Lessons from Iceland

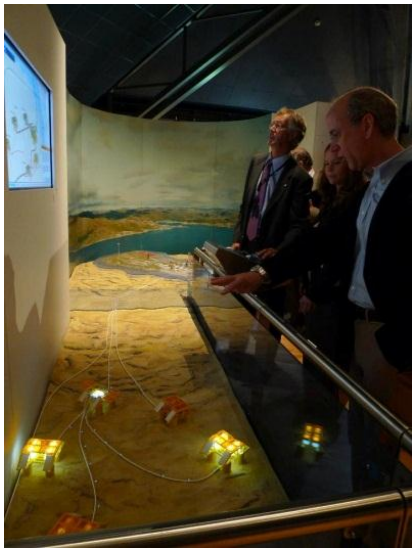
Energy and Policy Report to Alaskans

Institute of the North

INSTITUTE OF THE NORTH

GOVERNOR WALTER J. HICKEL, FOUNDER

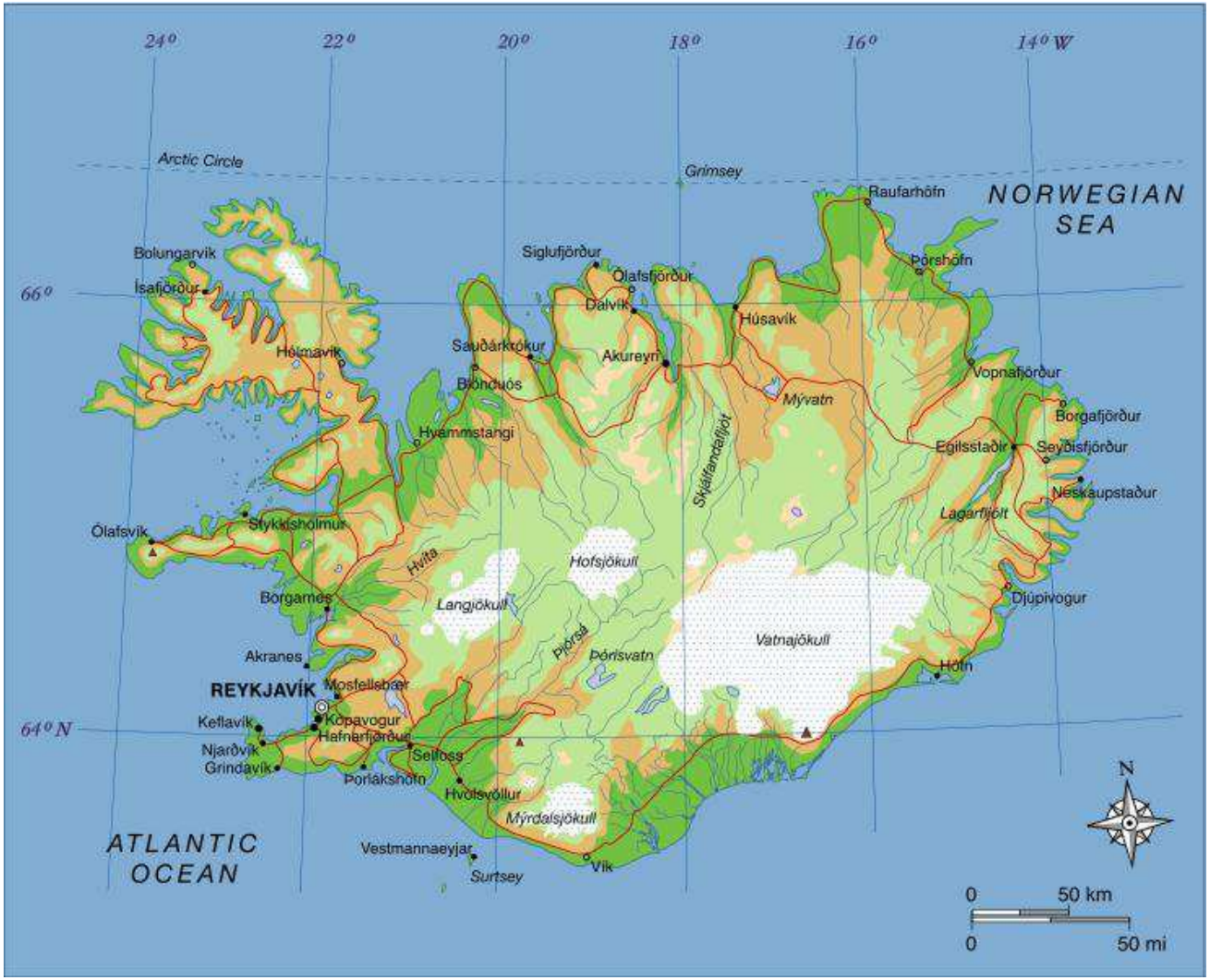
- The Institute of the North’s mission is to inform public policy and cultivate an engaged citizenry
- Circumpolar Policy Tours provide the opportunity to examine energy, resource and economic development best practices while also sharing Alaska's interests and perspectives with international leaders.



Iceland Policy Tour - An Overview

- **Policy Meetings**
  - Parliament
  - President
  - Ministry of Foreign Affairs
  - Ministry of Industries and Innovation
- **Renewable Energy Industry Visits**
  - Landsvikjun Fljótsdalur power station
  - Reykjavik Geothermal
  - Municipality of Arborg/Selfoss District Heating
  - Hellisheidi Geothermal Plant
  - Mannvit Engineering
  - Verkis Consulting
- **Economic Development: Energy Intensive Industries**
  - Alcoa Fjardaál aluminum smelter
  - Verne Global data center
  - Fluda Sveppir mushroom plant
- **Research/Education Briefings**
  - University of Iceland
  - Gekon Consulting (cluster management)

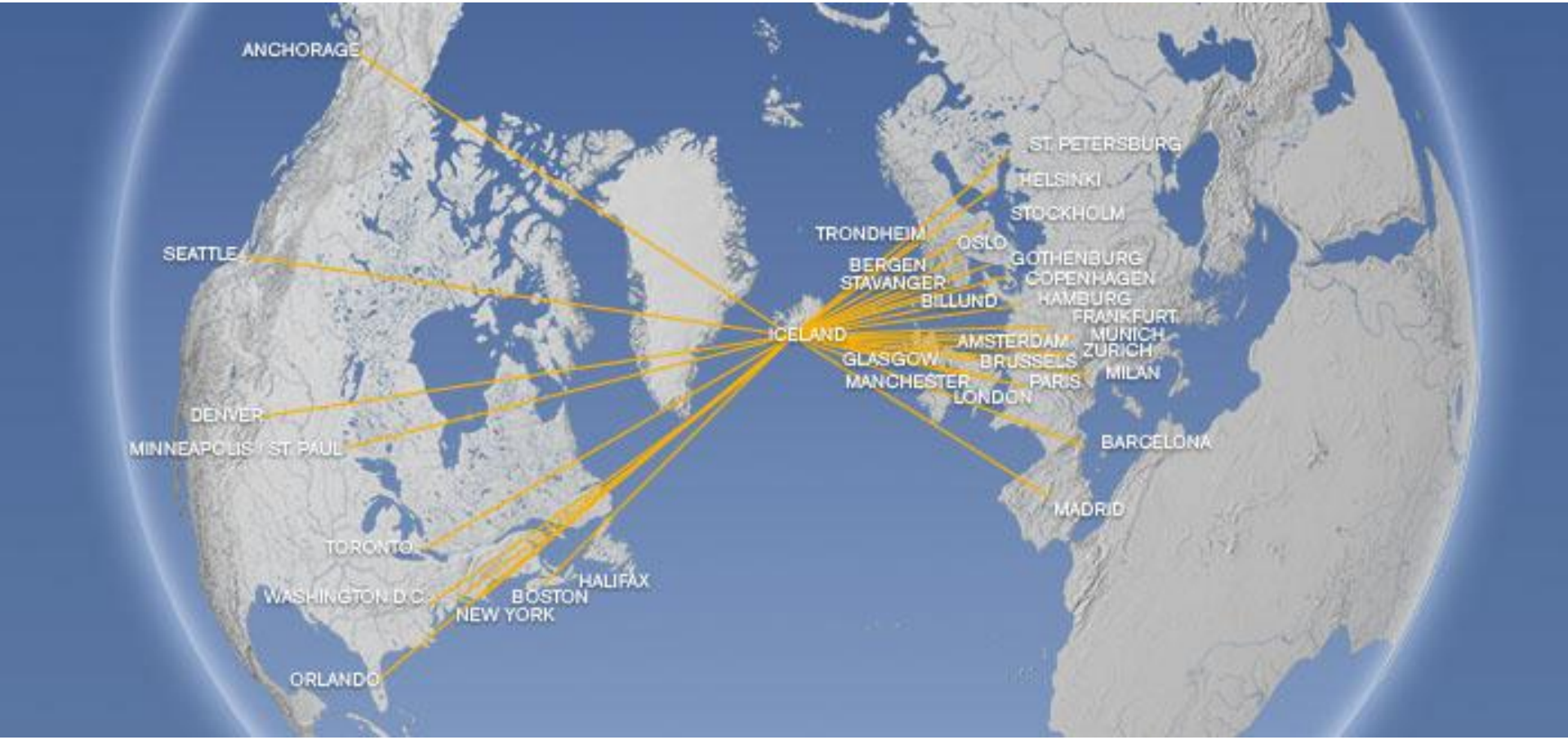
Iceland


24°
22°
20°
18°
16°
14° W
66°
64° N
Arctic Circle
Grímsey
NORWEGIAN SEA
ATLANTIC OCEAN
Raufarhöfn
Þórshöfn
Bolungarvík
Ísafjörður
Siglufjörður
Ólafsfjörður
Dalvík
Húsavík
Hólmavík
Sauðárkrókur
Akureyri
Blönduós
Mývatn
Vopnafjörður
Borgafjörður
Hvammstangi
Egilsstaðir
Seyðisfjörður
Skjálfandafljót
Neskaupstaður
Lagarfljót
Ólafsvík
Stykkishólmur
Hvítá
Hofsjökull
Langjökull
Djúpivogur
Borgarnes
Vatnajökull
Þjórsá
Þórisvatn
Akranes
Höfn
REYKJAVÍK
Mosfellsbær
Kópavogur
Keflavík
Hafnarfjörður
Njarðvík
Selfoss
Grindavík
Þorlákshöfn
Hvolsvöllur
Mýrdalsjökull
Vestmannaeyjar
Vík
Surtsey
N
0
50 km
0
50 mi

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%	-

Air Crossroads of North America and Europe



Iceland and Alaska—Gateways to the Arctic

Arctic Transshipment

Iceland Energy Themes

- Identifying comparative advantages
- Strategic, long-term planning
- Investment
  - People
  - Institutions
  - Infrastructure

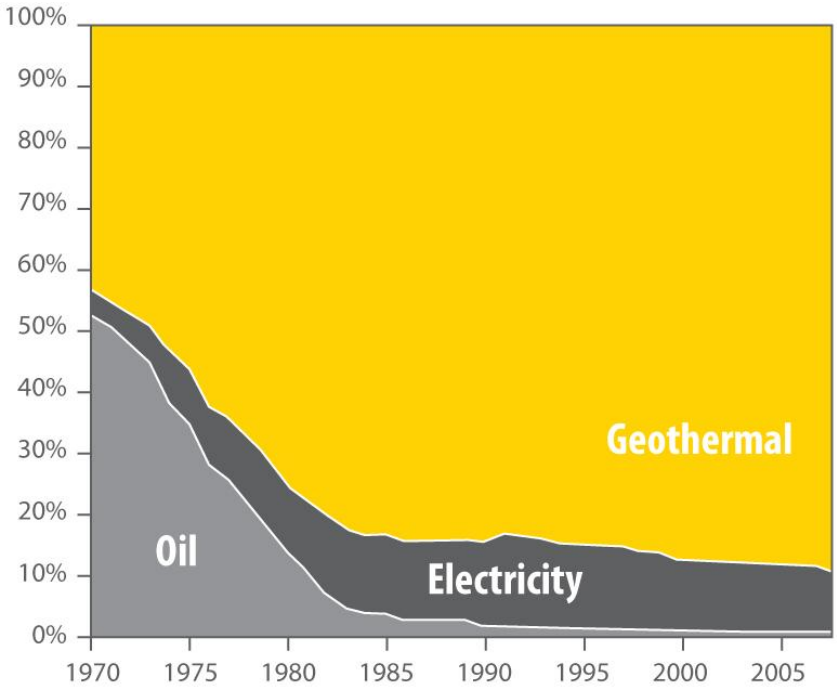
Iceland Energy Mix

- 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

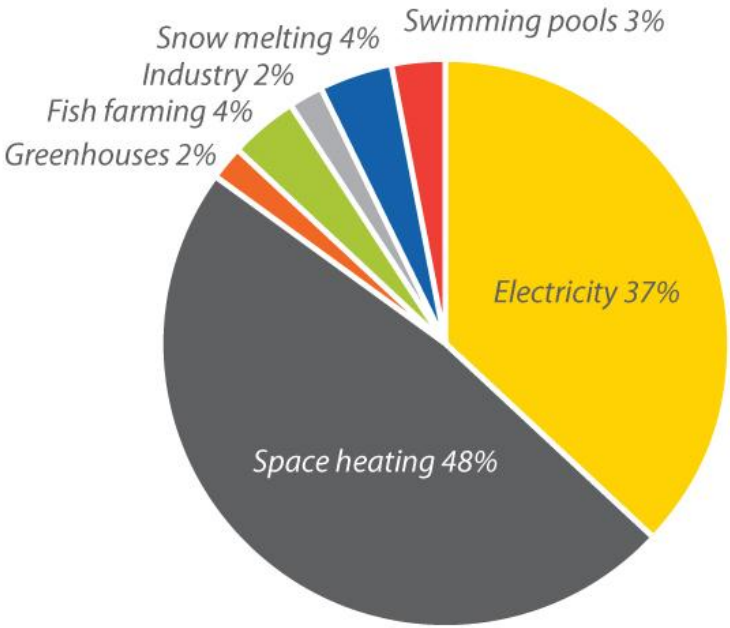
Source Iceland National Energy Authority

Geothermal Energy in Iceland

Space Heating

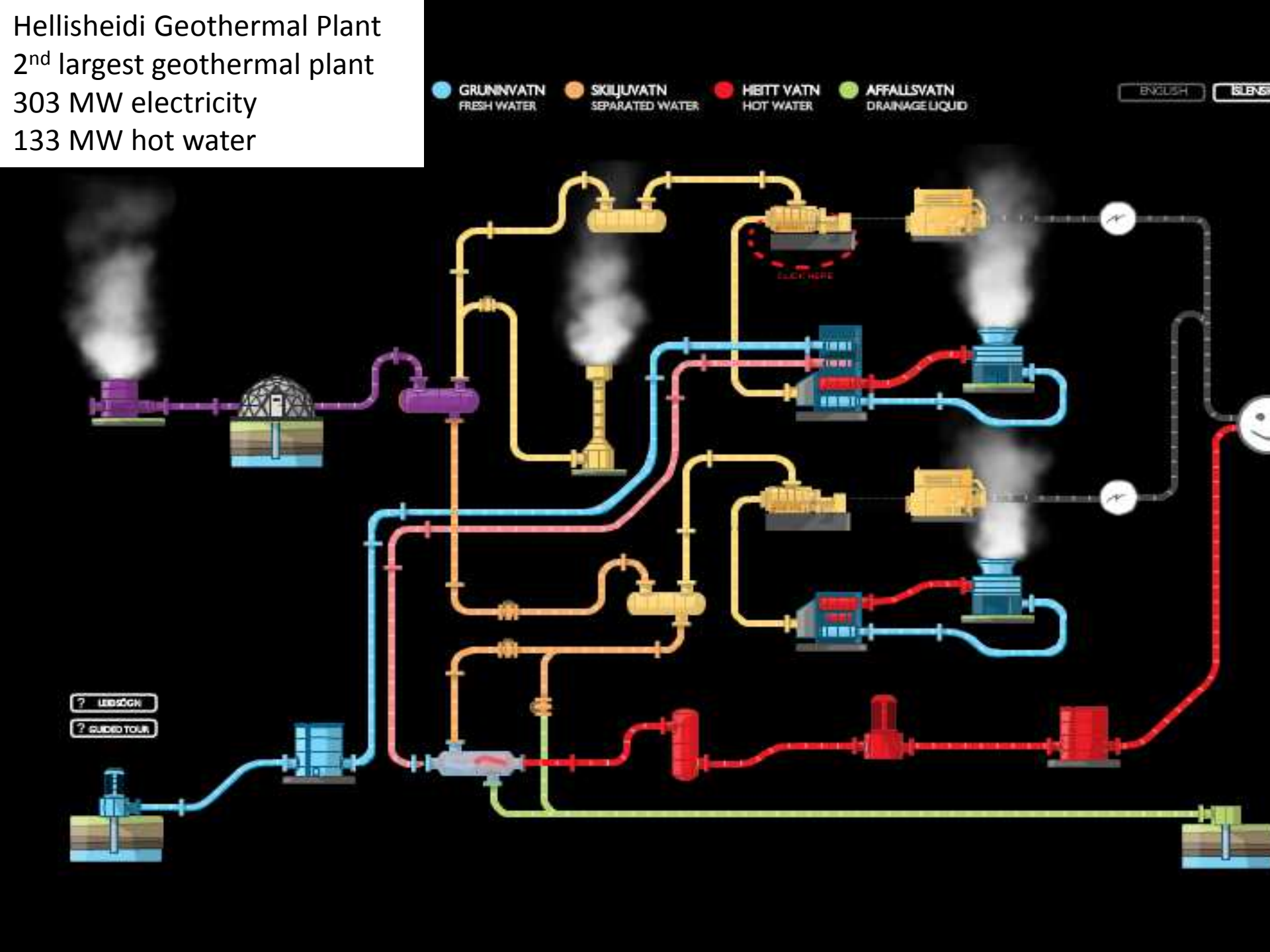


Geothermal Utilization



Source Iceland National Energy Authority

Hellisheidi Geothermal Plant
2nd largest geothermal plant
303 MW electricity
133 MW hot water



Electricity Profile (2010)

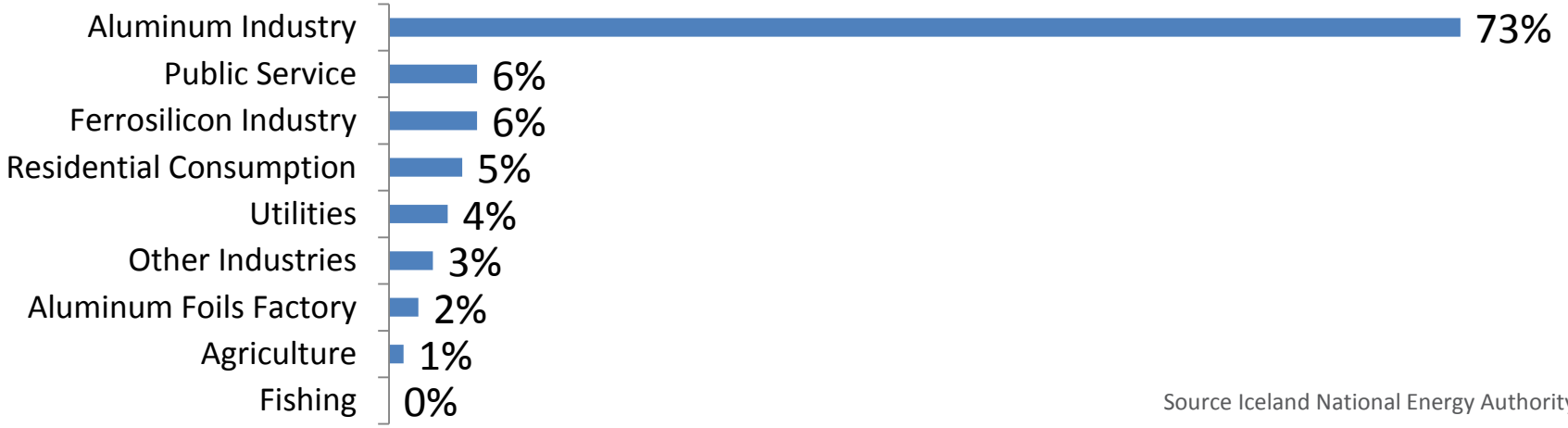
Installed Capacity

	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

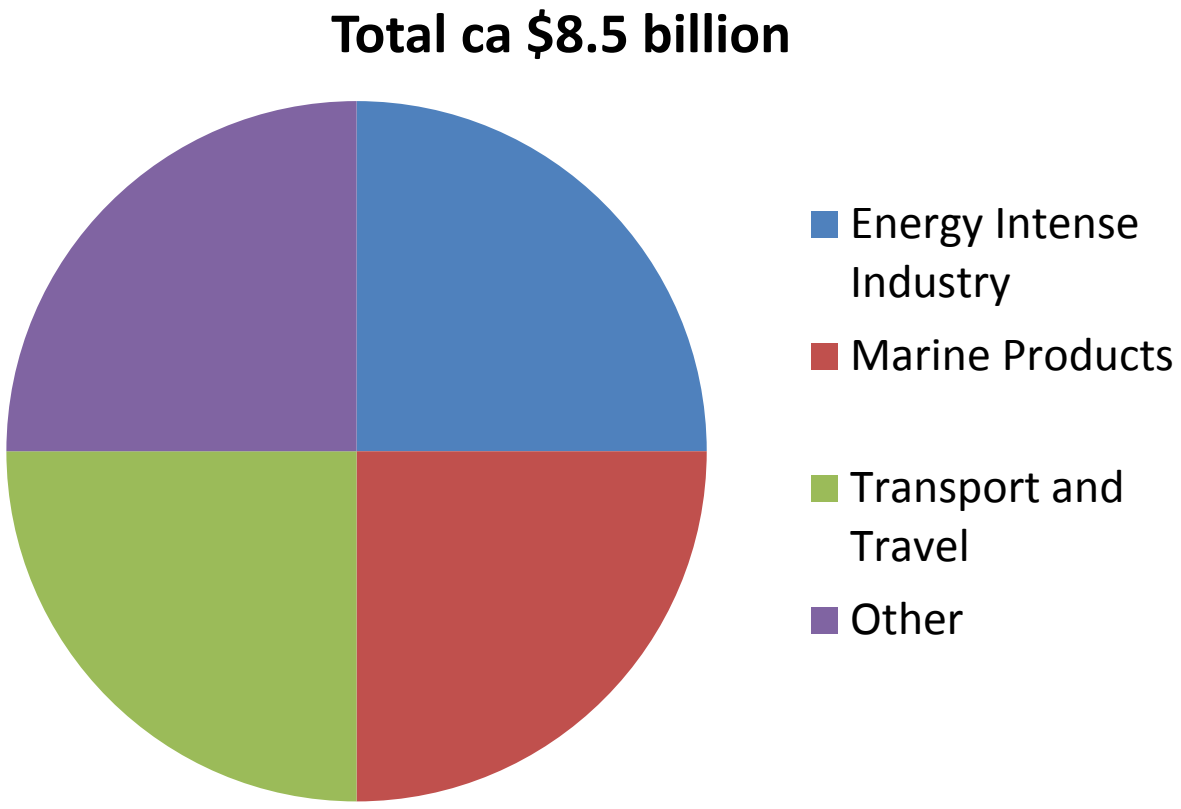


Source Iceland National Energy Authority

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)



Positive Trade Balance, 14%

Verne Global Data Centre

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

UAF Energy Policy Research

- 4 graduate students conducting targeted policy analysis papers for legislators
- Overcoming barriers to transformation
  - District heating in Reykjavik
  - Geothermal development and knowledge economy
  - Kárahnjúkar project
  - Food security

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

Next Steps

- Continue **bridge building** between Alaskan and Icelandic government agencies, private companies and universities
  - Encourage international investment—service contracts and pilot projects that highlight Icelandic expertise in geothermal and export Alaskan expertise in oil/gas and mining
  - Share policy frameworks and support of international agreements (such as Arctic Council, UNCLOS)
  - Host reception to celebrate and highlight Icelandair's seasonal direct flight between Reykjavik and Anchorage
  - Plan folloow-up trip to focus on fisheries and rural development, possibly in conjunction with Greenland Policy Tour in June 2013
- Alaska as **influencer**
  - Implement liaison to act as Alaska state consulate to Iceland that maintains continuous presence in Iceland
  - Strategically plan to position an Alaskan for role as next Director of the Arctic Council Secretariat

Questions?