



HORIZON 2020

Orkuáætlun Evrópusambandsins 2018-2020

Íslensk orkuverkefni og tækifæri Íslenskra aðila í evrópsku samstarfi;
Hjalti Páll Ingólfsson, GEORG Research Cluster

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GEORG is a non-profit research driven geothermal cluster initiative that brings together players in the geothermal field to form a strong force for rapid progress and value creation in geothermal research, engineering and design for the benefit of the society.

GEORG

GEO THERMAL RESEARCH CLUSTER

GEORG AIMS TO STRENGTHEN RESEARCH AND DEVELOPMENT IN THE FIELD OF GEO THERMAL ENERGY



Support for
Geothermal
Research Projects

Service to Cluster
Participants



Grant Application
Support for Cluster
Participants

Promotion
and Dissemination

A photograph of the Golden Gate Bridge in San Francisco at dusk. The bridge's towers and suspension cables are illuminated with warm orange lights, contrasting with the deep blue twilight sky. The city lights of San Francisco are visible in the background across the water.

Build bridges between
partners and disciplines



Evrópu vinkill



- Þátttaka í Stjórnarnefnd fyrir Orkumál í rammaáætlunum Evrópusambandsins frá 2009
- Þátttaka í stofnun og stjórn "European Technology and Innovation Platform" (ETIP) fyrir jarðhita

- Höfðum frumkvæði að Geothermal ERA NET - > 2M€ verkefni
- Rekum verkefnisskrifstofu GEOTHERMICA -> ~60M€ verkefni*
- Rekum verkefnisskrifstofu fyrir DEEPEGS -> 20M€ verkefni

* Að meðtöldu mótframlagi frá iðnaði

Geothermal energy contributes to the Energy Union

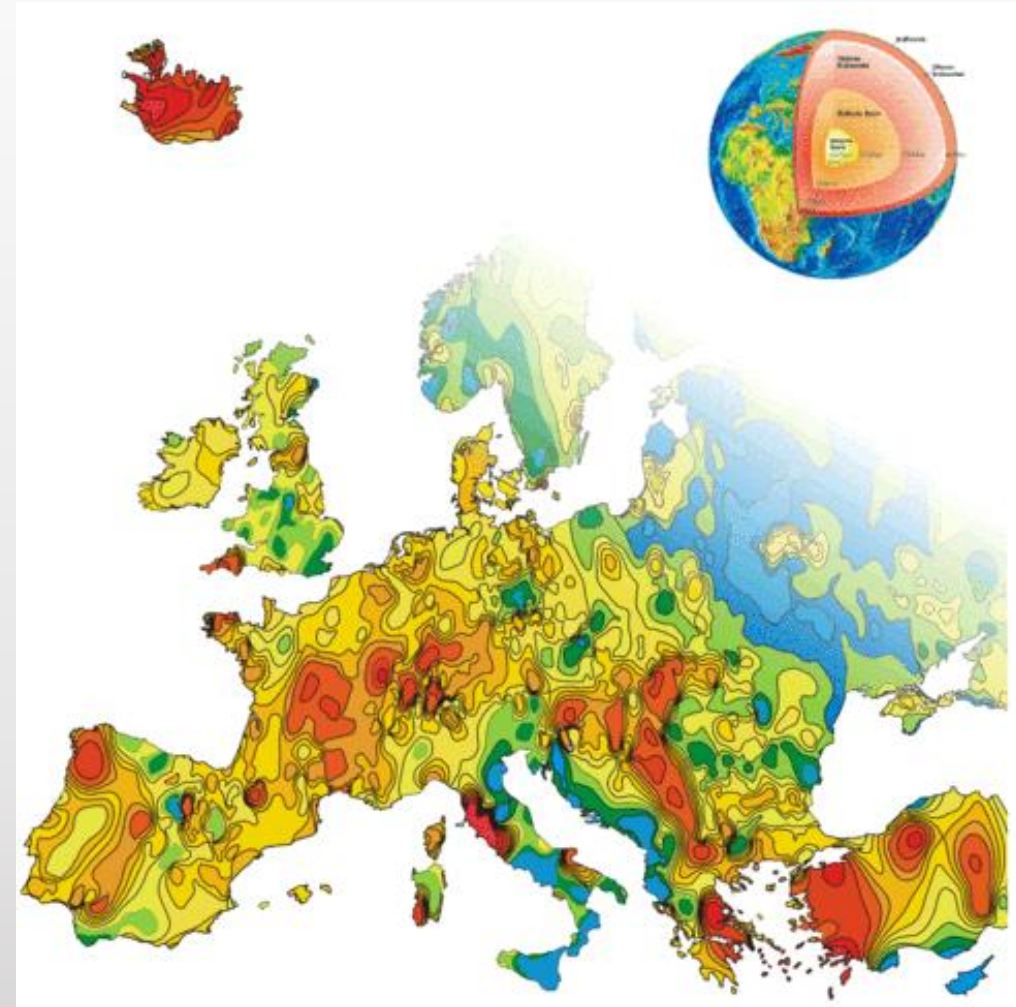


Geothermal energy is environmentally friendly.

It produces reliable baseload **power** and **heat** – all the more important to balance intermittent supplies from other renewable energy sources

Geothermal is a renewable energy source and independent of weather conditions.

Geothermal energy is indigenous and contributes to Europe's security of supply.

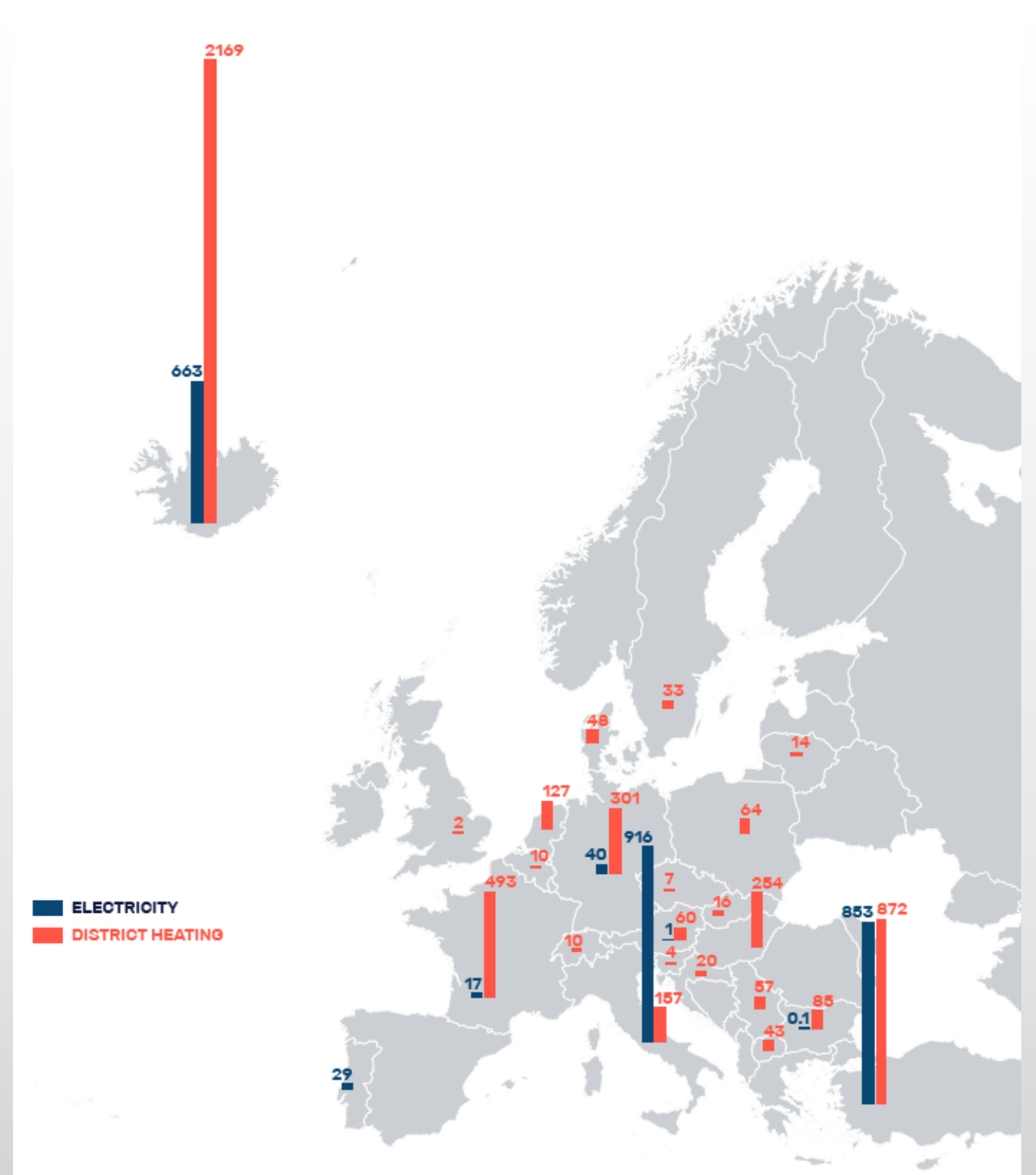


Installed capacity for geothermal electricity and district heating in 2016 (MW)

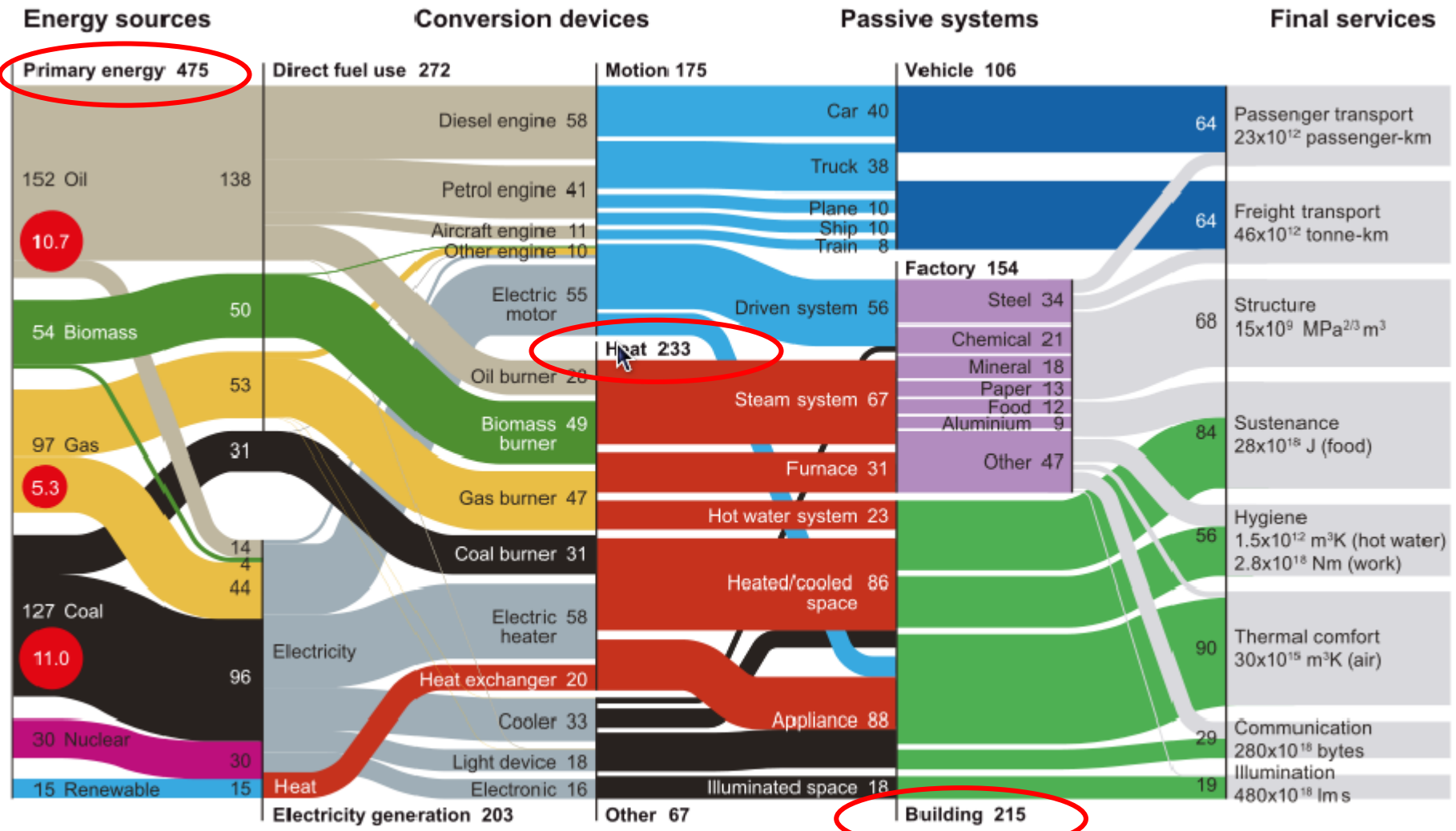
Over 200 projects are planned and capacity is estimated to grow by up to 6.5GW by the end of this decade, with the main markets being France, the Netherlands, Germany and Hungary.

As for power generation, the future role of geothermal energy will depend on the roll-out of enhanced geothermal systems (EGS).

If EGS are successfully developed and deployed, as advocated by the SET Plan targets, the EU could reach a total installed capacity of 80GW by 2050.



Global Primary Energy Use 2005



Annual global flow of energy in 2005, EJ [10^{18} joules]

Annual global direct carbon emissions in 2005, Gt CO₂ [10^9 tonnes of CO₂]

“Trendsetters” of the EU research and innovation agenda



- **SETPLAN** - Accelerating the transformation of Europe’s energy system
 - The SET-Plan promotes research and innovation efforts across Europe by supporting the most impactful technologies in the EU's transformation to a low-carbon energy system. It promotes cooperation amongst EU countries, companies, research institutions, and the EU itself.
- **GEOHERMICA** Co-fund consortium
 - Pooling national and EC funds for research and innovation, focusing on improving business cases for geothermal energy and establishing a long-lasting strategic collaboration of national geothermal research and innovation program owners and managers of the GEOHERMICA consortium.
- **ETIP DG** European Technology and Innovation Platform for Deep Geothermal
 - an open stakeholder group, endorsed by the European Commission under the Strategic Energy Technology Plan (SET-Plan), with the overarching objective to enable deep geothermal technology to proliferate and reach its full potential everywhere in Europe.
- **EGEC** European Geothermal Energy Council
 - non-profit international organisation founded in 1998 to promote the European geothermal industry and enable its development both in Europe and worldwide, by shaping policy, improving business condition, and driving more research and development.
- **EERA JPGE**
 - European Energy Research Alliance Joint Program on Geothermal Energy

SET Plan Declaration of Intent: deep geothermal targets



1	<p>Increase reservoir performance* resulting in power demand of reservoir pumps to below 10% of gross energy generation and in sustainable yield predicted for at least 30 years by 2030; * Reservoir performance includes underground heat storage.</p>
2	<p>Improve the overall conversion efficiency, including bottoming cycle, of geothermal installations at different thermodynamic conditions by 10% in 2030 and 20% in 2050;</p>
3	<p>Reduce production costs of geothermal energy (including from unconventional resources, EGS, and/or from hybrid solutions which couple geothermal with other renewable energy sources) below 10 €/ct/kWhe for electricity and 5 €/ct/kWth for heat by 2025; Costs have to be confirmed establishing at least 5 plants in different geological situations, of which at least one with large capacity (20 MWe or, if for direct use only, 40 MWth).</p>
4	<p>Reduce the exploration costs by 25% in 2025, and by 50% in 2050 compared to 2015;</p>
5	<p>Reduce the unit cost of drilling (€/MWh) by 15% in 2020, 30% in 2030 and by 50% in 2050 compared to 2015;</p>
6	<p>Demonstrate the technical and economic feasibility of responding to commands from a grid operator, at any time, to increase or decrease output ramp up and down from 60% - 110% of nominal power.</p>

Non Technical Barriers:

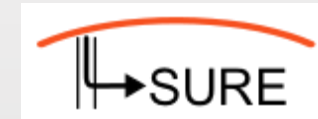
- A) Risk mitigation (Financial/project)
- B) Social Acceptance

SET-Plan Temporary Working Group Deep Geothermal Implementation Plan



R&I activity number	R&I activity name
R&I activity 1	Geothermal heat in urban areas
R&I activity 2	Materials, methods and equipment to improve operational availability (high temperatures, corrosion, scaling)
R&I activity 3	Enhancement of conventional reservoirs and development of unconventional reservoirs
R&I activity 4	Improvement of performance (conversion to electricity and direct use of heat)
R&I activity 5	Exploration techniques (including resource prediction and exploratory drilling)
R&I activity 6	Advanced drilling/well completion techniques
R&I activity 7	Integration of geothermal heat and power in the energy system and grid flexibility
R&I activity 8	Zero emissions power plants
NTBE-A	Increasing awareness of local communities and involvement of stakeholders in sustainable geothermal solutions
NTBE-B	Risk mitigation (financial/project)

The ongoing H2020 Geothermal Project family



Read all about it @

www.geothermalresearch.eu



Search for and stimulate
opportunities for our partners

"For the benefit for all"





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