

# Workshop Nazionale Progetto GEOELEC

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*Formazione ed occupazione in geotermia:  
una panoramica europea*

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# Background

- growing geothermal energy sector world-wide and an increasing demand of geothermal experts
- lack of specialists in many fields of expertise
- complexity of geothermal technology requires a wide range of experts on different levels of skills, multidisciplinary expertise and good interaction of the several disciplines
- basic training in geothermal exploration, exploitation and utilization available in most of the European countries, but inadequate to supply the high skilled workforce needed in the geothermal sector
- limited number of geothermal training at higher education, only few specific university degree programs and professorships in geothermal energy



# Existing education



## Existing education at University level

- Geoscience / Georesources
- Material Science
- Chemical and Mechanical Engineering
- Computational Sciences
- Economics and Legal aspects

Only few European universities hold chairs in GE and offer specific degree courses



# Existing education

B.Sc, M.Sc., PhD programs

**available at several European Universities, e.g.:**

## B.Sc. Degree

- Albert-Ludwigs-University Freiburg (Germany)  
*in Energy Resources and Geothermal Energy*
- University of Iceland  
*in Geothermal Power Plants*

## M.Sc. Degree:

- University of Iceland  
*Geothermal Power Plants, Direct Geothermal Utilization*
- University of Applied Sciences Bochum & International Geothermal Center in Bochum (Germany)  
*in Construction Engineering/Geothermal Energy Systems*

## Ph.D Degree:

- University of Neuchatel, University of Iceland and Reykjavik University





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  - ▶ [Best Practice Guide](#)
  - ▶ [Conference paper database](#)
  - ▶ [Past WGC proceedings](#)
  - ▶ [Global Geothermal Courses](#)
  - ▶ [Links](#)
- ▶ [Conference paper database](#)
- ▶ [Conferences & Events](#)
- ▶ [Contact](#)

## International Geothermal Training Courses

The following list provides you with an overview of geothermal training courses by continent and country. Information include course language, focus, degree, credit points and contact details at the universities. Select the desired geographical region first, then the country.

### Europe

[Croatia](#)

[Germany](#)

[Hungary](#)

[Iceland](#)

[Macedonia](#)

[Poland](#)

[Romania](#)

[Switzerland](#)

### Asia

### Australia/Pacific

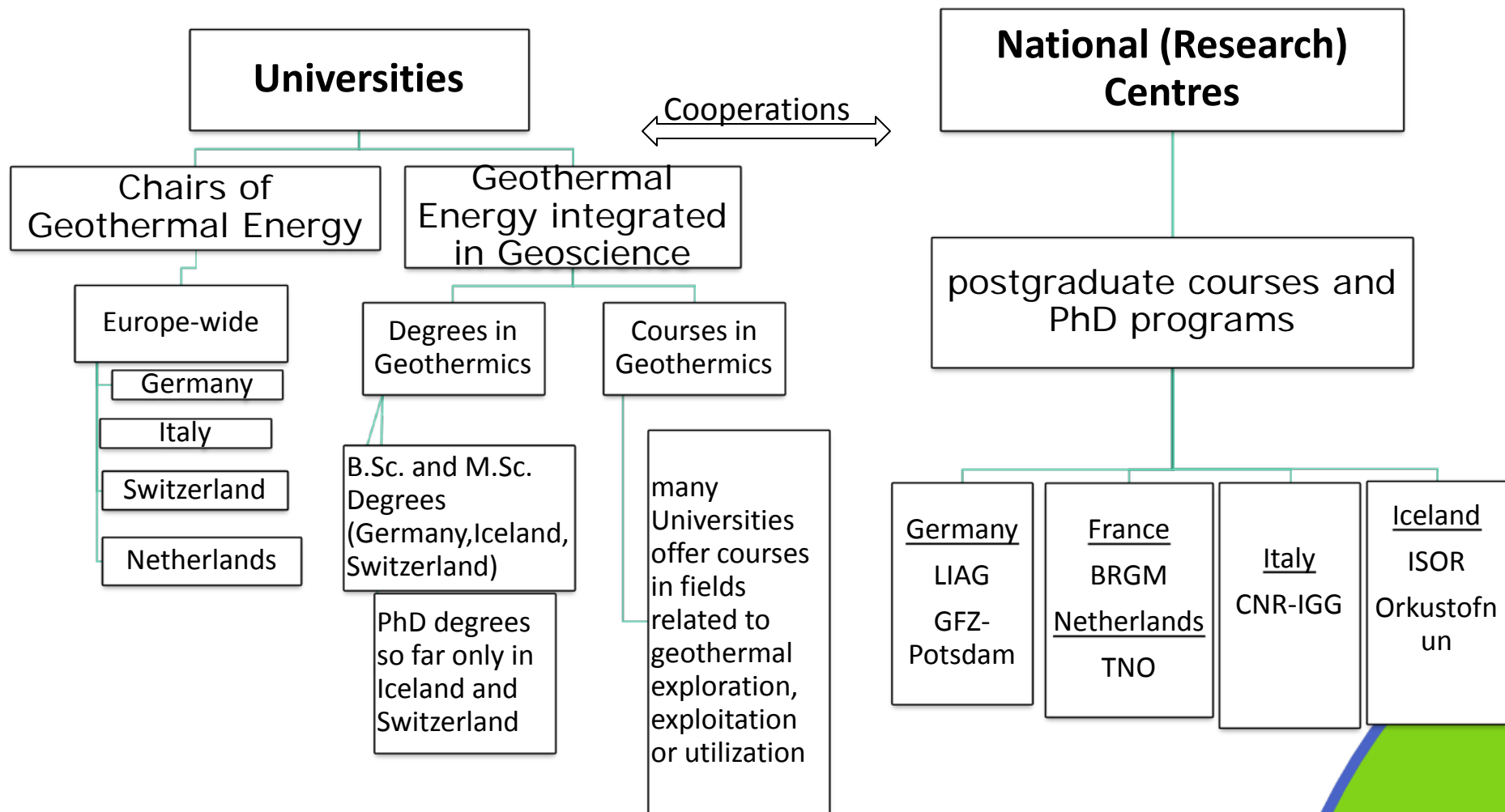
## Iceland

## Reykjavik

City	<b>Reykjavik</b>
University / Institute / Faculty / Division	University of Iceland, School of Engineering and Natural Sciences, Faculty of Industrial Engineering, Mechanical Engineering and Computer Science
Language	English
Name of Course / Program	Mechanical Engineering
Degree	BSc, MSc, PhD
Topics and ECTS / Credits / Points	BSc, MSc: Reservoir Engineering (7.5 ECTS), Geothermal Power Plants (7.5 ECTS), Geothermal Drilling (7.5 ECTS), Direct Geothermal Utilization (7.5 ECTS)
Website	<a href="https://ugla.hi.is/kennsluskra/index.php?tab=skoli&amp;chapter=content&amp;id=25958&amp;kennsluar=2012">https://ugla.hi.is/kennsluskra/index.php?tab=skoli&amp;chapter=content&amp;id=25958&amp;kennsluar=2012</a>
Contact	Faculty of Industrial Engineering Mechanical Engineering and Computer Science Ólafur Pétur Pálsson E-Mail: <a href="mailto:opp@hi.is">opp@hi.is</a>
Address	University of Iceland Sæmundargötu 2 101 Reykjavik Iceland

City	<b>Reykjavik</b>
University / Institute / Faculty / Division	United Nations University Geothermal Training Program
Language	English
Name of Course / Program	6 months Geothermal Training Program (April-October), divided into three phases: 1) introductory lectures 2) specialised training 3) research project
Degree	UNU certificate, diploma The program can be extended to a MSc and PhD in cooperation between the UNU-GTP and the University of Iceland
Topics and ECTS / Credits / Points	The program contains 30 ECTS units
Website	<a href="http://www.unugtp.is/">http://www.unugtp.is/</a>

# Existing education



# Needs by 2030



## SET Plan on Education & Training Initiatives Assessment Report for “Geothermal Energy”

### EDUCATION AND TRAINING NEEDS – European Union Member States and Associated Countries

Qualification	European Workforce 2012	Estimated Education & Training Needs 2012-2020 (new positions + replacements)	Estimated Education & Training Needs 2020-2030 (new positions + replacements)
<b>GEOHERMAL ENERGY</b>			
<b>TOTAL</b>	2500	21 000 + 1000	35000 + 1450
<b>Researchers</b>	500	5000 +200	5000 + 250
<b>Engineers</b>	1100	8000 +400	15000 + 600
<b>Technicians</b>	900	8000 + 400	15000 + 600

The needs in education and training concern deep geothermal energy, only, with a strong focus on electricity production





# Requirements for education and training



- Summary:
  1. Only about 10% of the employees foreseen for 2020 exist today
  2. 60% of the 22'000 jobs (2020) need university education
  3. (university education has duration of about 5 years: We are already late!)
  4. 25% of the 14'000 jobs will be researchers (developing technology)
- About 20'000 are foreseen mainly in a new technology (EGS) by 2020

## Conclusion:

- **University level education (14'000 in the next 8 years)**
- **at prototype installations (1'400 in the next 8 years)**

# Training and Education Needs

- Increasing demand because of growing geothermal energy sector world-wide but shortage of geothermal experts.
- Basic training on geothermal technologies: Only few programmes exist in EU member states. Geothermal education at universities (M.S., MBA, Ph.D. Programmes) under development.
- The limited number of available specialised training courses at higher education related to geothermal exploration, exploitation and utilisation, is inadequate to supply the high skilled personnel needed in the geothermal power industry
- Complexity of geothermal technology needs an holistic approach.
- Multidisciplinary expertise and interaction of several disciplines are necessary.



# GEOELEC: Supporting Institutions and Companies



National Research Council, supported by Politecnico di Milano, Italy



Organization for Applied Scientific Research, Netherlands



Bureau de Recherches Géologiques et Minières, France



Centre for Renewable Energy Sources and Saving, Greece



German Research Centre for Geosciences, Germany



Energie Baden-Württemberg AG, Germany



Mannvit, Reykjavík, Iceland



GGSC: Lawyers Gaßner, Groth, Siederer & Coll., Germany



European Geothermal Energy Council





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