Increasing policy makers' awareness and the public acceptance - Athens, Greece, Workshop 6

September 13-14 2007

Effective Policy Making for Sustaining a Renewable Energy Society in Iceland

Jonas Ketilsson
Geothermal Specialist
Energy Resources Division
National Energy Authority of Iceland (NEA)

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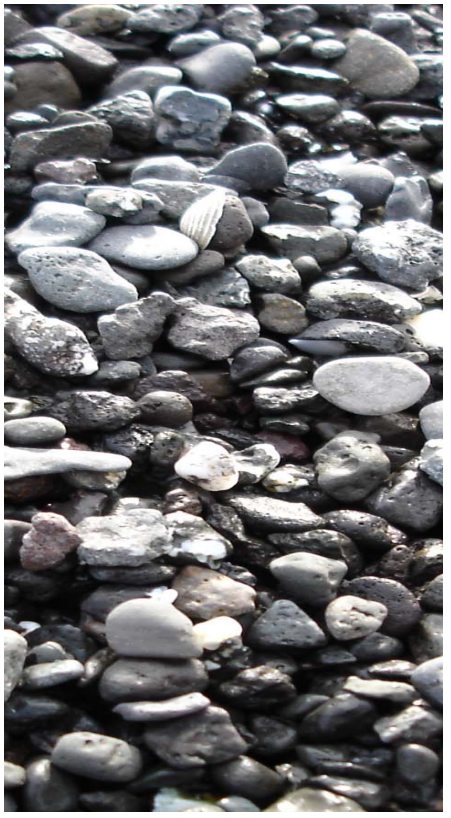
National Energy Authority

Overview

- Role of NEA
- Energy Utilization in Iceland
- Public Awareness
- Green Initiatives to Increase Public Acceptance
- Policy of the Government

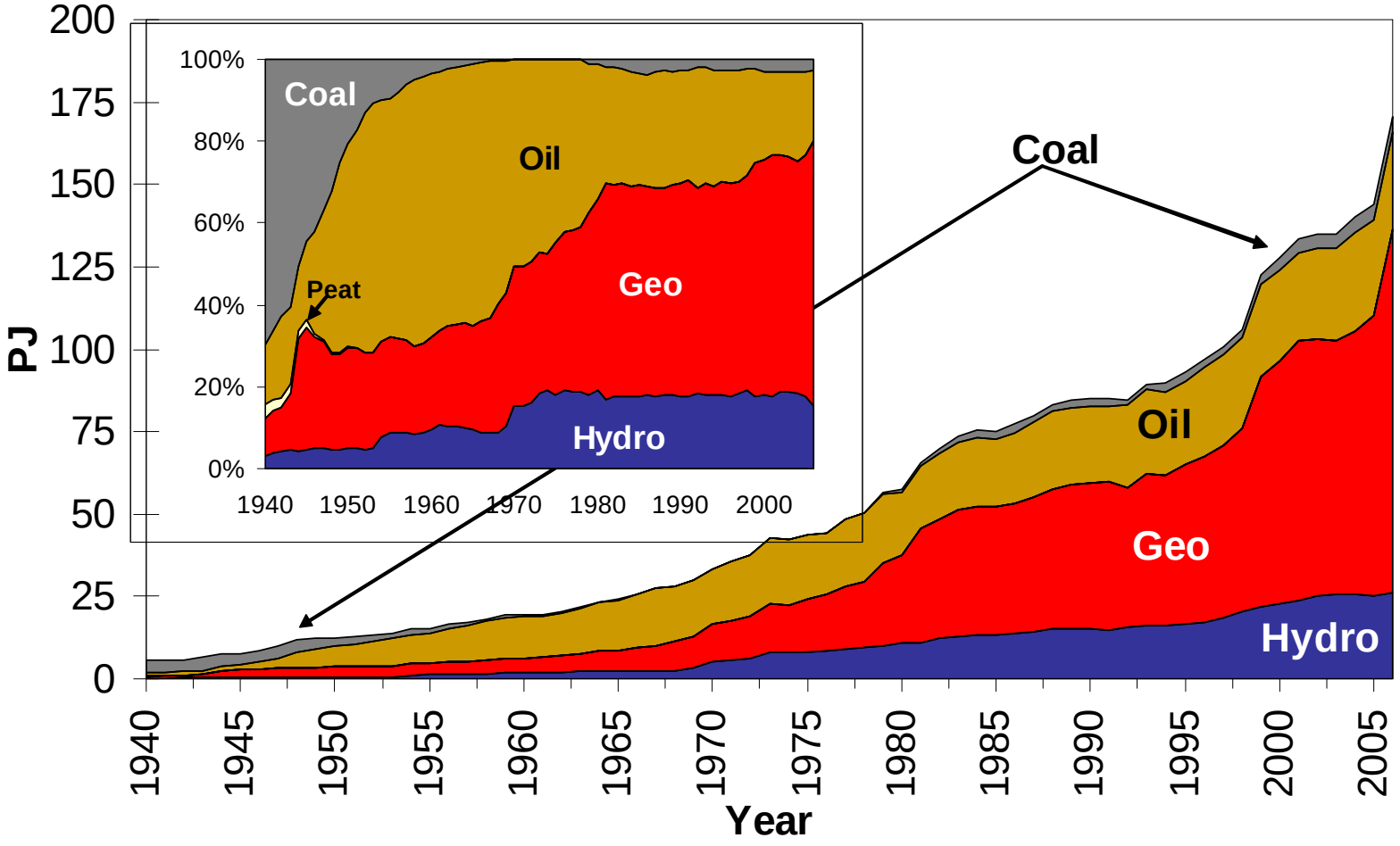
Role of the National Energy Authority (NEA)

- Contracts and conducts research in the field of energy
- Accumulates and maintains databases on the energy resources
- Disseminates knowledge on energy sources and utilization
- Administers energy affairs and advises the minister



Energy Utilization in Iceland

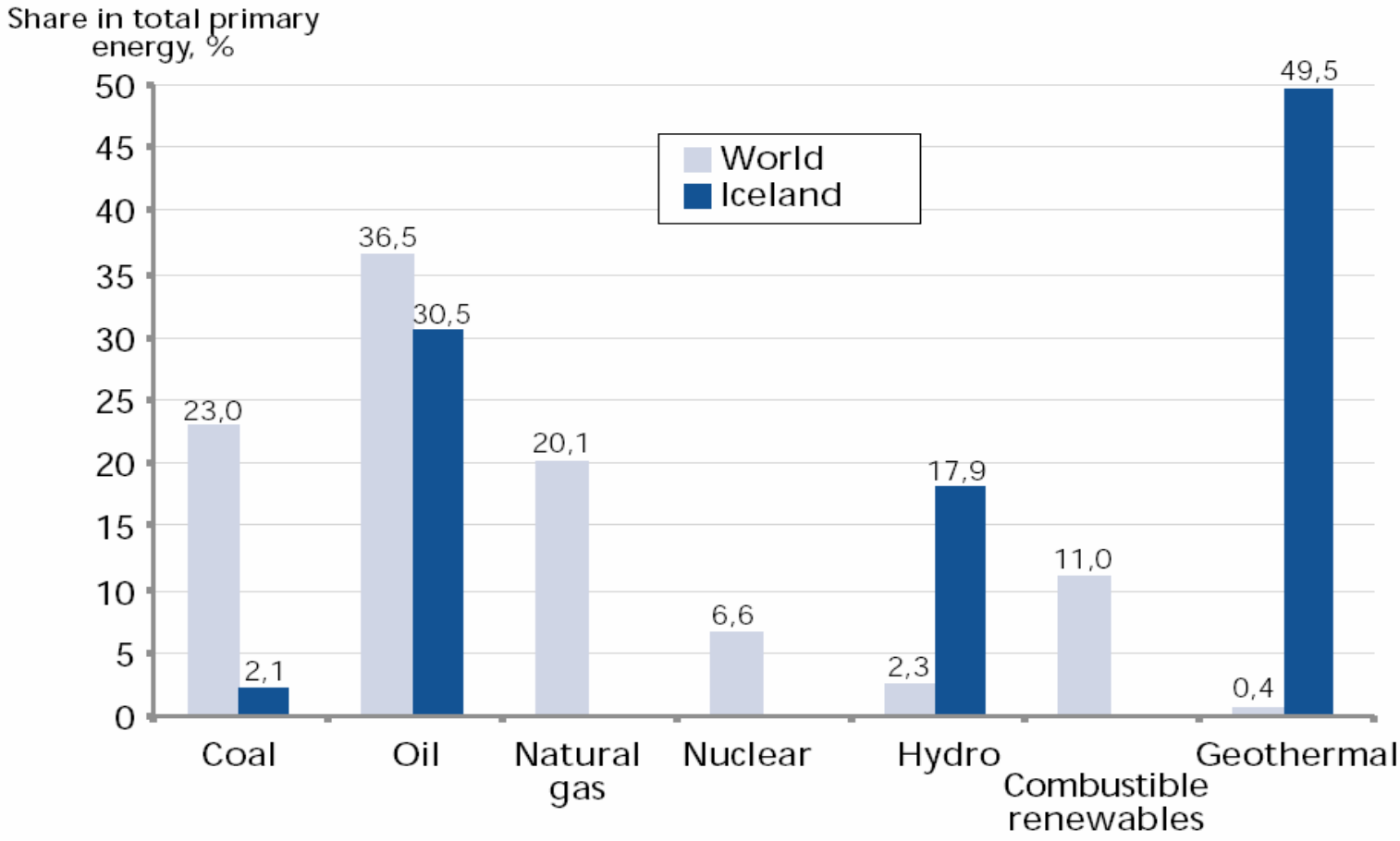
Primary Energy Consumption 1940-2006



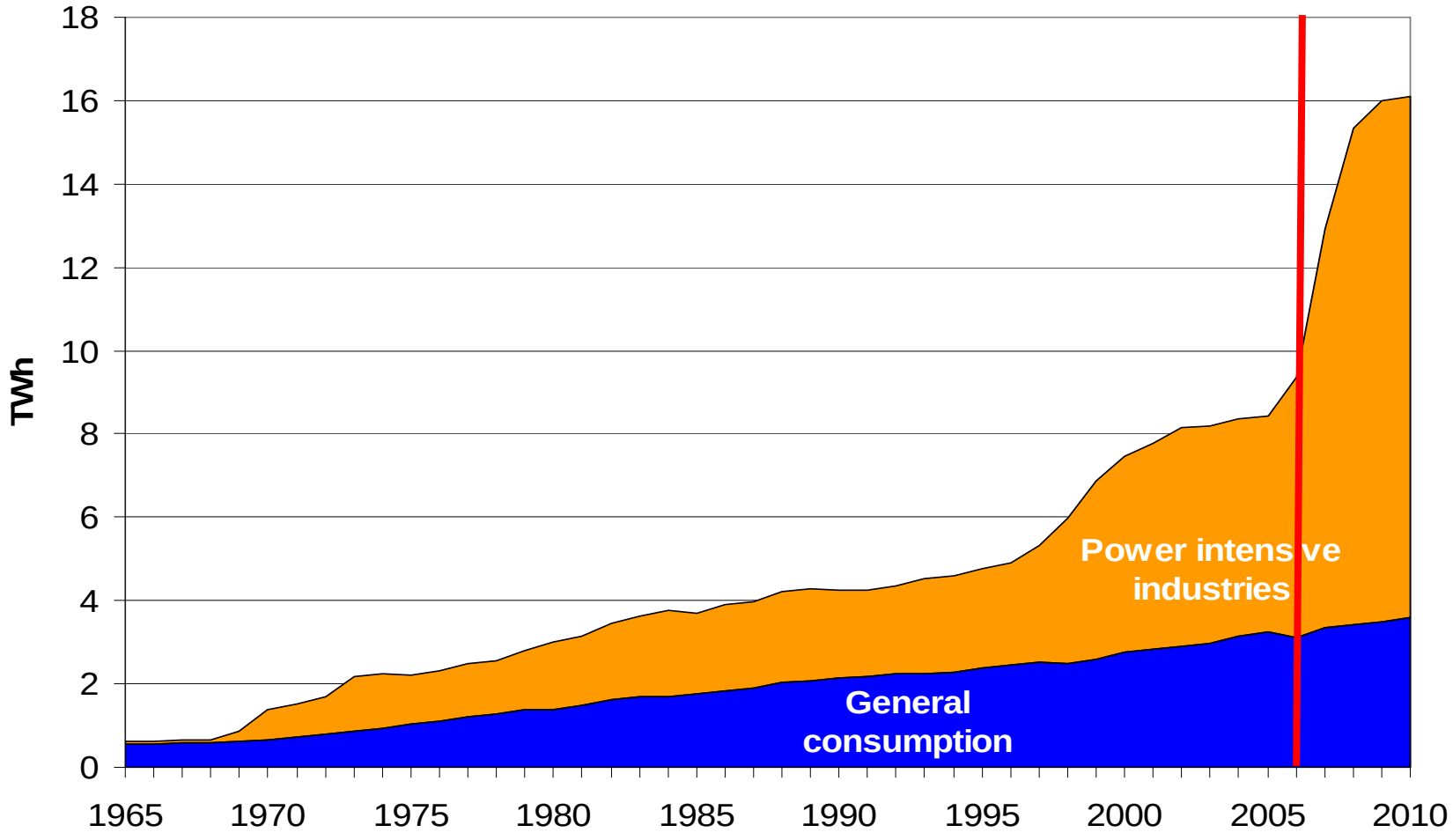
Basic Facts 2006

- All stationary energy is renewable
- 72% of primary energy is renewable
  - Highest ratio in OECD - and probably in the world
- Oil still needed for 28% of the primary energy demand
  - About half to operate the fishing fleet
  - The other half mainly for motor vehicles

Composition of Primary Energy Supply in the World and in Iceland 2003



Electricity Consumption 1965 - 2010



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Power Intensive Industry

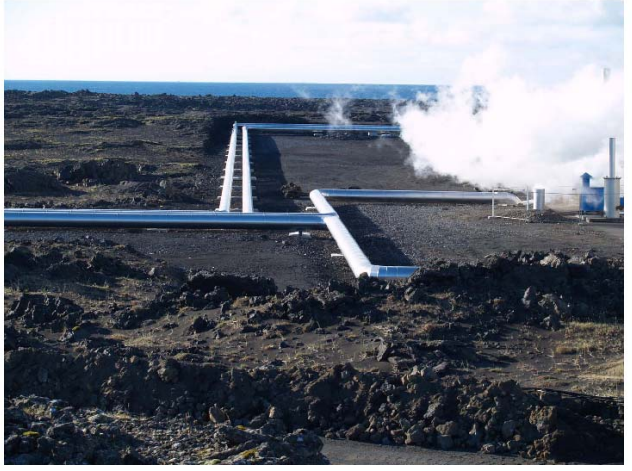
Kárahnjúkar Hydro-Power Plant
A controversial project

Public Awareness

Protests Against Kárahnjúkar Power Plant

Pictures from www.savingIceland.org

Visual Impact of Geothermal Power Plants



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Pictures from Dr. Birgir Jonsson

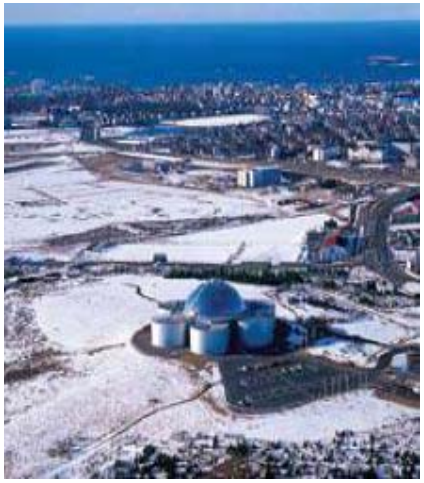
Visual Impact of Geothermal Power Plants

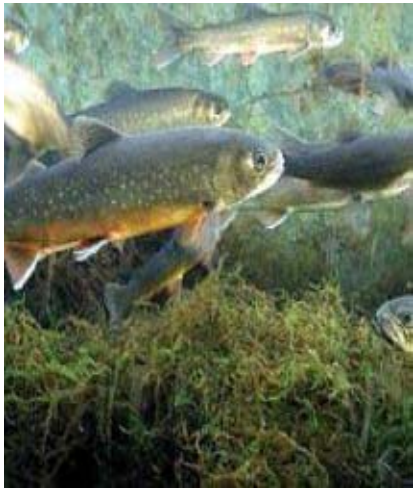
Notkunarleyfi OR: Intranet/Internet, verkefnaskýrslur, skyggnusýningar og fréttabréf OR. Um aðra notkun þarf að semja sérstaklega.
© Mats Wibe Lund

Visual Impact of Geothermal Power Plants

Green-Initiatives to Increase Public Acceptance

Examples of Direct Use





Geothermal welcome centres

ICELAND

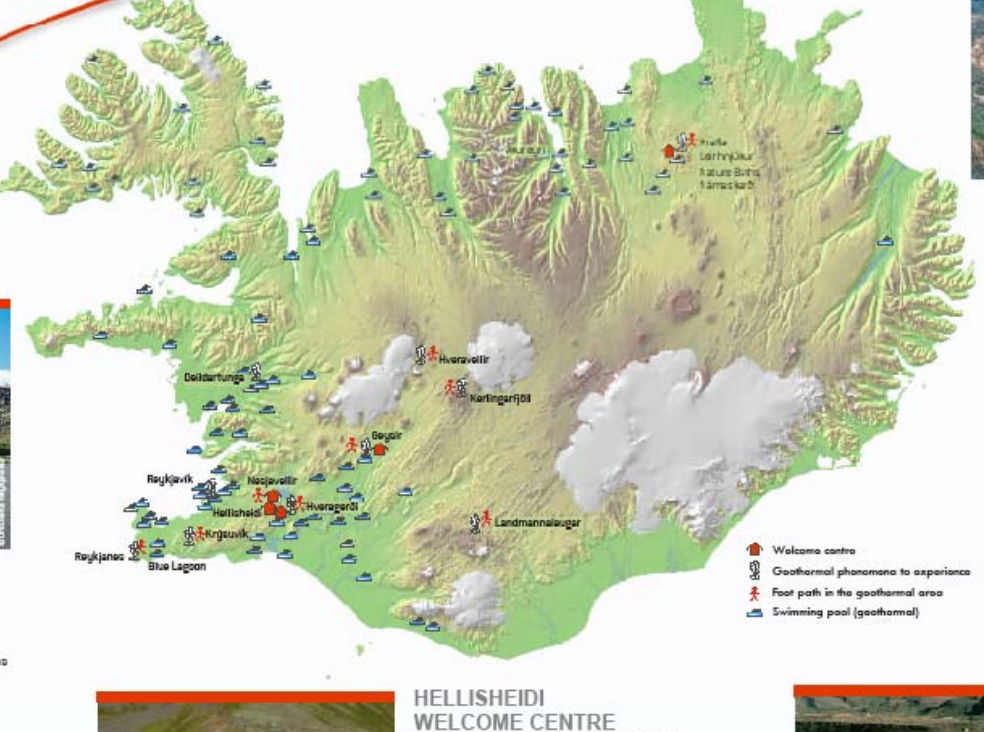
NESJAVELLIR WELCOME CENTRE

At the Welcome Centre in Nesjavellir power station, an account is given of energy generation from a high-temperature geothermal system as well as the process utilised by the plant, and of the Reykjavík district heating system.

Opening hours 1. June - 31. August
Monday to Saturday 9 - 17
Sunday 13 - 18
September - May on request

Free Admittance

For more information
Tel: (+354) 480 2409
www.or.is



KRAFLA WELCOME CENTRE

Krafla is a geothermal power plant and at the Welcome Centre you will find information on geothermal energy and the Krafla eruptions, including a short, entertaining film on how geothermal steam is used to generate electricity.

Opening hours 1. June - 31. August
Monday to Friday 12:30 - 15:30
Saturday to Sunday 13 - 17

Free Admittance

For more information
Tel: (+354) 515 9000
www.lv.is

GEYSIR WELCOME CENTRE

Geysir Centre is a museum by the largest geysir in the world, where modern multimedia shows combined with ample information enlighten visitors about some of Iceland's amazing natural phenomena, and allow them to feel some, as is the case with the earthquake simulator.

Opening hours
May - September 10 - 19
Jan. - April /Okt. - Dec. 11(12) - 16(17)

Cost of Admission
Adults 450,- ISK
Children 6 - 12 years 200,- ISK
Children < 6 years Free,
Student 350,- ISK
Seniors > 66 years 250,- ISK

For more information
Tel: (+354) 480 6800
www.geysircenter.com

HELLISHEIDI WELCOME CENTRE

The geothermal power plant at Hellisheidi started to operate in 2006 and will be enlarged in stages until 2009. The Welcome Centre will be opened in the middle of July 2007.

Opening hours from 15 July 2007
Daily 9 - 19:00

Free Admittance

For more information
Tel: (+354) 516 6100
www.or.is

HVERAGERÐI WELCOME CENTRE

In Hveragerði a geothermal field located in the town centre is harnessed for district heating and greenhouses. At the tourist information facilities on the eastern margin of the area information is available on the nature of the geothermal field and the relation of geology, tectonics, volcanic activity and microbiology to geothermal activity. Information on boreholes and production is presented too.

Opening hours 1. June - 31. August
Monday to Friday 10:30 - 18
Saturday to Sunday 13 - 16

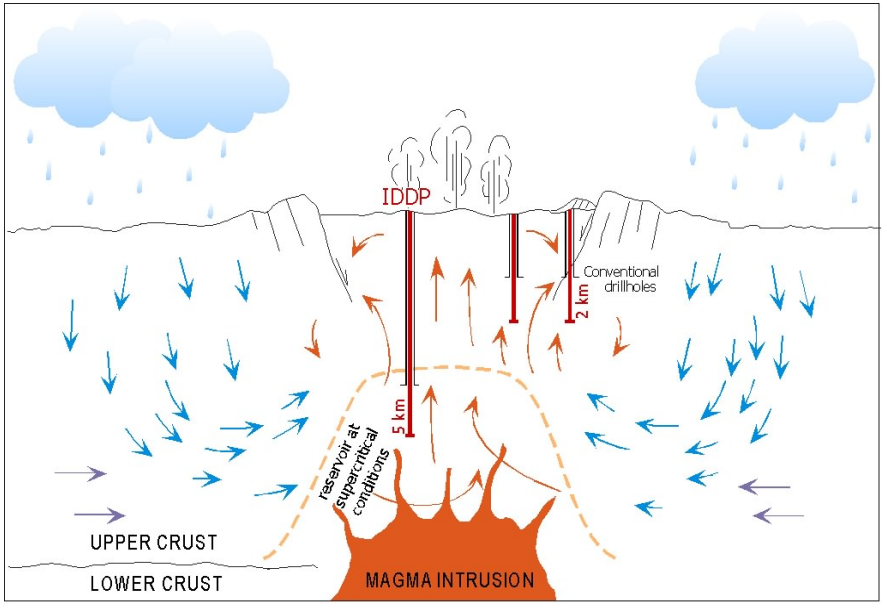
Free Admittance

For more information
Tel: (+354) 483 4601 / 660 3905
www.hveragerdi.is

The ENGINE project (ENhanced Geothermal Innovative Network for Europe) is a co-ordination action supported by the 6th Research and Development framework of the European Union (http://engine.brgm.fr).
ÍSOR (Iceland GeoSurvey) is a governmental institution that provides a wide variety of energy research, exploration and development services on contract in Iceland and abroad (www.isor.is).
This poster is produced by ÍSOR as part of the promotion activity of ENGINE for furthering the use of geothermal energy within Europe. The welcome centres are independently operated and have not received support from ENGINE.

- A new era in geothermal development
  - 400-600 °C, superheated steam
  - 40-50 MWe from each well

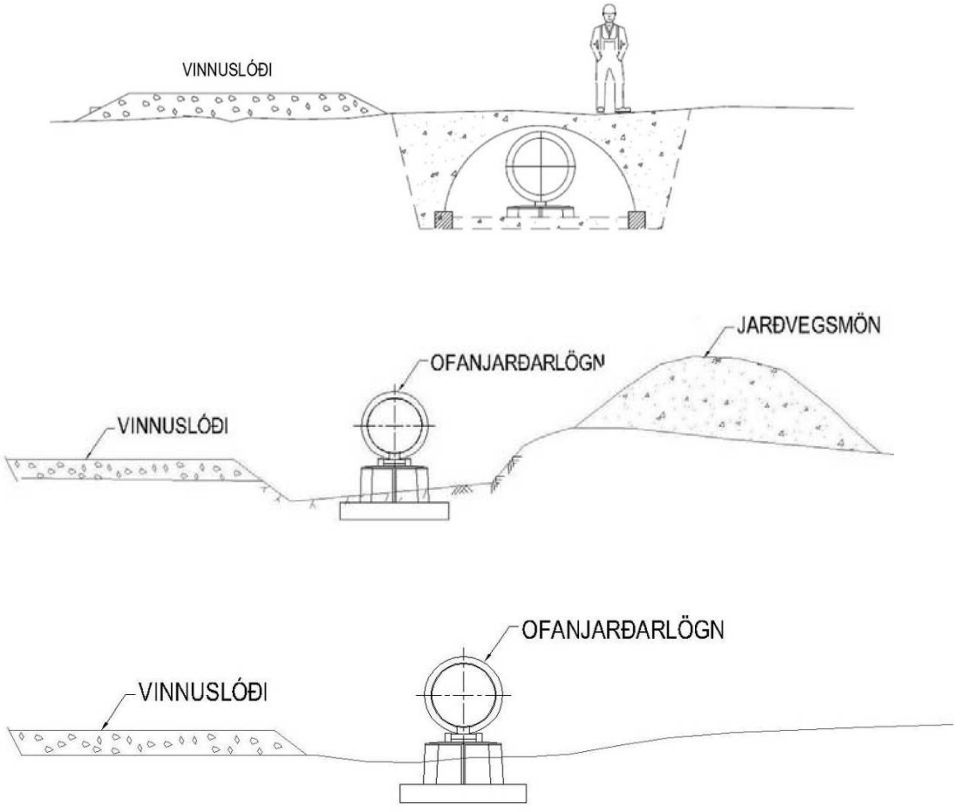
- Deep Vision meeting
  - First IDDP well at Krafla next year
  - 2nd & 3rd IDDP wells 2009-2010 within Hengill and Reykjanes fields.
  - Pilot plant testing planned to be completed in 2015



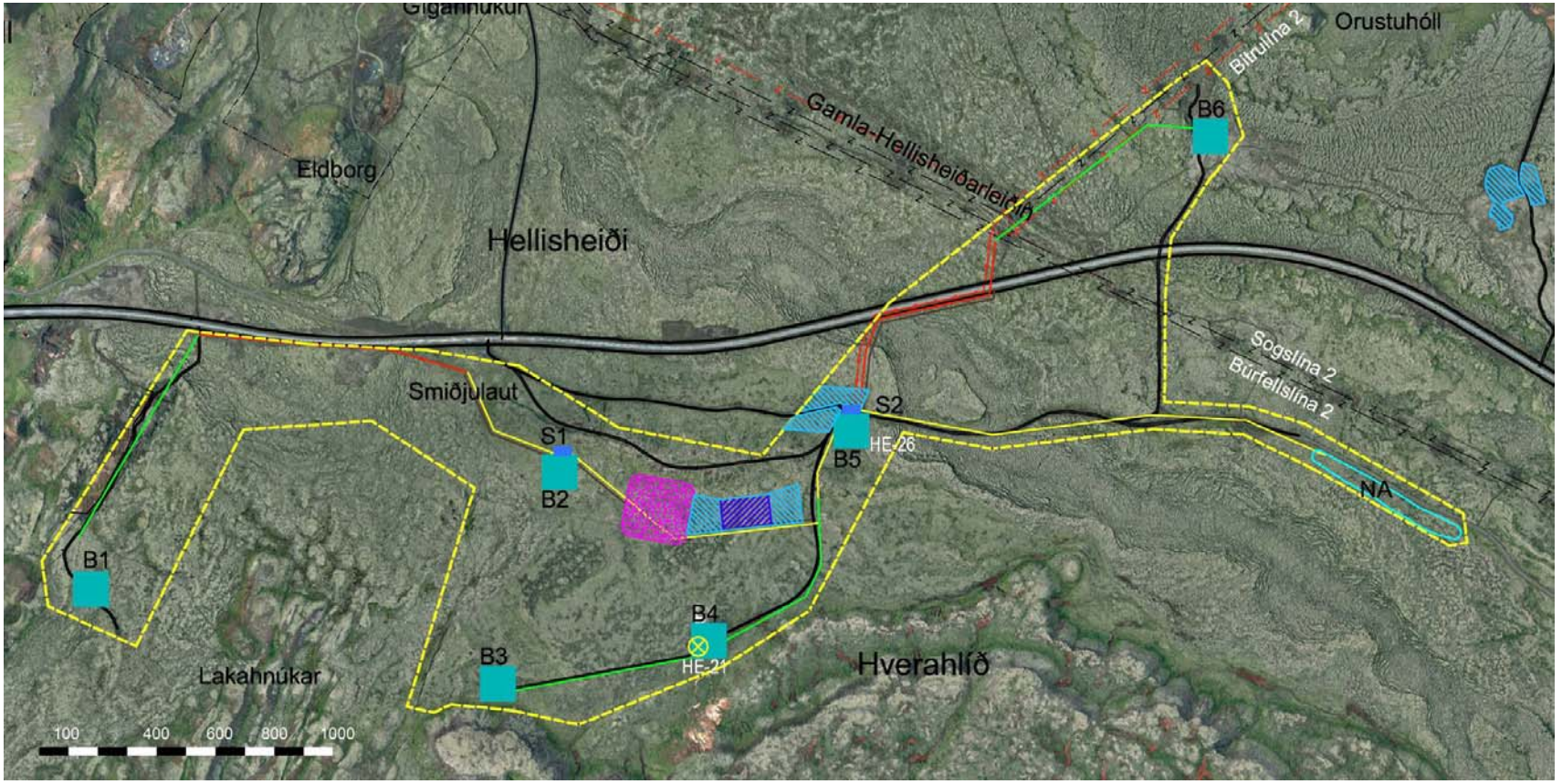
Geothermal Power Plant Design

- Minimize visual impact
  - Adapt design to environment
  - Buildings partly underground or hidden
  - 5-7 deviated wells on each platform
  - Pipelines partly/completely underground
  - All run-off water injected back into the reservoir

Examples


VINNUSLÓÐI
JARÐVEGSMÖN
OFANJARÐARLÖGN
VINNUSLÓÐI
OFANJARÐARLÖGN
VINNUSLÓÐI

Examples


Gígahnúkur
Orustuhóll
Bitrulína 2
Gamla-Hellisheiðarleiðin
B6
Eldborg
Hellisheiði
Sogslína 2
Búrfellslína 2
Smiðjulaut
S2
S1
B5
HE-26
B2
NA
B1
B4
B3
HE-21
Lakahnúkar
Hverahlíð
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400
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800
1000

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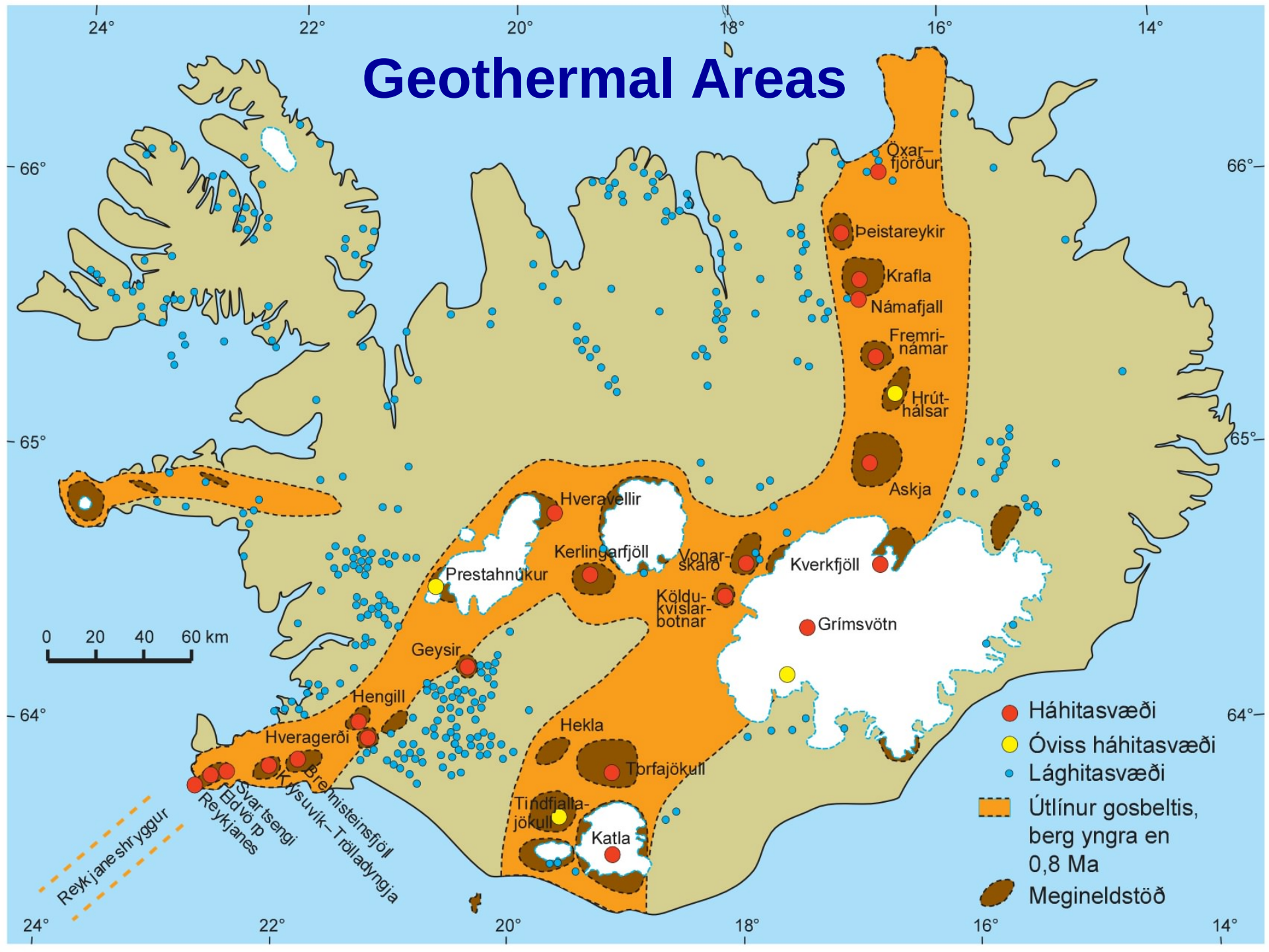
Policy of the Icelandic Government

Framework Programme for Utilization of the Energy Resources

- Parliament started the work in 1997
- Proposed power projects are evaluated and categorized on the basis of:
  - Energy efficiency and economics
  - Impact on the natural environment, cultural heritage sites, fishing, hunting and recreational activities
  - Implications for regional development
  - Priorities projects
- Is to be presented to Parliament in 2010

Framework Programme: Working Groups

- Working Group I
  - Evaluates what impact proposed power projects will have on Nature, landscape, geological formations, vegetative cover, flora and fauna, as well as cultural heritage and ancient monuments.
- Working Group II
  - Evaluates the impact on outdoor life, agriculture, revegitation, fishing in rivers and lakes, and hunting.
- Working Group III
  - Evaluates the impact proposed power projects can have on economic activity, employment and regional development.
- Working Group IV
  - Identifies potential power projects, both hydro and geothermal,and carries out technical as well as economic evaluation of the projects.


Geothermal Areas
24°
22°
20°
18°
16°
14°
66°
65°
64°
Öxar–
fjörður
Þeistareykir
Krafla
Námafjall
Fremri-
námar
Hrút-
hálsar
Askja
Hveravellir
Kerlingarfjöll
Vonar-
skarð
Kverkfjöll
Prestahnúkur
Köldu-
kvíslar-
botnar
Grímsvötn
Geysir
Hengill
Hveragerði
Hekla
Torfajökull
Tindfjalla-
jökull
Katla
Reykjaneshryggur
Svartsengi
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Reykjanes
Krýsuvík–Trölladyngja
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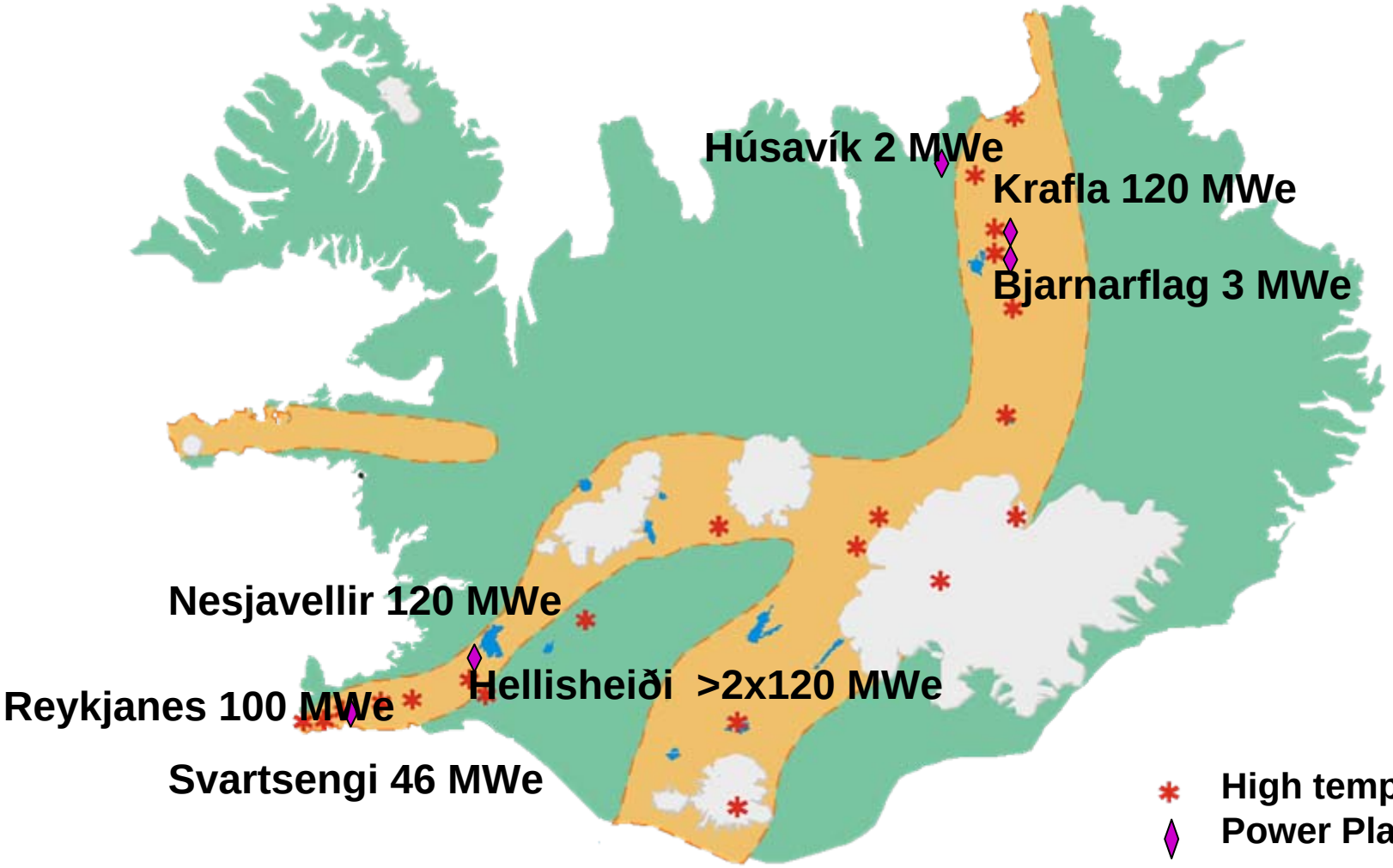
Installed and Planned Capacity



Policy Declaration of the New Government: "In Harmony with the Environment"

- "Iceland … a world environmental leader
- Broad consensus on conservation of valuable natural areas
- Plan for reducing greenhouse gas emissions
- Systematic steps … to increase the use of environmental-friendly vehicles"

Geir Haarde (Prime Minister) and Ingibjörg S. Gisladottir (Minister of Foreign Affairs)

Policy Declaration of the New Government: - Next Steps in Energy Utilization -

- Particular focus on conservation value of high-temperature geothermal fields
  - which will be classified with respect to conservation and harnessing
- Complete [the] framework plan [on the energy resources and conservation value] by the end of 2009
  - and present the conclusions to Parliament for formal consideration
- Until [then] no previously untouched areas will be encroached upon
  - without the approval of Parliament,
  - unless research or harnessing permits have already been issued.

Dr. Össur Skarphéðinsson
Minister of Industry

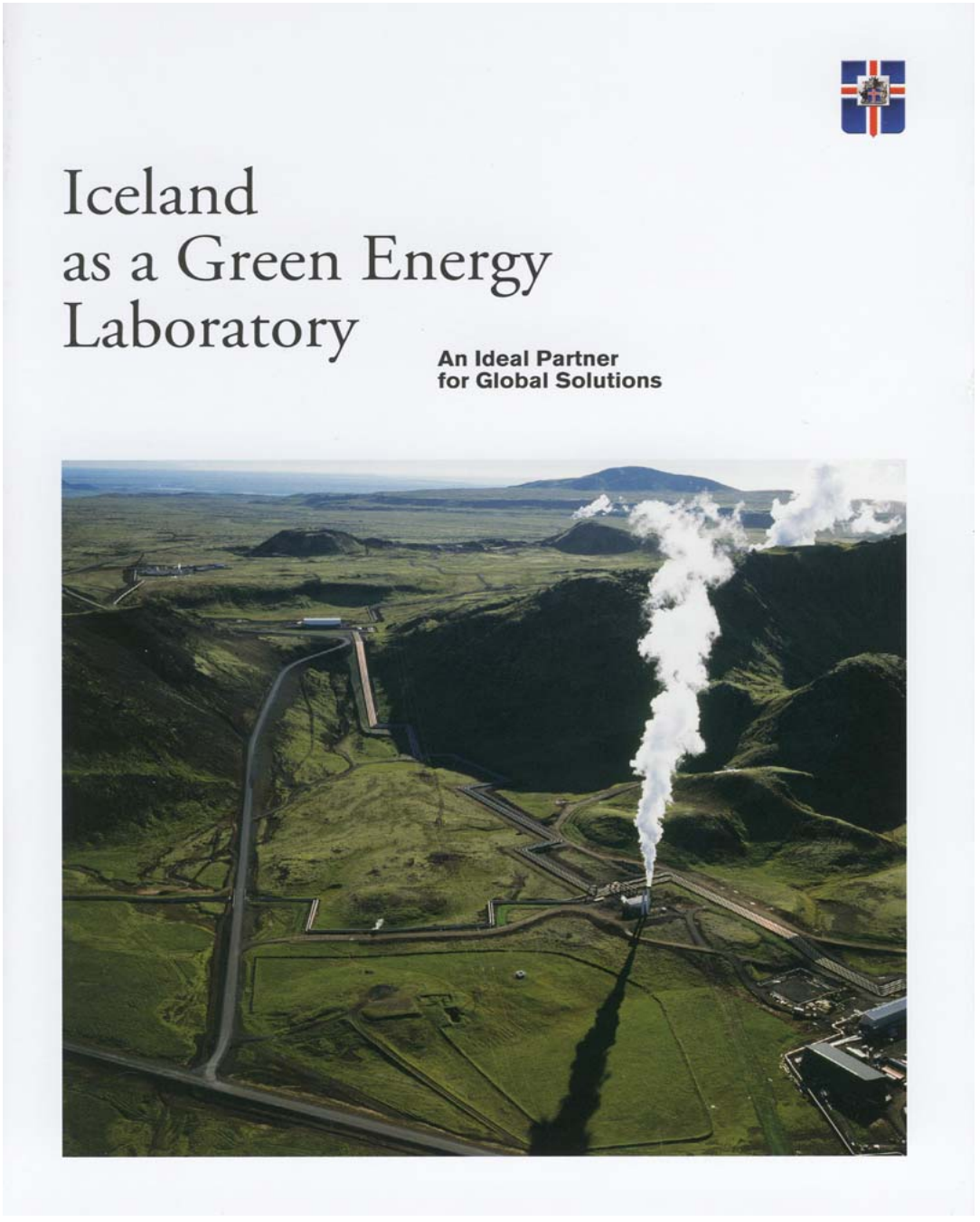
Policy Declaration of the New Government: - Next Steps in Energy Utilization -

- ..areas … deemed important by … the Ministry for the Environment, will be exempted from harnessing and may not be disturbed until the future classification has been made …
  - [These areas are then listed]

Þórunn Sveinbjarnardóttir
Minister for the Environment

Vision of the President of Iceland

Dr. Ólafur R. Grímsson



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Efcharistó – Takk fyrir!

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Mechanical Engineer
and Geophysicist
Geothermal Specialist

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