Feedback from GEORISK partners: The case of Greece

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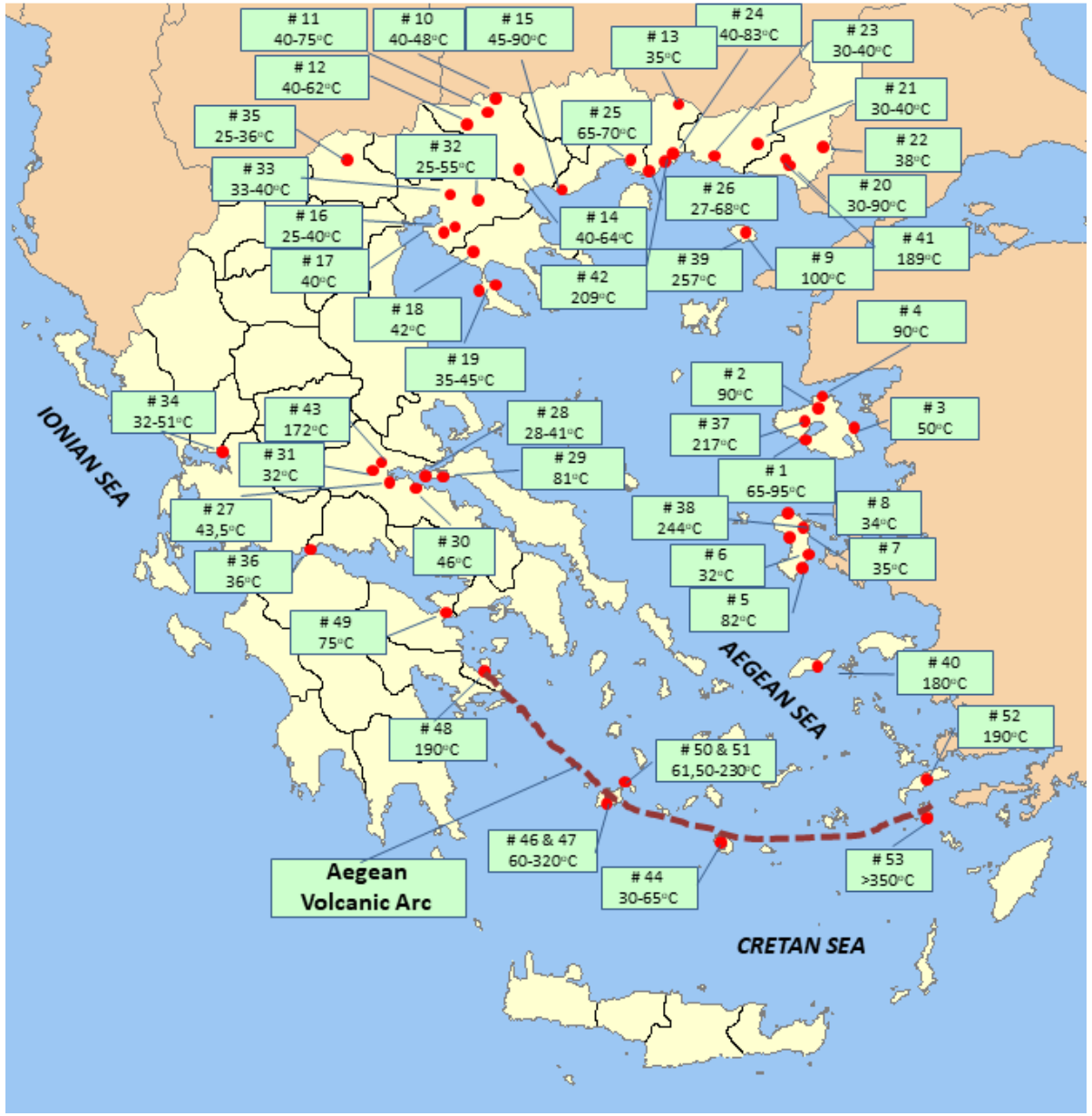
Geothermal fields in Greece



Main projects under investigation & planning

Geothermal electricity power plants projects under investigation

Location	Expected capacity installed (MWe)	Consortium	Development phase
Milos	5	PPC Renewables & ELLAKTOR	geothermal concession and power generation license available
Kimolos	5		
Lesvos	8		
Nisyros	5		
Methana	5		
Santorini	0		

Planned GeoDH plants

Location	Status /Type	Expected Capacity Installed (MWth)	Consortium
Aristino - Alexandroupolis	Low temperature (<90, °C) Hydrothermal	20	Municipality of Alexandroupolis
Erateino - Nestos		8	Municipality of Nestos
Nea Kessani - Xanthi		12	Agritex Energy

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Potential risks

- Workshop on Risk evaluation & assessment (June 2019)
- Questionnaire on risk evaluation distributed to geothermal experts

	Socio-Economical risks	Operational & Geological risks	Drilling risks
Shallow geothermal resources of Macedonia and Thrace	• Mainly financial uncertainties may cause significant hindrance for further development.	• Geological uncertainties do not present high degree of difficulties; • Chemical composition; • Reinjection processes.	• Minimal relevance; • Currently no challenges that could considerably hinder development.
Deep Sedimentary Reservoirs	• Social acceptance and political attitude; • Lack of clients.	• Medium level risks; • Fluid chemistry (depositions and corrosion). • Risk of not finding the geothermal resource • Risk of surface leakages.	• Medium risk level; • Shortage of deeper geological data; • Re-injection process management; • Risk of toxicity of the thermal waters.
Aegean Volcanic Arc	• Strong public opposition.	• Local infrastructure is not developed enough to accommodate and relay the electricity to the mainland.	• Low drilling risks.

Risk mitigation

No Risks Mitigation Schemes are presently available in Greece. However:

- The Hellenic Survey of Geology & Mineral Exploration (public body) has performed and is performing exploration activities throughout the geothermal fields in Greece; thus, through public funding, the possible exploration and geological risks are reduced for potential investors.
- Municipalities, with funds from the National Strategic Reference Framework (NSRF), develop infrastructure for District Heating networks. Thus, costs related to lack of funding, and relevant aspects, are reduced.

Workshop: Establishment of RMS for geothermal projects (02.2020)

#	Question	Options	freq
1.	Scheme sponsor	a) State only	4
		b) State and when sustainable to be privatized	3
		c) Private	1
		d) Public and private partnership	**5**
		e) International finance sources	**5**
2.	Geographical scope	a) Greece	1
		b) Greece, per region	**7**
		c) Greece, neighbour countries can join (all countries finance their costs)	2
		d) European level	4
		e) International without country preference	2
3.	Risks covered	a) Exploration	2
		b) Exploration and development	**4**
		c) Exploration, developemnt and operation (geological risk)	2
		d) Exploration, operation, legal and financial risks	2
		e) All possible risks are covered	2
		f) To be determined per case	2

#	Question	Options	freq
4.	Geological Scope	a) Shallow and medium depth sedimentary formations	2
		b) Deep sedimentary formations	1
		c) Volcanic formations	0
		d) All possible formations	**7**
5.	Scheme type	a) Grant	4
		b) Refundable grant	**6**
		c) Convertible grant	5
		d) Pure insurance scheme	2
6.	Insurance premium	a) 5-8%, plus 1-3% costs	2
		b) 8-12%, plus 1-3% costs	1
		c) To be determined per case	**6**
7.	Risk cover	a) 40-60%, max amount determined	0
		b) 50-85%, max amount determined	**6**
		c) To be determined per case	3
		e) Other	1
8.	Scheme Operation	a) Sponsor determines	1
		b) Sponsor determines, advised by experts	**7**
		c) Other	1

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Legislation that could assist the establishment of a geothermal RMS

Legislation	Relevant section	Comment
Law 3468/ 2006 Production of electricity from renewable energy sources and high efficiency electricity and heat cogeneration, and other provisions	**Article 19** Committee for the Promotion of Large Scale Investment in RES and CHP. **Quote:** "A Committee for the Promotion of Large Scale Investment in RES and CHP is set up at the Ministry of Development* in the fields of RES and CHP" *responsibilities have been transferred to the Ministry of the Environment and Energy	Potentially, the specific Committee could be involved in the implementation of RMS schemes for geothermal, in the general context of RES and CHP promotion.
Law 3468/ 2006 Production of electricity from renewable energy sources and high efficiency electricity and heat cogeneration, and other provisions	**Article 21** Reports on the promotion of RES **Quote:** "Identification and recording of all causes and events preventing the increase of electricity production from RES."	The recording of barriers related to geothermal development within the specific process, could highlight the need for the implementation for RMS.
Law 4602/ 2019 Exploration, exploitation and management of the geothermal potential of the country, establishment of the Hellenic Survey of Geology & Mineral Exploration, ownership unbundling of natural gas distribution networks, and other provisions	**Article 14** Incentives for the development of geothermal energy **Quote** "1. By common decision of the Ministers of Finance and Environment and Energy, special incentives for the development of geothermal exploration and exploitation projects."	This Article allows the government to establish incentive schemes to support geothermal development. However, it does not specifically mention the type of incentives (e.g. grants, subsidies); in this context, RMS could be also included within the proposed incentives/ measures.

Policies that could assist the establishment of a geothermal RMS

Policy	Relevant section	Comment
National Energy and Climate Plan (NECP) Ministry of the Environment and Energy, 01/2019	**Section 5.3.2** Risk factors and challenges **Quotes** "The key principles of energy planning include optimizing the cost-effectiveness of policy measures, while safeguarding the interests of all parties involved, and in parallel keeping the risk of implementation failure to a minimum level." "In particular, the optimization of the return of public funds will be achieved through the reduction of subsidies and instead the granting of preferential loans that will allow the recycling of capital funds (reimbursable aids) through special funds." "Accordingly, the creation of conditions for attracting investment will be achieved, firstly through the proper regulatory framework and secondly by the rational rules governing the implementation of each measure. Mechanisms to be considered to strengthen this framework will be the provision of insurance for initial collateral damages of loaning schemes, …, the standardization of procedures and methodologies to reduce the risk of involved parties, in cases of difficult to manage projects, …"	Directly related to the potential creation of RMS for RES and energy saving actions. The specific section seems that could directly assist the creation of an RMS scheme in Greece as it: • Acknowledges the importance of risk mitigation; • Proposes the use of preferential loans through special funds; • Proposes the provision of insurance for initial collateral damages of loaning schemes.

Next steps

- Meetings with stakeholders
- 2o Workshop: Northern Greece, June 2020 (?)
- Development of RMS proposal
- 3rd Workshop: Athens, September 2020 (?)

- Ministry of Environment and Energy: Committee for the Geothermal Law;
- As official government consultant, CRES has proposed funding schemes (grants plus subsidized interest loans) for geothermal energy of high & low enthalpy for the exploratory and development phases.

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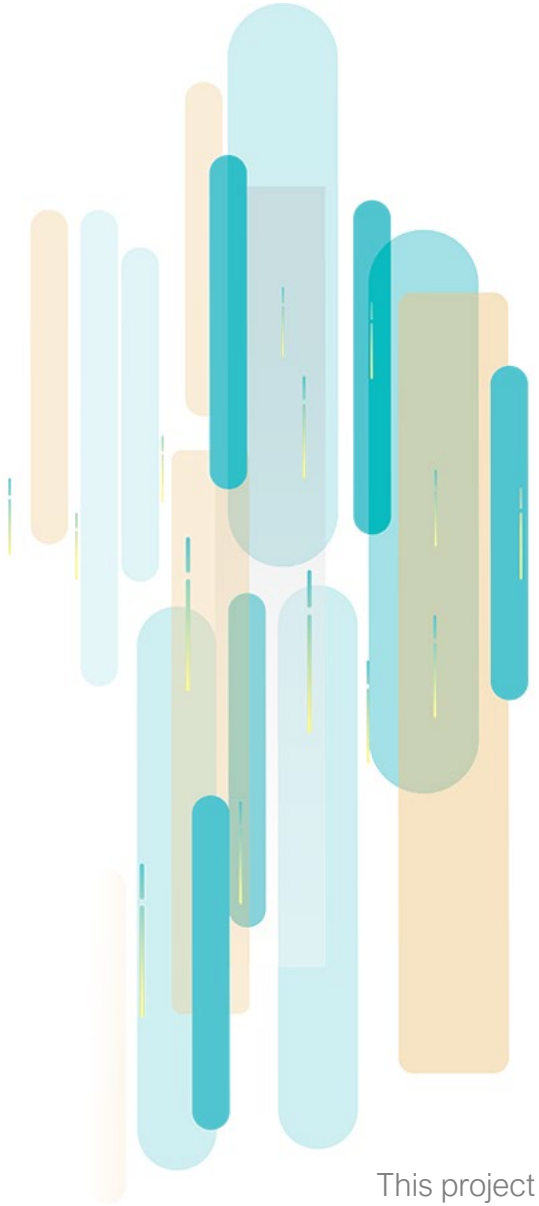

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Thank you for your attention

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