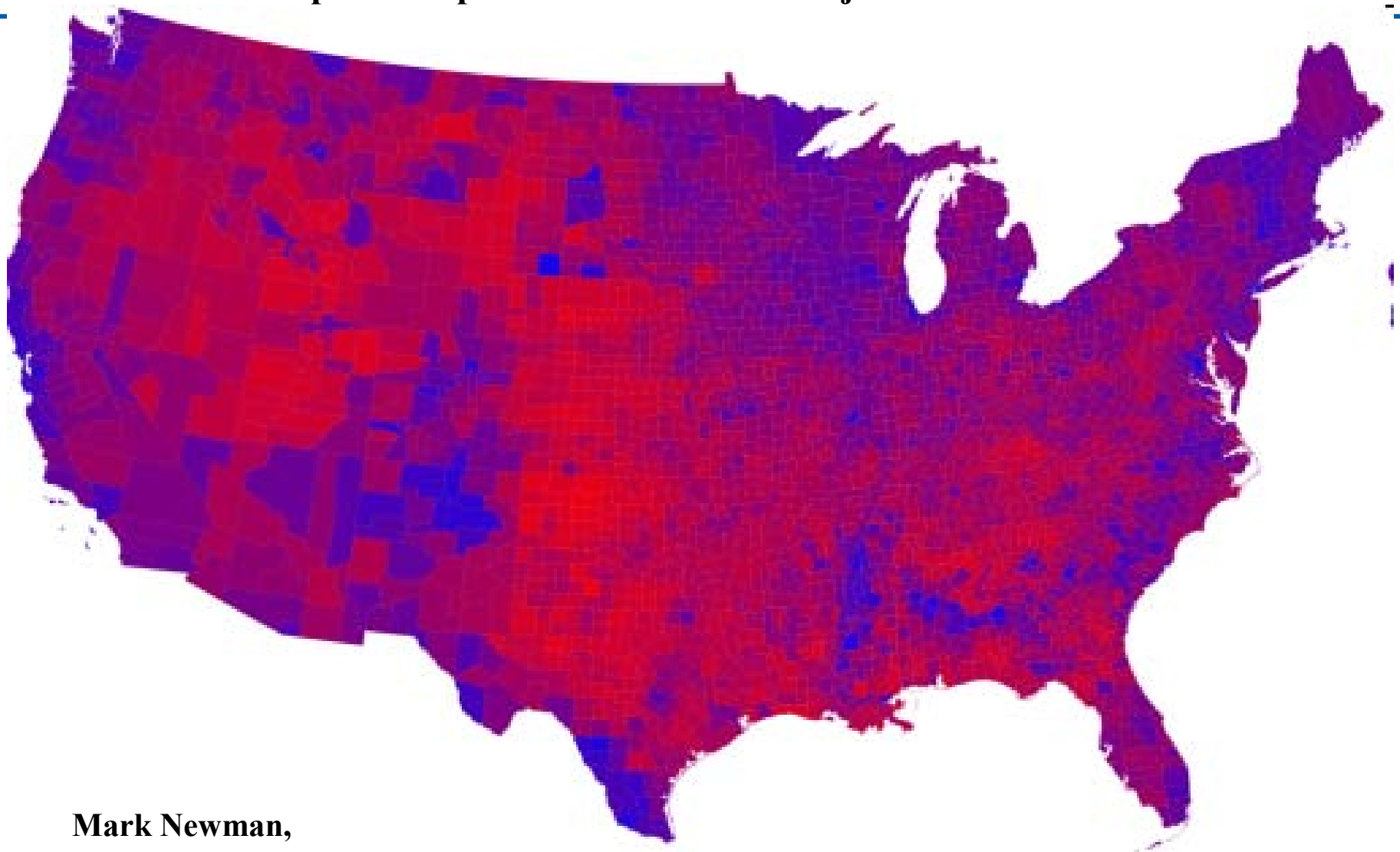
These 3-1/2 days provide a unique opportunity to learn from your colleagues.



Enjoy the presentations.
Listen attentively.
Have some fun.
Bring home some new ideas.

County-Level Map of the 2008 US presidential election results

http://www-personal.umich.edu/~mejn/election/2008/



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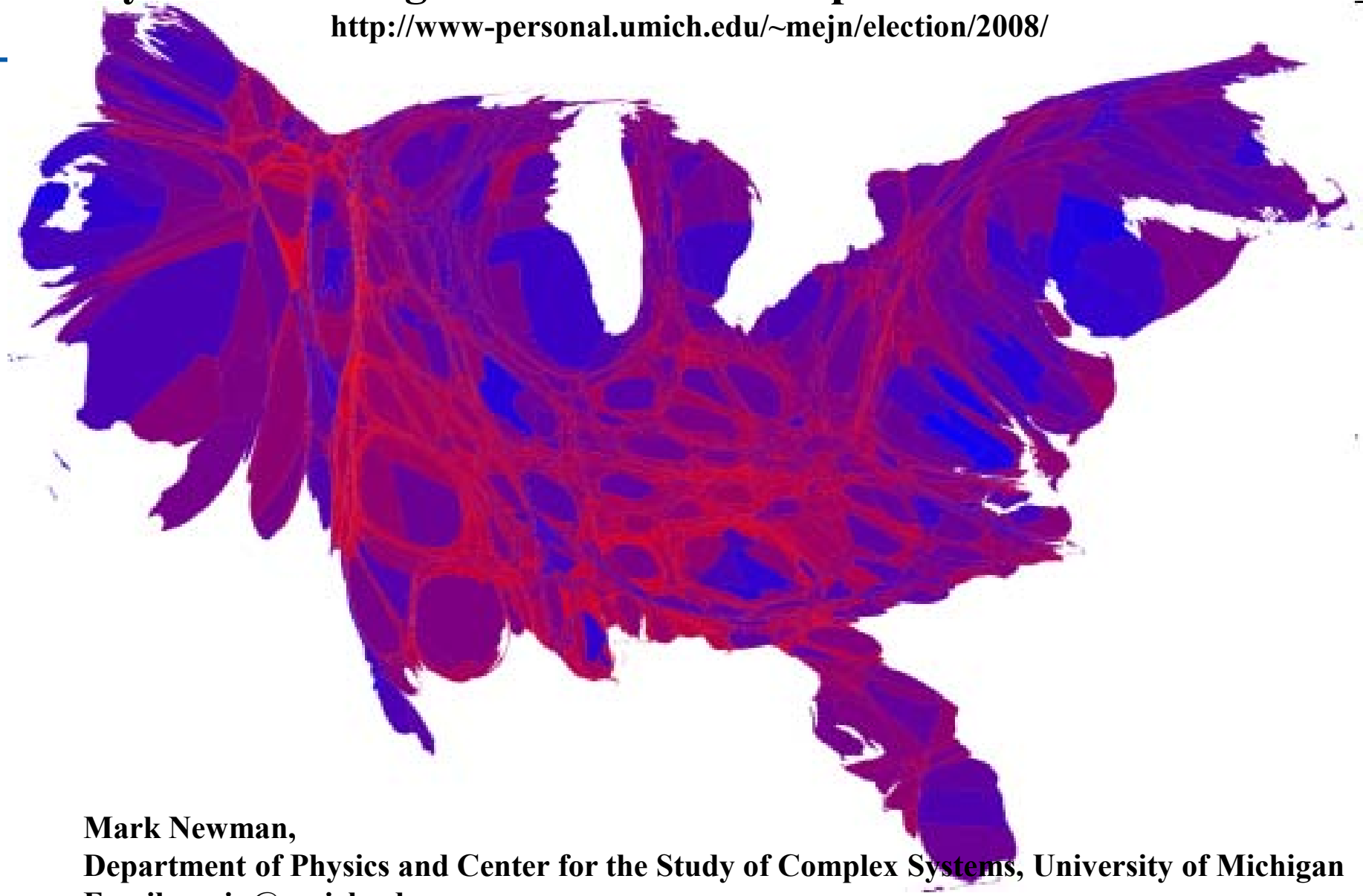
Updated: November 16, 2008

County-Level Cartogram of the 2008 US presidential election results

http://www-personal.umich.edu/~mejn/election/2008/



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