Low carbon solutions – the story from Iceland

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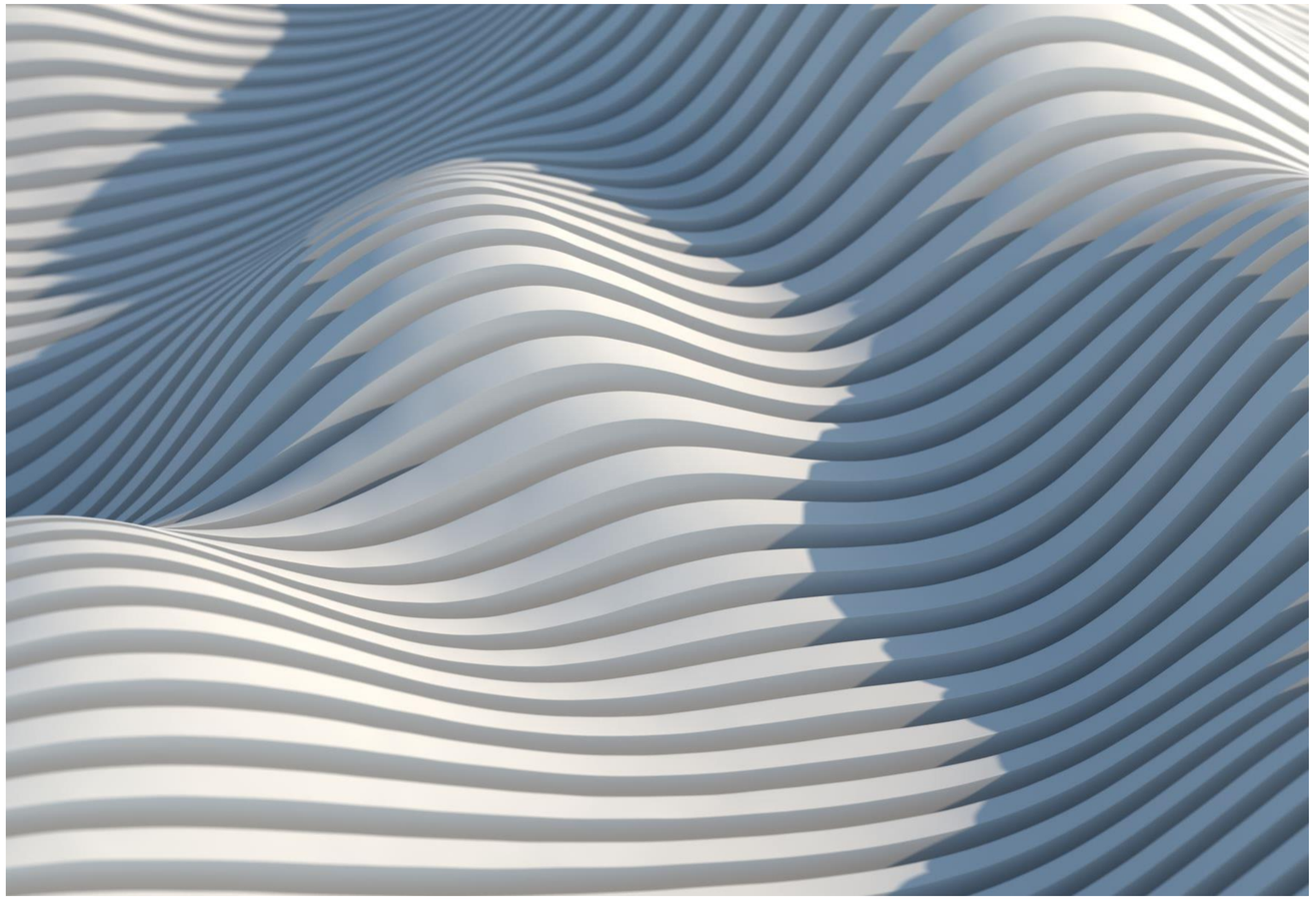
ORKUSTOFNUN

Role and tasks of the National Energy Authority

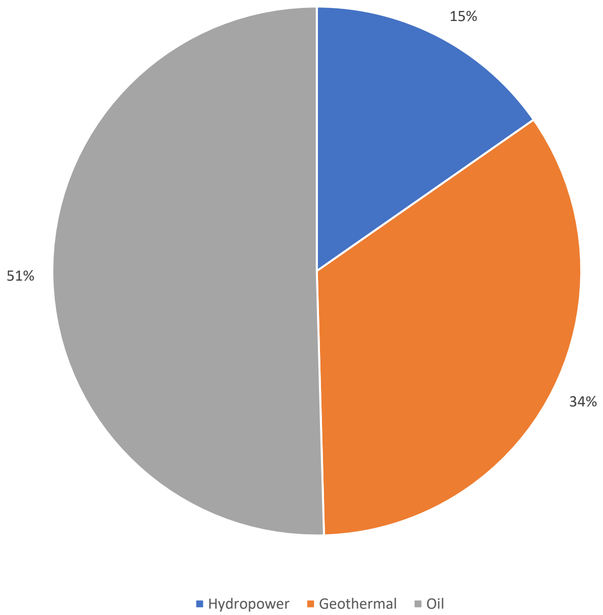
- Energy Policy Recommendation
- Licensing resources
- Monitoring resources
- Climate change, energy transition and innovation
- Data, energy efficiency, research
- International cooperation and PR, (EEA Grants, WEC, Nordic, IGA, IEA, etc.)



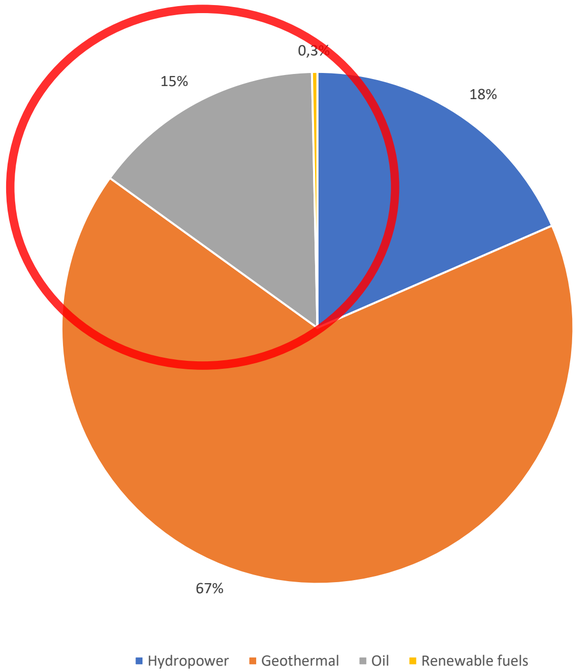
99,9% ELECTRICITY PRODUCED FROM RENEWABLES

90% OF HOUSES HEATED WITH GEOTHERMAL

85% OF PRIMARY ENERGY COMES FROM RENEWABLES


15%
51%
34%
Hydropower
Geothermal
Oil

1970


0,3%
15%
18%
67%
Hydropower
Geothermal
Oil
Renewable fuels

2020

Iceland's Climate Goals

- EU commitment under the Paris Agreement of at least 55% net greenhouse gas emissions reduction by 2030 compared to 1990

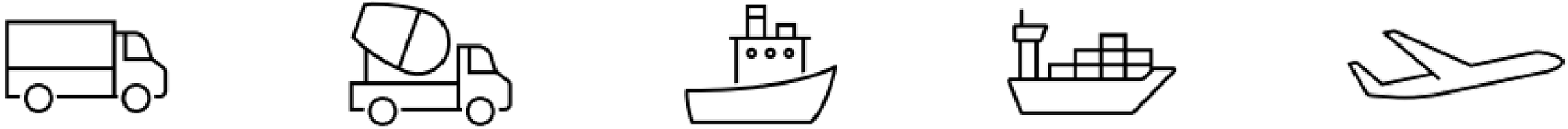
- Climate Action Plan for emissions reduction being revised
  - Current goal of 40% by 2030 compared to 2005 levels
  - Carbon neutral by 2040.
  - Full fossil fuel phase-out by 2040

- The energy sector in Iceland is focused on two main approaches to mitigating climate change
  - Energy transition from fossil fuels to renewable energy
  - Carbon capture and storage and carbon capture and utilization technologies

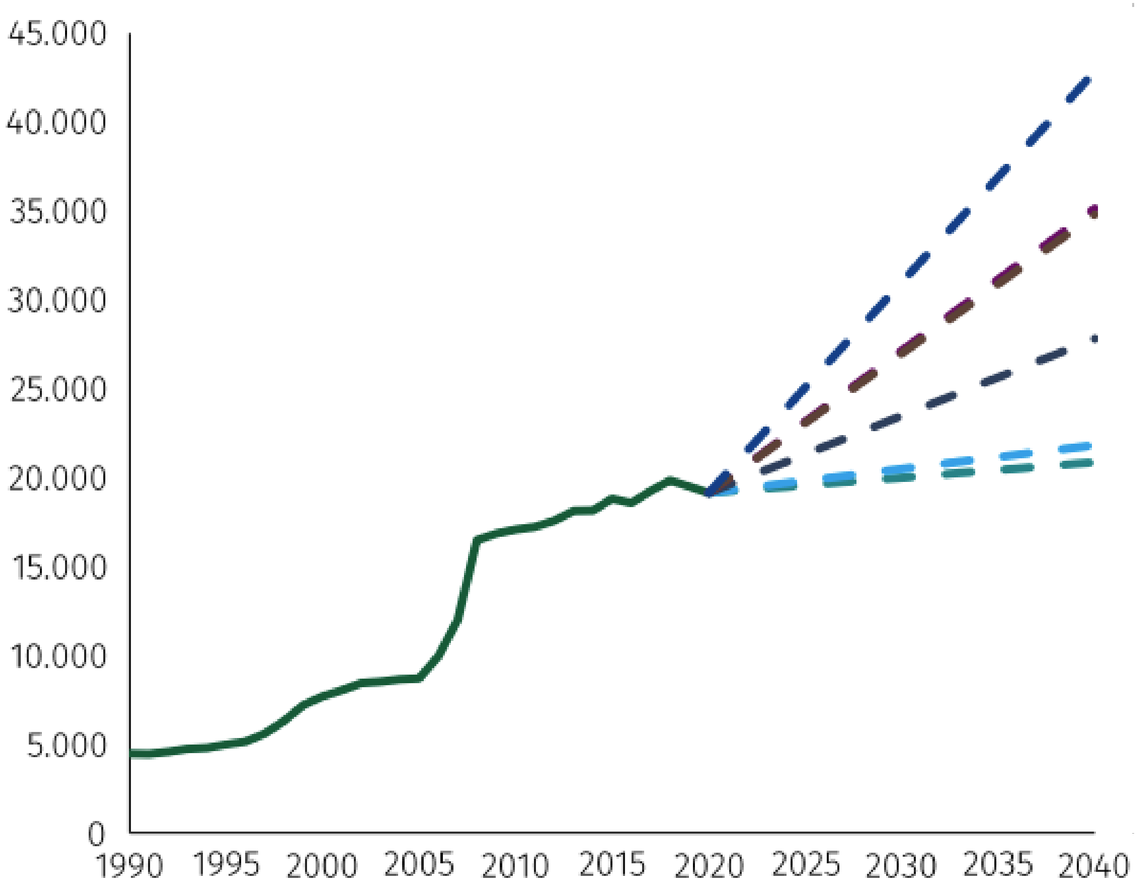

Renewable energy
Energy efficiency, smart technology and diversity
Benefit to society and consumers
Nature conservation and minimized environmental impact
Competitivity and value creation
Sound and resilient countrywide infrastructure
Secure energy supply
Energy transition and climate matters
Sustainable Energy Future 2050

The energy transition task ahead

Energy transition in all transportation sectors by 2040

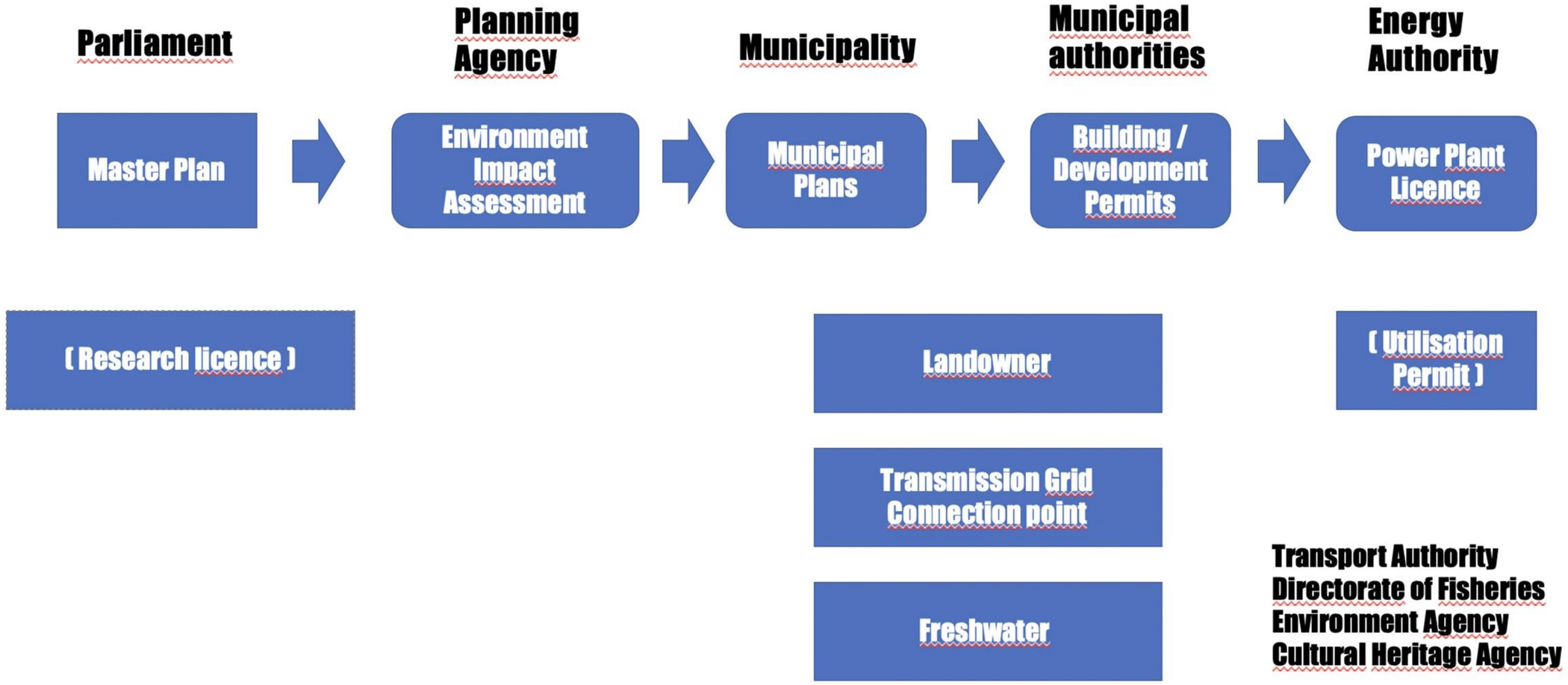


How to close the remaining gap?



Scenarios	2020 [GWh]	2040 [GWh]	% increase
Hydrogen pathway 2	19.127	43.127	**+125%**
Samorka – energy transition and growth	19.127	42.821	**+124%**
Samorka – energy transition	19.127	34.775	**+82%**
Hydrogen pathway 1	19.127	32.217	**+68%**
NEA – greener future	19.127	21.815	**+14%**
NEA – business as usual	19.127	20.844	**+9%**

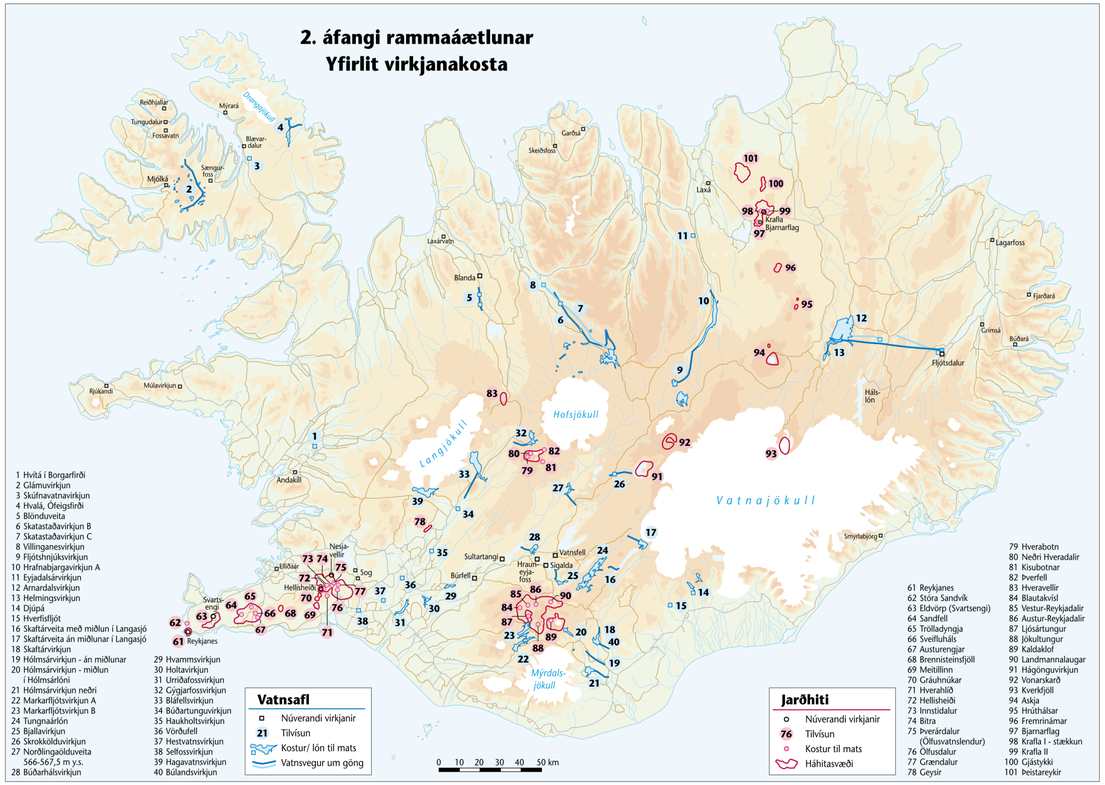
LICENSING PATHS FOR POWER PLANTS



THE MASTER PLAN

CLASSIFIES ICELAND'S ENERGY OPTIONS INTO THREE CATEGOIRES BASED ON AVAILABLE DATA FROM A TECHNICAL, LANDSCAPE, ECONOMICAL AND CULTURAL PERSPECTIVE:

- **ENERGY UTILIZATION**
- **NATURE PROTECTION**
- **ON HOLD**



Power projects in Iceland

No big power projects have been completed in recent years

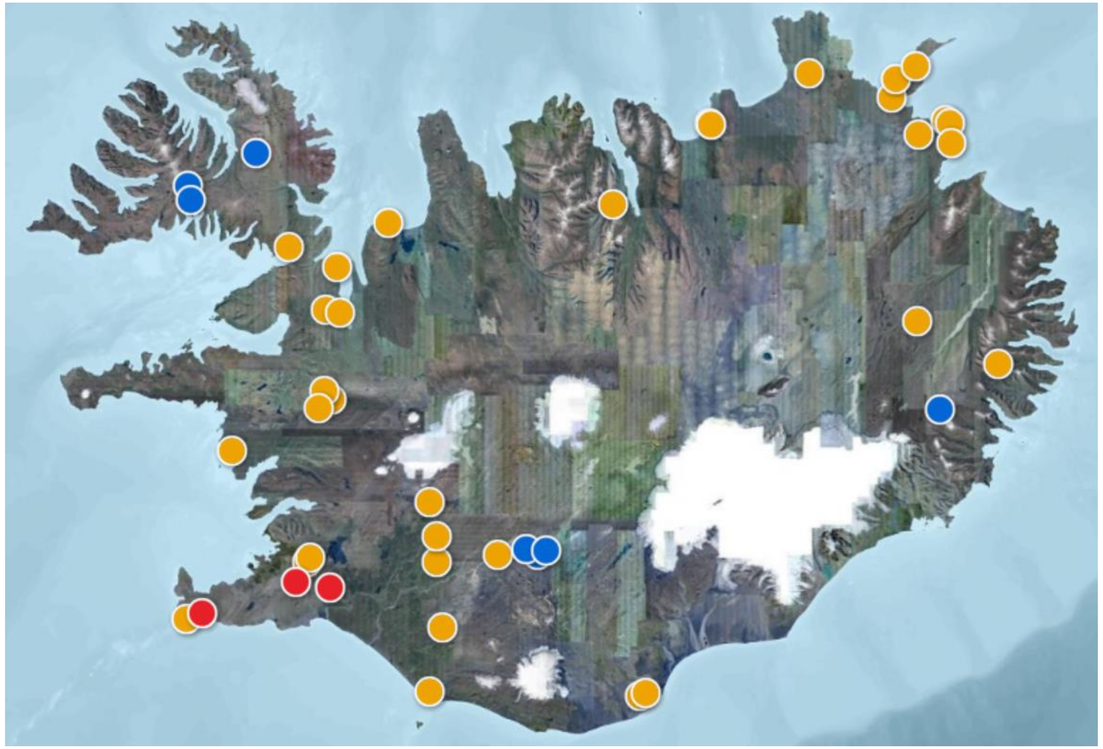
- 100 MW hydropower expansion project in 2018
- No new power plant >10 MW in the last 5 years

Current Master Plan allows for (3rd phase):

- 5 Hydropower projects from 35-140 MW
- 10 Geothermal projects from 45-150 MW (some only thermal power)
- 2 Wind projects, 100-120 MW

- The 5th phase is ongoing
- The 4th phase was not completed:
  - 44 powerplant options were submitted to the National Energy Authority and 28 met the legal data requirements.
  - Total estimated max. capacity is 3667.8 MW of all submitted options in the 4th phase

	Est. max MW
Wind	3154.6
Geothermal	200
Hydropower	313.12



- Wind options (34)
- Geothermal options (3)
- Hydropower (7)

Current discussion in Iceland

How to make sure new renewable energy production will lead to energy transition in the transport sector?

- Gradual, slow increase in demand for direct electrification
- Power intensive e-fuel projects in the future, but technology not yet fully developed
- Current power-intensive industries and other larger consumers show interest in expanding

Should Iceland produce its fuels, import them, or export them?

- Economy of scale?
- Energy utilization or nature protection?

Icelandic know how to support and implement low carbon solutions

- **Use of geothermal energy** – Increased energy security and tackling the heating challenge
- **Carbon capture and mineralization** – reducing emissions with innovation
- **Green transport** – Tackling the transportation challenge

Energy cooperation
Iceland and the EEA Grants

Orkustofnun currently working with

- Poland
- Romania
- Bulgaria

Countries List

- Bulgaria (BG)
- Croatia (HR)
- Cyprus (CY)
- Czech Republic (CZ)
- Estonia (EE)
- Greece (EL)
- Hungary (HU)
- Latvia (LV)
- Lithuania (LT)
- Malta (MT)
- Poland (PL)
- Portugal (PT)
- Romania (RO)
- Slovakia (SK)

Tapping into geothermal energy has never been more important

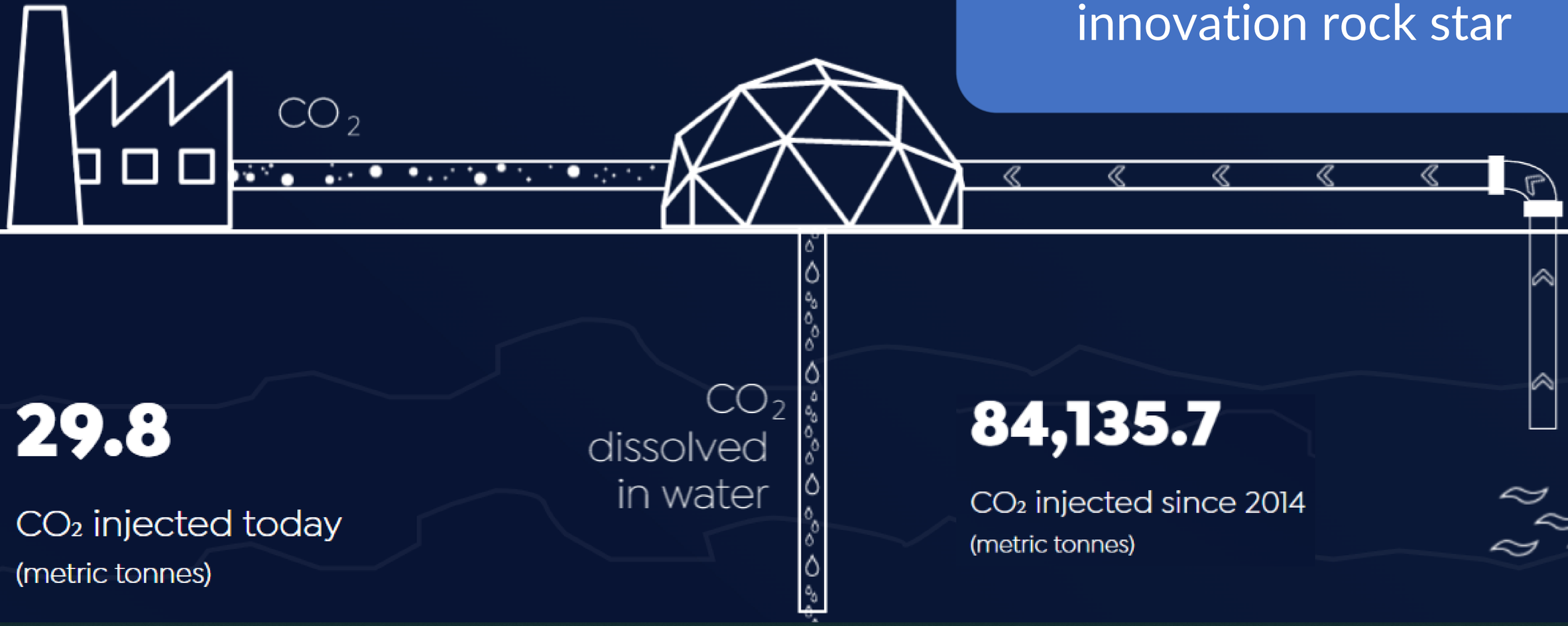
Reducing emissions with innovation

CCS technologies

We turn CO_2 into stone

Carbfix provides a natural and permanent storage solution by turning CO_2 into stone underground in less than two years.

Carbfix – Iceland's innovation rock star



29.8

CO_2 injected today
(metric tonnes)

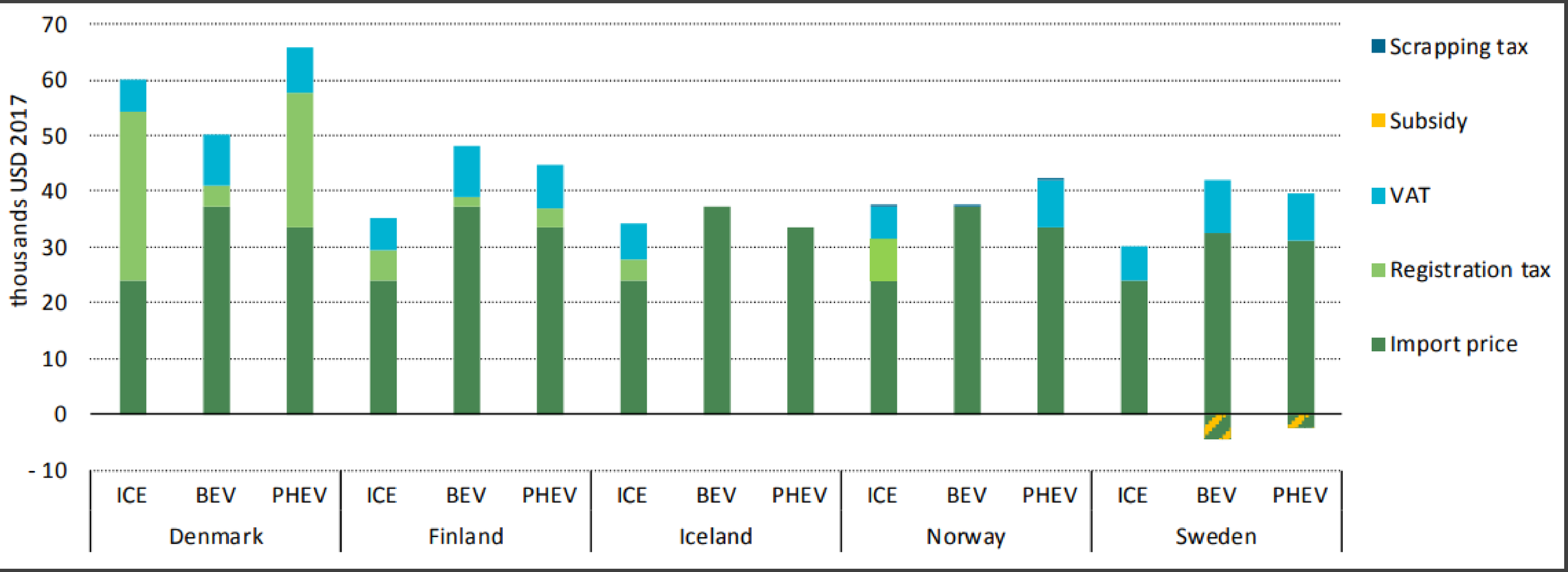
84,135.7

CO_2 injected since 2014
(metric tonnes)

CARBON RECYCLING INTERNATIONAL

Transport - Supporting the energy transition

Energy transition from fossil fuels to renewables



Energy transition in transport

- Carbon neutrality and full fossil fuel phase-out in 2040
- 100% newly registered cars powered by green energy in 2030
- 50% of newly registered cars today are powered by green energy
- **Aviation** and **shipping/fishing fleet** the next big challenge

ICELANDIC ENERGY FUND

SUPPORTED DEVELOPMENT OF GEOTHERMAL DISTRICT HEATING

NOW SUPPORTS ENERGY EFFICIENCY PROJECTS + INFRASTRUCTURE FOR EVs

1 MW hydrogen production

First plane 100% powered with electricity

Always welcome to contact us at Orkustofnun

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THANK YOU