02/03/15 Overview: Lessons Learned from The Arctic Energy Summit

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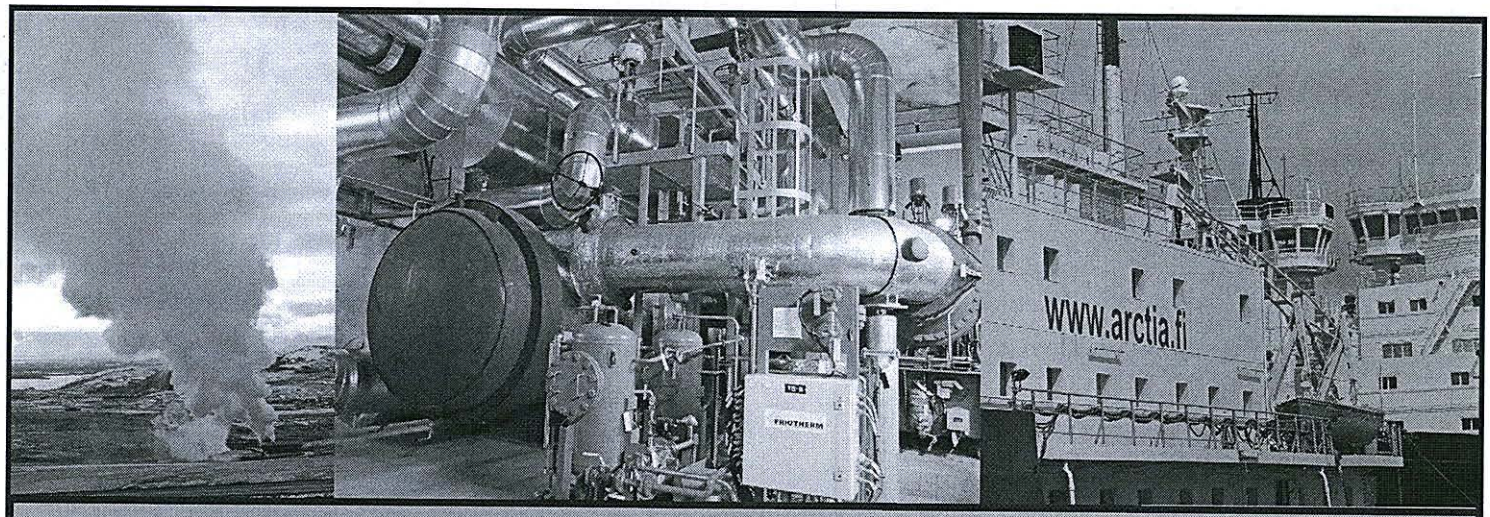


Energy as part of a Lasting Future

28-30 September 2015

Fairbanks, Alaska

www.arcticenergysummit.com

THE ARCTIC ENERGY SUMMIT
ALASKA • 2015

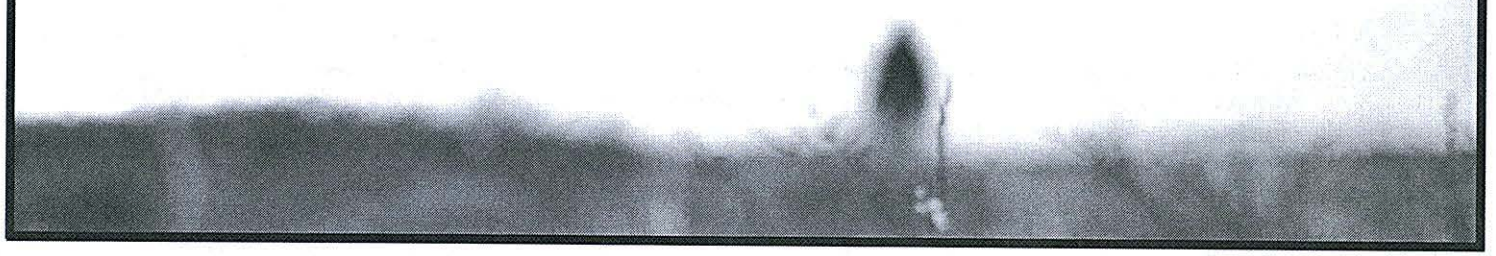
THE 2015 ARCTIC ENERGY SUMMIT: FAIRBANKS, ALASKA

The Arctic Energy Summit is a multi-disciplinary event expected to draw hundreds of industry executives, government agency officials and policy makers, researchers, energy professionals and community leaders together to collaborate on and share innovative approaches to Arctic energy issues. The 2015 Summit will address:

Oil & Gas Exploration and Production
Remote and Rural Heat & Power
Business of Clean Energy

The three day Summit will feature:

⇒ Plenary keynote speeches and panel discussions related to overarching themes
⇒ Breakout sessions in panel, technical presentation and workshop format
⇒ Remote energy "hackathons" – collaborative problem-solving for northern communities
⇒ Closing work sessions to develop recommendations



JOIN THE INSTITUTE OF THE NORTH FOR THE 2015 ARCTIC ENERGY SUMMIT

The Institute of the North works on an array of critical issues in the Arctic, focused on the region's economic prosperity and resilient communities. Our legacy work has addressed Arctic infrastructure development – including energy, aviation, telecommunications, and marine shipping. Much of that work is based on establishing and sustaining cross-border relationships. The Arctic Energy Summit is a great example of our efforts in this arena, having occurred twice under the auspices of the Arctic Council's Sustainable Development Working Group and generating robust discourse resulting in tangible outcomes. This intersection of business, community and government provides meaningful exchanges that inform decision-making. Beyond those who attend, the sessions are filmed and video, presentations and the written proceedings are distributed to a network of thousands of interested stakeholders.

Call for Presentations

Abstracts due by February 27, 2015, related to:

- Oil & Gas Exploration and Production
- Remote and Rural Heat and Power
- Business of Clean Energy

Sponsorship

Sponsorship levels begin at $750,
with the highest levels receiving the most recognition.

Thank you to current sponsors:
Iceland's Ministry of Foreign Affairs,
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Shell Alaska, and Arctic Slope Regional Corporation.

Visit www.arcticenergysummit.com for complete details, or contact Nils Andreassen at nandreassen@institutenorth.org or 1 (907) 786-6324.

Representative List of Organizations Attending and Sponsoring the 2007 and 2013 Arctic Energy Summits

Aalborg University * AANDC * AK Yakutskenergo * Aker Arctic * **Alaska Center for Energy and Power** * **Alaska Energy Authority** * Aleut International Association * **Arctia Shipping** * Municipal Light & Power * Arctic Centre * Arctic Council Indigenous Peoples Secretariat * Arctic Council SDWG * **Arctic Portal** * **ASRC** * Bercha Group * **Bettisworth North Architects** * **BG Group** * Bodø University * **BP** * Bremenports * CAFF Working Group * CANMET Energy Technology Centre * **CH2M Hill** * Chukotka Autonomous Okrug * **City Council of Akureyri** * City of Seward * City of Unalaska * Cold Climate Housing Research Center * **ConocoPhillips** * Consul of South Korea * Crowell & Moring * DNV AS * Ecoshelf * EFLA Consulting Engineers * Embassy of Germany * En+ Group * Energieforschungs Stiftung * Eni Petroleum * ENTRIX * Environment Canada * enXco Development Corp * ExxonMobil * Finnish Environment Institute * FSUE "ATOMFLOT" * Geological Survey of Canada * Global Infrastructure Fund Research Foundation Japan * Government of Chukokta * Government of the Khanty-Mansiysk * Government of Yukon * Gwich'in Council International * Hyak Maritime * Hydro Quebec * HydroOGK * ICAS * International Association of Reindeer Herders * International Institute for Sustainable Development * Inuit Circumpolar Council * Inuit Tapiriit Kanatami * Inuvialuit Game Council * Isavia * IUCN * JOGMEC * JSC "Sakhaenergo" * Keppel Offshore & Marine Ltd * Korea Polar Research Institute * **Kurchatov Institute** * **Landsvirkjun** * Mannvit Engineering * **Ministry for Foreign Affairs of Iceland** * **NANA** * **National Energy Authority of Iceland** * NREL * Natural Resources Canada * Nature Conservancy * **North Slope Borough** * North Slope Science Initiative * Northwest Arctic Borough * Northwest Territories Power Corporation * Norwegian Petroleum Directorate * Ocean Renewable Power Company * **Olgoonik** * **PDC Engineers** * Petrozavodsk State University * Raftákn ehf * RAIPON * Raytheon Polar Services * Reykjavik Energy Investors * ROSNOR * Rosshelf * SAIC * Sandia National Laboratories * Sevmash * **Shell** * SRI International * SSPA Sweden AB * Statoil ASA * Stefansson Arctic Institute * Swedish Polar Research Institute * **Tactical Marine Solutions** * **TDX Power** * **U.S. Arctic Research Commission** * Ugra Territorial Energy Co JSC * **Ukpeaġvik Iñupiat Corporation** * UNEP * University of Akureyri * **University of Alaska** * University of Namur * University of Saskatchewan * University of the Arctic * University of Tromso * University of Winnipeg * URS Corporation * Varmalausnir ehf * Verve Energy * **Vitus Energy** * VRB Power Systems * World Economic Forum * WWF Global Arctic Programme

Institute of the North
Center for Alaska's Arctic Policy

Presentation by
Nils Andreassen Executive Director

|Who we are|

Vision: Effective land and resource governance resulting in individual and collective prosperity.

Mission: To inform public policy and cultivate an engaged citizenry.

Strategic Focus: Understanding and conveying the opportunities and obligations of the Arctic.

|Responding to|

Fundamental challenges facing Alaska and Alaska's Arctic:

- Declining oil production
- Infrastructure deficit
- Significant change taking place
- State and national environment of fiscal constraint
- Increasing international and national attention; local and regional areas of concern

Fundamental Lessons for Alaska, from Iceland and Norway

Iceland - *Sacrifice in the short-term for long-term prosperity*

1. Pick a resource
2. Develop comprehensive plan
3. Own the infrastructure
4. Export value-added product

Norway - *Respond to complexity with sophistication*

1. Export non-renewable resource, develop renewables for domestic use
2. Co-invest in production and infrastructure, sharing risk and reward
3. Build regulatory capacity for effective and efficient development of resources

Iceland and Alaska by the Numbers

		Iceland	Alaska
	Population (2011)	320,000	722,000
	Area (square miles)	39,768	664,988
	GDP (USD, 2011)	$14 Billion	$45 Billion
	GDP/Capita (2011)	$38,0000	$65,143
	Power Consumption/ (Petajoules in 2010)	234.0	.676
	Installed Electricity Generating Capacity in 2011 (MW)	2,579.0	2,067.0 (1,400 in Railbelt)
	Democratic Government/Currency	Sovereign, Unicameral Parliament; 5 parties; President; Not EU/IS Kroner	Non-Sovereign State; Bi-Cameral; 2 parties; Governor/US Dollar
Electricity	Hydroelectric	73.8%	21%
	Geothermal Electricity	26.2%	-
	Natural Gas Electricity Generation	-	56%
	Oil	-	14%
	Coal	-	9%
Home Heating			
	Natural Gas	-	46%
	Fuel Oil	-	36%
	Electricity	10%	10%
	Geothermal	90%	-

Iceland Energy Mix

- 80% of primary energy supply comes from renewable resources (hydro, geothermal)
  - 99.9% of electricity production
  - 99% of space heating
- Remaining 20% comes from imported fossil fuels, used mainly in transportation and fisheries

Source Iceland National Energy Authority

Electricity Profile (2010)

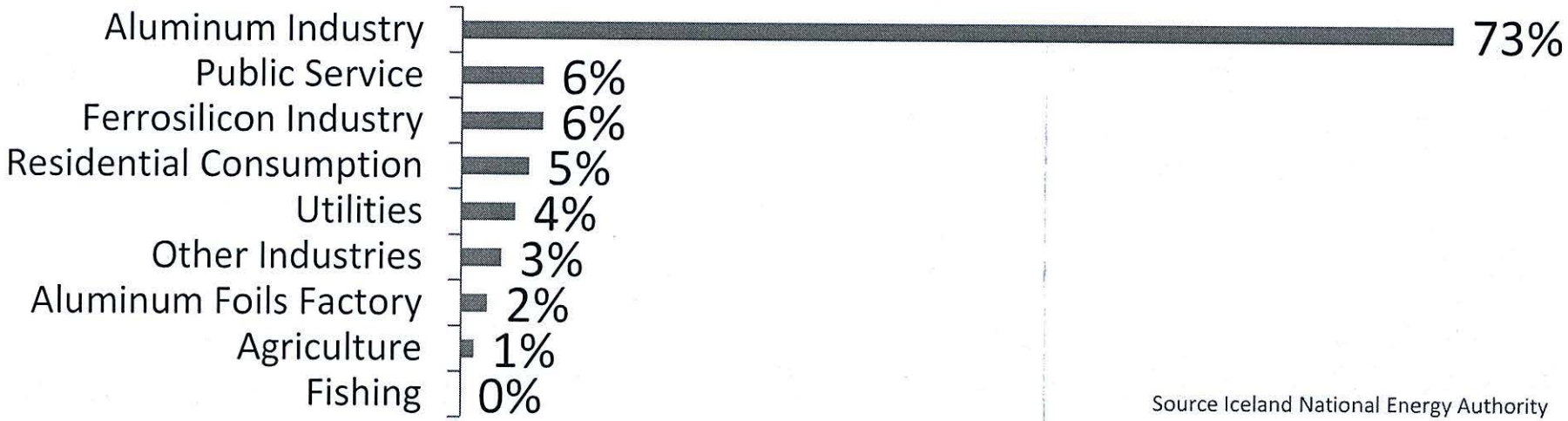
Installed Capacity

	MW	%
Hydro	1,883	73.0
Geothermal	575	22.3
Fuel	121	4.7
Total	**2579**	**100.0**

Electricity Production

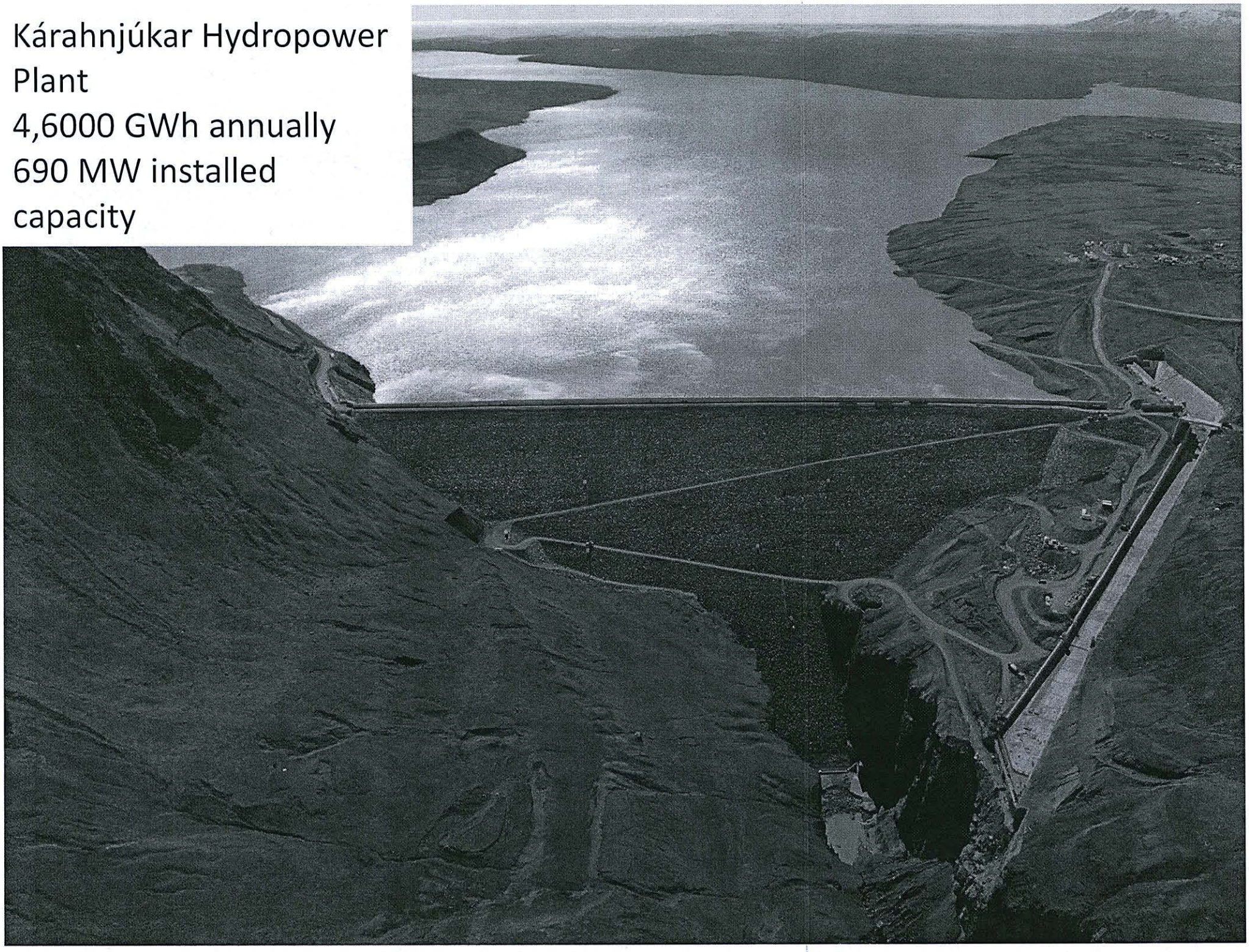
	MW	%
Hydro	12,592	72.9
Geothermal	4,465	27.0
Fuel	2	0.0
Total	**17,059**	**100.0**

Electricity Consumption

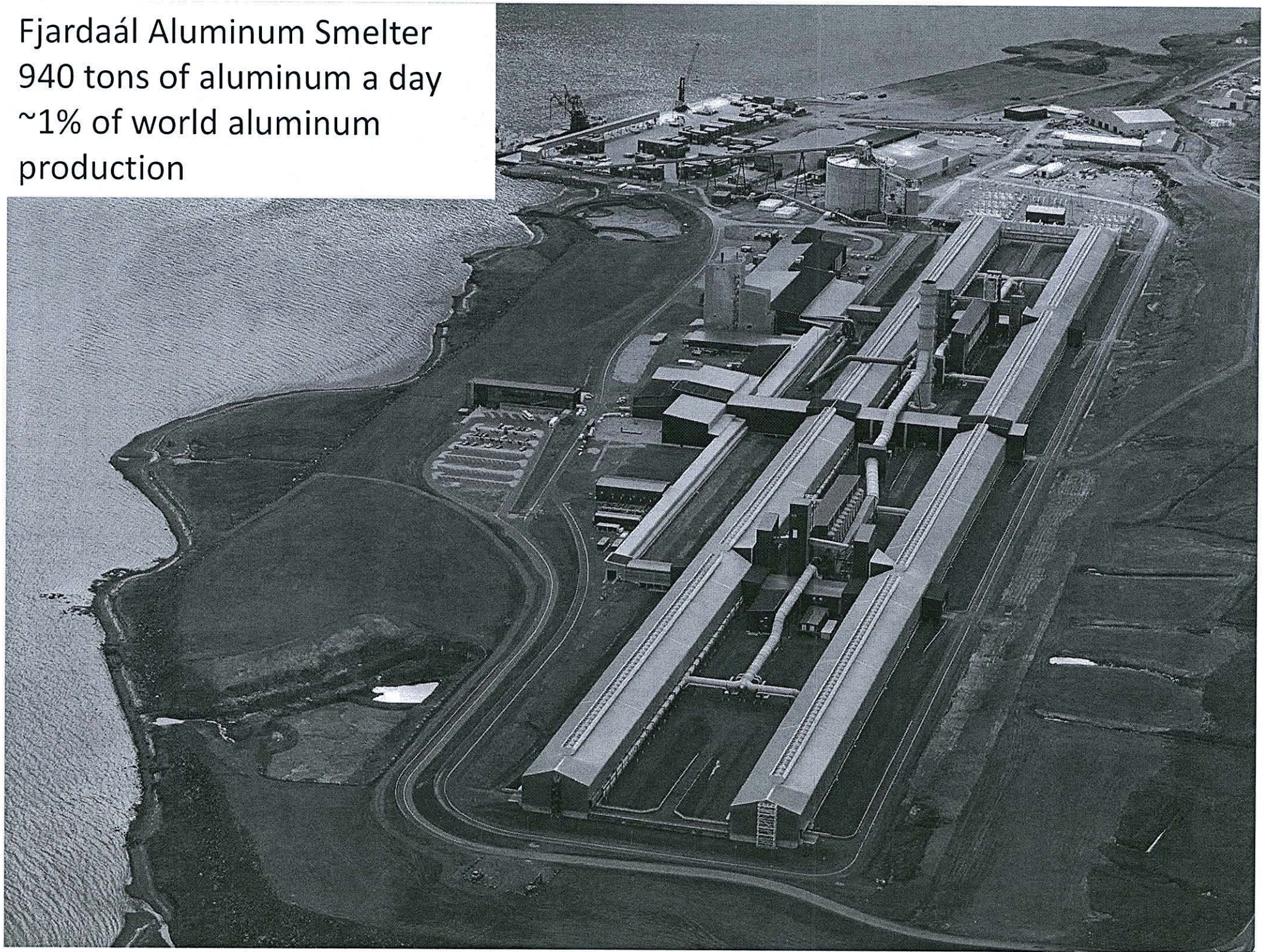


Source Iceland National Energy Authority

Kárahnjúkar Hydropower Plant
4,6000 GWh annually
690 MW installed capacity

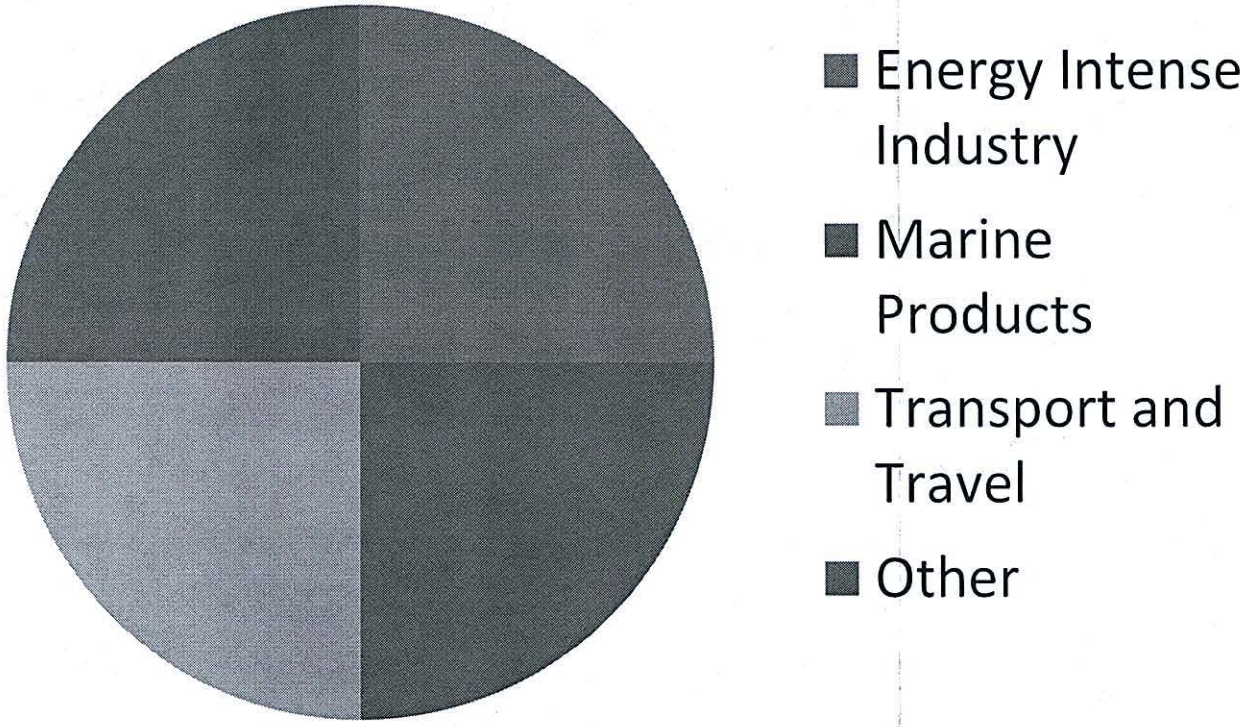


Fjardaál Aluminum Smelter
940 tons of aluminum a day
~1% of world aluminum production



Iceland Exports (2011)

Total ca $8.5 billion



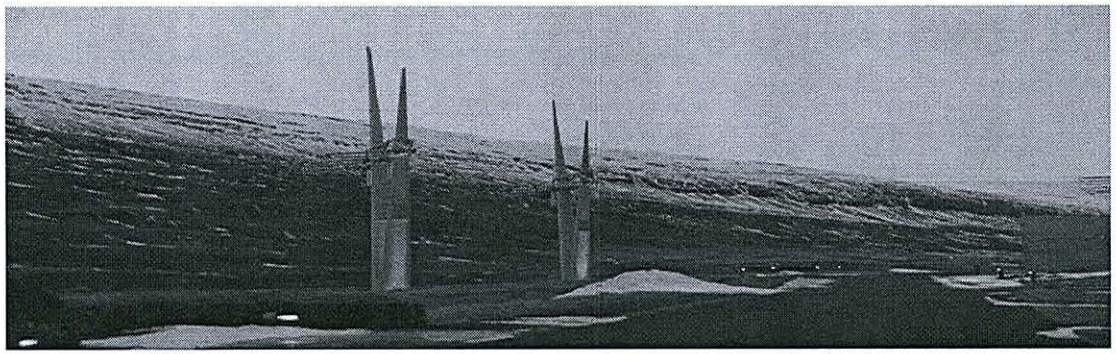
Positive Trade Balance, 14%

Iceland Energy Planning

- Comprehensive Energy Strategy for Iceland
  - Having renewable energy sources replace imported energy
  - Support diversified industry
  - Precautionary and protective approach in energy production
- Master Plan for Utilization of Renewable Energy Resources
  - 80 different possibilities for hydropower and geothermal power plants have been listed and analyzed
    - Sustainability issues, preservation of natural environments and historic sites, tourism and alternative land use, regional development and economy
  - Sites put in three categories:
    - **Green** – Proceed with utilization process (apply for licenses etc.) – 8.5 TWh
    - **Yellow** – Site subject to further research – 12.5 TWh
    - **Red** – Site shall be preserved and not utilized for energy purposes – 11.3 TWh

Who should own the grid?

- Circumferential electric transmission grid serves almost all communities
- Government of Iceland as a guarantor, not financier
- "Power" of the grid—meet community needs and anything is possible
- Institutional innovation: access to transmission system creates a framework so competition can occur



Lessons for Alaska

- **Fiscal prudence**
  - Big projects (both public and private) are only pursued with financing/buyer is in place
  - Spend less than you earn
- **Long-term decision-making** on infrastructure investment
  - Icelanders have been willing to sacrifice in the short term for future prosperity
  - No subsidies but state-supported infrastructure
- **Strategic planning**
  - Identify areas that the region can lead on and be intentional to make steady careful progress in developing essential expertise
  - Economic development strategy: diversification of national economic portfolio with cluster development
  - Master Plan for Energy Development: weighing all options before deciding which to energize, need more information, to conserve

Snapshot of Norway (2010):

- **Population:** 4,888,000 (7x that of Alaska)
- **Income Per Capita:** $88,400 (vs. $43,209 AK)
- **Income: GDP/PPP:** $59,100 (vs. $47,700 U.S.)
- **Unemployment Rate:** 3%
- **% of Government annual expenditure paid by oil and gas revenues:** 10 - 26% (vs. 80-90% AK)
- **Democratically elected Parliament.**

Norway's Licensing System:

- Norway selects tracts to license (6 year initial term) after consultation with stakeholders
- Norway conducts initial seismic (2D); results are made public
- Industry submits applications consisting of a work plan, financial strength, safety record (no bonus bid, no royalty)
- Licenses are awarded based upon work plan and qualifications; 6 years = "Drill or Drop"

Norway's Licensing System (cont.)

- Environmental and other approvals are included in license
- License may include several partners and specifies state (Petoro) share as part of terms
- Going forward, all partners are part of decision process, share investment, expenses and information

What is SDFI

- **State invests and participates directly** (the same as a producer) in the development of the resource
- State substitutes ...

  ... **definitive work and investment commitments**, for upfront lease bonus,

  ... **participation in development decisions** and access to information, for passive royalty role
- **State becomes an active participant** rather than a passive, back seat driver

Most significant lesson learned

- SDFI creates **alignment of interests** between the State and producers
  - State gains understanding of investment dynamics
  - State has full access to data and better understands field dynamics and development
  - State participates directly and has the ability to help drive development decisions
  - Increases State understanding, reduces State suspicion
- Norway once used bonus and royalty system, but transitioned away from it because they concluded it impaired investment decisions

Implementing SDFI in Alaska

- Can be added as an option in new leases
- But, that does not reach "low hanging fruit"
  - Challenge is to make SDFI available as an option to help immediately in developing existing resources
- Important part of Norwegian model: create a professional, non-politicized corporation (similar to Permanent Fund Board) to administer state's interest

RECAP: Private Companies Like: Norway's Investment Incentives:

- **Reduced Risk** (2D seismic provided by Norway)
- **Reduced Up-Front Costs** (no $ bids)
- **Shared Risk/CO-INVESTMENT** (SDFI)
- **Alignment** between Norway and industry
- **Predictability:** Quick permitting, consistent environmental and safety rules, limited judicial interference. License to Production in 3 years.
- **Tax Stability:** 78%; non-progressive. Rapid deductibility of development costs

Takeaways

- Norwegian Petroleum Directorate – intersection of public and private sector with public interest
- Oil and gas for export; renewables for domestic energy consumption
- Government take maximized through state-owned enterprise, co-investment arm, state investment in infrastructure
- Stability plus returns results in private sector confidence

House Energy Developed - Roadmap

- Criteria - A principle or standard by which something may be judged or decided

- Strategy - prioritize or rank how we spend limited money in a way that produces results

- System – tracks projects/expenditures to make sure that we are accomplishing the goals set out by the policy

Potential Recommendations

- Make standing committees of House Energy and Senate In-State Energy – consolidate oversight
- Evaluate energy projects with accurate information, and options vetted and weighed against one another
  - Instead of projects or technology, focus on infrastructure
- Encourage better outreach and communication from state agencies – benchmarks of success
- Encourage and support private investment
- Implement energy policy as a key element of fiscal policy – fenceposts for policy makers and agencies

Arctic Energy Summit

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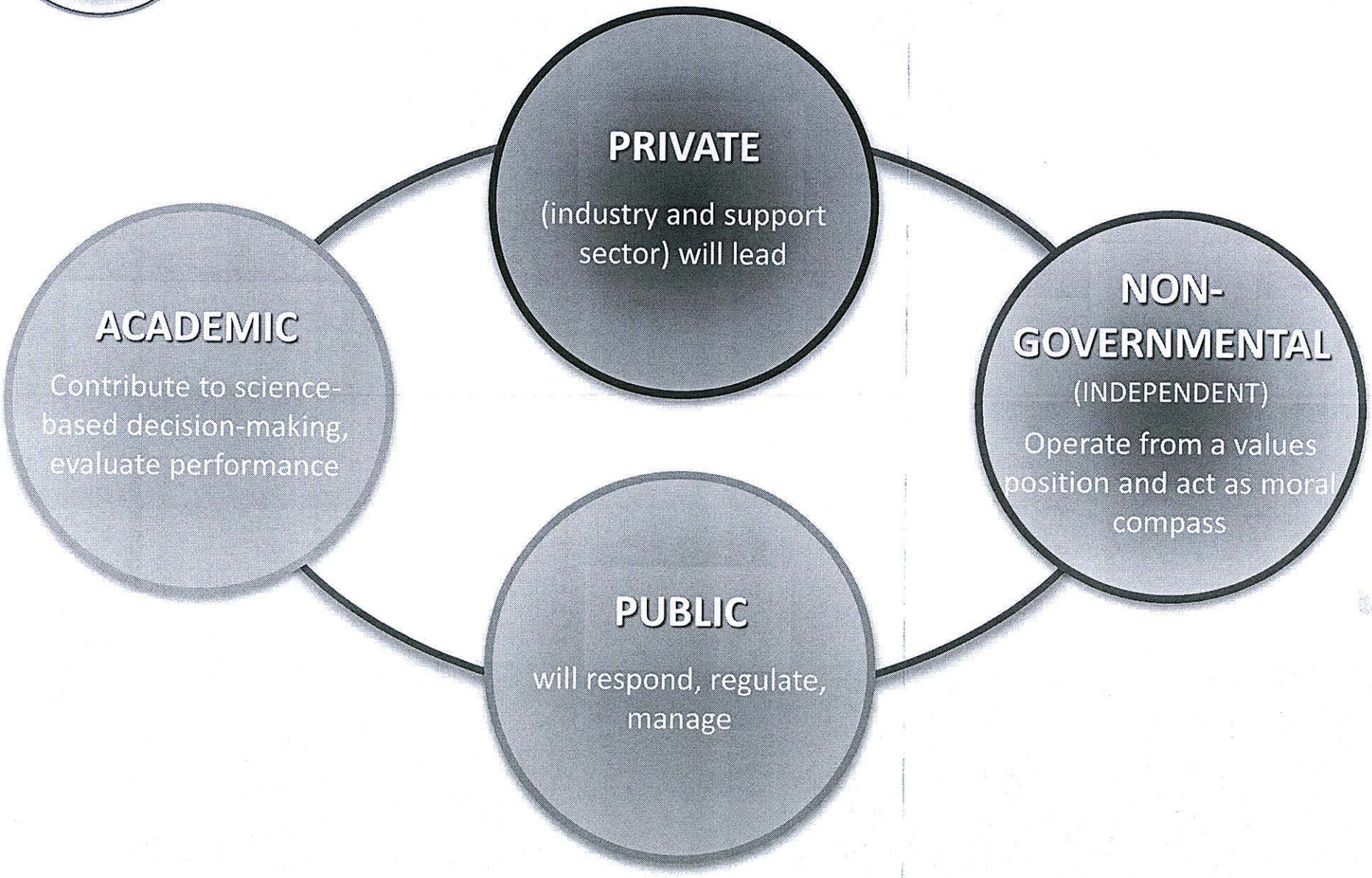
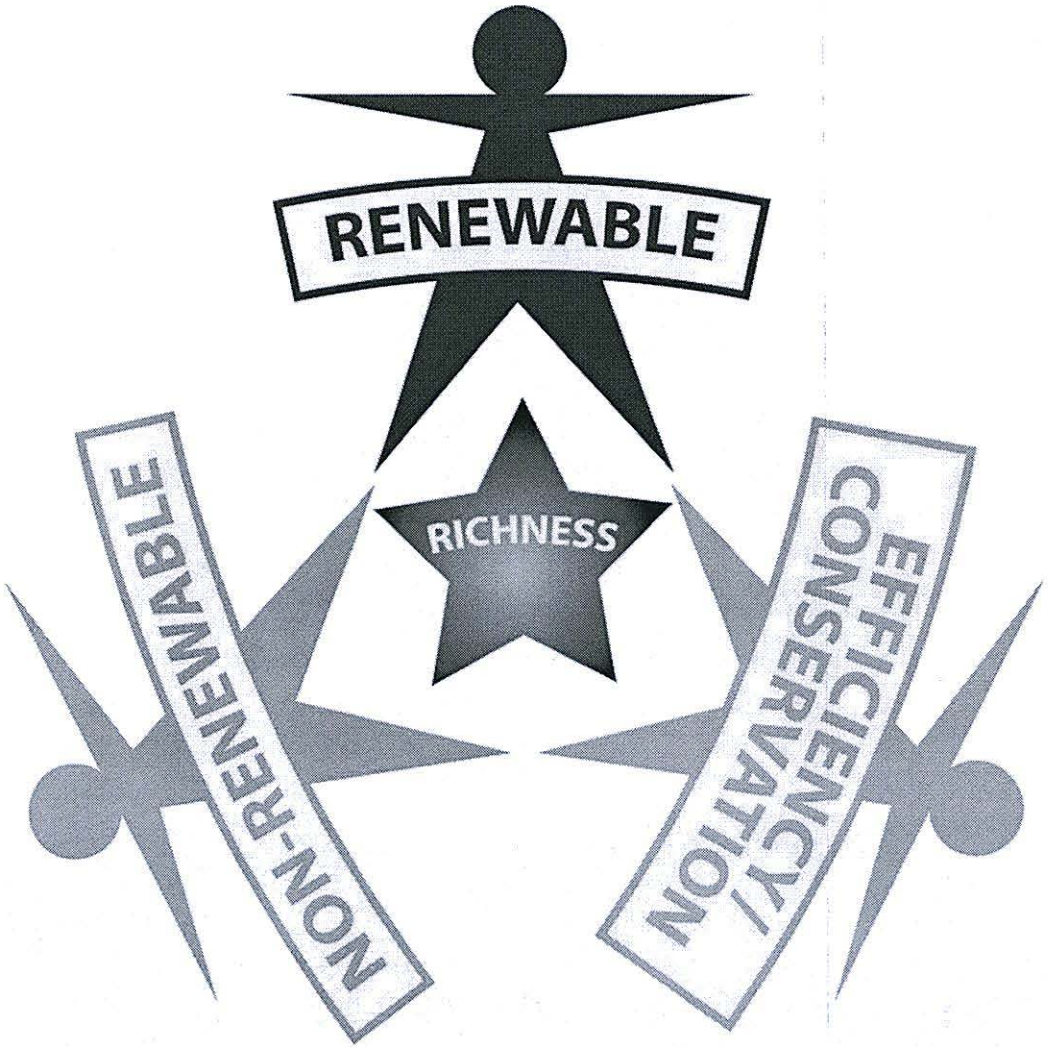
Themes from 2013 Arctic Energy Summit

Richness
Responsibility
Resilience

Cross-Sectoral Approach



Richness


RENEWABLE
RICHNESS
NON-RENEWABLE
EFFICIENCY/
CONSERVATION

Responsibility

Not risk free, but commitment to risk mitigation

Necessary response ability

Community, culture, and environment

- Development of indicators

Resilience

Ability to respond and adapt to change – system capacity to bounce back

Asset dependent, plus scale and rate of change

Time sensitive – implement responsibility now

Resilient communities depend on resilient energy systems

Potential Research/Projects

1. Impact of grid connectivity to social and economic development
2. Inventory of measures of government support to both extractive industry and renewable energy projects
3. Study examining the benefit sharing arrangements to local communities from private sector development
4. Lessons learned from policies promoting renewable energy
5. Dedicated financial vehicle (i.e.; Arctic Development Bank or Arctic Resilience Fund) to support renewable energy, local development, and resilience
6. Develop best practices guide to northern energy efficiency, through engineering, architecture and design

2015 Arctic Energy Summit

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GOVERNOR WALTER J. HICKEL, FOUNDER

Energy Contributing to a Lasting Future
Security and Affordability

September 28-30,2015 in Fairbanks, AK
– coinciding with the Arctic Council's SDWG meeting

Upstream	Remote	Business of Clean Energy
Oil and Gas Development	Heat and Power Solutions	

Thank you!

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