

Annual report on the RD&I activities and their impacts

YEAR 1

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Deep GEOTHERMAL IWG
SUPPORT UNIT



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Introduction

The first Annual report on the RD&I activities and their impacts presents the annual 2019 review of the new and ongoing RD&I projects to better understand the trends and the ongoing activities.

This analysis is part of the Task (6.1) on having a Comprehensive Analysis of the RD&I Geothermal Panorama.

These RD&I activities are analysed to assess how the SET Plan related RD&I activities, detailed in the 8+2 IP fiches, and the targets of the “Deep Geothermal Implementation Plan, are executed.

Methodology

It compiles results from the work done in **WP2-3-4** and data collection activities already started by ETIP deep geothermal and ERANET-geothermal and treat information from:

- **Member States level**
- **Researchers (D3.3)**
- **Industry (D 4.1)**

It reports data collected for the SET Plan during the annual reporting for the Steering Group in 2019 and 2020.

RD&I activities 2019

Annual budgets for geothermal R&I

EU R&I funding from Member States allocated to geothermal energy during the period 2000-2010 amounted to around €210mln, so a yearly amount of €21mln.

For the decade 2010-2020, Member States progressively increased national R&D funding for geothermal, with the aim of doubling the overall effort by 2020.

Recent data reported by the DG-IWG (annual reporting to the SET Plan, August 2020) shows a total R&I projects budget of 512.2 Mln Euro in geothermal for the period 2017-2022. In Europe, the public funding for this 5 years period is about 305 Mln Euro, the private contribution being €207.2 Mln. The annual amount of public funding (EU + national) is then circa €61 Mln. It is three times the amount of a period 2000/2010. The private (mainly from industry, and some own funding from research organisations) cofunding for

EU, transnational and national projects is about 210 Mln Euro, so an annual basis of 41 Mln Euro.

Geothermal R&I projects funding per country

In € Mln	Total project budget	Public funding	Private contribution ¹	of which EU funded		
				Total budget	Public funding	Private contrib
Total	512,2	305	207,2			
EU	225,3	173,9	51,4			
National	286,9	131,1	155,8			
Austria	5,8	5,4	0,4			
Belgium	7	7	0			
Czechia	0,7	0,7	0			
France	101,7	61,2	40,5	20,3	18,3	2
Germany	113,1	60,8	52,3	21,1	20,9	0,2
Hungary	4,2	4,2	0			
Iceland	70	43,6	26,4	64,9	39,3	25,6
Ireland	0,7	0,5	0,2			
Italy	23,6	16,7	6,9	15,7	6,8	8,9
Norway	9,7	na	na			
Switzerland	19,8	6,3	13,5			
The Netherlands	106,7	51,7	55	32,8	16,3	16,5
UK	49,2	46,9	2,3	49,2	46,9	2,3

Table: Geothermal R&I projects funding per sources (public/private) and per country (sources Deep Geothermal IWG reporting 2020 to the SET Plan)

Note: Some EU projects are not reported there because the coordinator is not from a country mentioned in the table.

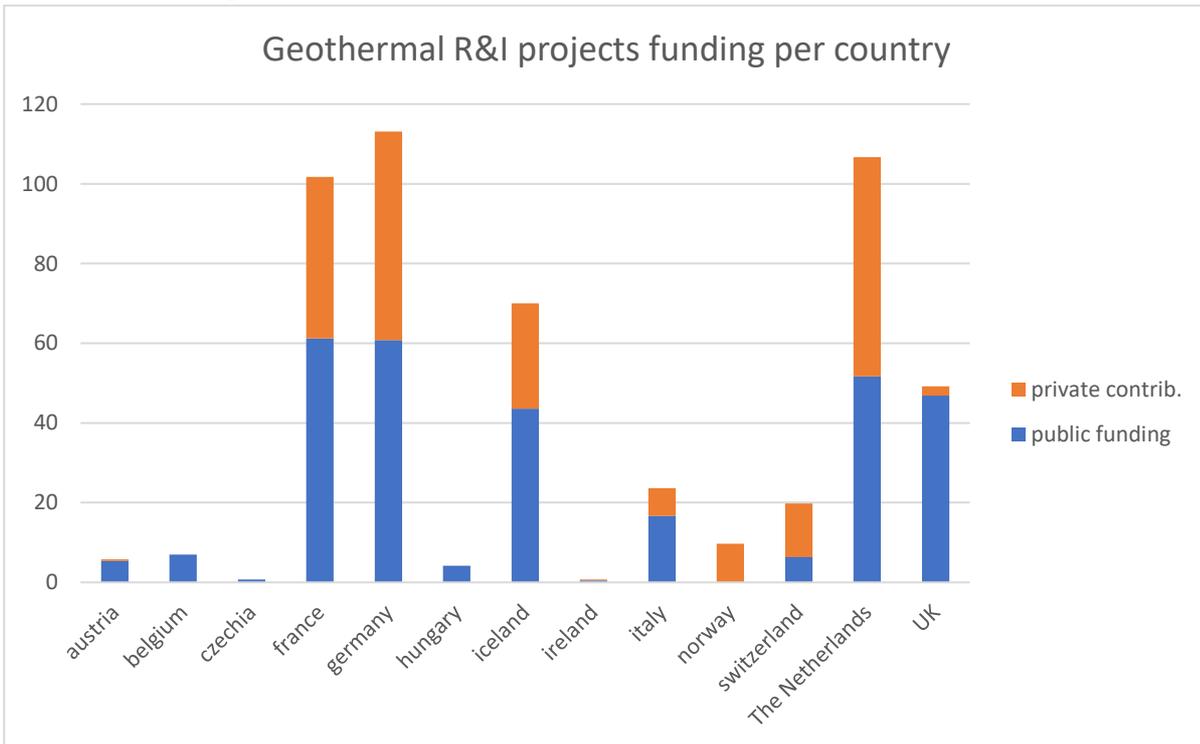
From the total, €286.9 millions are for projects funded by transnational and national budgets. The public share is € 131.1 Mln.

The EU funding is about € 225 Mln from which EC contribution is € 173.9 Mln.

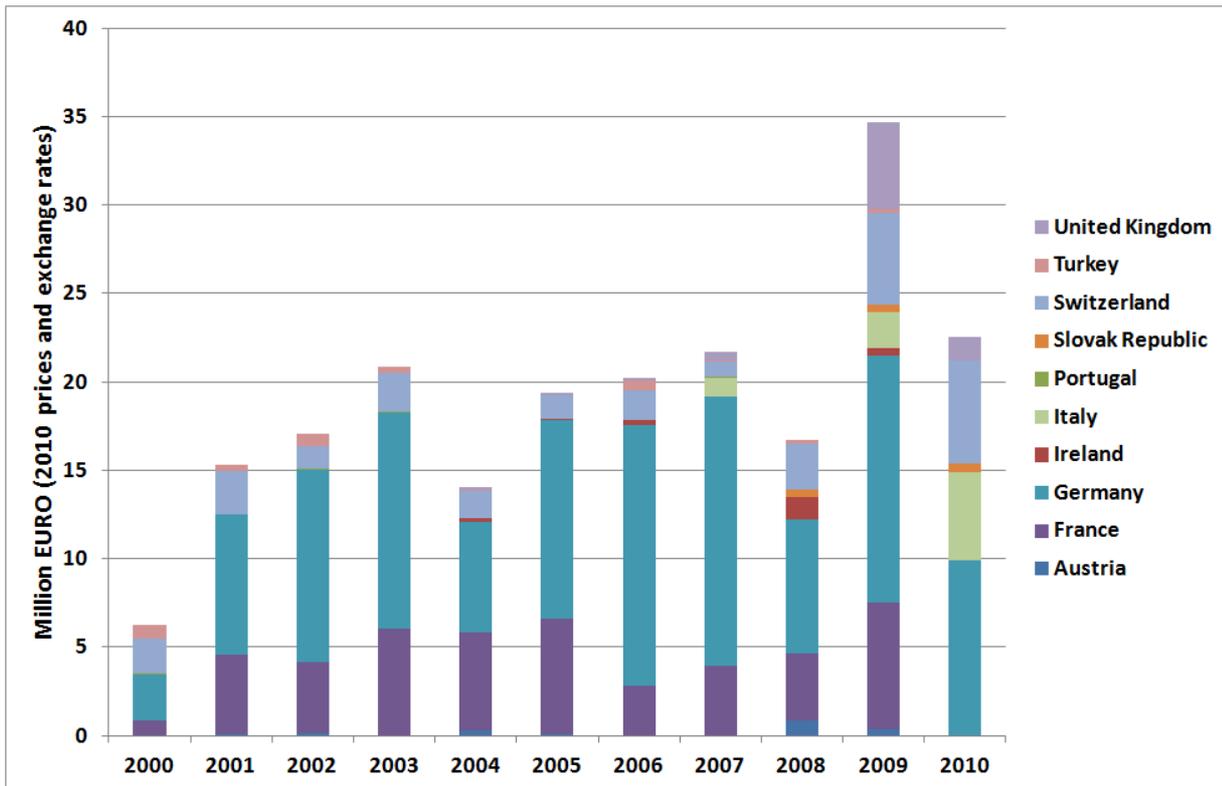
The trends from the last year can be seen in the three graphs below:

¹ Private contribution is the part of the budget not coming from the public funding. Although, it is essentially coming from the industry, in some projects this part is also covered by own funding of research institutes and other public organisations (geological surveys etc.).

- Geothermal R&I projects funding per sources (public/private) and per country in 2017-2022
- Country specific budgets for geothermal RD&D as reported to the IEA for the period 2000-2010.
- Breakdown of the total EU Member State RD&D expenditure on energy supply side technologies in 1974-2007.



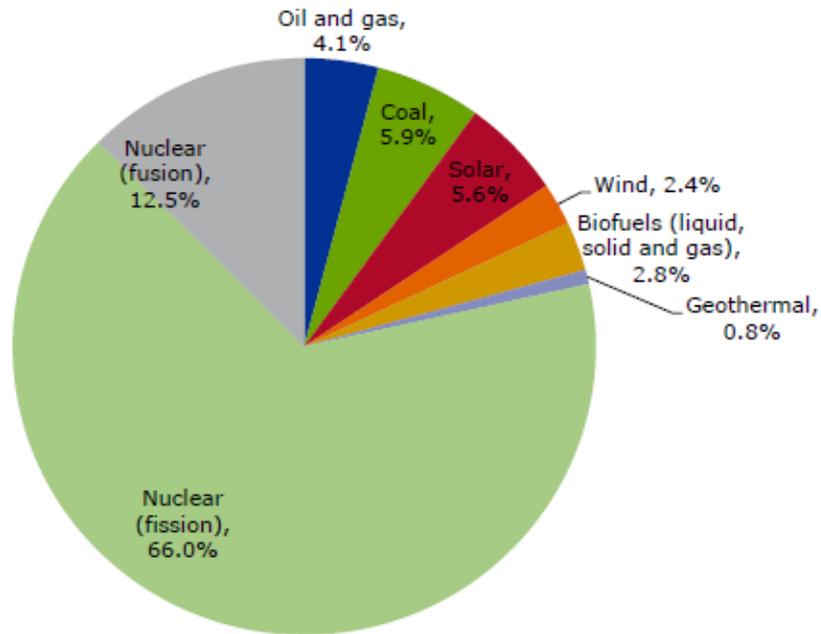
Graph: Geothermal R&I projects funding per sources (public/private) and per country for the period 2017-2022 (sources Deep Geothermal IWG reporting 2020 to the SET Plan)



Graph: Country specific budgets for geothermal RD&D as reported to the IEA for the period 2000-2010.

The European Commission’s final report [“Subsidies and costs of EU energy”](#) unveiled for the first time in 2012 data on costs and subsidies across various generation technologies in the electricity sector in all EU Member States. The level of support dedicated to geothermal is staggeringly insignificant compared to other mature or less mature technologies. In 2012, geothermal received only €70 million, 20 of which from the European level. In comparison, solar PV received €14.7bn, coal €9.7bn, wind (onshore and offshore) €11.2bn, nuclear €6.6 bn, and natural gas € 6.5bn. This significant discrepancy is all the more regrettable that the geothermal sector is ready to deploy new innovative and low-carbon technologies.

Additionally, the study estimates the order of magnitude of historical interventions across all power generation technologies. It demonstrates that, over the past 30 years, nuclear and coal have benefited from considerable public support which “still has a direct effect today”. In terms of R&D expenditures, between 1974 and 2007, more than two-thirds of EU and Member States’ R&D expenditures were allocated to nuclear energy, and only 0.8% to geothermal (See Figure below).



Breakdown of the total EU Member State RD&D expenditure on energy supply side technologies (€₂₀₁₂ 87 billion) in 1974-2007.

Source: Subsidies and costs of EU energy: Final report, p. 29.

Total interventions, external costs and costs by power technology are illustrated below.

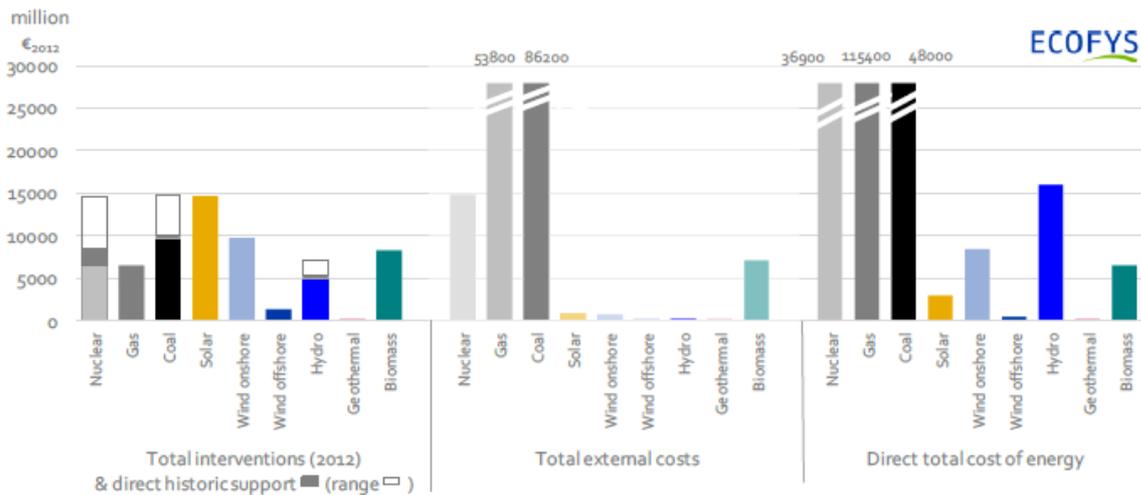
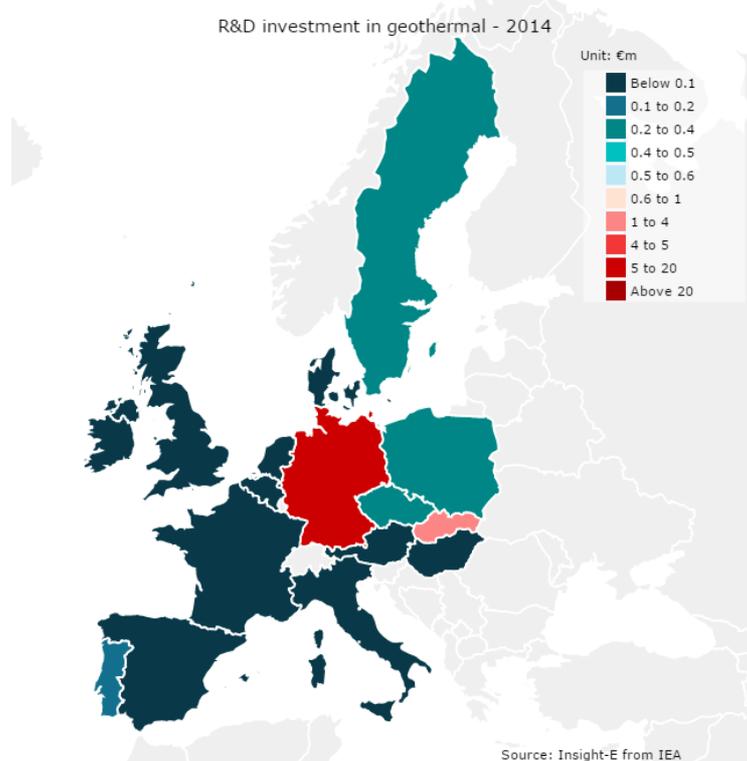


Figure 4-2: Total interventions, external costs and costs of energy split by technology 2012 (in million €₂₀₁₂)

Note: In this figure, total interventions exclude those not allocated to technologies i.e. infrastructure, energy demand, energy saving and free allocation of EU ETS allowances. Direct historic support is shown as ranges at the top of the interventions bar (marked by a gap in the bar). External costs have a higher level of uncertainty than the other components.

Source: Subsidies and costs of EU energy: Final report, p. 52.

The activity INSIGHT-E from IEA was able to report R&D investment in 2014 per European country. Although the eclectic picture seems right, the data reported are doubtful.



Link: http://insightenergy.org/static_pages/energy_transition_indicators

Private contribution

For the period 2017-2022, the private contribution in co-funded geothermal R&I projects is about € 210 Mln. About € 50 Mln is invested by the geothermal industry in EU projects and around € 150 Mln at national level or in transnational activities. In France, Germany, Iceland and The Netherland the private contribution is very significant (between 26 to 55 millions of euros) and represent nearly 50% of the project funding. In Switzerland, this share increases to 75% (€13.5 Mln on € 19.8 Mln).

The share of the private contribution coming from Industry, Geological surveys and research entities will be presented in details in the report 2021 (D6.2).

Country/EU	Total projects funding (€ Mio)	% of private contribution
Total	512,2	40%
EU	225,3	23%
National	286,9	54%

Austria	5,8	7%
Belgium	7	0%
Czechia	0,7	0%
France	101,7	40%
Germany	113,1	46%
Hungary	4,2	0%
Iceland	70	38%
Ireland	0,7	29%
Italy	23,6	29%
Norway	9,7	na
Switzerland	19,8	68%
The Netherlands	106,7	52%
UK	49,2	5%

Geothermal companies already involved in R&I activities are presented in a separate report (Map of geothermal market actors: A mapping of the private stakeholders potentially active in RD&I on geothermal (deliverable 4.1). It presents companies involved in co-funding of European projects:

- Horizon 2020 programme
- GEOTHERMICA-funded projects

IMPLEMENTATION PLAN AND TARGETS

Statement	Still relevant	Needs revision	Reasoning and recommendations
Implementation plan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Targets			
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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Improve the overall conversion efficiency, including bottoming cycle, of geothermal installations at different thermodynamic conditions by 10% in 2030 and 20% in 2050	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
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/kWhel for electricity and 5 €/ct/kWhth for heat by 2025	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Reduce the exploration costs by 25% in 2025, and by 50% in 2050 compared to 2015	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Reduce the unit cost of drilling (€/MWh) by 15% in 2020, 30% in 2030 and by 50% in 2050 compared to 2015	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

1. *includes energy storage

In accordance with the SET-Plan [Declaration of Intent](#) on Strategic Targets in the context of an Initiative for Global Leadership in Deep Geothermal Energy, the DG-IWG – according to its Terms of Reference – has committed to revising the [Deep Geothermal Implementation Plan](#) in 2020.

WORKING GROUP ORGANISATION

This is not relevant for the 2019 submission as the IWG is just launched.

ONGOING PROJECTS

List of relevant national and EU co-funded R&I projects that address the targets of the Implementation Plan:

Project name (min. > € 1 mln)	Website or short description	Start year	End year	Budget / Funding (EUR million)	Relevant activities addressed / targets achieved	Results open to SET Plan community (Y/N)
GEOHERMICA						
CAGE	http://www.geothermica.eu/projects/cage/	2018	2021	13.5 / 5.8	R&I 6	Y
COSEISMIQ	http://www.geothermica.eu/projects/coseismiq/	2018	2021	2.5 / 1.1	R&I 3, NTBE A	Y
GeConnect	https://www.geothermalresearch.eu/geconnect/	2018	2021	1.2 / 0.9	R&I 3, 6	Y
GEOFOOD	https://geofoodproject.eu/	2018	2021	1.7 / 1.2	R&I 7, NTBE A	Y
GEO-URBAN	http://www.geothermica.eu/projects/geo-urban/	2018	2021	0.7 / 0.5	R&I 1	Y
HEATSTORE	https://www.heatstore.eu/project.html	2018	2021	16.3 / 8.3	R&I 1, 7	Y
PERFORM	http://www.geothermica.eu/projects/perform/	2018	2021	3.0 / 2.2	R&I 2, 4	Y

ZoDrEx	http://www.geothermica.eu/projects/zodrex/	2018	2021	4.9 / 2.9	R&I 6, 3	Y
Horizon 2020						
CARBFIX2	https://www.carbfix.com/	2017	2021	2.2 / 2.2	R&I, 8	Y
CHPM2030	https://www.chpm2030.eu/	2016	2019	4.2 / 4.2	R&I 3	Y
CoolHeating	https://www.coolheating.eu/en/	2016	2018	1.6 / 1.6	R&I 1, 7	Y
DEEPEGS	https://deepegs.eu/	2015	2019	42 / 19	R&I 3, 6	Y
DESCRAMBLE	http://www.descramble-h2020.eu/	2015	2018	15.7 / 6.8	R&I 6, 3	Y
DESTRESS	http://www.destress-h2020.eu/en/home/	2016	2020	24.7 / 10.7	R&I 3, 6	Y
EoCoE-II	www.eocoe.eu	2019	2021	8.6 / 8.3	R&I 5	Y
GECO	https://geco-h2020.eu/	2018	2022	18.2 / 15.6	R&I 8	Y
GeMex	http://www.gemex-h2020.eu/index.php?lang=en	2016	2020	10 / 10	R&I 3, 5	Y
Geo-Coat	http://www.geo-coat.eu/	2018	2021	4.7 / 4.7	R&I 2	Y
GEOENVI	https://www.geoenvi.eu/	2018	2021	2.5 / 2.5	R&I 8, NTBE A	Y
GEORISK	https://www.egec.org/georisk-project/	2018	2021	2.2 / 2.2	NTBE B	Y
CROWD THERMAL	https://cordis.europa.eu/project/rcn/224316/factsheet/en	2019	2022	2.3	NTBE A & B	
GeoSmart	https://www.geosmartproject.eu/	2019	2023	19.7 / 17.4	R&I 7, 4, 2	Y
GeoWell	http://geowell-h2020.eu/	2016	2019	4.7 / 4.7	R&I 2, 6	Y
MEET	https://www.meet-h2020.com/	2018	2021	11.7 / 10.0	R&I 3,4	Y
S4CE Science for Clean Energy	http://science4cleanenergy.eu/	2017	2020	9.8 / 9.8	R&I 8	Y
SURE	http://www.sure-h2020.eu/	2016	2019	6.1 / 5.9	R&I 6, 3	Y
THERMODRILL	http://www.thermodrill-h2020.org/	2015	2019	5.8 / 5.4	R&I 6	Y
Multilateral funding opportunities						

SYSEXPL-REX (D, CH)	SYSEXPL - Systematic Geothermal Exploration via (geo)magnetic Potential Field Methods; REX-Quantitative exploration risk analysis	2019	2023	3.2 / 2.4	R&I 5	Y
IDDP (IS, NO)	http://iddp.is/					
DGE Rollout (D, NL, B, F)	https://www.nweurope.eu/projects/project-search/dge-rollout-roll-out-of-deep-geothermal-energy-in-nwe/	2018	2022	18.7 / 11.1	R&I 1, 5	Y
Large national/regional projects						
SCAN	https://scanaardwarmte.nl/english/ Seismic campaign, novel data reprocessing and exploration wells to facilitate future geothermal development	2019	2021	15.0 / 15.0	R&I 5	Y
HIPE	https://www.rvo.nl/subsidies-regelingen/projecten/high-performance-geothermal-well	2017	2021	6.0 / 3.8	R&I 6	Y (partially)
CRECCIT	https://www.rvo.nl/subsidies-regelingen/projecten/cost-reducing-enhanced-composite-casing-installation-technology	2016	2021	10.0 / 5.2	R&I 2, 6	Y (partially)
LEAN	http://europeangeothermalcongress.eu/wp-content/uploads/2019/07/346.pdf	2018	2021	13.5 / 6.0	R&I 1, 5, 6	Y (partially)
Geothermal Directional Drilling (NL)	https://www.rvo.nl/subsidies-regelingen/projecten/geothermal-directional-drilling	2014	2019	8.9 / 4.0	R&I 1, 6	Y (partially)
G2G (NL)	https://www.rvo.nl/subsidies-regelingen/projecten/g2g-van-gas-naar-geothermie	2014	2020	8.0 / 1.4	R&I 6	Y (partially)
ANIGMA (NO)	https://www.uib.no/fg/brs/118027/characterising-modeling-geothermal-reservoirs-anigma#project-coordinator-s-	2015	2019	1.2	R&I 5	?
EGS Alsace (FR)	geothermie.es.fr	2015	2019	4.7	R&I 3	
GEFISS (FR)	http://www.geodenergies.com/sites/default/files/upload/documents/fichesprojet/fiche_synthetique_gefiss_en.pdf	2018	2022	3.5 / 1	NTBE A	
FaMeK (DE)	Fiber-optic acoustic measuring system for more accurate and cost-effective exploration of deep geothermal wells	2018	2020	2.6 / 1.3	R&I 6	Y

Drill:BOGS (DE)	Acquisition, implementation and first operation of a fully automatic, large-scale drill rig for the development of next generation drilling technologies for the exploration of deep geothermal systems	2018	2020	0.52	R&I 6	Y
EffGeo (DE)	Specific and general improvements in efficiency of geothermal power plants	2018	2021	0.83 / 0.4	R&I 4	Y
ReSalt (DE)	Reactive Reservoir systems - Scaling and Erosion and its Impact on Hydraulic and Mechanic Reservoir properties	2018	2020	2.0 /1.9	R&I 2 & 3	Y
GeoMo (DE)	Geothermal monitoring for the installation and operation of probes with integrated monitoring of the consumption for individual optimization of the heat pump	2019	2021	1.9 / 1.5	R&I 1	Y
INSIDE (DE)	Handling induced seismicity and ground displacements as interference aspects during the operation of geothermal projects in the South German Molasse basin.	2019	2022	4.7 / 3.1	R&I 1 & CC A	Y
GeoFern (DE)	Geothermal District Heat Supply in Berlin	2019	2022	1.8	R&I 1	Y
GeoMare (DE)	Optimized control and operation technology with sustainable reservoir management for the deep geothermal heat projects in the Munich area	2018	2021	5.3 /3.1	R&I 1	Y
Roll-out of Deep Geothermal Energy in NWE	Roll-out of Deep Geothermal Energy in NWE – Germany; a project portfolio that aims to substitute coal-fired energy supply into district heating schemes with geothermal energy supply	2019	2022	6.2 (2.35 German Funding, 3.85 NER 300 for German Part)	R&I 1	Y

– Germany (DE)						
OBE (DE)	Optimization of drilling operations for geothermal projects through realistic real-time simulation	2019	2022	1.3	R&I 6	Y
SEIGER (DE)	Seismic monitoring of deep geothermal power plants and possible seismic impact	2019	2022	3.3 /2.8	NBTE-A	Y
VALTRE (CH)	Validating technologies for EGS development	2017	2020	12.4 / 2.3	R&I 3	Y

PROGRESS AND PRIORITISATION OF ACTIVITIES

assessment for each of the activities of the Implementation Plan:

- **the prospect for progress** within the time horizon² considered in your IP by using a traffic light system
 - Green: There are ongoing projects addressing this activity
 - Orange: coordination is mature enough to enable projects to take-off in the near future
 - Red: no activity or progress
- whether the activity is a **priority** in 2019-20 for the success of this IP

Implementation Plan activities ³ as in the endorsed IP ⁴	Progress ^{Error! Bookmark not defined.}	Priority	Comment
1. Geothermal heat in urban areas	●	<input type="checkbox"/>	
2. Materials, methods and equipment to improve operational availability (high temperatures, corrosion, scaling)	●	<input type="checkbox"/>	
3. Enhancement of conventional reservoirs and development of unconventional reservoirs	●	<input type="checkbox"/>	
4. Improvement of performance (conversion to electricity and direct use of heat)	●	<input type="checkbox"/>	
5. Exploration techniques (including resource prediction and exploratory drilling)	●	<input type="checkbox"/>	
6. Advanced drilling/well completion techniques	●	<input type="checkbox"/>	
7. Integration of geothermal heat and power in the energy system and grid flexibility	●	<input type="checkbox"/>	

² You can specify the time frame or add more context in the 'Comment' column

³ Including Non-Technological Barriers/Enablers (NTBE) or Cross-cutting Issues

⁴ <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan/implementation-plans>

8. Zero emissions power plants	●	<input type="checkbox"/>	
NTBE A. Increasing awareness of local communities and involvement of stakeholders in sustainable geothermal solutions	●	<input type="checkbox"/>	
NTBE B. Risk mitigation (financial/project)	●	<input type="checkbox"/>	

FUTURE PROJECT CALLS

Information on forthcoming relevant national and EU R&I project calls in support of the Implementation Plan:

Call name	Funding agency	Short description and web link if available	Start year	End year	Budget (EUR million)	Relevant targets or activities addressed
GEOTHERMICA II	ADEME; FZJ-PtJ, Rannis; GSI; RVO; RCN; DGEG, UEFISCDI; AEI; DETEC; TÜBITAK and DoE	http://www.geothermica.eu/call-to-action/	2020	2023	18	All R&Is
Innovation Fund	EC	https://ec.europa.eu/clima/policies/innovation-fund_en	2020	2030	Around 10'000	All

H2020 Green Deal call	EC	https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-cc-activities_en.pdf	2020	2021	1000	All
National calls						
Germany	BMWi, BMBF,	7 th National Energy Research Program: Ongoing national research Program for Energy topics	2018	ongoing	1'300 million €/year	Complete Energy sector
Iceland	Rannis	Once a year / regular				
Netherlands	RVO	“Hernieuwbare Energie” (broader than geothermal only) https://www.rvo.nl/subsidies-regelingen/hernieuwbare-energie	Annual publication		2019: M€ 50	All R&Is except R&I 8
Netherlands	RVO	“Demonstration Energy Innovation” (broader than geothermal only) https://www.rvo.nl/subsidies-regelingen/demonstratie-energie-en-klimaatinnovatie/energie-innovatie-dei	Annual publication		2019: M€ 35	All R&Is except R&I 8
France	SGPI/ADEME	Programme des Investissements d’Avenir 3 (PIA3 ⁵) Once a year / regular	2019	2021	N/A	All R&Is

⁵ <https://www.ademe.fr/sites/default/files/assets/documents/presentation-aap-pia-ademe.pdf>

POLICIES AND MEASURES

Information and examples of policies and measures that are conducive to the progress of the Implementation Plan:

Policy or measure	EU or Member State or SET-Plan Country	Type of support (monetary, regulatory etc- details)	End year	Start year	Relevance / effect on Implementation Plan
For summary see ERANET Geothermal review http://www.geothermaleranet.is/media/publications-2015/Geothermal-ERA-NET-D2_1-Geothermal-energy-status-and-policy-review-NTs.pdf					
For a range of SET-Plan countries and EU member states in particular, see https://www.egec.org/media-publications/geothermal-country-fiches-key-proposals-for-geothermal-in-european-countries/	AT, BE, CZ, DE, DK, EL, ES, FR, FI, HR,HU, IE, IT, NL, PL, PT, RO, SI, SK, UK	Various	Ongoing	Ongoing	NTBE-B
COSVIG (public-private partnership)	Region of Tuscany (IT)	Voluntary measures			NTBE-A
RSE (Ricerca sul Sistema Energetico)	IT	Research into electric power sector			

SDE+/SDE++ Feed-in premium	NL	Monetary	Ongoing	2012	Feed in premium for various RES, including geothermal heat. Enabler for market growth
Guarantee scheme geothermal energy	NL	Monetary - conditional	ongoing	2009	Risk mitigation scheme (NTBE -B)
Geothermal guarantee scheme	CH	Monetary - conditional	2030	2009	Risk mitigation scheme (NTBE-B)
Contributions to geothermal prospecting and exploration for power projects	CH	Monetary	2030	2018	Risk mitigation scheme (NTBE-B)
Contributions to geothermal prospecting and subsurface development for direct use projects	CH	Monetary	2025	2018	Risk mitigation scheme (NTBE-B)
Recast RES Directive 2019	EU	Article 23: increase Renewable HC consumption & article 24: open DH	2030	2021	R&I 1

SYNERGIES WITH OTHER IMPLEMENTATION PLANS

Indications on which other Implementation Plans – if any – are critically important for the success of the Implementation Plan on Deep Geothermal Energy:

SET Plan Implementation Plans	Of critical importance to the success of the Deep Geothermal Energy Implementation Plan	Comment / Description of established collaboration –if any.
1&2 Photovoltaics	<input type="checkbox"/>	
1&2 CSP	<input type="checkbox"/>	Thermal energy storage with focus on geothermal energy
1&2 Offshore Wind	<input type="checkbox"/>	
1&2 Ocean	<input type="checkbox"/>	
3.1 Consumers	<input type="checkbox"/>	
3.2 Smart Cities	<input checked="" type="checkbox"/>	Deep geothermal heat sources in District Heating
4 Energy Systems	<input checked="" type="checkbox"/>	Integration of local geothermal energy in the energy system
5 EE Buildings	<input checked="" type="checkbox"/>	Deep geothermal heat sources in District Heating; Development of high-temperature heat pumps
6 EE in Industry	<input checked="" type="checkbox"/>	Heat and energy extraction from reservoirs; Development of high-temperature heat pumps
7 Batteries	<input type="checkbox"/>	Drilling techniques and metal extraction processes
8 Renewable Fuels and Bioenergy	<input type="checkbox"/>	
9 CCUS	<input type="checkbox"/>	Geothermal resources production and use of underground; permanent CO ₂ (and NCG) storage; CO ₂ as heat exchange medium
10 Nuclear Safety	<input type="checkbox"/>	

SYNERGIES BEYOND THE SET PLAN

List of cooperation initiatives that exists beyond the SET Plan community (e.g. Mission Innovation Challenges), with a short description and information on the involvement of Implementation Plan Working Group members – if any:

Initiative	Short description and web link if available	Start year	End year	Implementation Plan participation	Relevant targets or activities addressed
IEA Geothermal	The IEA Geothermal Technical Collaboration Programme (IEA Geothermal or the Geothermal TCP) is a framework for international collaboration and networking among nations, industries and industry organizations on all aspects of geothermal resources and geothermal energy. http://iea-gia.org/ ;	1977	ongoing	No	Potential to contribute to R&I 1, 2, 3, 5, 6, 8
International Partnership for Geothermal Technology	The International Partnership for Geothermal Technology (IPGT) provides a forum for government and industry leaders from the five member countries, (Australia, Iceland, New Zealand, Switzerland and the United States) to coordinate their efforts, and collaborate on projects. Partners share information on results and best practices to avoid blind alleys, limit unnecessary duplication, and efficiently accelerate the development of geothermal technologies. https://ipgtgeothermal.org/#	2008	ongoing	Yes (US DoE, NZ has expressed interest in joining GEOTHERMICA calls)	R&I 2, 3, 5, 6 and 8
EEA Grants	Iceland, Norway, Liechtenstein				

IGA	The IGA aims at being the leading world authority in matters concerning the research and development of geothermal energy by setting educational standards and offering worldwide energy solutions and in-house technical support, with special support for countries in early stages of geothermal development. https://www.geothermal-energy.org/		Ongoing	No	
Global Geothermal Alliance	The GGA is an inclusive and neutral multi-stakeholder platform that brings together public, private, intergovernmental and non-governmental actors that share a common vision of accelerating the deployment of geothermal energy for power generation and other applications. http://www.globalgeothermalalliance.org/	2015	ongoing	No	
S3 Partnership Geothermal Energy 2.0	Partner Regions are all engaged in projects and investments in geothermal energy technologies. Through their commitment to the S3 Partnership Geothermal Energy 2.0, they foster interregional cooperation to share, test and jointly develop new solutions that can help overcoming existing gaps and concerns.	2019	ongoing	Yes	All
European Research Infrastructure Consortia (ERIC-EPOS)	EPOS – a number of Thematic Core Services and in particular: Geo-Energy Test Beds for Low Carbon Energy https://www.epos-ip.org/data-services/community-services-tcs/geo-energy-test-beds-low-carbon-energy		ongoing	Yes	All
Mission Innovation	Mission innovation challenge 7 on heating and cooling:				

	http://mission-innovation.net/our-work/innovation-challenges/affordable-heating-and-cooling-of-buildings/ http://mission-innovation.net/				
EUROGEOSURVEYS	http://www.eurogeosurveys.org/				

ADDITIONAL SUGGESTIONS FOR MONITORING

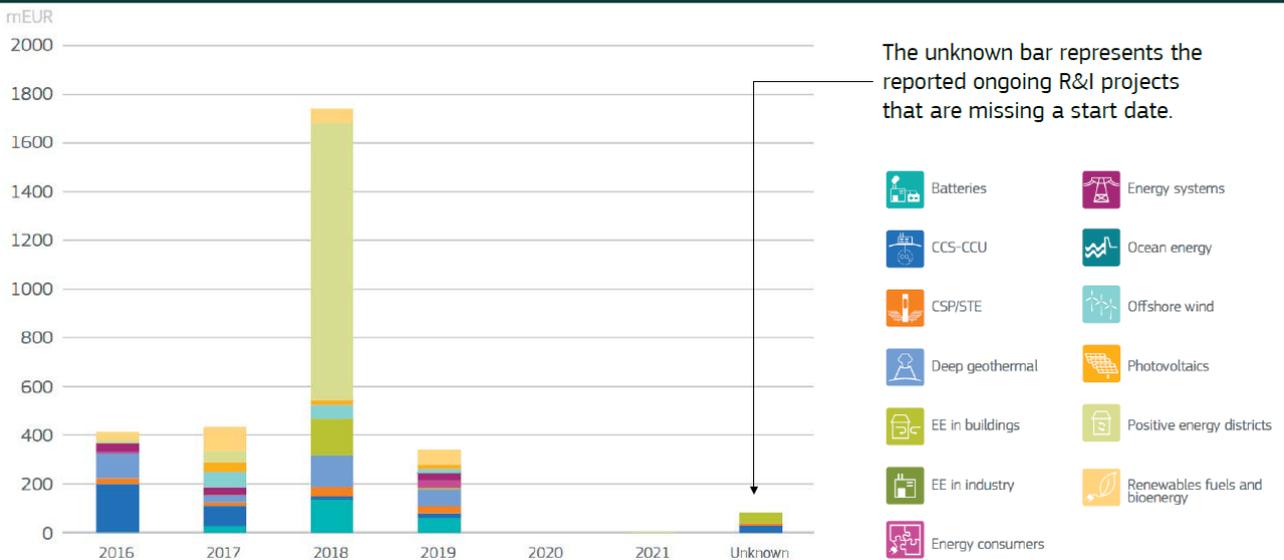
Additional aspects relevant to the Implementation Plan that should be monitored and/or any specific metrics to measure progress:

Additional aspect to be monitored	Metric	Baseline	Comment / Reasoning
R&D Investment by the public sector (including regional funds)	€ per year	2015	Tracks public investment and level of commitment
R&D Investment by the private sector	€ per year	2015	Tracks private sector investment, but fiendishly difficult to establish in a systematic manner across Europe
Share towards NECP (targets for geothermal)	GWh Heat GWh Power	2020	

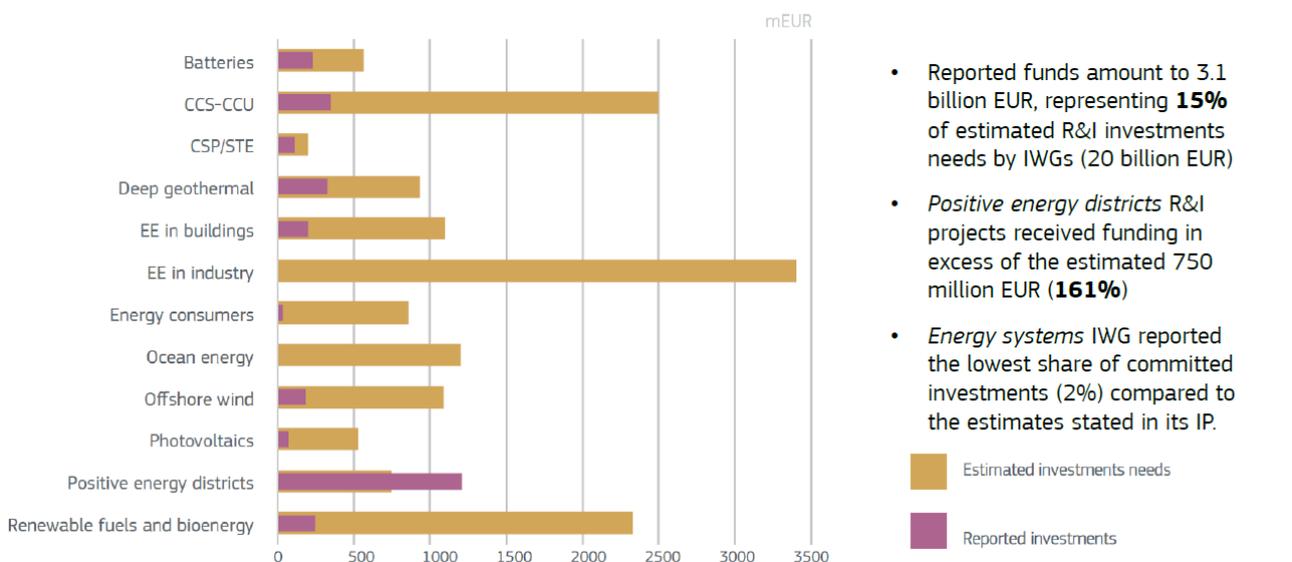
SET Plan reporting

SET PLAN ANNUAL REPORT TO THE STEERING GROUP: REPORT FROM THE IWGS

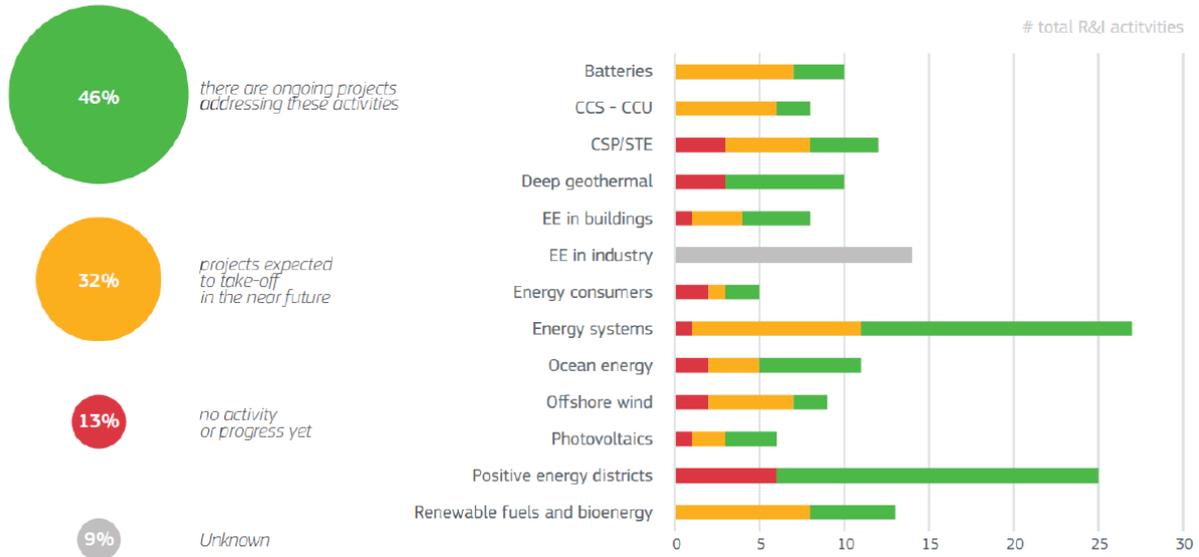
Ongoing R&I projects addressing the targets



Reported investments vs estimated needs



Progress on addressing all IPs activities



FEEDBACK FROM 2019 ANNUAL REPORT ON GEOTHERMAL

What worked really well:

- Level of cooperation among the Deep Geothermal-IWG actors (community building through shared vision and purpose)
- Annual Report helps define purpose and targets of the Deep Geothermal-IWG

Identify the areas that need to be improved:

- Clear definition of the purpose of the Annual Report (avoid data collection for its own sake and unnecessary duplication)
- present overview to stakeholders in SET-Plan countries
- demonstrate cohesion of the Deep Geothermal community
- use data collected in the Annual Report as motivation to update DoI targets and Implementation Plan (Deep Geothermal-IWG management tool)

Ideas for improvement:

- Let IWG define the purpose and use of the Annual Report (2-3 paragraphs)
- Relate “list of ongoing projects” to impact on DoI targets and Implementation Plan
- Use Annual Reports to improve visibility of IWGs (and place them prominently in SETIS - <https://setis.ec.europa.eu/deep-geothermal-implementation>)