Plugging Iceland’s Renewable Energy into UK’s Grid is a Win-Win Option

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Sustainability and environmental awareness comprise a new megatrend that inevitably will impact the energy market.

1970-2000
Globalisation

Industry gains a strong foothold in Iceland
Energy intensive industry, aluminium and ferrosilicon
› Century Aluminum
› Elkem
› Rio Tinto Alcan

2000-2010
Telecommunication & IT

Growing industry in Iceland
Telecom industry and further development of other industry
› Alcoa
› Becromal
› Rio Tinto Alcan enlargement
› Data centers appear

Post 2010
Green revolution & renewable energy

New emphasis in marketing in Iceland
Developing current customers and increasing diversity
› Verne Holdings
› High-tech industries
› New energy sources developed
› Sale of green certificates

Landsvirkjun will continue to endeavour to meet the needs of its various customers
Landsvirkjun generates 13 TWh of renewable energy per year and is growing due to increased global industrial demand.
Landsvirkjun’s policy is based on the idea that the Icelandic energy market should reflect international development.

Landsvirkjun’s role is to maximise return on the energy sources that have been entrusted to the company, with emphasis on sustainable utilisation, value creation and cost-efficiency.

- GDP growth
- Job creation
- Increased knowledge
- Export revenue

Carry out effective electricity generation and development
Build up a diverse customer group
Link up with the European energy market

Not necessarily a physical link
Iceland has already secured the energy independence and competitiveness that Europe today strives to achieve.

**Energy independence in Iceland**
- 100% renewable electrical power
- The 3rd most reliable electricity infrastructure globally

**Competitiveness in Iceland**
- Europe’s most competitive electricity contracts

**Decarbonisation in Iceland**
- Currently 66% green
- Transportation sector awaits the technology

Europe’s underlying motivation for the law enforced 2020 RES targets:
- Energy independence
- Competitiveness
- Decarbonisation

Significant investments in coming years
Iceland “exports” its renewable energy through various commodities with aluminium being the most prominent one. Processing of downstream aluminium products is growing. Iceland has a visible share in global ferrosilicon production, with a 2% share in global aluminium production. A growing data center industry with promising prospects is another area of focus. Diversification is likely to add new “export” channels.
Iceland generates renewable energy significantly beyond its basic needs making it an “exporter” of renewable energy.
Iceland has interesting opportunities to increase Europe’s renewable generation through well developed technologies.
The reason for further increasing generation in Iceland is driven by enhancing local prosperity and not the need.

Despite future options being more costly than earlier options they are still among Europe’s most competitive.

Iceland faces the possibility to significantly increase generation and preserve vast areas at the same time.

Compensation for environmental impacts will play a bigger role in future decision making.

What Landsvirkjun believes to be technically, economically and environmentally acceptable.

Two windmills erected in Autumn 2012 for R&D

<table>
<thead>
<tr>
<th>Onshore wind</th>
<th>Geo</th>
<th>Hydro</th>
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<td>655 MW</td>
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<td>1,900 MW</td>
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Iceland faces increased demand from industrial consumers awaiting the inevitable turnaround in the global economy.

Aluminium consumption
[million tonnes per year]

45,000 MW needed until 2020

EU DC consumption
[MW]

USA DC consumption
[MW]

Landsvirkjun’s objective is 170 MW in 2020

Silicon consumption
[million tonnes per year]

1,200 MW needed until 2016

A similar story for most industry sectors
Recent pre-feasibility studies suggest that an IC from Iceland to the UK is financially and technically feasible.

Rising energy prices in the UK have increased the relative price difference to the Icelandic market. Sale of green certificates as a means to stimulate build-up in renewable power generation.

2020 legally binding RES targets
An IC connecting Iceland to the UK would be the longest of its kind and would traverse deep waters.

**Investment needed**
- IC itself
- Local power plants
- Local transmission systems

**Likely business model**
- IC a part of the UK’s network
- IC operated cost+
- EU approval needed
The feasibility for Iceland of exporting energy presumably depends heavily on the magnitude of green incentives.

Is there a win-win solution?

- Grey part: Price received locally in Iceland
- Green part: Generation cost in the UK
- Grey part: IC cost
- Green part: Price for IC exports
- Comparison for receiving country

- Jobs?
- Magnitude of green incentives should consider various indirect country level impacts
- Other?
- Environmental impacts?
- Knowledge?
- Power price to households?
Linking the UK energy infrastructure to Iceland has lots of benefits for both the UK and Iceland

**Benefits for the UK**
- Reduced cost of reaching RES targets
- Enhanced security of supply
- Controllable and reliable baseload energy
- Wind/solar intermittency balanced with hydro
- Smoothening of price fluctuations
- Tangible renewables vs. statistical transfers

**Benefits for Iceland**
- More competitive local energy sector
- Enhanced security of supply
- Increased efficiency in the energy system
- Flexibility of hydro used to its utmost capacity
- Higher cost generation build-up made feasible
- Increased demand for Icelandic energy
Landsvirkjun wishes to involve more parties in evaluating a possible IC and proposes the following next steps to be taken:

**Ongoing feasibility study**
1-2 years

1. Analysing technical aspects...
   - the seabed
   - possible landing sites
   - options for further energy generation and energy transmission

2. Analysing sociological aspects in Iceland...
   - possible impacts on energy generators, energy intensive industries and Icelandic households
   - impacts that other ICs have had, f.ex. in Norway, Canada, Tasmania and Sardinia

3. Analysing commercial and legal aspects in the UK and Iceland...
   - mutually beneficial commercial solutions for both the UK and Iceland
   - necessary adjustments to current law in order for a proper business model to be authorised

Laying of a subsea IC takes 4-5 years