GLOBAL GEOTHERMAL ALLIANCE

IRENA
International Renewable Energy Agency

Global Geothermal Alliance: Updates on activities in 2019

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10 th session IRENA Assembly, 12 January 2020

Outline

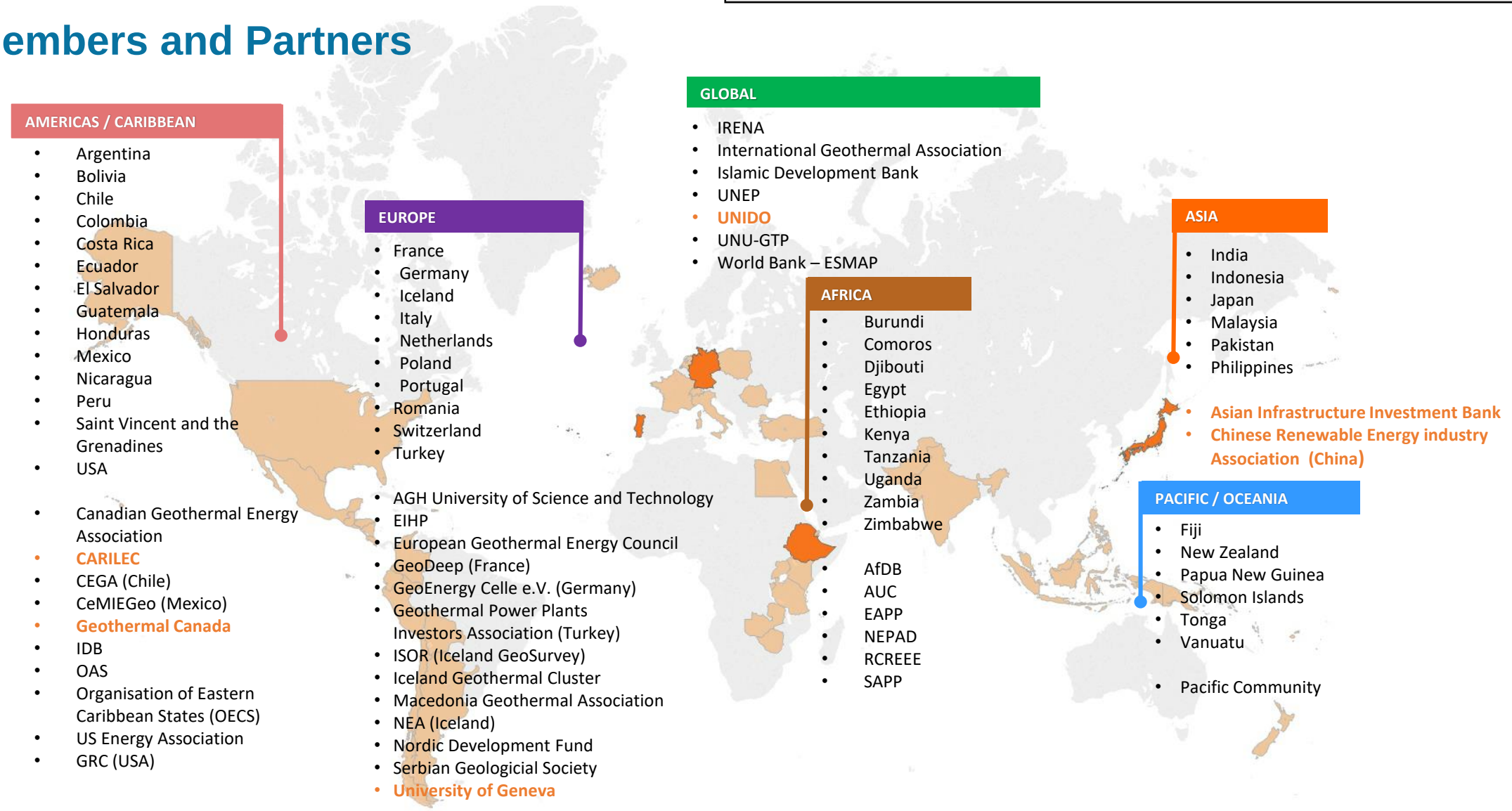
- ❑ **Introduction and updates**
- ❑ **Regional Engagement – Latin America and East Africa**
- ❑ **District Heating and Cooling – Capacity Building**
- ❑ **Geothermal Resource Assessment/Classification - UNFC**

46 COUNTRIES AND **39** PARTNER INSTITUTIONS ACROSS THE GLOBE

GLOBAL GEOTHERMAL ALLIANCE

Multi-stakeholder global platform for enhanced dialogue, cooperation and coordinated action to strengthen enabling frameworks and facilitate international outreach for geothermal energy (launched at COP 21)

Members and Partners



AMERICAS / CARIBBEAN

- Argentina
- Bolivia
- Chile
- Colombia
- Costa Rica
- Ecuador
- El Salvador
- Guatemala
- Honduras
- Mexico
- Nicaragua
- Peru
- Saint Vincent and the Grenadines
- USA

- Canadian Geothermal Energy Association
- **CARILEC**
- CEGA (Chile)
- CeMIEGeo (Mexico)
- **Geothermal Canada**
- IDB
- OAS
- Organisation of Eastern Caribbean States (OECS)
- US Energy Association
- GRC (USA)

EUROPE

- France
- Germany
- Iceland
- Italy
- Netherlands
- Poland
- Portugal
- Romania
- Switzerland
- Turkey

- AGH University of Science and Technology
- EIHP
- European Geothermal Energy Council
- GeoDeep (France)
- GeoEnergy Celle e.V. (Germany)
- Geothermal Power Plants Investors Association (Turkey)
- ISOR (Iceland GeoSurvey)
- Iceland Geothermal Cluster
- Macedonia Geothermal Association
- NEA (Iceland)
- Nordic Development Fund
- Serbian Geologicial Society
- **University of Geneva**

GLOBAL

- IRENA
- International Geothermal Association
- Islamic Development Bank
- UNEP
- **UNIDO**
- UNU-GTP
- World Bank – ESMAP

AFRICA

- Burundi
- Comoros
- Djibouti
- Egypt
- Ethiopia
- Kenya
- Tanzania
- Uganda
- Zambia
- Zimbabwe

- AfDB
- AUC
- EAPP
- NEPAD
- RCREEE
- SAPP

ASIA

- India
- Indonesia
- Japan
- Malaysia
- Pakistan
- Philippines

- **Asian Infrastructure Investment Bank**
- **Chinese Renewable Energy industry Association (China)**

PACIFIC / OCEANIA

- Fiji
- New Zealand
- Papua New Guinea
- Solomon Islands
- Tonga
- Vanuatu

- Pacific Community

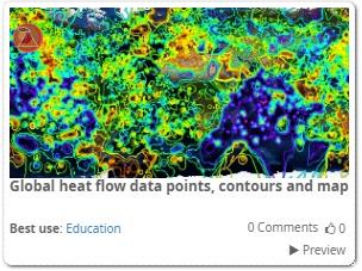
In orange: Partners joining in 2019

GGA Action Plan - Priority Action Areas

1. Resource and Market Assessment

Identify and map:

- Resource potential
- Existing and potential geothermal market status and near term projects in the pipeline



2. Needs and Obstacles Assessment

Scope the needs for assistance with focus on:

- Countries with transformative potential, including, where pilot projects have been identified
- Removal of obstacles of policy, regulatory, funding or capacity building nature

3. Enabling Frameworks

- Assist with the creation of enabling frameworks
- Enhance awareness on and improve risk mitigation mechanisms
- Facilitate access to financing & risk mitigation instruments and support project development tools
- Regional and thematic capacity building

4. Networking and Outreach

- Establish a global network of geothermal practitioners building upon existing networks
- Promote geothermal energy's key role in supporting decarbonisation strategies and support implementation of NDCs

Source: OECS

Website as Knowledge Sharing Platform

New sections:

- International frameworks for resource assessment
- International training centres
- Regions Profiles

Upcoming:

- Country profiles
- Policy and financing

Upgrading the website as Knowledge Sharing Platform to facilitate insight sharing and tools

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Regional engagement in Latin America

Launch of Regional Action Plan for Latin America – January 2019

- High-level meeting at the 9° Session of IRENA Assembly
- Geothermal development is one of the priorities

Renewables Readiness Assessment for El Salvador (on-going)

- Assessment suitability deployment of RE
- Improving framework for implementing new projects (tendering process, PPAs, etc.)
- Developing a dedicated framework for small-scale and direct use projects

Bolivia: Presenting key lessons and recommendations for geothermal heat applications in the agri-food sector

- ROSE Workshop (Design of action plan for monitoring SGD 7 - Bolivia, June 2019
- Exploring utilisation of geothermal resources in remote areas

Engagement with SICA and other partners in Central America

- Observer in the Geothermal Development programme implemented by GiZ in the framework of SICA

Pre-COP 15 in Costa Rica

- Regional Workshop on Energy Transformation in Central America
- Exchanging lessons learned and best practices in the development and implementation of decarbonisation strategies

Next Steps

- Capacity Building on Geothermal energy for agri-food applications (2020)

Regional engagement in Eastern Africa

Market Assessment Report for Geothermal Electricity and Direct Use in Eastern Africa

Objectives:

- Provide an updated status of the geothermal market
- Identify bottlenecks and provide recommendations
- Provide indications on further action by IRENA and partners

Outcome Regional Workshop on Geothermal Financing and Risk Mitigation in Africa (2018)

- Around 100 delegates: Burundi, Comoros, Djibouti, Egypt, Ethiopia, Kenya, Uganda, the United Republic of Tanzania, and Zambia

Inclusive consultative process

Tailored questionnaires (Summer 2019)

- Energy ministries and geological surveys, IPPs active in the region, IPPs not active in the region, Public geothermal developers, Development partners, non-Energy entities

Consultation with key partners and stakeholders on preliminary results (Oct. 2019)

- AUC, energy ministries, UNEP, IPPs, geothermal developers, non-energy entities, development partners, geothermal experts

Next steps

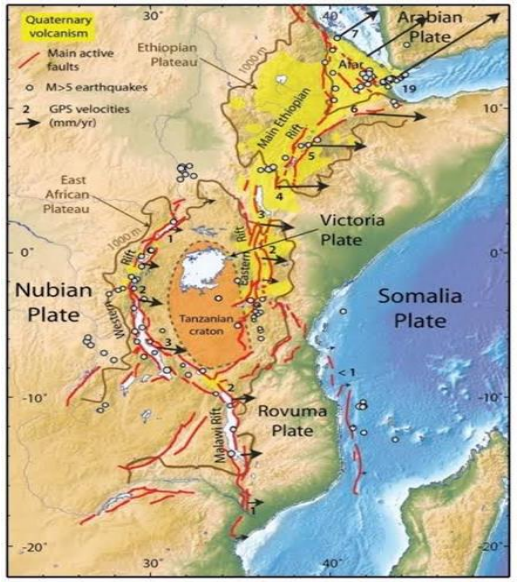
- Final round of review and publication (Q1 2020)
- Indications for further engagement

Regional engagement in Eastern Africa

Status of Geothermal Development in Eastern Africa

	Surface studies	Exploration & appraisal drilling	Feasibility study	Under construction	Installed (MWe)	Commercial Direct Use
Comoros	X					
Djibouti	X	X				
DRC	X					
Ethiopia	X	X	X		8.5MWe	
Kenya	X	X	X	X	878 Mwe	22.4MWt
Rwanda	X	X				
Tanzania	X					
Uganda	X					
Zambia	X					

Most projects in the region are at surface study or exploration drilling phase – except in Kenya and Ethiopia



Source: (Calais, 2016)

- The Eastern and western branches of EARS host different type of resource
- Only few countries have large geothermal potential for power
- High salinity in some geothermal fields
- Challenging access to finance

Emerging issues

- Electricity overcapacity in Kenya
- Grid interconnectivity

Regional engagement in Eastern Africa

Enabling frameworks and financing

Policy, Legal and regulatory framework

- Kenya and Ethiopia have dedicated geothermal licensing procedures
- Only Ethiopia has dedicated licensing procedures for direct use
- Mining laws are used for licensing geothermal resources in some countries
- Comoros, Djibouti, Tanzania and Uganda are in the process of developing legal frameworks
- PPA can unlock investment in absence of adequate enabling laws
  e.g. in Ethiopia

Financing and Development Models

- Govts playing a leading role to financing, esp. the high risk early stage development
- Public funds, private equity, GRMF and other TA grants have contributed to some progress
- The private sector is becoming more active but some companies struggle to progress

How could the gap be filled?

- Equity funding (Infraco Africa)
- Green bonds (Kenya)
- Well-productivity insurance (Geo-Futures facility)?
- Improving policy framework?
- Strenghteining capacities of local institutions and project facilitation for private sector?

With improved enabling frameworks, the private sector is willing to participate more

Regional engagement in Eastern Africa

Enabling Uptake of Direct Use


Seventh African Rift Geothermal Conference (AGeo-C7)
Kigali, Rwanda
31 October- 2 November 2018

KIGALI Statement of the Conference

Mainstreaming Direct use in Geothermal Development in Africa

ARGeo-C7 17 Conference Report

Direct use can support to address socio-economic needs of societies, but require dedicated strategies

Key factors

- **Dedicated enabling frameworks**
  - Policies, roadmaps, licensing
- **Financing**
  - co-location with power plants
  - Demonstrate financial viability
  - Dedicated Financing mechanisms
- **Awareness Creation**
  - methodologies to measure impact (FAO), feasibility studies, effective stakeholder engagement
- **Coordination of** development activities and energy and non-energy stakeholders
- **Alignment with other development goals**
  - Industrial development, rural development
- **Shallow geothermal resources have lower costs and risks**

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Integration of low-temperature RE in district energy

Main Drivers

- Reducing air pollution
- Increasing concerns on security of supply
- Decarbonisation objectives for the heating sector

Main Enablers

- Improved EE in buildings, requiring lower temperature heating systems
- Increased efficiency of heat pumps, enabling harnessing of low-T resources at shallow depths
- Development of new generation district heating, allowing integration of low-grade geothermal and other RE sources

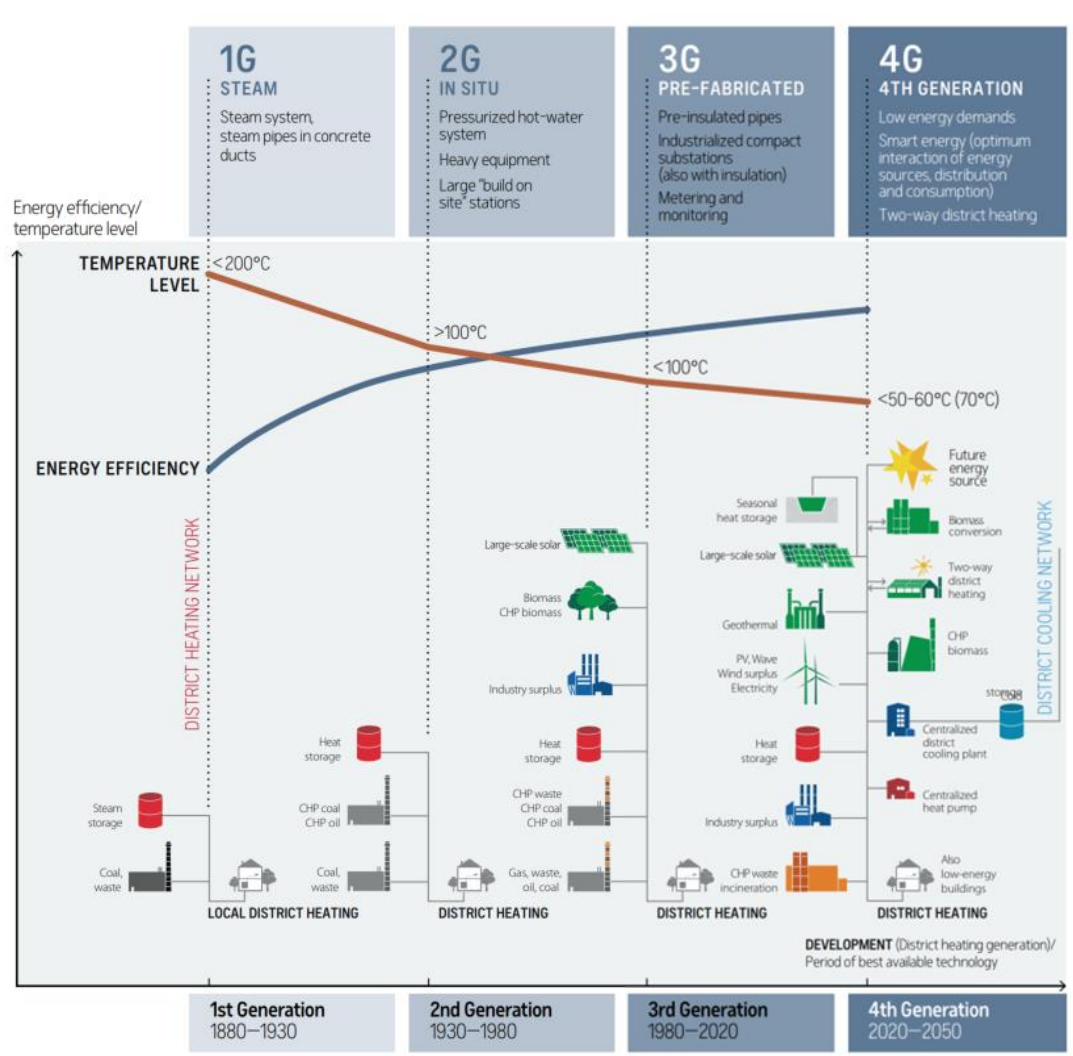
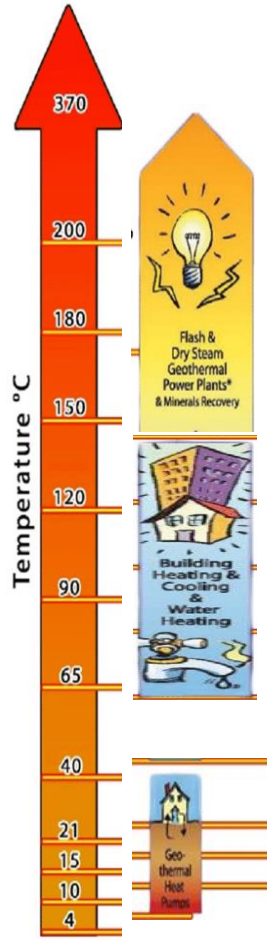


Illustration of the concept of 4th Generation District Heating in comparison to the previous three generations. *Source: Lund et al. (2014)*



Simplified Lindal Diagram

Capacity building to facilitate the integration of low-temperature RE in district energy

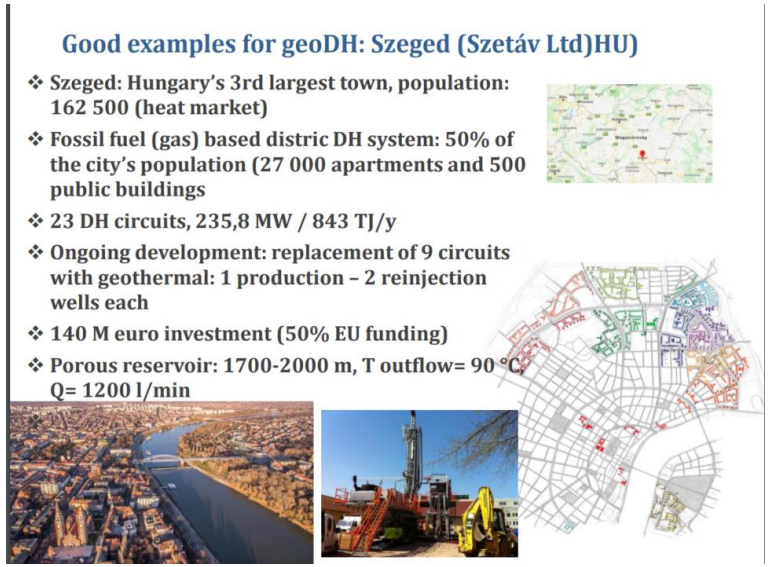
Increasing knowledge to address key challenges

- Capacity building in the framework of the 50th International HVAC&R Congress – Belgrade, December 2019 – organised by IRENA in partnership with EBRD

- Target audience: policy makers at national and local level, city planners, district energy providers from 6 countries: Belarus, BiH, Hungary, North Macedonia, Serbia, Ukraine

Credits: Milica Knežević for SMEITS©2019

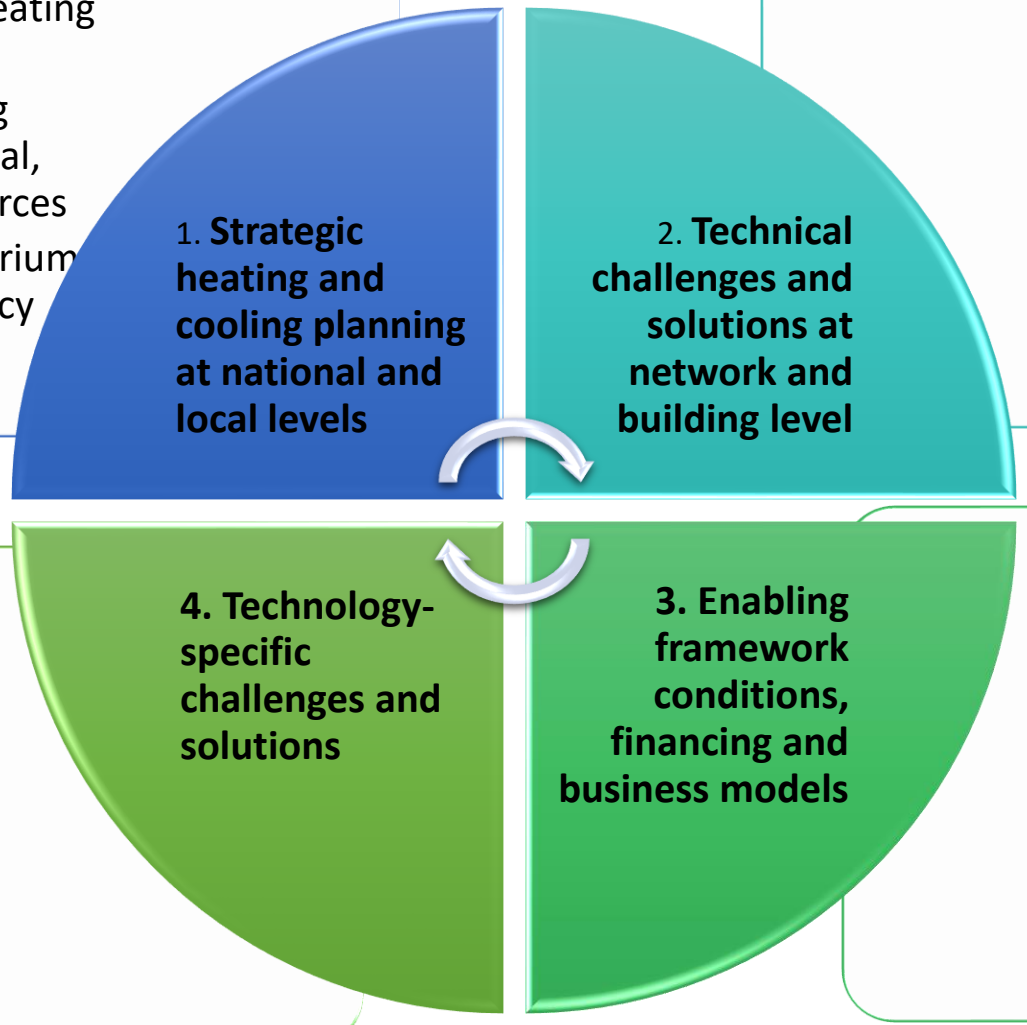
Credits: Milica Knežević for SMEITS©2019



Capacity building to facilitate the integration of low-temperature RE in district energy

Focus areas

- Identification and coordination of stakeholders
- Assessing demand for heating and cooling
- Identifying and assessing geothermal, solar thermal, and other local heat sources
- Define optimum equilibrium between energy efficiency and supply



- Assess compatibility with existing network
- Assess compatibility with existing building systems
- Define and implement integrated building renovation strategies and modernisation/fuel switch

- Ownership structure
- Regulations
- Financing and risk mitigation

- Solar thermal solutions
- Geothermal solutions
- Project facilitation

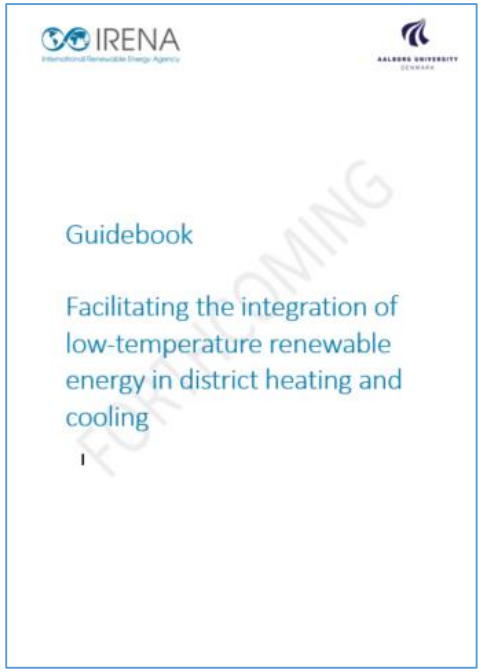
Next steps: Guidebook for policy-makers and Capacity Building in China

- IRENA in collaboration with Aalborg University is developing a guidebook for policy makers “Facilitating the integration of low-temperature RE sources in district heating and cooling”

- Objective: to increase the knowledge of policy makers on the available tools and options for integrating low-temp. RE into district heating and cooling networks

- IRENA set up an advisory **Practitioners’ Group** with experts from members and partners of **Global Geothermal Alliance** and district energy sector
  - ❑ Government ministries and departments: France, Portugal, United States, NEA (Iceland), AEDB (Pakistan),Geological Survey of Hungary
  - ❑ Multilateral development banks: EBRD, IDB, World Bank/ESMAP
  - ❑ Industry: Arctic Green Energy, CREIA (China), Geothermal Canada,, Iceland Geothermal, International Geothermal Association, Enova (BiH)
  - ❑ Academia and research institutions: DTU, Yasar Uni.- Turkey, Hamstad, RISE-Sweden Hamburg-Germany, University of Geneva.

- Online consultation meeting held in Oct 2019



Next Steps

- Capacity building activity in China (2020) with focus on geothermal energy
- Webinar open to all

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Promoting international standards for resource classification- joint pilot project

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THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

IGA INTERNATIONAL GEOTHERMAL ASSOCIATION

Objectives:

- Promote application of the specifications of UNFC-2009 to Geothermal Energy Resources
- Ensure uniformity with specifications applicable to other resources,
- Improve the way information on geothermal resources is communicated to investors, regulators, governments, etc.

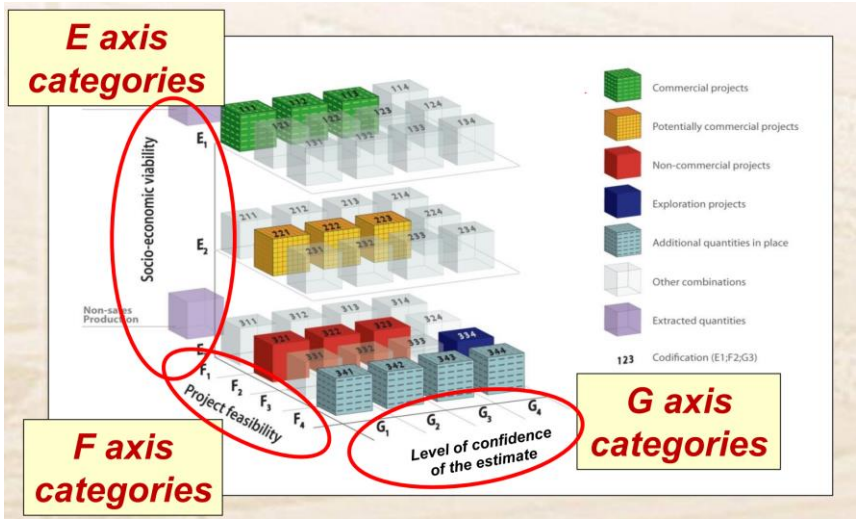
Capacity building: Introduction to the UNFC geothermal specifications and pilot the application in selected fields

Map subsurface temperature profiles and estimated potential

Pilot countries/regions: Indonesia, Eastern Caribbean, Ethiopia

Resource classification technical session
St. Lucia, 5-7 December 2018 ***(Source: OECS)***

Resource classification technical session.
Ethiopia, 5-7 February 2019 ***(Source: IRENA)***



Source: IGA/UNECE

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THANK YOU

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