# The Icelandic Energy & Hydrogen Policy

## - Programmes & Progress -

Country Statement for the IPHE Steering Committee
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Ministry for Foreign Affairs

# Contents of Presentation

- Policy on Energy and Hydrogen
- Programmes and Projects
- Education and Outreach

# Basic Facts about Icelandic Energy

- **Currently over 72% of all primary energy used in Iceland is renewable**
  - Highest ratio in OECD - and likely the world
- **Electricity production is now 100% renewable - and totally carbon free**
- **28% of the energy demand is from oil**
  - 50% to operate the fishing fleet - 50% for our car fleet
- **Iceland "cleaned up" prior to Kyoto**

# Historical Steps - Towards a Hydrogen Economy

- 1970 Three decades of hydrogen research at the University of Iceland
- ✓1997 Governmental Committee on Domestic Fuel Production
- 1998 Political Statement on Hydrogen Policy
- 1999 New Energy, & the ECTOS project - co-operation with EU & Global Stakeholders
- 2003 The world's first hydrogen station built at a conventional filling station
- ✓ 2003 Testing of the operation of three hydrogen-powered buses commences
- 2003 Member of IPHE - The International Partnership for the Hydrogen Economy
- ✓ 2002-4 Ongoing Programmes & Projects / Committe on Hydrogen Policy, etc

# The Energy Policy of the Government

**To promote utilisation of clean and renewable energy - in harmony with the environment**

**Focusing on;**

- **sustainable development**
- **diversify industrial activity**
- **increase exports and foreign investment**
- **improve standard of living**

# Towards a Hydrogen Economy

- The long term aim of the government is to have renewable hydrogen fuel - replace the fossil fuels for the transport sector and fishing fleet - as soon as it becomes technically and economically possible

# Towards a Hydrogen Economy
## Drivers of the Process

- Sustainable use of renewable enegy
- Security and diversity of energy supply

- Climate change challenges
- Air quality and health
- Protection of the environment

- Added value and opportunities
- Making the future by action
- Global - private public co-operation

# Towards a Hydrogen Economy Policy of the Government

**The Government's Policy has 5 aspects:**

- Favorable framework for business and research
- International co-operation
- Hydrogen research
- Education and training
- Ongoing policy formulation

**Iceland**

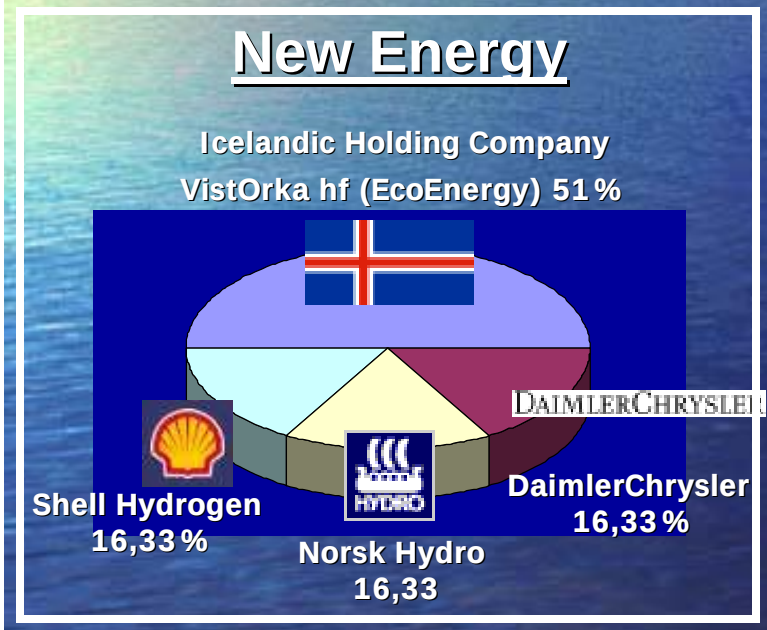
**As an International Platform for Hydrogen Research**

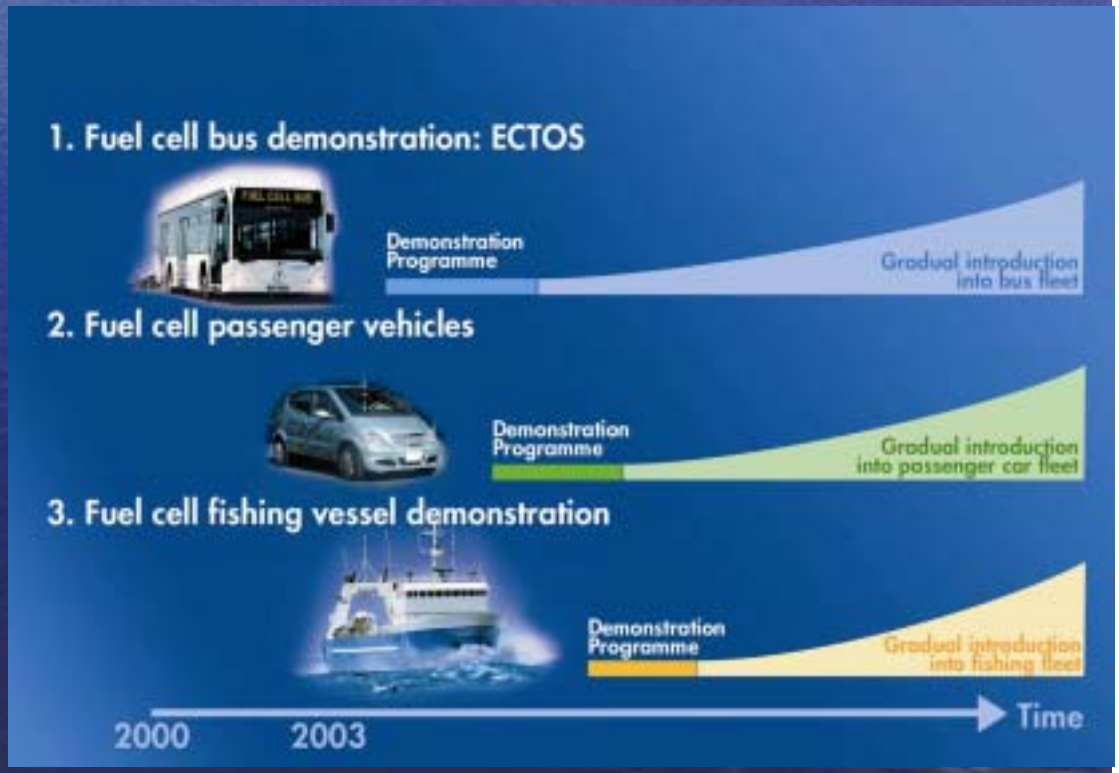
# Towards a Hydrogen Economy
## International Co-operation

**Iceland - Global Co-operation**

- ✓ **Member of the IPHE -** The International Partnership for the Hydrogen Economy
- ✓ **Member of the Hydrogen and Fuel Cell Platform in Brussel - EU**
- ✓ **Member of IEA, hydrogen**
- ✓ **Memorandum of Understanding between Manitoba and Iceland,**
- ✓ **Statement of Common Understanding for the Global Icelandic Hydrogen Partnership - between GETF in USA and Iceland**
- ✓ **The ECTOS Project,**
- ✓ **Euro-Hyport,**
- ✓ **HySociety,**
- ✓ **NORDIC ENERGY RESEARCH**
- ✓ **Nordic Summer School on Infrastructure**
- ✓ **Other projects with CEA France, Japan, United States**

# Icelandic New Energy "Roadmap"



# Hydrogen Projects

## The ECTOS Project

### Infrastructure – The Hydrogen Station & Buses

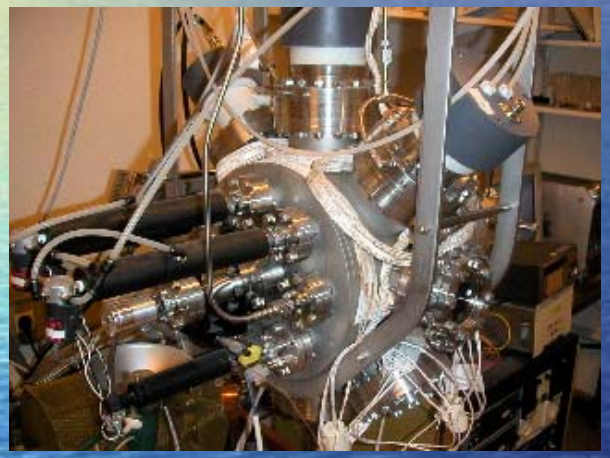


Iceland: I

# Hydrogen Projects
## ECTOS & Other Projects

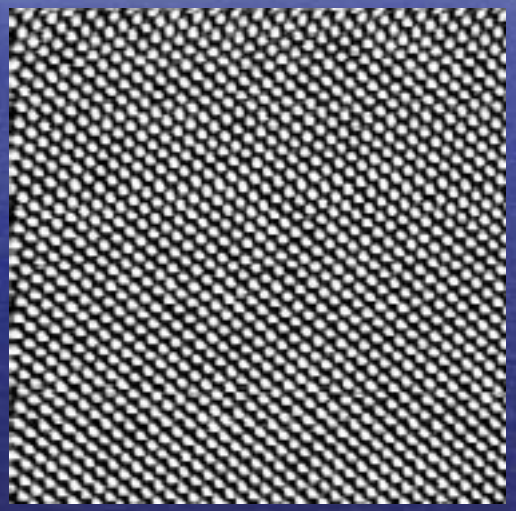
- ECTOS – bus & infrastructure demonstration
- EURO-HYPORT – education, infrastructure and export of $H_2$
- Storage of $H_2$
- Geothermal hydrogen
- Hydrogen passenger vehicles ($ICEH_2$ &/or FC)
- Market assessment of small fuel cells
- Social acceptance – Economics (cost benefit, etc) – External costs (NEEDS)
- Marine interest (NEW-H-SHIP)
- Consultancy
- Education
- Hydrogen Energy Technology Center (in preparation)

# Hydrogen Projects
## Some Hydrogen Projects



Materials preparation


VARMARAF



Artificial hydrogen containing nanostructures

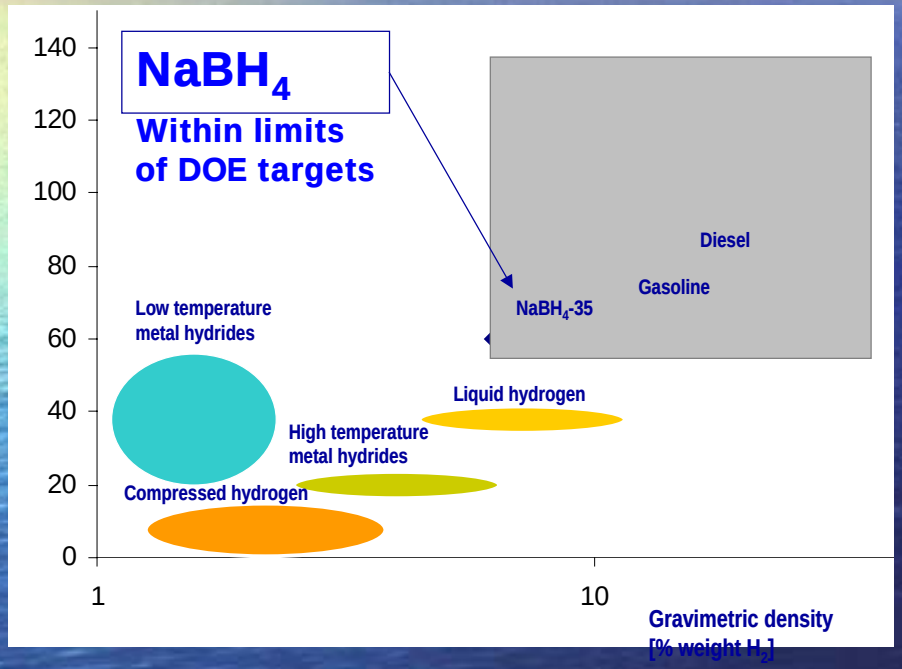
Spin off products
Solid state generators for low temperature heat and Thermoelectric electrolysis

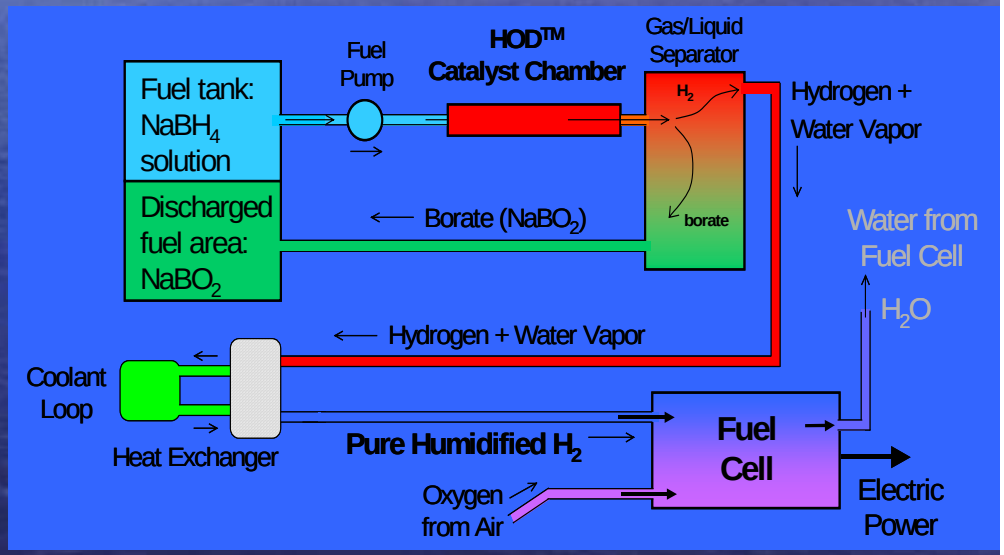
# Hydrogen Projects at the University of Iceland

- Fundamental research into metal hydride chemistry and physics
- Nanostructures and Hydrogen
- Geothermal Hydrogen: geothermally assisted Hydrogen compression using metal hydrides
- Hydrogen from vented $H_2S$
- SocioEconomic studies of $H_2$
- Over a dozen graduate students in projects related to Hydrogen

# Hydrogen Projects

## Sodium-Borohydride for Storing Hydrogen




**$NaBH_4$ as a hydrogen storage is an interesting candidate, since $NaBH_4$ solution is both non-flammable and non-toxic**

**The use of geothermal energy for production of $NaBH_4$ is an efficient and environmental friendly process**

# Domestic Policy & Project Actions

- Lowering tariffs and taxes on hydrogen vehicles are now under consideration
- Preparation of other hydrogen activities

# Education & Outreach

## Domestically

**Events on Hydrogen**

- **Presentations for Schools and Colleges on Hydrogen**
- **Conferences on alternative fuels held by the National Energy Authority of Iceland**
- **Hydrogen Educational Materials on the Web**

# Education & Outreach

## Internationally

- Increased international focus on hydrogen is needed to facilitate the transition to the hydrogen economy
- Iceland is introducing hydrogen as a theme at various international and regional venues

# Education & Outreach

## Internationally - Hydrogen at the UN

- Briefing for UN officials cosponsored by the Philippines on the Hydrogen Economy and IPHE in November
- Briefing for UNDP officials
- Briefing for UNEP officials
- Briefing for DESA officials

# Education & Outreach

## Hydrogen for Regional Co-operation

- **The Baltic**

  **Hydrogen has been introduced as a theme for the Baltic Sea Region Energy Cooperation (BASREC)**

- **The Barents**

  **The Energy Working Group of the Barents Euro-Arctic Council has identified "implications of hydrogen development" as a theme of interest for the region**

- **The Arctic**

  **The Arctic Council has recognized the relevance of hydrogen development for the Arctic and is following IPHE work**

# Education & Outreach

## Hydrogen Study Tours to Iceland

**Educational Hydrogen Seminars by Iceland New Energy & University of Iceland - and Information provided by Ministries, Agencies & Embassies**

- **Up to 2000 visitors from over 25 countries have been introduced to hydrogen by Iceland New Energy in the last two years**
- **The visitors are from government, private business, institutions and organizations**
- **Over 200 visitors came from the media**


Thank
you