


Research as a Component of State Energy Planning

Presented by: **Gwen Holdmann, Organizational Director**
Alaska Center for Energy and Power
2008 Rural Energy Conference





THE CHALLENGE: Finding ways to reduce the cost of energy in rural Alaska and throughout the State, and developing new and/or expanded economic opportunities for Alaskan residents and industries

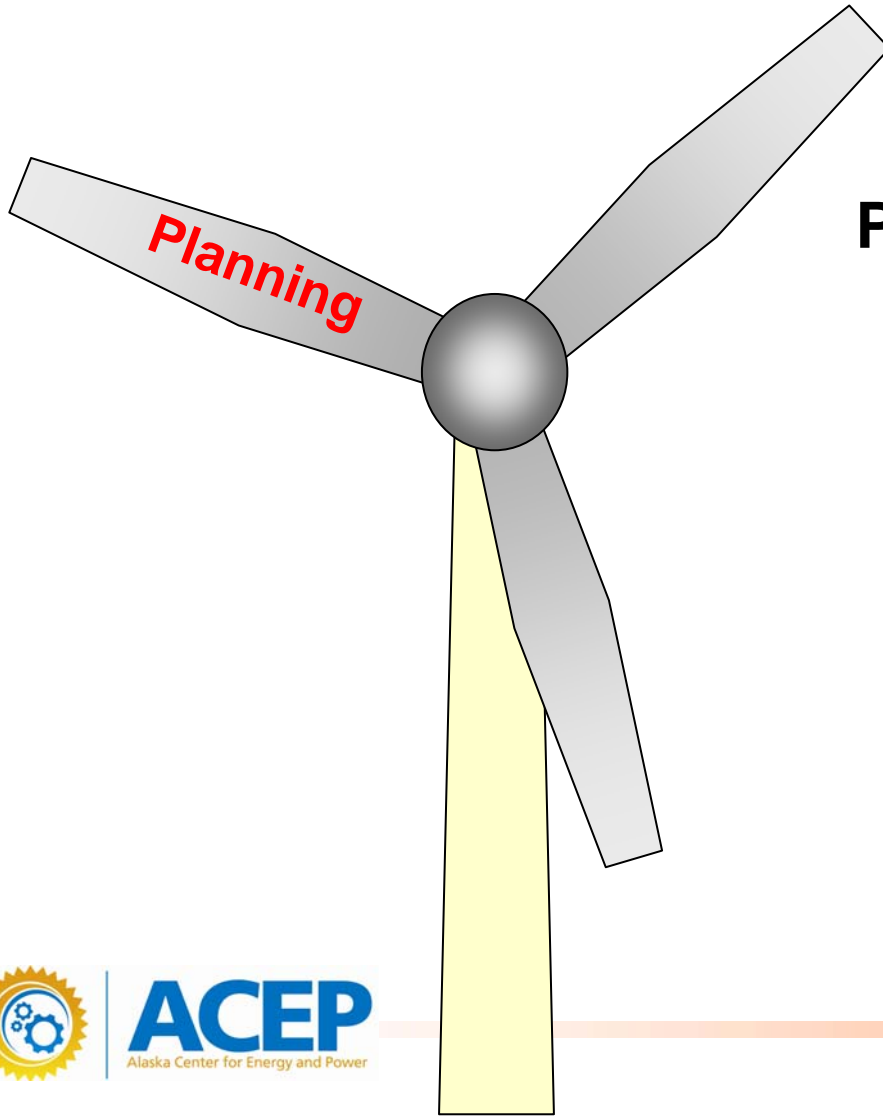
What are our Goals?

- Lower the cost of energy? For whom?
- Stabilize the cost of energy?
- Community self-sufficiency?
- Build/boost local economies?
- Create jobs?
- Develop wealth?
- Reduce greenhouse gas emissions?

How do we get there?

- Make smart investments
- Take calculated risks
- Start with low-hanging fruit

How do we get there?



Planning:

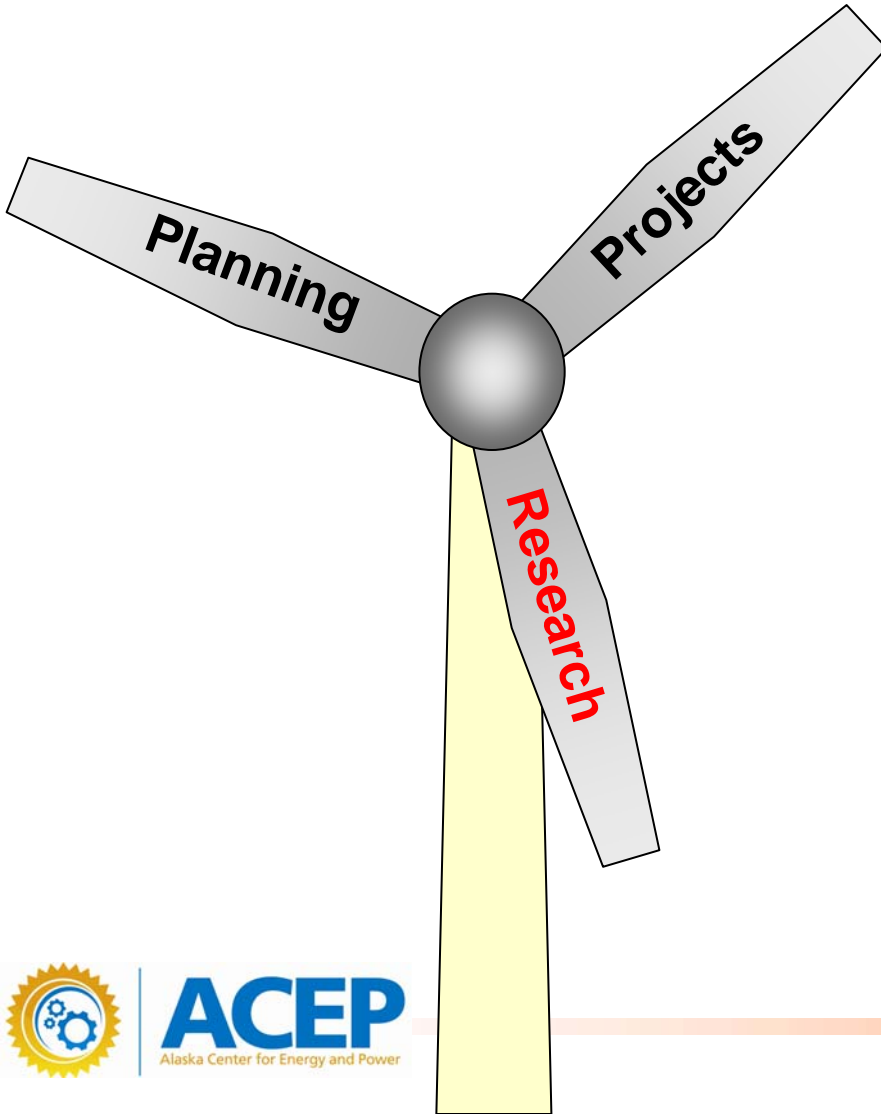
- Community level
- Regional
- Statewide



How do we get there: Projects



How do we get there: Research

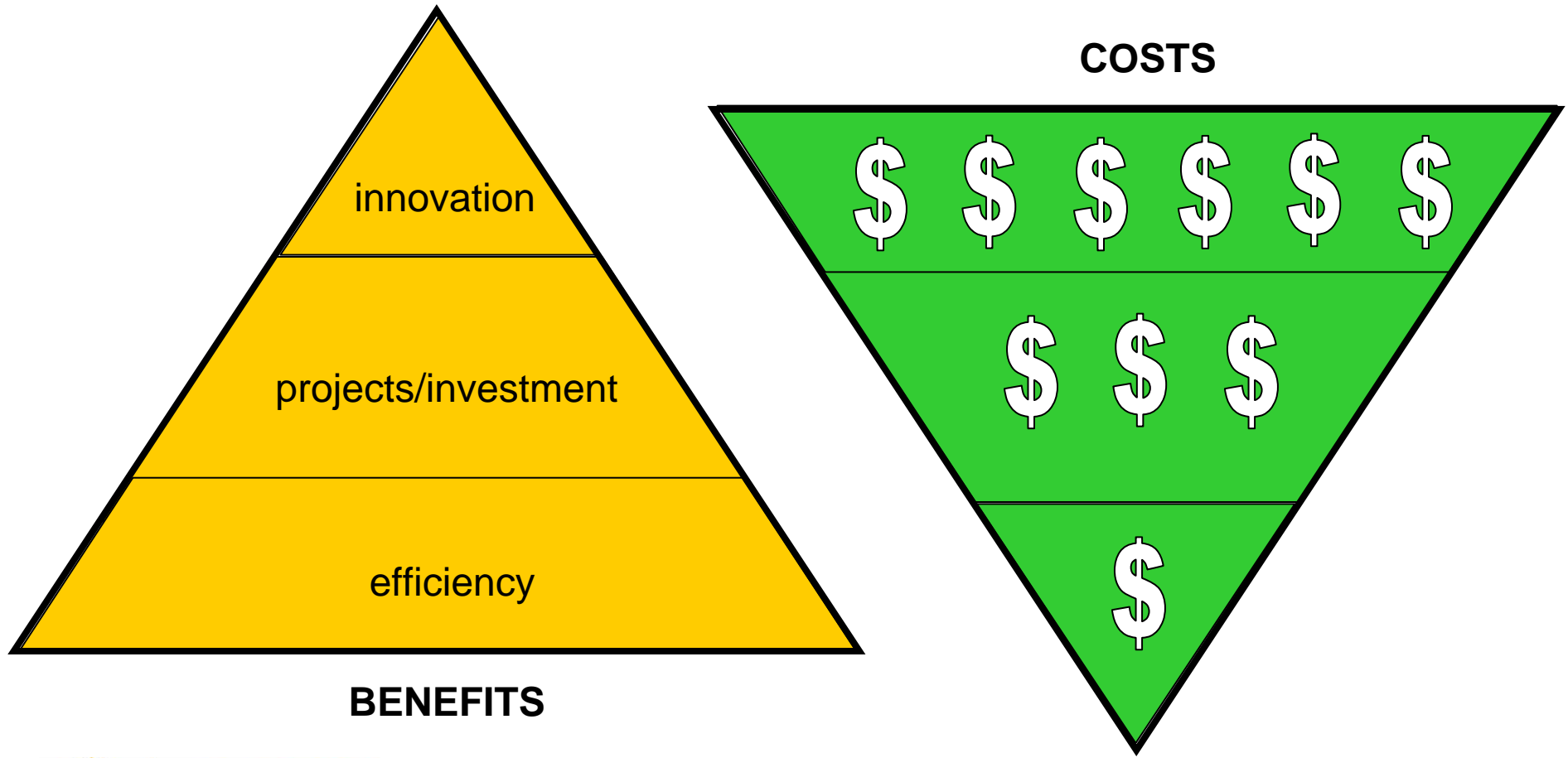


Research:

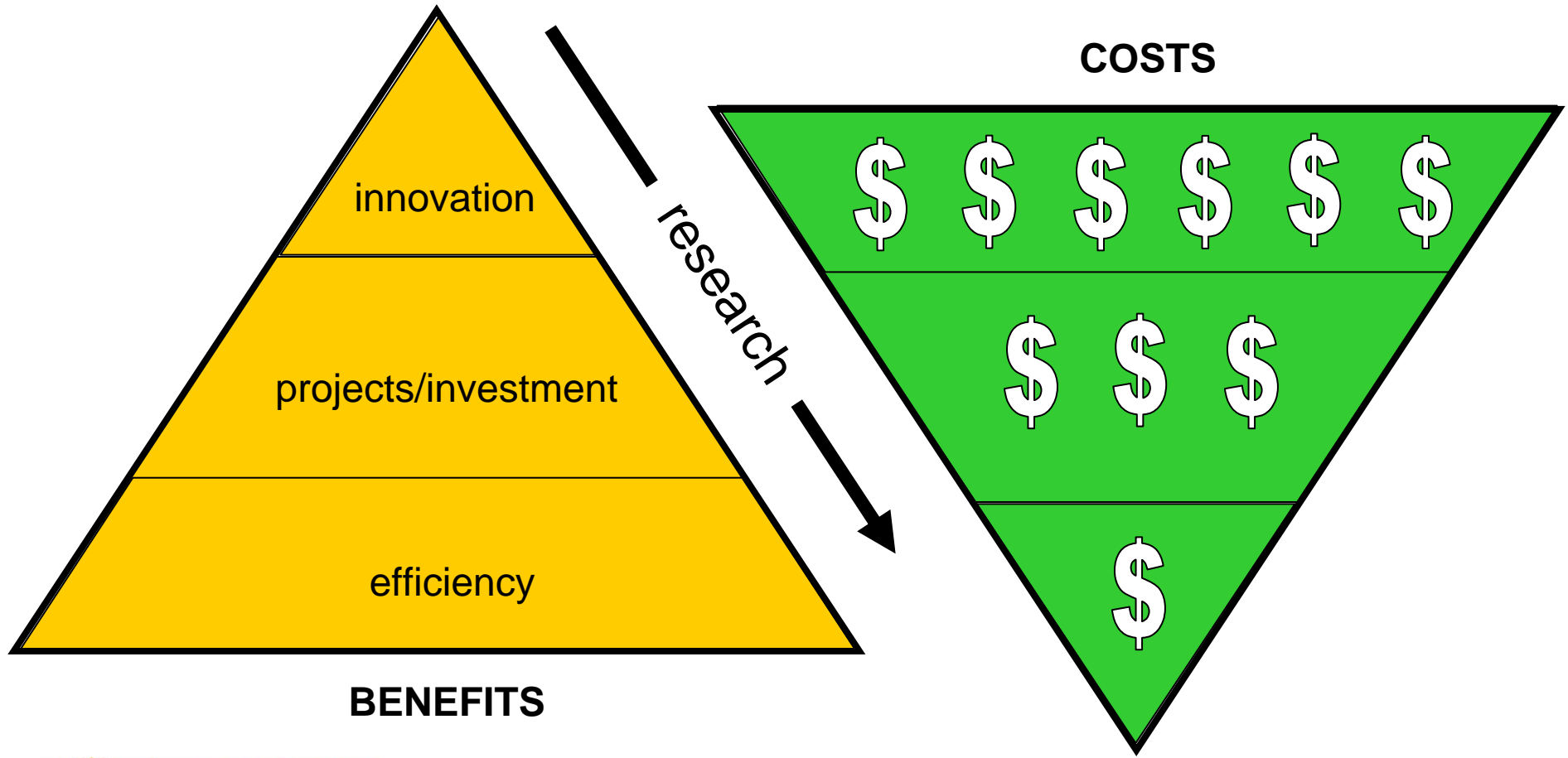
- 'Peering over the horizon'
- Needed for long-term success
- A good investment



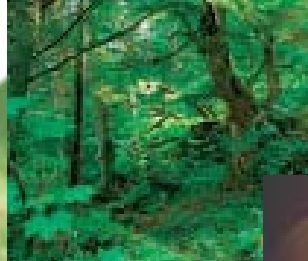
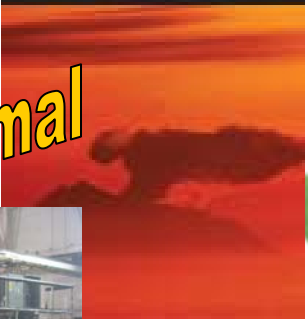
How do we get there?



How do we get there?



Geothermal



Biomass



Ocean



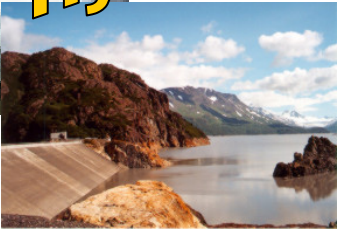
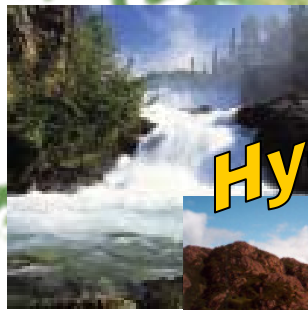
Alaska's Renewable Resources



Wind



Hydro



Solar



Coal



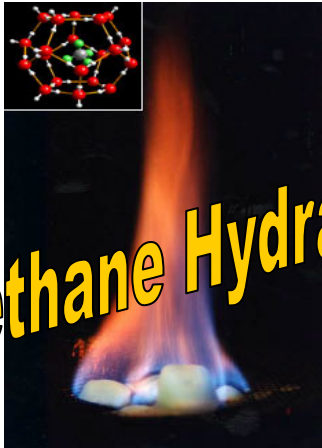
Oil

Natural Gas



Alaska's Non-Renewable Resources

Methane Hydrates



Coalbed Methane



Heavy Oils





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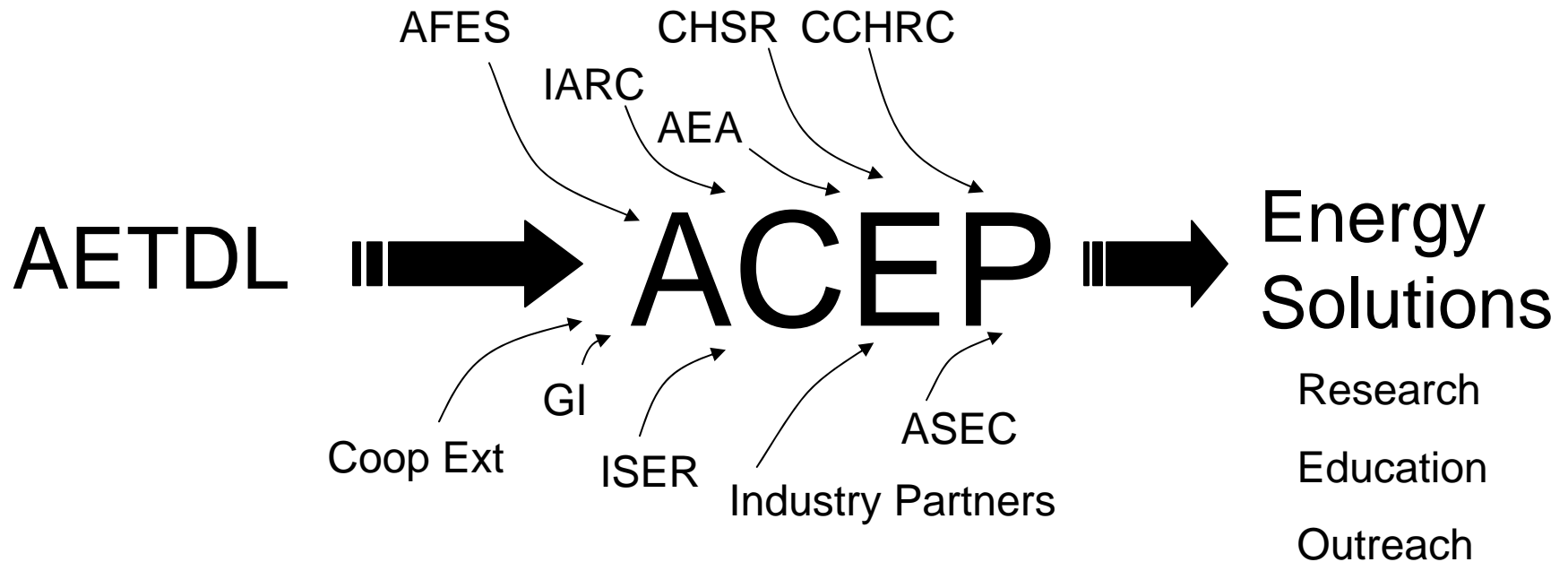
ACEP
Alaska Center for Energy and Power

ACEP RESEARCH MISSION: To meet state and local need for applied energy research by working towards developing, refining, demonstrating, and ultimately helping commercialize marketable technologies that provide practical solutions to real-world problems.

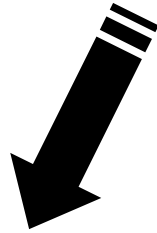


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What role can the University play?



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Community
energy
solutions



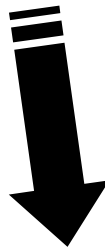
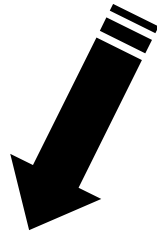
Community Energy Solutions



Diesel Efficiency
Energy Economics
Energy Storage
Geothermal
Biomass
Coal Bed Methane
Fuels
In-River Hydro
Tidal Energy
Wind Power



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Community
energy
solutions

Powering
the
economy



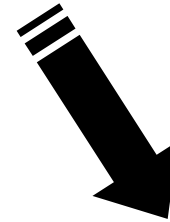
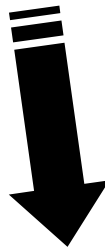
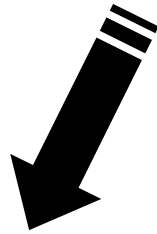
Powering the Economy



Geothermal in the Aleutians
Susitna
Power for Mines
Etc.



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Community
energy
solutions

Powering
the
economy

The
Energyfield
of the future



The 'Energyfield' of the Future



Methane hydrates
Gas pipeline
Heavy oil
Etc.



ACEP Projects & Focus Areas

- Waste heat capture
- Energy storage
- Geothermal
- Tidal and In-stream hydro
- Wind/diesel hybrid systems
- Climate change impacts on current and future projects
- Alternative fuels
- Baseline greenhouse gas inventories
- Short-rotation woody biomass crops
- Education and outreach



For more information on the Alaska Center for Energy and Power, contact:

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VRB Flow Battery Testing



VRB Flow Battery Testing

- Vanadium flow battery (energy stored in liquid, electrolyte is solid (nafion))
- Advantages: energy storage only limited by size of tanks, deep charge discharge with no degradation, 14,000 hours in testing
- Disadvantages: BOP issues, leaks, ultimate cost unknown
- Unfunded technology, but may be critical for enabling wind in Alaska
- 10kW, claim is 70-80% efficient and 13,000 cycles before failure

VRB Flow Battery Testing



Procurement Experiment

- Can we buy a flow battery?
- How much will it cost?
- Will the company supply the product on time?
- Will the company support the product in the field?
- Will the product perform as advertised?

VRB Battery Problems

- Leaks traceable to bad plastic unions
- Stack failure (perhaps due to our leaving the system at maximum charge for a couple of months)—Stack was replaced (fall 2006)
- Electrolyte replacement by VRB (fall 2006)
- Leaks and second stack failure (spring 2007)
- Decision to replace unit with new 8.3kW stack system
- Unit replaced, start-up in Fairbanks October 2008
- Stack Failure on new unit traceable to a manufacturing defect after only 23 cycles
- Stack replaced 1/2/2008, ran for 276 cycles until breaker failure on lab circuit on 3/21/08
- All these issues were taken care of in a prompt and professional manner by VRB
- Net result of all these issues convinces us that VRB is serious about making these units succeed

Funding Energy Research

