### **Minutes of the 43rd Executive Committee Meeting**

IEA Geothermal Implementing Agreement

Web conference meeting

20th - 21st April 2020

# 20th April 2020 9.00am (British Summer Time)

## Welcome

Lothar Wissing (Chair) welcomed participants to the video conference meeting.

Members

Betina Bendall – Alternate Australia

Matthijs Soede – Member European Commission

Christian Boissavy – Alternate France

Lothar Wissing - Member Germany

Manuela Richter - Alternate Germany

Kasumi Yasukawa - Member Japan

Chris Bromley - Member New Zealand

Jiri Muller - Member Norway

Christian Minnig - Alternate Switzerland

Lauren Boyd - Member United States of America

Amal Mansor -Member UK

Jonathan Busby Alternate UK

Sara Montomoli – member Italy

Virginie Schmidle-Bloch Member France

Observers

Katharina Link (Leader WG 8), Brian Carey (Executive Secretary), Jan Carey (Secretary assistant) and Hideki Kamitatara

Apologies

Gudni Axelsson – Alternate Iceland

Yoonho Song – Member Republic of Korea

Tae Jong Lee – Alternate Republic of Korea

Carsten Sørlie – Alternate Norway

Gunter Siddiqi – Member Switzerland

**Proxy Voting** – Yoonho Song Member for Republic of Korea advised proxy by email 16/04/20.

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## Actions arising from the 42nd ExCo Meeting and previous meetings.

Actions tabulated below remain to be completed all others have been completed.

|  |  |  |
| --- | --- | --- |
| **Action #** | **Description** | **Responsible** |
| 41/1 | Put information out about Working Groups giving opportunities for people to connect. Indicate which tasks we need specific expertise. | Working Group / Task leaders / Exec Sec |
| 41/7 | Executive Secretary and Christian Minnig to work together on progressing the preparation of the innovative geothermal technology ‘yellow pages’. | Christian Minnig and Exec Sec |
| 42/1 | Brian Carey and Christian Minnig to clarify the “yellow pages” concept and customer (Action 41/7). How will they be updated is to be considered. To prepare material on ideas on this for the next ExCo. | Christian Minnig / Exec Sec |
| 42/6 | Executive Secretary to follow up some of the Costa Rica workshop speakers to see their interest in their organizations becoming a network partner. | Exec Secretary |
| 42/7 | All members to collate resources they have that could be part of a resource library | ExCo members / WG Leaders  |

# Relevant ExCo Issues

## 2020 Offenburg Expo and Congress

Congress postponed till February 2021.

North Atlantic Symposium **–** This IEA Geothermal symposium is prepared and is on hold waiting to be delivered at the right time subject to presenters being willing to update materials and present.

## IEA Geothermal Mid Term Report

This [presentation](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2003%2026%20Draft%20Mid%20term%20presentation%20for%20REWP.pdf) has been prepared by the Executive Secretary and is now to be presented to the 78th REWP in September 2020 in Toronto or via videoconference if the meeting is video conference convened.

# IEA Secretariat Report (Hideki Kamitatara)

Hideki Kamitatara presented the [IEA Secretariat report](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20IEA%20Secretariat%20Presentation%20to%2043rd%20ExCo.pdf).

Work in Renewables

Technology Progress and support.

Global Market reports focusing on Distributed PV and Hydropower

Systems Integration with case studies in India, China and Thailand

Publications and Ministerial summits

Ministerial Summits considering clean energy transition, systems integration and bio-futures.

Series of reports e.g. considering reducing emissions and Covid 19 economic impact

Sustainable Development Scenarios.

Geothermal Power generation would need a 10% annual increase to reach the 2030 IEA target. Geothermal Technology is not on track.

Inter TCP webinar

Ten TCPs considered Energy Power system. Two Sessions – Wind / PV at a system level, and Flexibility options (Storage, grid, demand side and production)

REWP 77 - April 2020

This was a webinar meeting which included:

* Renewable Energy Market Report with a focus on Hydropower and the impact of Covid.
* Photovoltaic Power Systems TCP mid-term delivered their report.
* Discussion on collaboration with IRENA.

REWP 78

Geothermal TCP will give their mid-term report in person if travel restrictions allow.

**Discussion**

It was pointed out that IEA Geothermal have a programme of cooperation with IRENA at meetings such as the Geotherm Congress and Expo in Offenburg. IRENA tend to provide more general rather than practical information. Hideki suggested that IEA Geothermal might invite IRENA to some ExCo meetings in the same way as the Wind TCP have. IRENA will be at the 78th REWP meeting in Toronto and there we can discuss further what collaboration might look like for the Geothermal TCP.

# Working Group reports

## WG 1 - Environmental impacts

Chris Bromley presented the [WG 1 report](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20WG1%20Report%20to%2043rd%20ExCo.pdf).

Four tasks continue as part of the working group activity.

Revised target for Book on Environmental and Social Issues is now September 2020 with a focus on getting story / message across rather than presenting just facts. Chris will ask people for written material and reviewing as needed.

Preparing the presentations for the two WG 1 papers for WGC 2020.

Matthijs Soede spoke of a study to be published next month on Geothermal Plant, Application and Emissions, Overview and Analysis.

## WG 8 - Direct Use of Geothermal Energy

The [WG 8 report](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20WG8%20Report%20to%2043rd%20ExCo.pdf) was presented by Katharina Link.

Task A and B - innovative applications and communication

IEA Geothermal Workshop in Canada 2020 (if not cancelled)

IEA Geothermal Workshop on Mine water uses in Glasgow in April 2021

Collection of existing information about direct use and geothermal heat pump applications: factsheets, videos, links to web sites, etc. Collection will be published on our web site.

Concise guideline on how to establish geothermal heat pump systems in a country (based on the Japanese questionnaire and approach which is very useful.)

Task D

Questionnaire and guidelines now used for the IEA Geothermal Trend Report and will be presented at WGC 2020.

Task E – Design and Engineering Standards

The list is to be circulated for updating.

Task F Costs of GSHP systems

Cost data on GSHP and Groundwater systems is being collected. To be worked up into a report with recommendations for action.

Katharina is currently collecting historical Swiss data; finding it difficult to get information about the evolution and the costs over the last 40 years.

Task G “Monitoring of GSHP systems”

Working with the IEA Heat Pump TCP Annex 52 as the opportunity presents.

The IEA ECES TCP has a task on “geothermal de-icing” commencing in 2020.

Three WG8 WGC 2020 papers have been completed.

**Discussion**

Drilling costs can reduce with time as has occurred in Switzerland. Figures are good to show over the longer term, although the costs are different for every country.

Japanese Government questionnaire is valuable and comprehensive in aspects to be considered. Switzerland results can be made available. Kasumi to email the questionnaire to the IEA Geothermal members and alternates.

Katharina Link will leave IEA Geothermal in July as funding has not been able to be secured for her ongoing involvement. Appreciation for her work in leading the Working Group was expressed. Decided to postpone the discussion on WG 8 leadership until later, i.e. the 44th ExCo meeting.

## WG 12 - Deep Roots of Volcanic Geothermal Systems

Chris Bromley presented the [WG 12 report](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20WG12%20Report%20to%2043rd%20ExCo.pdf). The WG seeks to be abreast of the latest activity in this area of geothermal R+D.

Five nations have projects underway. A map of geothermal areas where very hot temperatures have been recorded was presented, along with graphics associated with supercritical resources.

WG 12 WGC 2020 paper reports the key challenges to be addressed for significant advances to occur in supercritical geothermal resource use.

Latest Results from IDDP2 Reykjanes are to be live streamed in a Webinar on Friday 24th April 2020.

NZ has a five-year programme Geothermal the Next Generation funded from the 3rd Quarter 2019. The programme includes laboratory studies on water-rock and other chemical interactions including a sub project on gas emissions reduction. There is a communications task focused on knowledge sharing and information activity seeking to support project acceptance.

WG 12 is considering planning an IEA Geothermal workshop on Deep Roots of Volcanic Geothermal Systems.

## WG 13 - Emerging Geothermal Technologies

Christian Minnig presented the [WG 13 report](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20WG13%20Report%20to%2043rd%20ExCo.pdf), reporting progress and activities proposed for 2020 as best as these are currently known.

**Task A1** – Two play-type workshops were convened during 2019. One focused on conduction dominated play types and the other on convection dominated.

**Task A2** - Tool Market overview published in 2019.

**Task B** – Innovative Geothermal Drilling Technology video prepared and released. During 2020 relevant data continues to be collected with the aim of establishing a well drilling learning curve.

**Task D** Induced Seismicity

Comprehensive reference listings in the 2019 WG 13 Report.

Future activity to include:

WGC 2020 - May 2021

* Presentation of WG 13 Task D Induced Seismicity paper.
* Exchange views between induced seismicity authors (different sessions: geophysics, environment, reservoir management)

Work collaboratively on a summary document to assist developers, policy makers and the general public to make informed opinions about the risks involved.

**Task E** Surface Technologies.

There is a planned workshop in May 2021 in collaboration with ORMAT in Tel Aviv on ORMAT premises. This may be delayed due to COVID19.  Details to be confirmed with an update at the next ExCo.

# Event Planning

## 44th ExCo Video Conference

This is the most likely meeting arrangement due to the expectation that international travel restrictions will remain widespread through to the end of 2020 due to Covid.

The Executive Secretary has discussed this with Steve Grabsy (Alberta Canada).

ExCo decided not to have the Canadian workshop and just hold a video conference for the ExCo and WG meetings.

**Action 43/1** Executive Secretary to contact Steve Grabsy and advise that the meetings and the workshop will not now go ahead in 2020.

## 45th ExCo and Mine Water Geothermal Energy Systems

ExCo and Mine Water Geothermal Energy Symposium 2021.

Edinburgh bookings have been reworked with Dynamic Earth and are now as follows.

13th May 2021 (Thursday) 45th Exco

14th May 2021 Working Group meetings

15th / 16th May 2021 Weekend in Edinburgh

17th May 2021 Mine Water Energy Symposium

18th May 2021 Field trip to Mine water site

## World Geothermal Congress 2020

Now 21st to 26th May 2021 to follow the Edinburgh meetings.

## 46th ExCo – Tel Aviv

Jiri Muller advises the meeting in Tel Aviv (plus workshop) must be postponed either till fall 2021 or spring 2022. Jiri will know more in the September 2020 after he has talked to Ormat and the Research Council of Norway (RCN). The Tel Aviv meetings to be discussed at the 44th ExCo.

# Country Reports

## Italy

Sara Montomoli presented the [Italian Country Report](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20Italy%20Country%20Report.pdf)

2018 and 2017 data are the most up to date and available data.

There has been no change to installed electricity capacity since 2015 when Bagnore 4 commenced operation. During 2018 some drilling for the 20 MWe Monterotondo 2 was undertaken. Direct Use is growing slowly. The areas where this application is economically sustainable are already developed.

Problems and issues are coming from fake news and the 5 star organization who are opposed to geothermal utilization. Questions raised include:

* Is it renewable?
* Is it green and clean?
* Does it really contribute to fighting climate change?

There have been changes to policies relating to Geothermal development. There is an absence of support and as of 4th July 2019 geothermal is not able to benefit from any incentive schemes.

Italy has no experience of CO2 gas reinjection.

Research - CO2 and cooling tower studies

CO2

Studies on natural emissions undertaken by Pisa University

Natural CO2 emission from soil degassing (~500 -700 t/h) is more than one order of magnitude greater than the CO2 emission from geothermal plants (~60 t/h)

CO2 recycling through bio fixing and the creation of chemicals (methanol, ethanol)

* Bio- fixing in the Spirulina Pilot plant – H2S is not an issue in the gas stream to the spirulina facility because it is removed in the AMIS process as part of H2S management at the power plant.

Cooling Tower

Testing of a hybrid cell on a cooling tower at the Nuova San Martino power plant with the objectives of increasing water availability for injection and decreasing water vapour plume visibility were successful.

## New Zealand

Chris Bromley presented the [New Zealand report](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20New%20Zealand%20Country%20Report.pdf).

The presentation updated aspects of electricity and direct geothermal use in New Zealand including a graph of the various energy sources producing electricity along with future projections. Some 17% of New Zealand’s electricity is produced from geothermal. No new geothermal power plants were commissioned during 2019. Direct Use was some 9.7 PJ with half of this used to power Industrial facilities. There are a relatively small number of geothermal heat pumps with the market growing slowly.

Highlights

**Electricity** - Facilities operating at 85-99% capacity; operators adjust injection & production strategy for changes in discharge enthalpy.

Turbine rotors at Nga Awa Purua (132 MWe) and Kawerau (106 MWe) were swapped out.

Ngawha (Top Energy) 31.5 MWe expansion - construction well underway.

Contact Energy has drilling and testing underway for the 1st half of the Tauhara II 250 MW expansion.

Weighted average of NZ geothermal power station CO2 emission factor 76 g/KWhr (was 140 in 1990).

Direct Use

Nationwide Direct Use Action Plan (2018 – 2019) is being implemented.

KA57 a make-up well drilled for NTGA produces the equivalent to ~30 MWe / 250 MWth. Kawerau has been operating for 60 years.

Bay of Plenty Region and Taupo District promoting geothermal business (2019-20).

Some Different Applications

Geo40 silica extraction plant at Ohaaki is operational which also has a research component seeking to extract Lithium.

Tuaropaki Trust & Obayashi Corp JV geothermal powered hydrogen project at Mokai is under construction.

In Taupo Nature’s Flame bio-fuel pellet production capacity doubled with geothermal energy replacing a lower capacity bio-fueled boiler.

At Kawerau the $33M geothermally powered Waiu Dairy milk drying factory commenced operation later in 2019.

Research

The presentation canvassed a number of research activities underway in New Zealand.

## Switzerland

Christian Minnig presented the [Swiss country report](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20Switzerland%20Country%20Report.pdf).

**Thermodrill** project for fast and effective hard rock drilling was completed in 2019.

The **Bedretto Underground laboratory** for geoenergies was opened in May 2019 – many experiments planned.

Current projects at Bedretto

* Demonstration of Soft Stimulation treatments of geothermal reservoirs (<http://www.destress-h2020.eu/home/> )
* ZoDrEx-Zonal Isolation, Drilling and Exploitation of EGS Projects
* Valter-Validating of Technologies for Reservoir Engineering
* MISS -Mitigating Induced Seismicity for Successful Geo-Resources Applications
* FEAR –Fault Activation and Earthquake Rupture

**SWEET** (SWiss Energy research for the Energy Transition) is a new funding program of the Swiss Federal Office of Energy open to Public research institutions collaborating with Swiss institutions, to accelerate innovations to implement Switzerland’s Energy Strategy and achieve the country’s climate policy goals. Energy fund for projects with calls starting in June 2020. Energy transition fund not just for geothermal. Foreign involvement is possible.

Current Geothermal Projects :

* Shallow geothermal projects. The successful smart thermal grids are now economically competitive and are being implemented by private entities.
* Direct use - prospecting for geothermal heat at; Canton of Geneva, Basal project and northern shore of Lake Geneva. Financed up to 60% by Federal funds.
* Bern geothermal heat storage project – using heat from a waste incinerator after heat used in a power turbine. Wells 250-500m depth into sandstone formation (braided river systems). Discharge temperature not known. Regulations are plume heated not more than 3OC 100m downstream of discharge well – apply in aquifers that are used for drinking water supply.
* Exploration drilling northern part of Lake Geneva.
* Others – heat and power AGEPP project and Haute Sorne (EGS).

There are URL links behind the names in the presentation if you wish to obtain further information.

**Green City** (Zurich) a combination of thermal groundwater utilization, 2 borehole heat exchanger fields. Heating & cooling and heat pumps run from PV generated electricity.

**Geothermie2020** Canton of Geneva – active programme being a long term coordinated, systematic exploration and geothermal energy utilization programme. Successful 744m well at Satigny, producing 50 l/sec 33 oC fluid. Second well to 1300m is to be drilled. Testing of various structural settings is a part of the work.

## UK

Jonathan Busby presented the [UK country](file:///%5C%5Cwai-win-smb%5Cshared%24%5CIEA-GIA%5CMinutes%20of%20ExCo%20Meetings%5C43rd%20Meeting%5CSupporting%20Documents%5C2020%2004%2020%20UK%20Country%20Report.pdf) report.

No operational electricity developments currently but there are two interesting opportunities for EGS power from granite structures that are underway. Cornwall looks promising where primary fractures are expected to be conduits that can support deep fluid flow.

The two active geothermal projects are:

* United Downs Deep Geothermal Project – Two wells drilled with encouraging initial results– testing was scheduled for spring 2020 but now likely to be autumn because of Covid.
* Eden Deep Geothermal Project heat from St Austell granite to be used locally for heat production. Second phase with additional drilling to produce electricity for local use and the grid.

Direct use schemes are only moving forward slowly. For Direct Use Heat Schemes the risk/reward ratio does not make it attractive to developers. GSHP sector has had a subsidy and has seen some growth.

Mine Water schemes can be used for energy storage and heating local housing and possibly small industrial parks. Energy from water at 12 to 20 oC is heat pumped to raise the temperature for facilities use.

Government strategies. 2017 Clean Growth Strategy. Nothing specific / dedicated in the strategy for geothermal energy but there are general funds to which a geothermal proposal can apply.

Stakeholders meeting in London February 2020 the output is a policy paper that considers the geothermal opportunities to work to policy and regulation that might support geothermal.

**ExCo Meeting closed at 12:58 British Summer Time (23.58 NZST)**