GEORISK Project

Tools and methodologies to support geothermal district heating and cooling

2021

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No [818232 — GEORISK]

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2 / Partners

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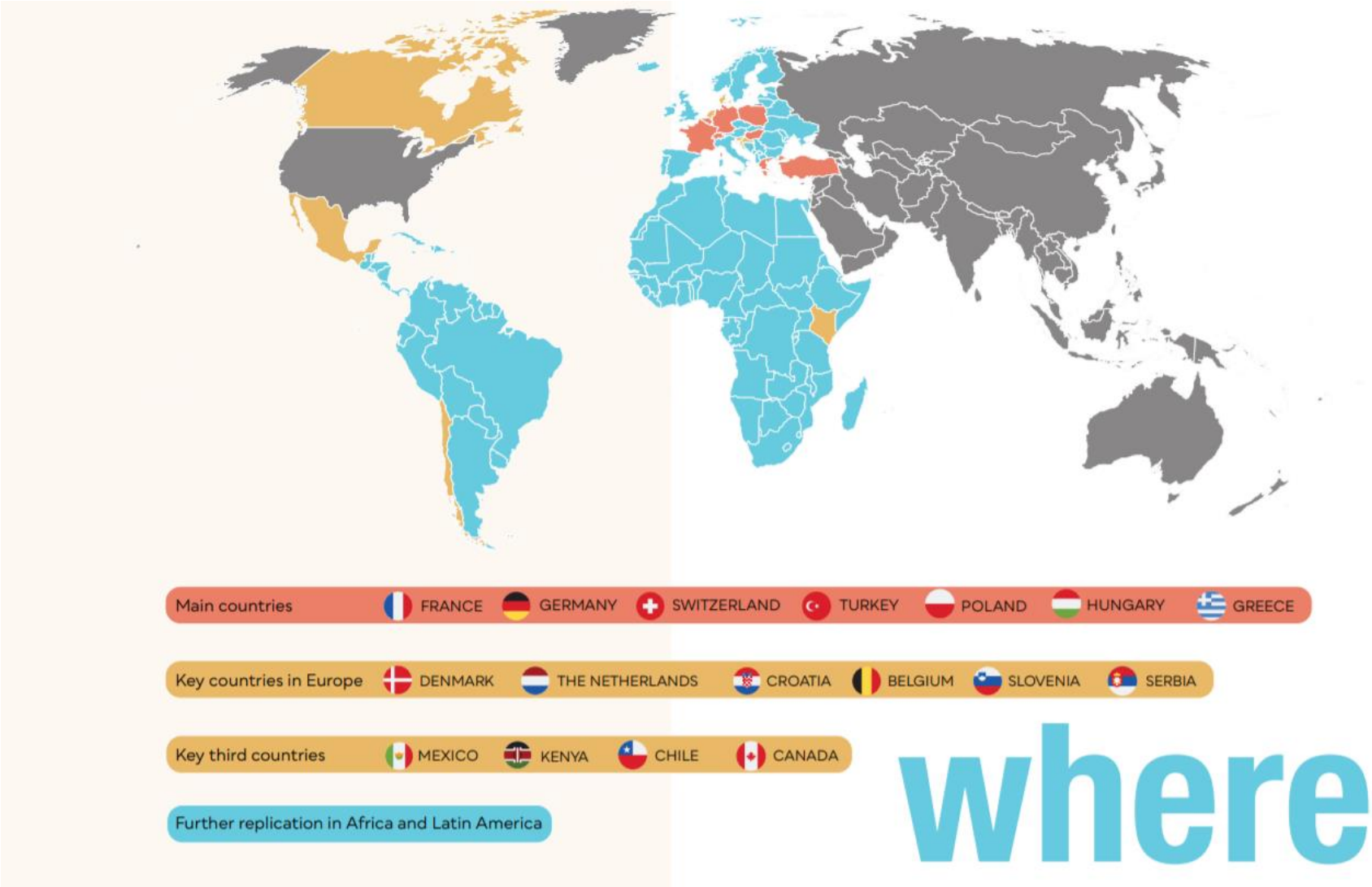
3 / Geographical coverage



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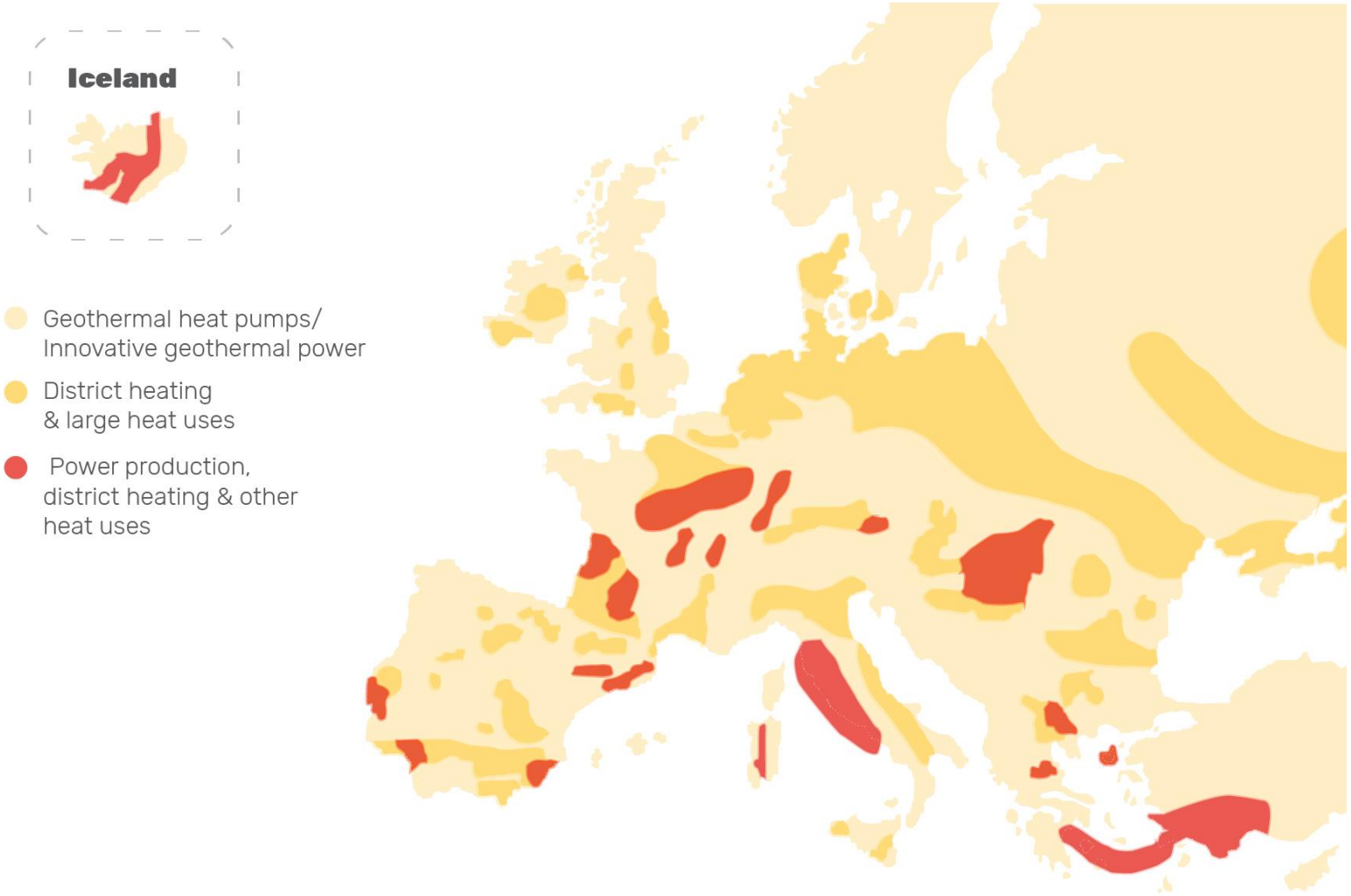
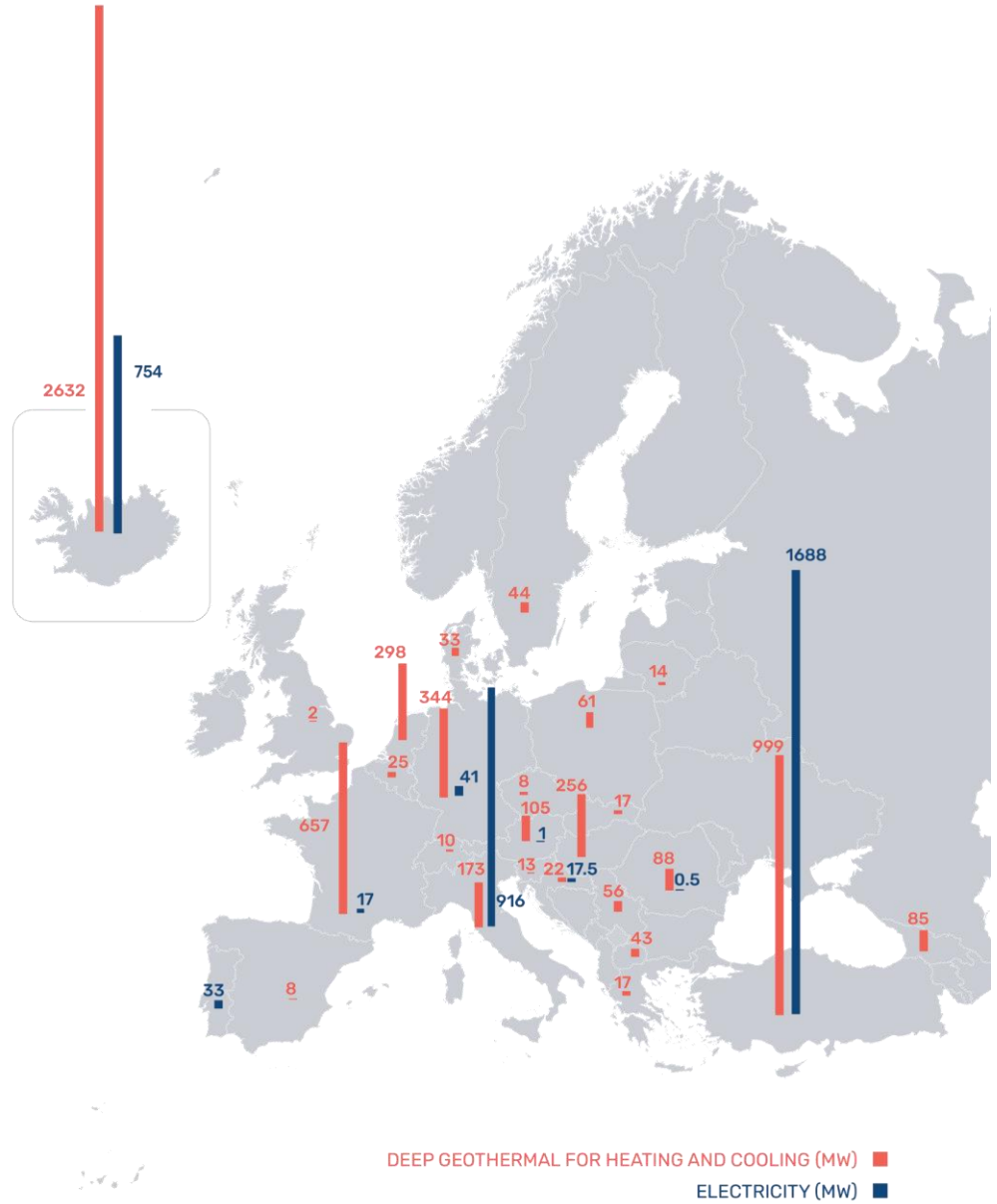
/ Geothermal resources in Europe



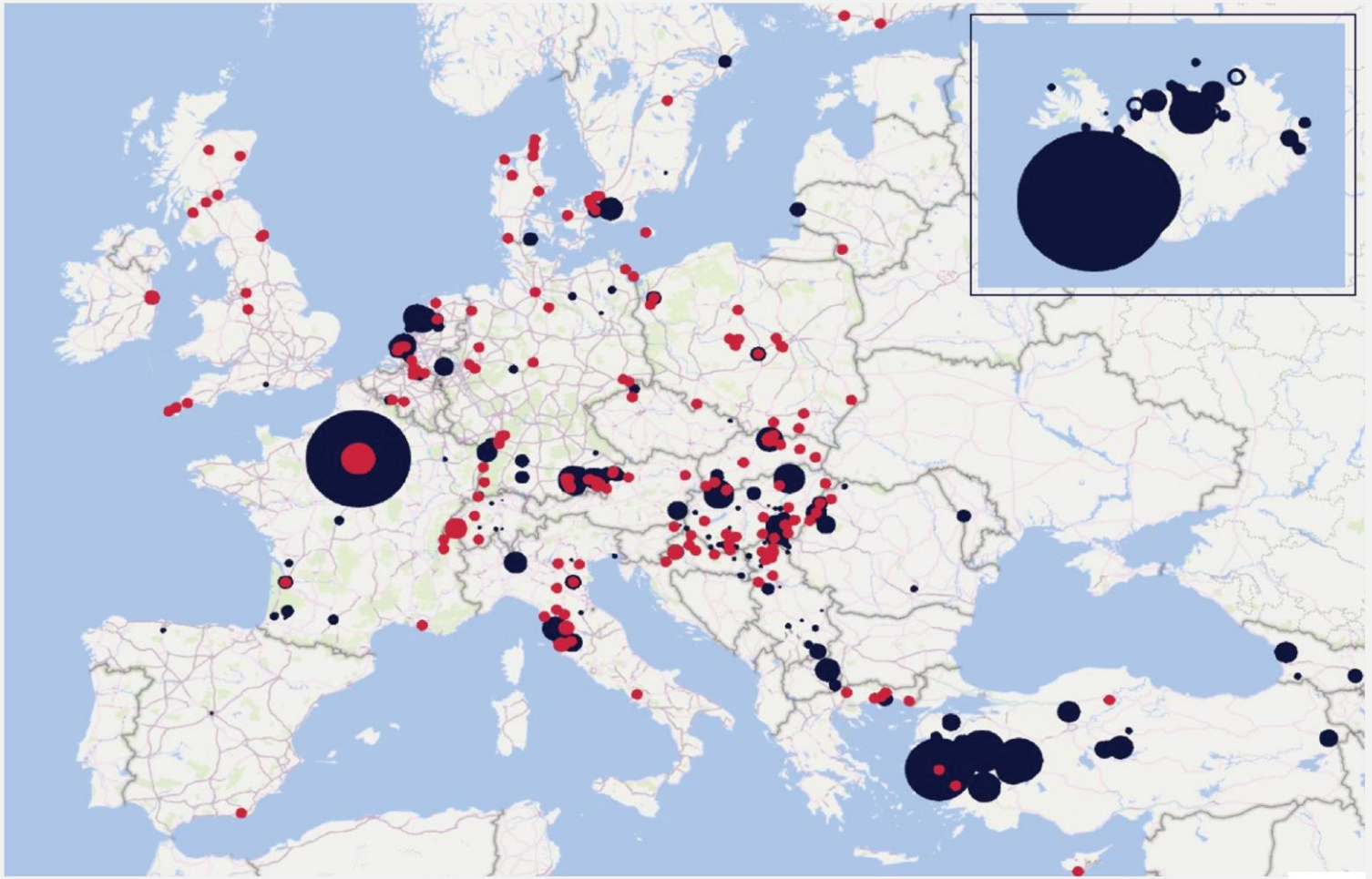
Overview

Some key figures

- 130 Geothermal electricity plant, with sustained deployment driven by the Turkish Market
- The EU passes the 2 GWth threshold for geothermal heating systems (DH,…)
- More than 2 million geothermal heat pumps in Europe at the end of 2020



Location of existing and planned geothermal district heating and cooling



installed geothermal district H&C capacity (MWth)

number of geothermal district H&C projects in development

EGEC GEOTHERMAL

How to deliver this project for **#Geothermal decade**

With de-risking schemes

EGEC GEOTHERMAL

RISK ASSESSMENT

1) Context and Identification of potential risks (BRGM)

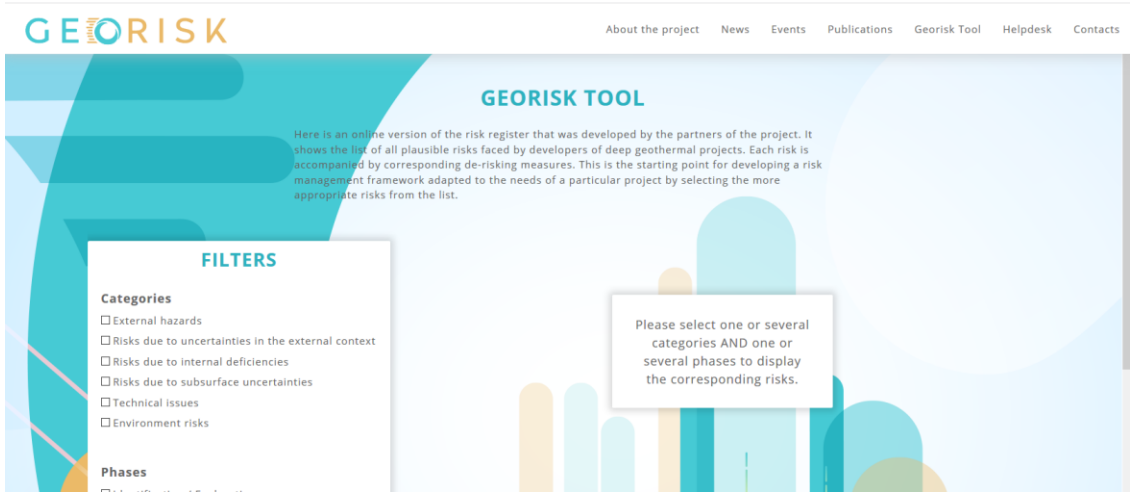
Geothermal Risks register, a workshop organised in each country > Done

2) Risk Assessment (GEC-CO)

Geothermal Risk Matrix > Done

3) Tools to assess the risks (BRGM)

GEOriskREPORT: Online tool for developers > Online



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FILTERS

Categories

- ☐ External hazards
- ☐ Risks due to uncertainties in the external context
- ☐ Risks due to internal deficiencies
- ☑ Risks due to subsurface uncertainties
- ☐ Technical issues
- ☐ Environment risks

Phases

- ☑ Identification / Exploration
- ☑ Drilling / Testing
- ☑ Exploitation / Development
- ☑ Post-closure

For more details, click here

Category	Id	Phases				Description
		IE	DT	ED	PC	
Risks due to subsurface uncertainties	D-1		✓			Flow rate lower than expected (reservoir)
	D-2			✓		Flow rate degrades over time
	D-3		✓			Temperature lower than expected (reservoir)
	D-4			✓		Temperature degrades too quickly
	D-5		✓			Pressure lower/higher than expected
	D-6			✓		Pressure is changing during the operation in an unexpected way
	D-7		✓	✓	✓	Fluid chemistry/ gas content / physical properties are different from expected
	D-8			✓		Fluid chemistry/ gas content / physical properties change
	D-9		✓			Target formation is missing in the well
	D-10		✓			Target formation has no/insufficient fluid for commercial production
	D-11		✓			Geological lithology or stratigraphy is different than expected
	D-12		✓	✓	✓	Excessive scaling in the geothermal loop
	D-13		✓	✓	✓	Excessive corrosion in the geothermal loop
	D-14			✓		Particle production ("sanding")
	D-15			✓		Hydraulic connectivity between wells is insufficient for commercial use
	D-16		✓	✓		Re-injection of the fluid is more difficult than expected
	D-17			✓		Degradation of the reservoir (structure, properties, deteriorating whole-scale further commercial utilization)

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RISK MITIGATION TOOLS

1) Existing and innovative financial tools: public and private (GEODEEP)

comparison of the Risk Mitigation Systems > Published

2) Framework conditions for establishment a new insurance scheme (SFOE)

> published as a Key deliverable

3) Conditions for a transition in the insurance schemes, according to market maturity (GEC-CO) > published

4) Helpdesk for establishing an insurance scheme (EGEC)

- For public authorities > published

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Level of risk and market maturity

Risk Mitigation Schemes

I. Grants

II. Repayable grants

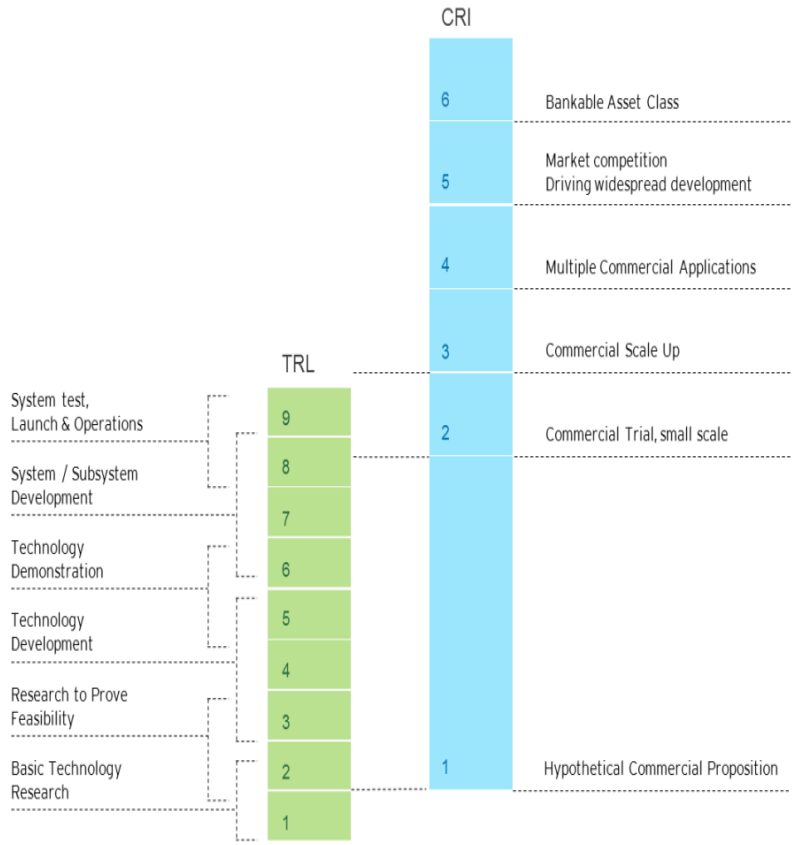
III. Convertible grants

IV. Public insurance scheme

V. Public-Private-Partnership

VI. Private risk Insurance

Commercial readiness index



Technological readiness level

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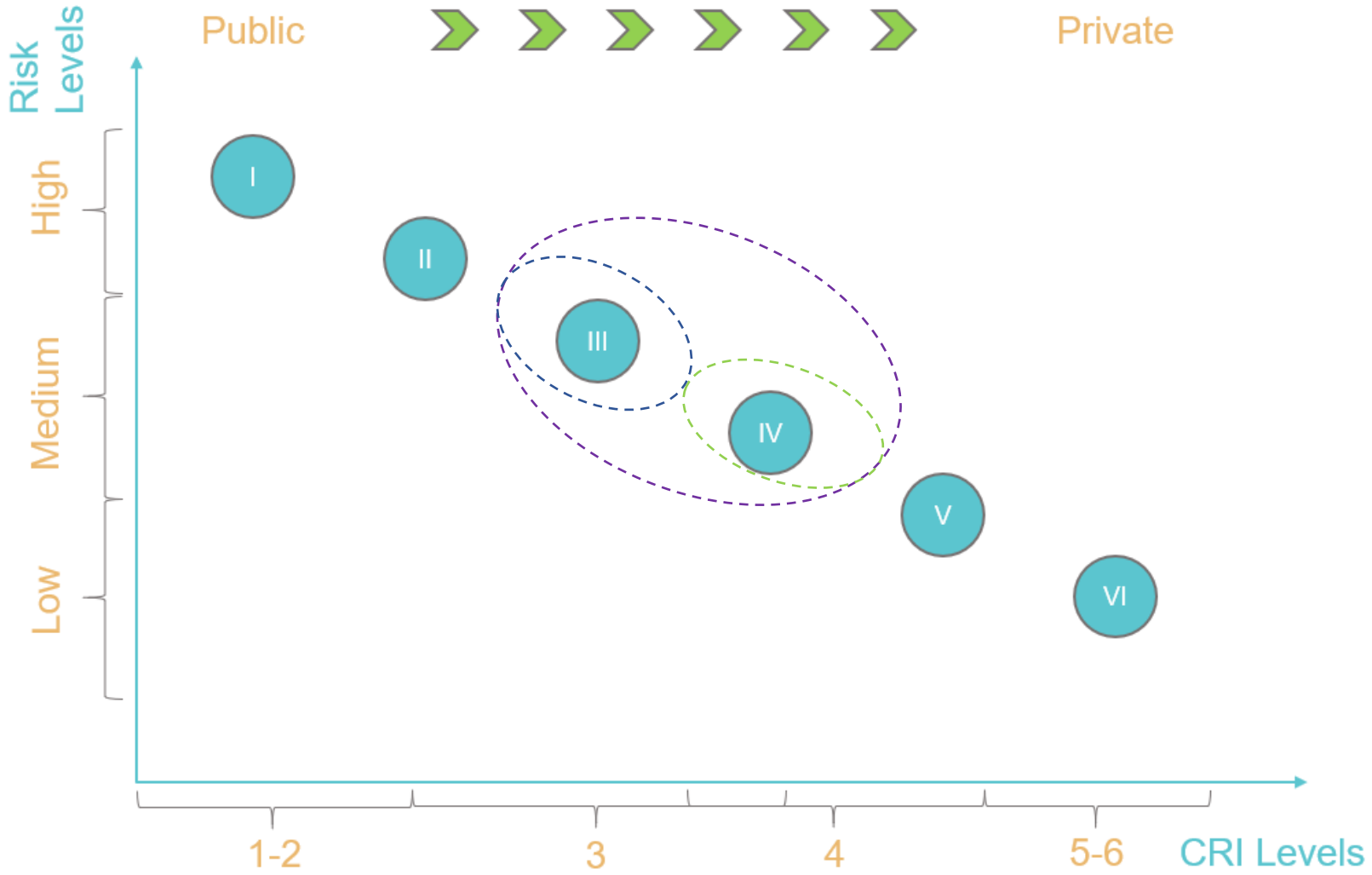

Risk Mitigation Schemes

I. Grants

II. Repayable grants

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IV. Public insurance scheme

V. Public-Private Partnership

VI. Private risk Insurance

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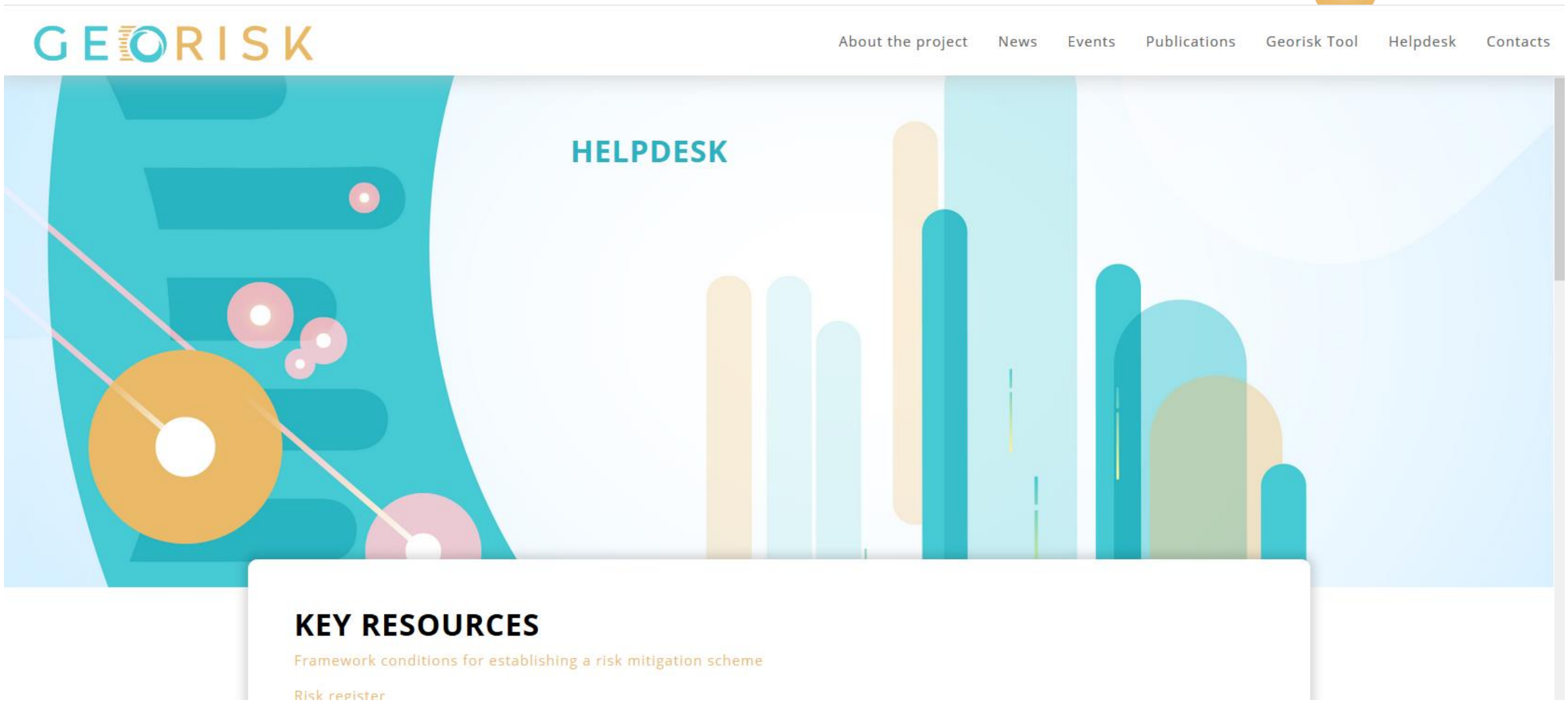
THE HELPDESK



WP 4: ESTABLISH sustainable RISK MITIGATION SCHEMES IN TARGET COUNTRIES

Hungary-Poland-Greece

France-Germany-Switzerland-Turkey

1) Create relationship with decision makers (IGSMiE PAN) (10-24) > ongoing

2) Support establishment of insurance scheme in target countries (CRES) (months 10-20) > ongoing

3) Assess its establishment, adopt corrective measures (Geoex) (months 18-24) > ongoing

A 10 years operation simulation of the financial model

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NEW RECAST OF THE RES Directive (2021)

‘4. To achieve the average annual increase referred to in paragraph 1, first subparagraph, Member States may implement one or more of the following measures:

(a) physical incorporation of renewable energy or waste heat and cold in the energy sources and fuels supplied for heating and cooling;

(b) installation of highly efficient renewable heating and cooling systems in buildings, or use of renewable energy or waste heat and cold in industrial heating and cooling processes;

(c) measures covered by tradable certificates proving compliance with the obligation laid down in paragraph 1, first subparagraph, through support to installation measures under point (b) of this paragraph, carried out by another economic operator such as an independent renewable technology installer or an energy service company providing renewable installation services;

(d) capacity building for national and local authorities to plan and implement renewable projects and infrastructures;

(e) creation of risk mitigation frameworks to reduce the cost of capital for renewable heat and cooling projects;

(f) promotion of heat purchase agreements for corporate and collective small consumers;

(g) planned replacement schemes of fossil heating systems or fossil phase-out schemes with milestones;

(h) renewable heat planning, encompassing cooling, requirements at local and regional level;

(i) other policy measures, with an equivalent effect, including fiscal measures, support schemes or other financial incentives.

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10 year simulation tool

GeoRisk Project, Premises

Premises
Suppositions
Insurance premium, % of the contracted cost
Risk cover, % of the contracted cost
Estimated success rate, % successful/unsuccessful cases
Costs
Total overhead costs, thousand €/year
Expert cost, thousand €/year
Risk covered (payment), thousand €/year
Project insured cost, thousand €/year
Insured cost of one average project, thousand €/year
Risk cover of one average project, thousand €/year
Insurance premium of one average project, thousand €/
Scheme launching amount, thousand €

Sheet No.	Title	Objective
1	Table of contents	Objective of the whole symulation: Calculating of the 10years cash-flow of the RMS, with estimating realistic projects, scheme operation and costs. Proving that the scheme is sustainable.
2	Premises	Collecting of realistic premises of the Scheme.
3	Operating chart	Illustrate the Risk Mitigation Scheme
4	Description of the Projects	Presentation of the Projects included into the Scheme.
5	10 years operating description	Descrition of the events of the projects as well as of the cash flow in every quarter
6	10 years cash-flow	Table and graphs of the cash-flow of the Scheme in the following 10 years.

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A 10 years operation simulation of the financial model

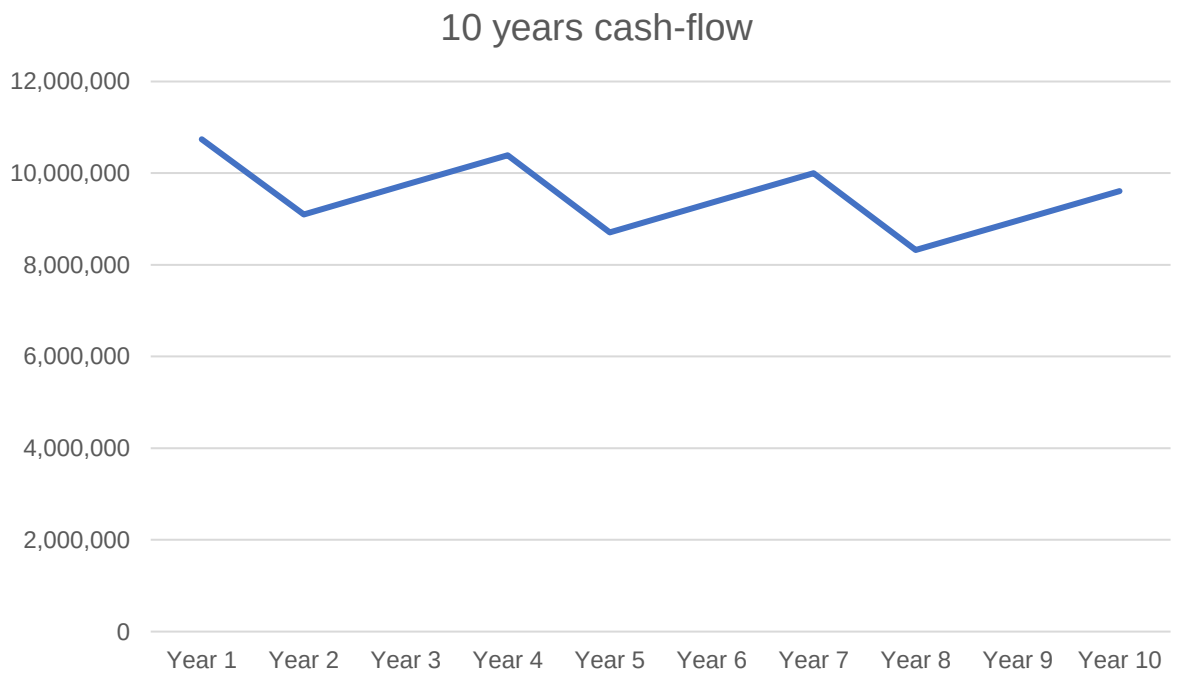
Operating simulation: analyses and further calculations in the three focus countries

Ten years operating symulation of the planned Hungarian Geothermal Risk Mitigation Scheme

10 years cash-flow

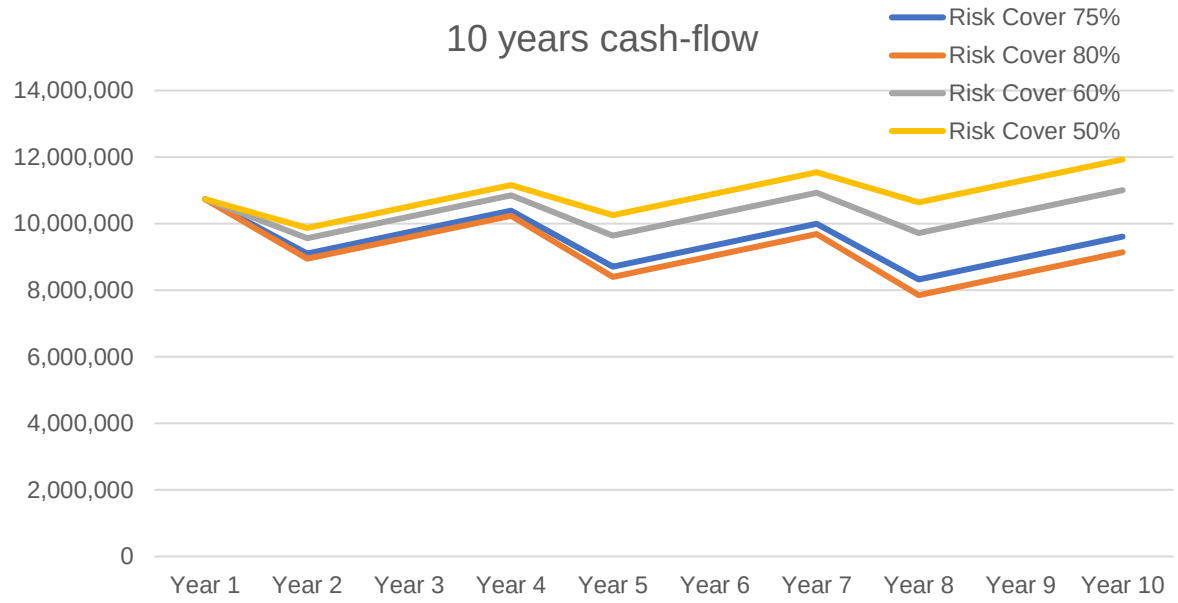
BASE calculation

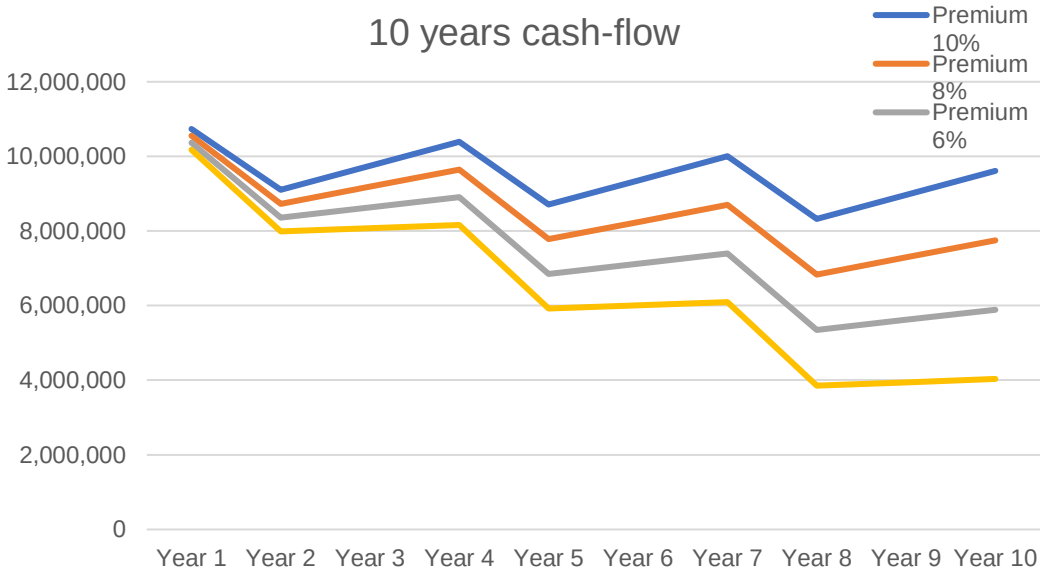
Total Assets	at the end of year, €
Year 1	10.735.000
Year 2	9.100.000
Year 3	9.745.000
Year 4	10.390.000
Year 5	8.710.000
Year 6	9.355.000
Year 7	10.000.000
Year 8	8.320.000
Year 9	8.965.000
Year 10	9.610.000

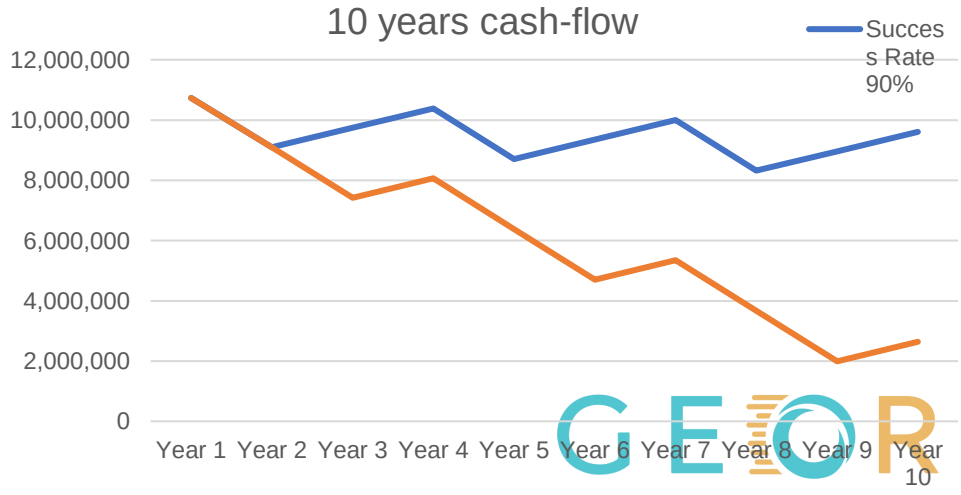


A 10 years operation simulation of the financial model

Premium, Risk Cover and Success Rate analysis with the Hungarian premises







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WP 5: REPLICATION AND PROMOTION IN EUROPE & GLOBALLY

- Countries to target in WP5 are
- in Europe (Denmark, Netherlands, Belgium, Croatia, Serbia, Slovenia)
- and outside (Chile, Kenya, Canada & Mexico).

- A regional, Pannonian Basin geo-risk insurance scheme is to be evaluated in WP5

> ongoing

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WP 5: REPLICATION AND PROMOTION IN EUROPE & GLOBALLY

Adapt tools, set framework conditions (GEODEEP) > ongoing

Create liaison with decision makers and international & national stakeholders, present tools (CRES)

one-to-one interviews, webinars, > ongoing

3) Capacity building (TBK)

Organise one workshop in each third countries > ongoing

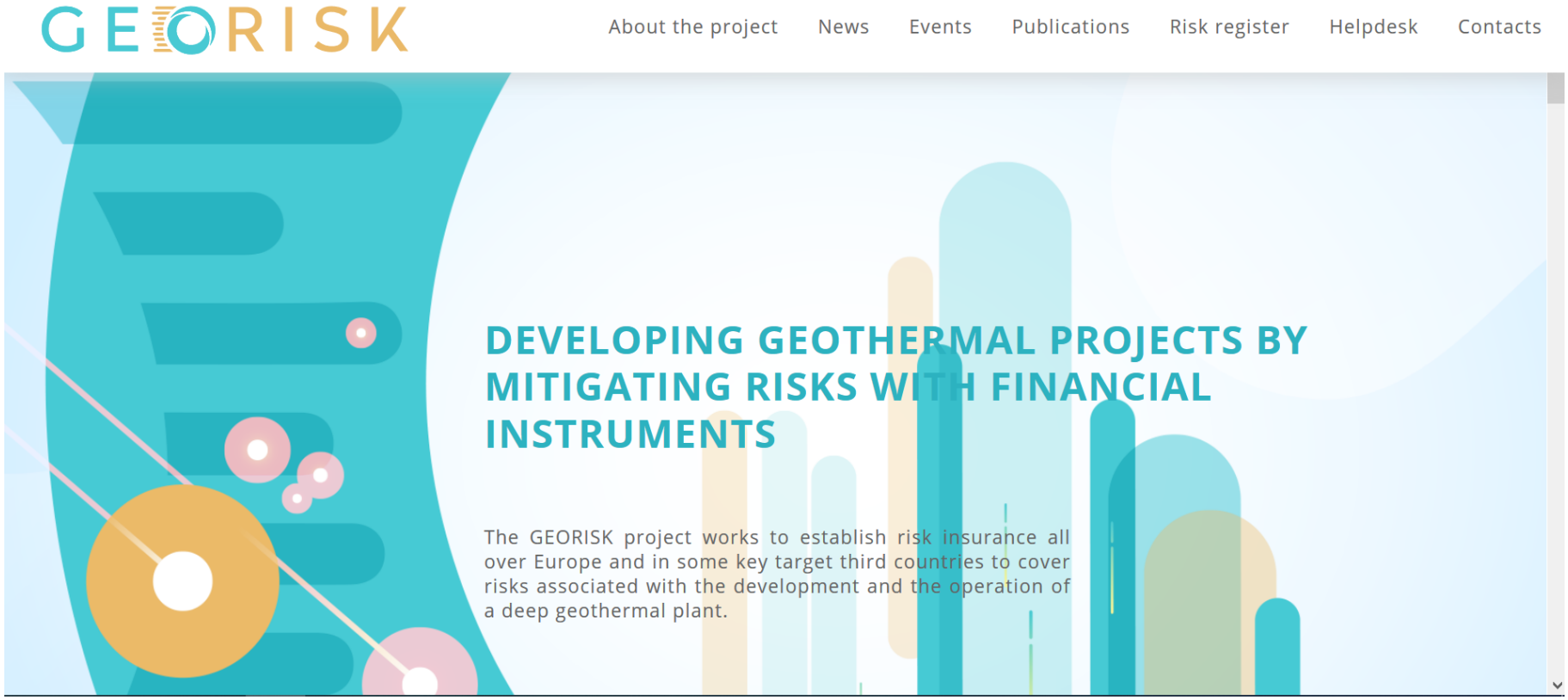
WP 5: COMMUNICATION

Publications: Reports, Brochures..

Website

Media campaign

Events



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