



**ACEP**  
Alaska Center for Energy and Power

# Alaska Senate In-State Energy Committee

February 14<sup>th</sup>, 2013

Gwen Holdmann, Director

Alaska Center for Energy and Power



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# Alaska Energy Use

Assuming a constant fuel demand, we are on track to spend over \$5 billion on diesel fuel in rural Alaska and ~ \$60 billion on fossil fuels for Railbelt electric power generation.

Energy-related appropriations have totaled \$2.3 billion since 2008 (PCE endowment, RE fund, AHFC programs, etc)

*- Rep Bryce Edgmon Legislative Update Feb 8<sup>th</sup>, 2013*

# Alaska's Energy Challenges

- ▶ High energy costs
- ▶ Fragmented electric grid
- ▶ Harsh climate
- ▶ End of supply lines
- ▶ Stranded resources
- ▶ Dispersed population



# Role of ACEP and the University of Alaska

- ▶ Developing Information for Decision Makers
  - Technology testing and optimization (industry)
  - Energy analysis (policy makers)
- ▶ Preparing students to work in energy-related disciplines
- ▶ Commercializing energy innovation



# Partnerships for Energy Solutions

- Geophysical Institute
- Institute for Social and Economic Research
- Institute of Northern Engineering
- Petroleum Development Laboratory
- School of Natural Resources and Agricultural Sciences
- Institute of Arctic Biology
- UAA School of Engineering
- International Arctic Research Center
- Resilience and Adaptation Program
- Cooperation Extension Services
- Rural Campuses
- Geographic Information Network for Alaska
- Marsh Creek
- Golden Valley Electric Ass.
- Shell
- Siemens Building Technologies
- Ocean Renewable Power Company
- Kodiak Electric Ass.
- Bering Straits Native Corporation
- ABS, Alaskan
- ExxonMobile
- GraphiteOne
- WH Pacific
- BP
- Usibelli
- ABB
- Boeing



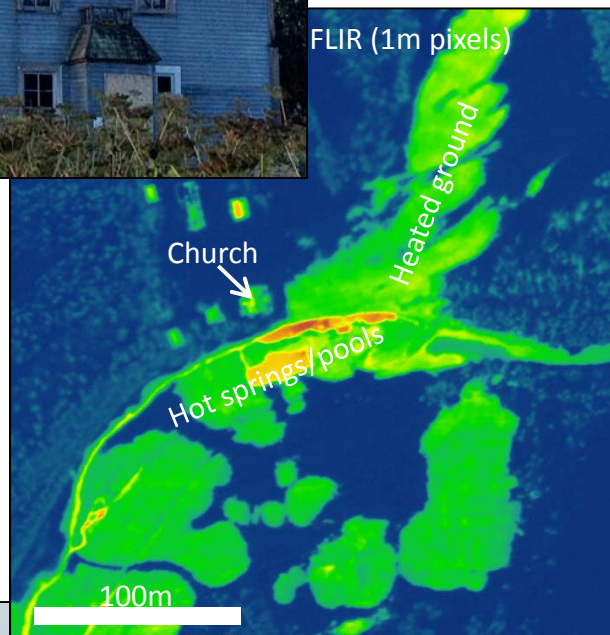


## Pilgrim Hot Springs



## Example: UAV for geothermal exploration

- Optical and FLIR cameras
- Potential for rapid, low-cost mapping and quantitative assessment
- Field trial at Pilgrim during 2013
- Complementary to airborne and satellite investigations



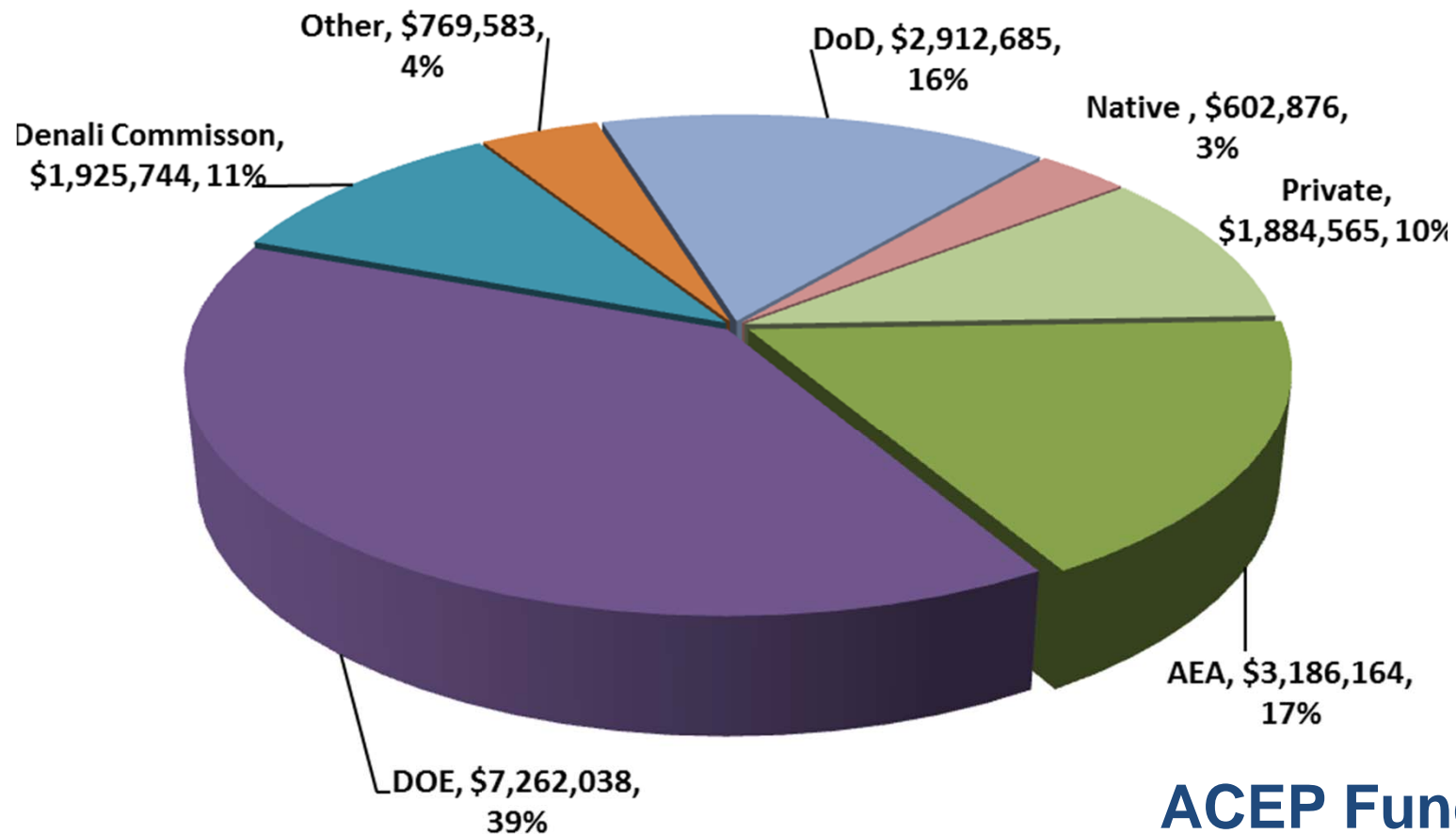
Aeryon Scout

# Airborne/UAV FLIR for targeting residential energy efficiency measures

- FLIR surveys to map building heat loss
- Rationale: poorly insulated homes will have hotter roofs or hot spots
- Calgary 'Heat' project
- UAV's offer potential for 3d FLIR mapping of buildings



# Economic benefits of Energy Research at UAF



## ACEP Funding

***\$18M in 20 active projects***

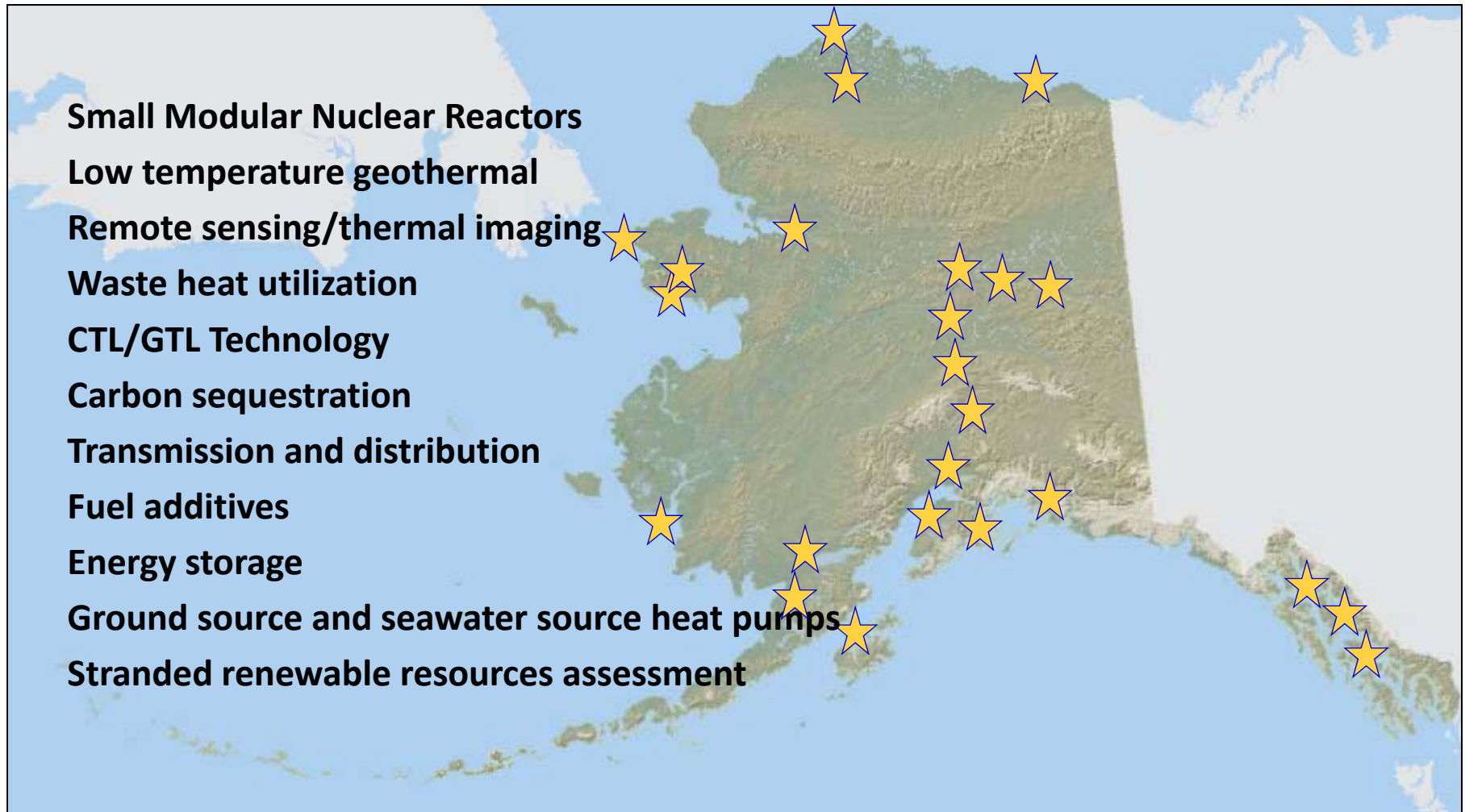
***\$12 in external grants and contracts for every \$1 in state base funding***



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# ACEP Projects are Statewide



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# Supporting Statewide Economic Development: *Alaska's comparative advantages*

- ▶ High contribution renewables
- ▶ Niche technologies (low temp geothermal, hydrokinetics)
- ▶ Difficult to extract/transport fossil fuels
- ▶ Value added processing – exporting energy through means other than pipelines and transmission lines (example - energy intensive industries)

# Alaska is a pioneer in 'island' energy systems



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# High contribution renewables



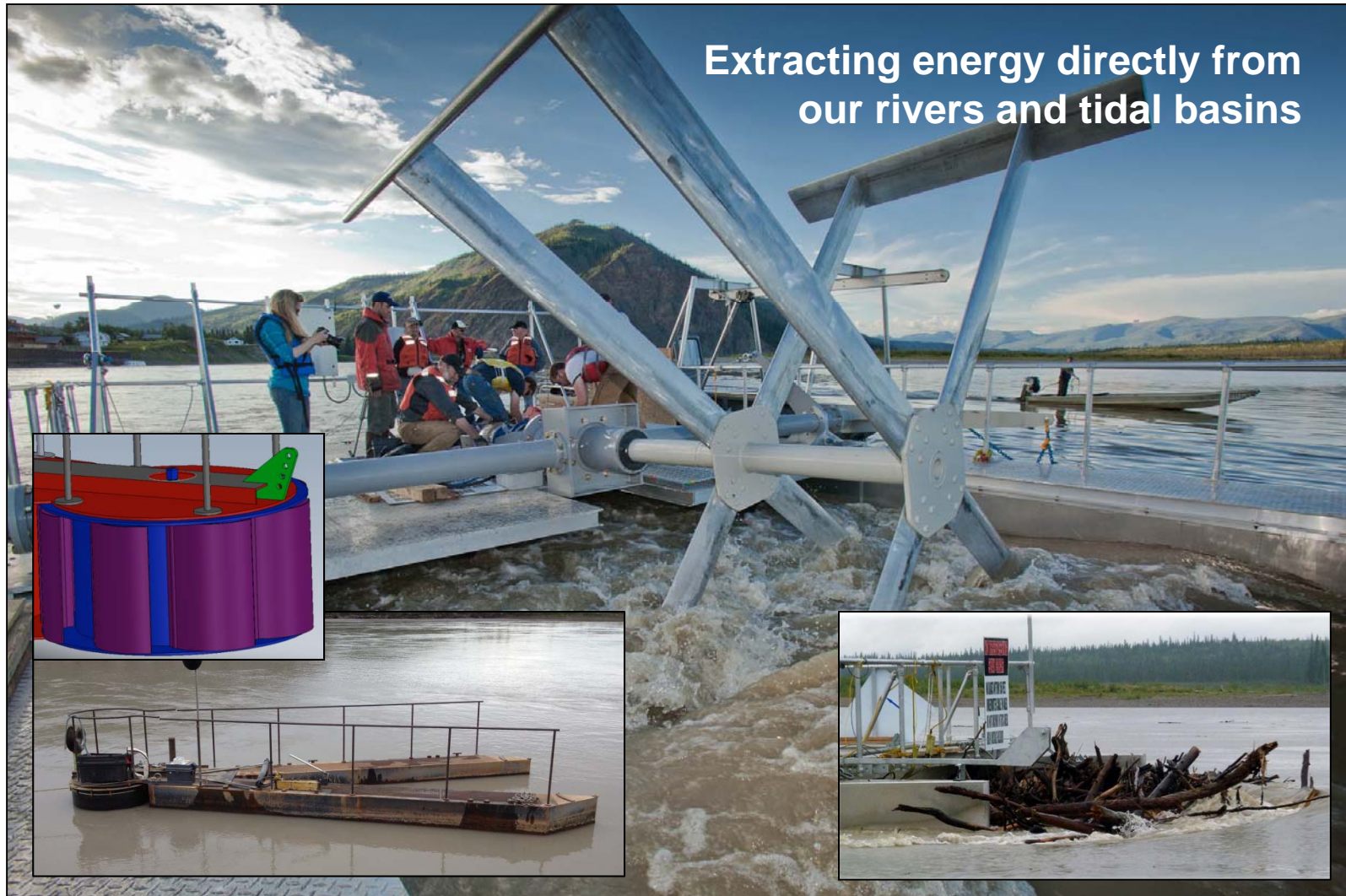
Addressing issues to improve penetration of wind-diesel systems through improvements in control, energy storage, low-load diesel, high penetration wind



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# Niche Technologies - hydrokinetics





# Niche technology: Low-temp Geothermal



Electratherm testing at UAF



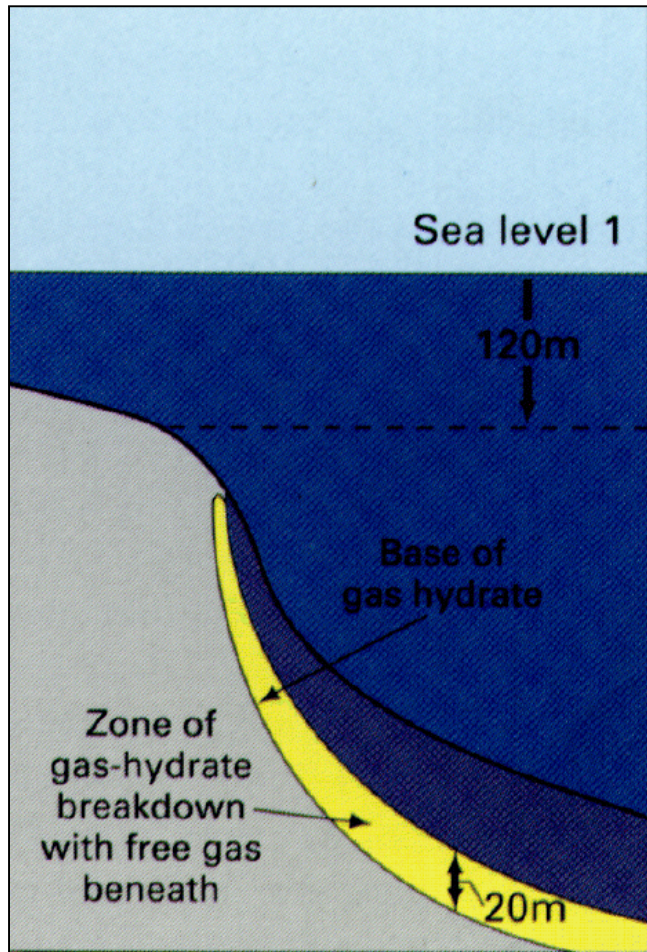
Chena Geothermal Project –  
lowest temperature commercial  
geothermal system in the world



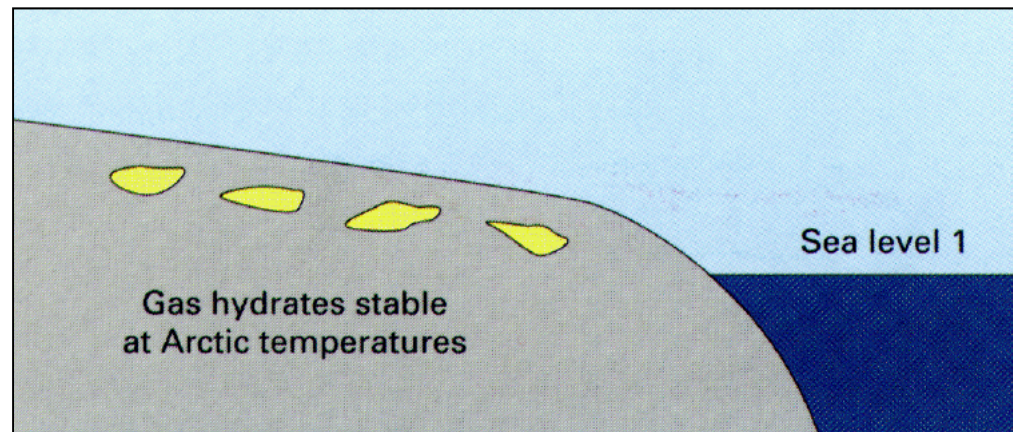
First Organic Rankine Cycle power plant  
using geothermal energy *in the world*  
operated at Manley Hot Springs in 1980



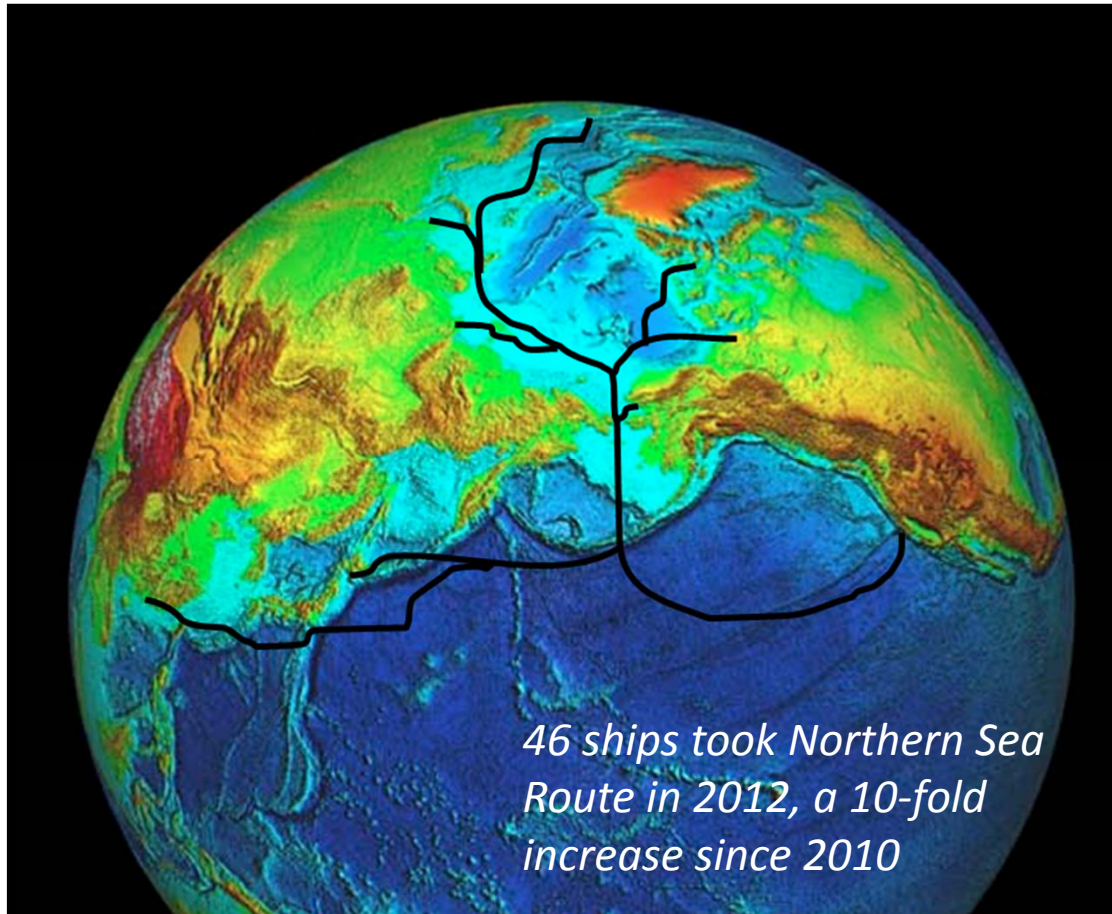
# Difficult to extract fossil fuels: On-Shore Methane Hydrates



*Energy content in methane hydrate resources worldwide dwarfs conventional oil and gas resources*



# Energy Intensive Industries



Alaska is already situated in close proximity to Asian markets

New markets and shipping routes may open in a seasonally ice-free arctic

Many new mineral discoveries expected to be made in the Arctic





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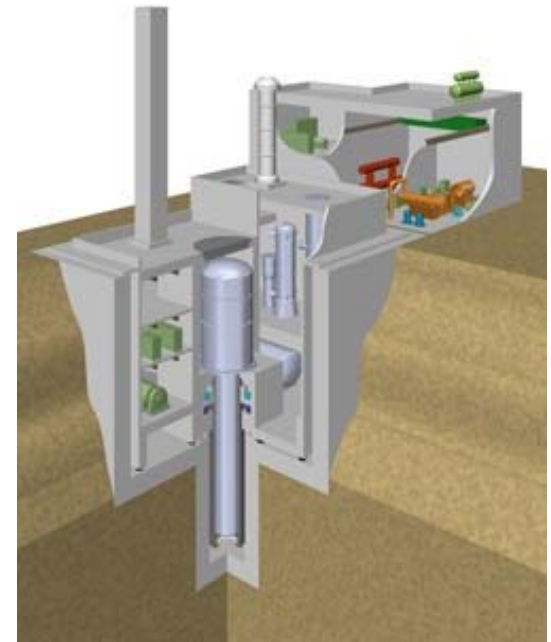
# Alaska as a leader in energy technologies

- ▶ Coil drilling technique pioneered in Alaska
- ▶ Thermosiphons for extracting heat to maintain pipeline and building foundations in permafrost-rich soil
- ▶ Largest battery system in the world in Fairbanks
- ▶ Low temperature geothermal (niche renewables)
- ▶ Leader in high contribution renewables



# How can the University support the legislative process?

- ▶ Assessing technology options
- ▶ Data collection and analysis
- ▶ Energy analysis to support policy decisions and appropriations
- ▶ Scenarios planning as a long-term planning tool



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# [www.uaf.edu/acep](http://www.uaf.edu/acep)



I skate to where the  
puck is going to be, not  
where it has been

- *Wayne Gretzky*



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