Eco-friendly fuels in Iceland

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- First policy measures towards hydrogen (electromobility) in 1998
  - Iceland an international platform for hydrogen research
- Current position:
  - Create the world’s first electromobility economy
- $\text{H}_2$ policy of the government:
  - Favourable framework for business and research
  - International cooperation
  - Education and training
  - Roadmapping and the „energy-shift“ policy
- First major steps:
  - Taxation incentives (no taxes on hydrogen vehicles)
    - Zeri emission vehicles carry no taxes (not even VAT)
  - Financial and international support
Government of Iceland (cont.)

• Use of domestic resources
  – Electro-mobility
    • Use electricity as the key bases for future transport systems – battery vehicles, plug-ins, hydrogen, etc.
    – Use all domestic available alternative source, i.e. methane (landfills) and synthetic fuels, DME, methanol, etc.
  – The role of the government is not to choose
    – Provide setting where alternative fuels can be tested
    – Dialogue with OEMs and examine vehicle and technological development
    – Collect data on different technologies (social, environmental and economic)

• National impact (cost-benefit)
  – Foreign currency savings (no imports of fuel)
  – Domestic energy
  – Independence (incentives – taxation – other)
  – Energy security
Fuels for land transport in Iceland

2.5% environment-friendly 😊

6.2% in 2016
Alternatives other than electricity and hydrogen

• Methane from landfill
• Methanol produced onsite a geothermal power plant (Svartsengi)
  – Mostly exported
• Biodiesel – mixed with fuels for land and marine use
  – Cooking oil
  – Rape-seed production
  – Imported
Human factor

• There is disbelief
  – Will batteries/methane/hydrogen/methanol last 5 years?
  – Will they work in the harsh conditions in Iceland? Out at sea?
  – Is that a surprise?

• Education
  – Is little or lacking – government has a role
  – Media plays an important role, most discussion is like advertisements

![Graph showing media discussion of H2 and BEV over time]

Media discussion

- H2
- BEV
Policy

• Government (national)
  – Actually done a good job in general!
  – However, no real action, no pioneering role
    • Institutions (companies) – near zero activities

• Government (community, city)
  – Reykjavik city – early adopter – pioneering role
  – Other communities – near zero activities
    • There is will, but seem to be financial constraints

• Support policy with actions

Government has built the platform. Currently there is little on it, but we are finally moving...
**Technology**

- Variety of vehicles and fuels already on the market
  - BEV’s, methane, H₂ coming soon
- Mature technology
- Cost same or similar
  - TCO for BEV’s equal after 60,000 km

**An example:**
Uptake for BEV’s similar to Norway. Success story!
Increase in alternative fuel vehicles in Iceland from 2000
Increase in the number of BEV in Iceland

Number of electric vehicles in Iceland

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Infrastructure for BEV’s

- Government recently announced support for 42 fast chargers and 63 semi-fast chargers for BEV’s.
- Already 12 fast chargers in place.
  - In 2019 there should be ~100 fast chargers in place.
  - For Iceland it is a major step forward.
- Hopefully sales of BEV’s will increase following this initiative.
- It is complicated to build BEV infrastructure, everyone want’s to travel at the same time.
  - New grid lines.
  - Many chargers at same location.
  - Low margin (cheap electricity), most people charge at home.
Vision of initial H₂ infrastructure

H2ME

Greater Reykjavík 199,682
Akureyri 17,295
Reykjanesbær 13,972
Borgarnes 1,828
Sauðárkrókur 2,640
Egilsstaðir 2,704
Selfoss 6,493

77% of total pop. 90% within circles

150 km diameter

1 No. of HRS

1 existing HRS
Construction of 3 HRS in Iceland within H2ME

- First station to be built in Reykjavik February 2018
  - Electrolyser station – all renewable electricity (hydro and/or geothermal)
- Second station to be built, location tbc. August 2018
  - Trucked in Hydrogen
- Third station to be built location tbc. December 2018
  - Trucked in Hydrogen

Shows continuance and commitment H₂ vehicles should become cost competitive around 2020 in Iceland
Marine use of eco-friendly fuel

- Great possibilities in utilisation of batteries, hydrogen and fuels cells and/or methanol
- Already two tour boats (whale watching) fully on battery
- New ferries are designed with partial battery load
- Discussion with fishing companies for diesel/electric and/or methanol/electric propulsion
  - Potential „green fishing in the future“
Tour boat;
Whale watching
Greenland excursions
2015-
A new concept

**RPHP**: *regenerative plugin hybrid-electric propulsion*

- Land connection
- Charging control
- Batteries
- Biodiesel generator (backup)
- Electric motor
- Control unit
- Propellor
Special designed equipment
(Unique set up (world wide))

- Designed propeller
- Designed control unit
- Generator - old engine
- Design battery solution
  4x60 Kw/300v
The renewable transport future is NOW

- Iceland in general on a reasonably good path
- Government long-term policy vital
  - Policy in discussion very strong
  - National RD&D funding missing
    - Job creation in the field is lacking
    - Nordic projects/funding simpler and more effective in many cases than EU!
      - Without incentives take-off will be slow
- Iceland should set firm goals
  - Renewables should be at least 50% of total transport by 2030
- Already vast experience by „doing“
- Iceland is a paradise for electromobility
THANK YOU