



Research for a Better Future

From Petroleum to Geothermal

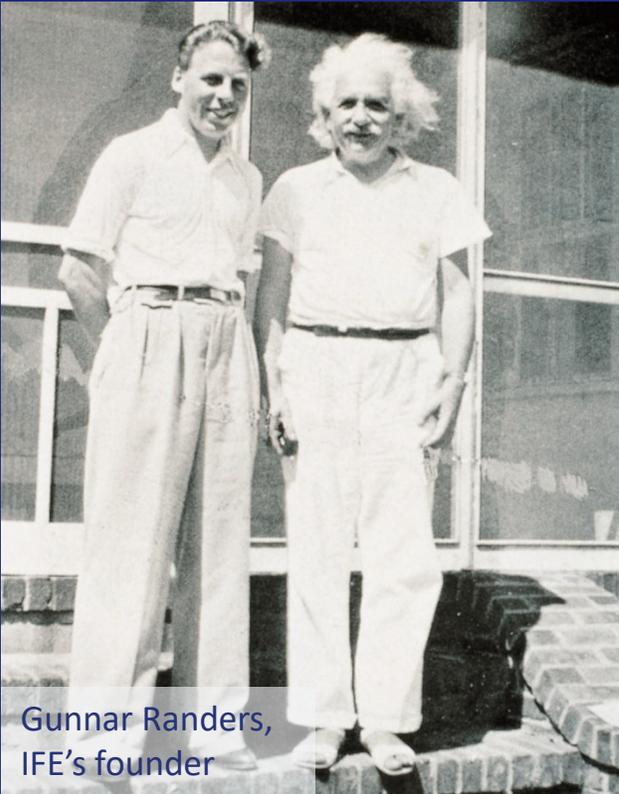
Mario Silva

Tracer Technology department

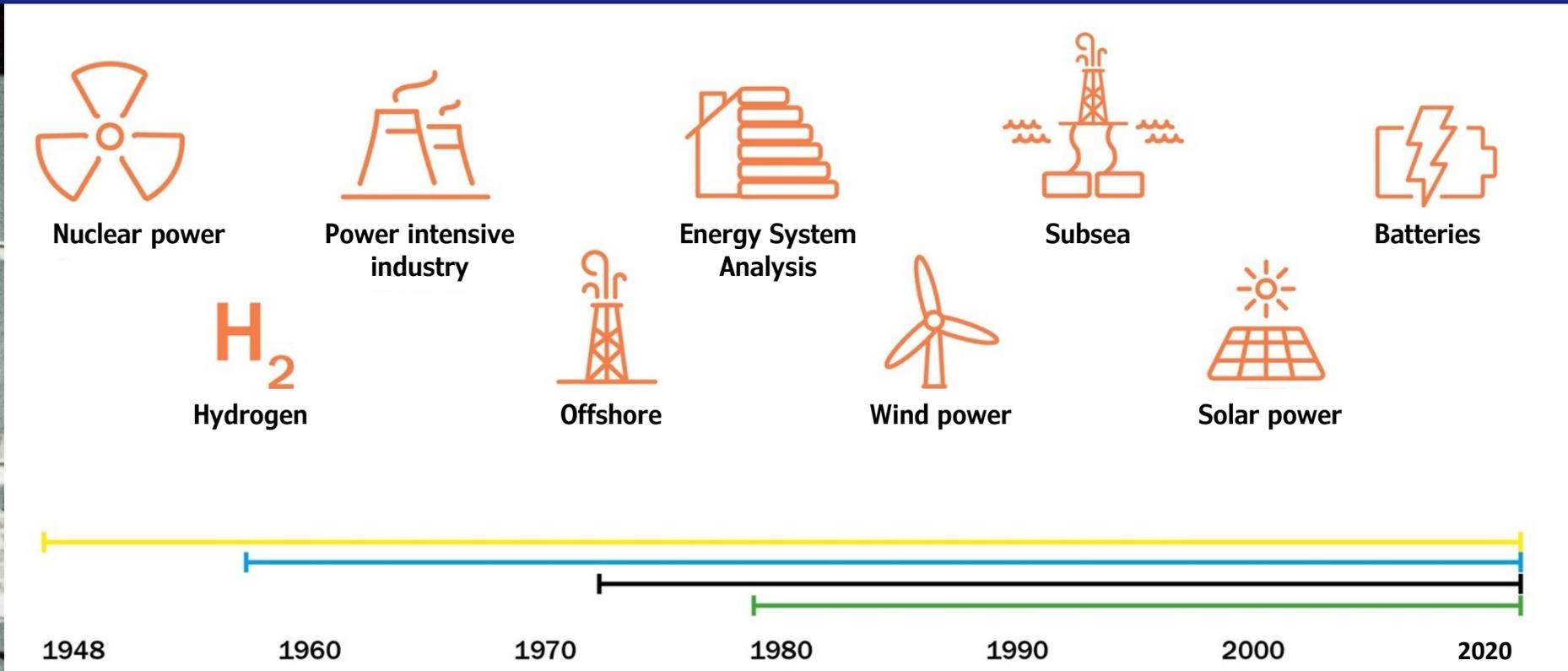
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IFE – Institute for Energy Technology (R&D)

Development of Norway as an energy nation for more than 70 years
~ 300 employees in 2 centers: Kjeller and Halden



Gunnar Randers,
IFE's founder



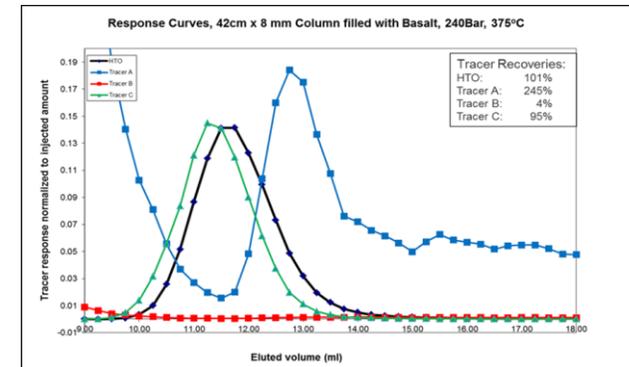
Main Geothermal Activities

- “Cooperation in Geothermal energy research Europe-Mexico for development of Enhanced Geothermal Systems and Superhot Geothermal Systems (GEMex)”



- H2020 “SOCIETAL CHALLENGES - Secure, clean and efficient energy” (10.2016 – 05.2020)
- IFE’s **Tracer department**: New inorganic water tracers for high-enthalpy unconventional geothermal reservoirs;

- 23 Partners from 10 countries



- Complementary effort of a European consortium with a corresponding consortium from Mexico

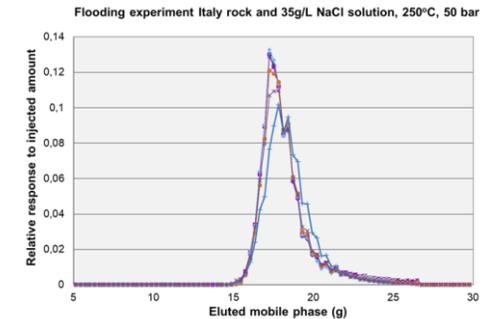
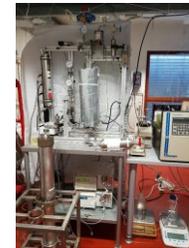
Main Geothermal Activities

- “Geothermal Emission Control (GECO)”



- 21 Partners from 9 countries

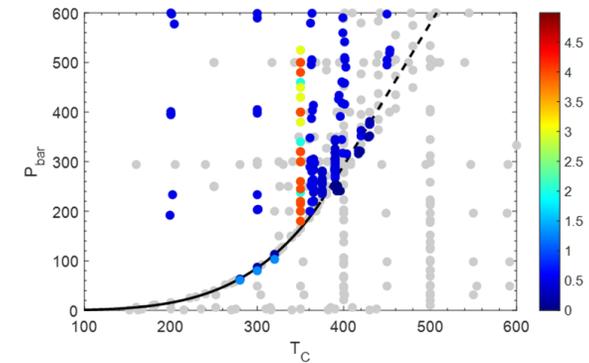
- H2020 “SOCIAL CHALLENGES - Secure, clean and efficient energy” (10.2018 – 03.2023)
- **IFE’s Tracer department:** Tracers and tracing methods for reinjected fluids (4 different case sites with deployment of CARBFIX technology)



- Updated and expanded experimental capacity
- Laboratory experiments “tailored” for each of the sites

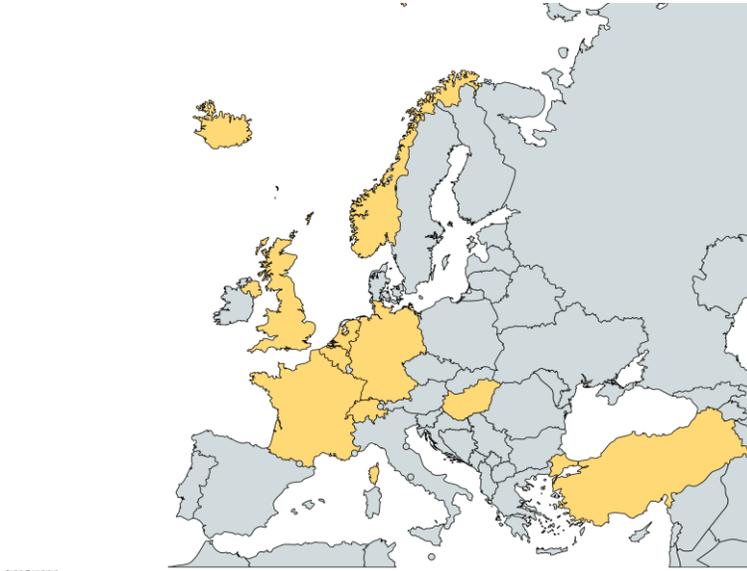
Main Geothermal Activities

- “Deep geothermal flow assurance; cost-efficient scale handling and heat fluid robustness (DeepScale)”
- NFR funded project (2019 – 2023)
- IFE’s **Tracer department** and the **Corrosion department**:
 - Experimental design and building of experimental setup, experimental evaluation of silica scaling HTHP (100-350 bar, 200-500°C) and high-low salinity.



Main Geothermal Activities

- “Redefining geothermal fluid properties at extreme conditions to optimize future geothermal energy extraction (REFLECT)”



- 27 Partners from 10 countries



- H2020 “SOCIETAL CHALLENGES - Secure, clean and efficient energy” (01.2020 – 09.2023)
- Diversified IFE’s contributions – study of silica solubility and precipitation
 - **Tracer department:** high salinity, low temperature
 - **Corrosion department:** low salinity, high temperature

Main Geothermal Activities

- “A circular by design environmentally friendly geothermal energy solution based on a horizontal closed loop (HOCLOOP)”



- 9 Partners from 6 countries



- Horizon Europe RIA “Climate, Energy and Mobility” (10.2022 – 03.2026)
- **IFE is the coordinator, and 4 departments are involved:**
 - WP1: Coordination, management and communication (**European and Tracer departments**)
 - WP2: Modelling of subsurface heat influx into the well (**Reservoir department**)
 - WP3: Heat transport to surface with CO2 mixtures and alternative fluids (**Corrosion department**)
 - WP6: Full scale test-operation (**Tracer department**)

Summary

- IFE has a strong focus in Geothermal energy through the scientific/technical contribution from 3 departments that were born from the oil and gas, and an European department with a proven methodology to develop applications, both to the EU framework and NFR.
- A fourth department (Fluid flow) can bring relevant competences to the picture.
- **Tracer department:**
 - Underground fluid distribution, saturation and circulation
 - High-temperature and high-pressure experimental capacity (500 °C, 800 bar)
- **Corrosion department:**
 - Scaling and corrosion in pipelines
 - H₂S and CO₂ experimental capacity
- **Reservoir department:**
 - Geomechanics and geochemistry
 - Experimental and modeling
- **Flow department:**
 - Multiphase transport in pipelines and porous media
 - Experimental and modeling