



IGA NEWS

Newsletter of the International Geothermal Association

IGA ACTIVITIES

Message from the President

John W. Lund, President

This is my last *Message from the President*, as I will be stepping down as President at the October 10th board meeting and the new President will be taking over on October 11th at the new Board of Directors' first meeting in Reykjavik, Iceland. It has been an interesting three years for me and for the Board. Much has been accomplished, mainly due to the hard work of the various Board members, who made my job easier. These accomplishments included:

- Holding a successful World Geothermal Congress 2005 in Antalya, Turkey along with numerous short courses and field trips. This meeting was under the leadership of Dr. Orhan Mertoglu, chair of the Turkish Organizing Committee, and Dr. James Koenig, chair of the IGA Organizing Committee.
- Moving the IGA Secretariat from ENEL in Italy to Samorka in Iceland. The transition was made smooth by the outgoing Executive Director, Dr. Ruggero Bertani with help from Iris Perticone and the Past President, Dr. Guido Cappetti, and the new Executive Director Valgardur Stefansson, who stepped into his role quickly. Unfortunately, Valgardur passed away from cancer in July 2006, and the leadership role was taken over by Dr. Arni Ragnarsson. He has continued to serve IGA well.
- Applying for and obtaining a \$US810,000 grant from the World Bank/GeoFund to perform a number of tasks in support of their geothermal mission, and to support the International Summer School, as well as a number of other training courses. This was brought about by the hard work of Dr. Gordon Bloomquist, chair of the Finance Committee, and Dr. Arni Ragnarsson. The negotiation for this grant has taken almost four years of hard work and negotiations with the World Bank, including several trips to Russia, Iceland and Washington, D.C.
- Awarding the World Geothermal Congress 2010 to Indonesia, that will be held in Bali in April of 2010 with the help of Board members Alimin Ginting and Dr. Jim Lawless, who prepared and negotiated the agreement for

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the meeting. The IGA organization of this meeting will be under the leadership of Dr. Gordon Bloomquist, chair of the Steering Committee. Several organizing committee meetings have already been held in Indonesia. The first circular will be available shortly.

- Publishing 12 issues of the IGA News under the expert supervision and work of Dr. Eduardo Iglesias and the editing of Dr. John Garnish. This is our main information and communication medium for IGA, in addition to our website.
- Keeping our budget and finances in order, paying our debts and keeping a positive balance in our account. Dr. Kevin Brown was the financial conscience for the Association, and kept a tight rein on our spending. No spending was undertaken without his review and approval.
- Forming the Western Pacific Regional Branch, under the leadership of Dr. Jim Lawless, who is also the Branch's first President.
- Similarly forming the European Regional Branch under the guidance of Prof Kiril Popovski.

The Board of Directors has held two Board meetings per year along with the Annual General Meeting. The Board met at the following locations with the help of the local Board members and sponsored by the country affiliate geothermal association.

- Antalya, Turkey, 10 October 2004; hosted by the Turkish Geothermal Association; organized by Dr. Orhan Mertoglu
- Ankara, Turkey, 14 and 15 February, 2005; hosted by the Turkish Geothermal Association; organized by Dr. Orhan Mertoglu.
- Beijing, China, 13 and 14 September 2005; hosted by the Geothermal Chinese Energy Society; organized by Dr. Keyan Zheng
- Brussels, Belgium, 3 and 4 April 2006; hosted by the European Geothermal Energy Council in the Renewable Energy House; organized by Dr. Burkhard Sanner.
- Chiba, Japan, 8 and 9 October 2006; hosted by Japanese Geothermal Associated; organized by Dr. Hiroaki Niitsuma, Dr. Toshihiro Uchida, Dr. Sachio Ehara and Dr. Kasumi Yasukawa.
- Manila, Philippines, 5 and 6 March 2007; hosted by the Philippine Geothermal Association, PNOG Energy Development Corporation, and Unocal Philippines/Chevron Geothermal and Power Company; organized by Dr. Manuel Ogena and Dr. Antonio Yee.
- Reykjavik, Iceland, 9 October 2007; hosted by Samorka and the Iceland Geothermal Association; organized by Arni Ragnarsson, Olafur Flovenz and Gestur Gislason.

Annual General Meetings, as required by the IGA By-Laws, were held in Antalya, Turkey, 10 October, 2004; Beijing, China, 14 September 2005; Chiba, Japan, 9 October 2006; and Reykjavik, Iceland, 9 October 2007.

In conclusion, I would like to thank my Board of Directors for their support over the past three years. I welcome and congratulate the new officers and board members, listed elsewhere in this IGA News.

Election results

Arni Ragnarsson and Ólafur G. Flóvenz, IGA Secretariat

A new IGA BoD for the period 2007-2010 has been elected. The election material was sent by mail to IGA members with voting rights at the beginning of June, including a personal password for web-based voting. Due to late arrival of membership lists from few Affiliated Organizations, their members received the election material later, either by mail or e-mail. Originally the deadline for voting was July 15th but, on account of late postal delivery in some countries and in order to increase the participation rate, the Executive Committee decided to extend the deadline until July 31st. After closing of the election the votes were processed at the Secretariat under the supervision of the IGA Secretary.

The main election statistics are reported in Table 1. The total number of eligible voters is 3,269 IGA members. We received 881 votes through the web and additional 38 paper ballots, most of them by mail and a few by fax. Thus the total number of votes received was 919 and 95.9% of them were cast on the web. Of the total number of ballots received 15 were invalid, mostly because votes were received both as paper ballots and through the web from some members. Thus the total number of ballots counted was 904 or 27.7% of the number of eligible voters, covering 42 countries. The total number of valid preferences was 14,980. We would like to draw attention to the high percentage of votes cast on the web, which suggests that the need for paper ballots should be reconsidered in future BoD elections.

The geographical distribution of the counted ballots is reported in Table 2, which also shows the percentage of ballots

received from each country out of the total number of eligible voters from the respective country. In Table 3 the distribution of votes received from the affiliated organizations is shown, along with the percentage of the eligible voters participating in each of them.

Table 4 shows the election results. The names of those elected are listed in alphabetical order and similarly for non-elected candidates. The results have been approved by the IGA President and the candidates have been notified. The geographical distribution of the new BoD members is reported in tables 5 and 6. We send our best congratulations to the new board.

Table 1. Main election statistics

Votes received through the web	881	95.9%
Paper ballots received	38	4.1%
Total votes received	919	100.0%
Anonymous outer envelopes	1	
Ballot received after the election closure	1	
Vote from a non-member	1	
Double votes	12	
Total invalid ballots	15	
Total ballots counted	904	27.7%
Total number of eligible voters	3,269	100.0%
Total number of valid preferences	14,980	

Table 3. Ballot distribution from Affiliated Organizations

Affiliation	Country	Total	% voters
CGEA	Canada	2	8%
GCES	China	34	51%
ESGA	El Salvador	33	69%
EGA	Ethiopia	0	0%
GGA	Georgia	1	9%
GtV	Germany	92	12%
HGA	Hungary	34	37%
HTES	Hungary	26	58%
GAI-IS	Iceland	37	34%
API-INAGA	Indonesia	36	36%
IGEA	Iran	0	0%
GAI	Ireland	5	15%
UGI	Italy	34	39%
IGAJ	Japan	39	43%
LGA	Lithuania	16	64%
MAGA	Macedonia	12	32%
MGA	Mexico	19	42%
SPG	Netherlands	2	6%
NZGA	New Zealand	49	35%
NGAP	Philippines	78	34%
PGA	Poland	4	8%
PGS	Poland	41	61%
RGA	Romania	15	63%
RUGA-GES	Russia	19	38%
SVG-SSG	Switzerland	21	32%
TGA	Turkey	66	77%
GRC	USA	141	18%
Total		856	27%

**Table 2. Ballot distribution per country.
Ballots were received from 42 countries**

Country	Total	% voters
Australia	7	33%
Austria	3	18%
Belarus	1	100%
Belgium	3	38%
Bulgaria	1	33%
Canada	7	17%
Chile	1	17%
China	35	47%
Croatia	1	100%
Denmark	1	33%
El Salvador	34	68%
France	5	38%
Georgia	1	9%
Germany	86	12%
Hungary	62	45%
Iceland	49	37%
Indonesia	40	33%
Ireland	5	16%
Italy	39	39%
Japan	55	44%
Kenya	4	57%
Korea	3	75%
Lithuania	16	64%
Macedonia	12	32%
Mexico	30	43%
Netherlands	2	5%
New Zealand	51	34%
Norway	1	50%
Pakistan	1	100%
Philippines	78	34%
Poland	45	39%
Portugal	1	33%
Romania	14	58%
Russia	20	38%
Singapore	1	33%
Slovakia	1	25%
Slovenia	1	14%
Switzerland	24	29%
Turkey	67	77%
Uganda	2	67%
UK	4	36%
USA	90	14%
Total	904	28%

Table 4. IGA BoD election results 2007.
The names of those elected are listed in alphabetical order and similarly for non-elected candidates.

Name	Country
Elected	
Miklos A. Antics*	Romania
Godfrey Bahati*	Uganda
Rosa Maria Barragán R.	Mexico
Graeme Beardsmore*	Australia
Ruggero Bertani	Italy
Christian Boissavy*	France
Paul Brophy	USA
Surya Darma*	Indonesia
Alimin Ginting	Indonesia
Gestur Gíslason	Iceland
Colin Harvey*	New Zealand
Paul Hirtz*	USA
Roland N. Horne*	USA
Beata Kepinska	Poland
Horst Kreuter*	Germany
Jim Lawless	New Zealand
Orhan Mertoglu	Turkey
Francisco E. Montalvo L.*	El Salvador
Martin N. Mwangi*	Kenya
Manuel S. Ogena	Philippines
Sanja Popovska V.*	Macedonia
Konstantin O. Povarov*	Russia
Horst Rüter*	Germany
Ladislaus Rybach*	Switzerland
Benedict Steingrímsson*	Iceland
Toshihiro Uchida	Japan
Francois-David Vuataz	Switzerland
Shigeto Yamada	Japan
Kasumi Yasukawa*	Japan
Keyan Zheng	China
Non-elected	
Lauro F. Bayrante	Philippines
Luis C. A. Gutiérrez-Negrin	Mexico
Marek Hajto	Poland
Tamás Hámor	Hungary
Mikhail D. Khutorskoy	Russia
Ramon Allan V. Oca	Philippines
Yoonho Song	S. Korea
Gábor Szita	Hungary
Koichi Tagomori	Japan
Tingshan Tian	China
Feliksas Zinevicius	Lithuania
Vladimir Zui	Belarus

Table 5. BoD members distribution per continent

Continent	New Board	Retiring Board
Africa	2	2
America	5	6
Asia	7	8
Europe	13	13
Oceania	3	2
Total	30	31

Table 6. BoD members distribution per country

Country	New Board	Retiring Board
Australia	1	
China	1	1
El Salvador	1	
Ethiopia		1
France	1	
Germany	2	1
Hungary		1
Iceland	2	2
Indonesia	2	1
Italy	1	1
Japan	3	4
Kenya	1	1
Macedonia	1	1
Mexico	1	3
New Zealand	2	2
Philippines	1	2
Poland	1	1
Romania	1	1
Russia	1	1
Switzerland	2	1
Turkey	1	2
Uganda	1	
UK		1
USA	3	3
Total	30	31

* New BoD member

WGC 2010-It's Not Too Early to Plan to Attend

R. Gordon Bloomquist Ph. D., Chair, IGA WGC 2010 Steering Committee

The IGA World Geothermal Congress Steering Committee together with the Indonesian Organizing Committee are well along in the planning for WGC 2010. The Committees held a joint meeting in Bali in February of this year to assess the proposed Congress facilities and hotels and to begin the long planning process. We were successful in establishing the initial Congress schedule, preparing the first circular and shortly thereafter establishing the Congress Web site (<http://geothermal.stanford.edu/wgc2010reg/default.htm>).

The facilities visited were found to be first rate and will allow for all technical sessions to be held in the same venue. Up to eight concurrent sessions are now planned to accommodate the anticipated 2000+ attendees. Hotels are all clustered near the Congress facilities and will provide excellent accommodation.

So our planning is well underway. Now it is time for you to begin to plan to attend what we believe will be the largest World Geothermal Congress yet held, one that will offer all participants the opportunity to share knowledge, renew or make new friendships, enjoy the hospitality of our Indonesian hosts and enjoy one of the world's most beautiful and geologically interesting venues.

The theme of the Congress is "Geothermal: the Energy to Change the World". It is our sincere belief that accelerated geothermal development can truly change our world for the betterment of all mankind including improving our environment, providing enhanced economic opportunities and fostering positive social change. Your participation will help make this dream a reality.

Visit the web page, fill out the questionnaire and remember it is not too early to begin to plan to attend WGC 2010-Bali! <http://geothermal.stanford.edu/wgc2010reg/default.htm>

How the IGA was born

Adapted from IGA News No.1, Spring 1990

The idea to develop a nonprofit, nonpolitical organization designed to serve the cultural, scientific, educational and informational needs of the entire geothermal community dated back nearly 20 years before IGA eventually came into existence. This possibility was first considered at the UN Symposium on Geothermal Energy held in Pisa in September, 1970. Since that time, the idea had been discussed informally on several occasions during geothermal workshops and meetings. Although belief in the basic idea was shared among those involved in geothermal energy throughout the world, for a number of practical reasons the organization did not materialize, and the initiative did not get off the ground until the beginning of 1986.

In January 1986, a group of geothermists relaunched the initiative within the U.S. Geothermal Resources Council (GRC). The GRC is an organization created in the 1960's to encourage research and development of geothermal energy in the United States. As the proposal to create an international organization to serve the worldwide geothermal community met with favourable reception within the GRC, an *ad hoc* international committee was convened within the GRC in 1986. The committee felt that international representation and participation was better secured through the involvement, in addition to the GRC, of the five international geothermal schools, located in Iceland, Italy, Japan, Mexico and New Zealand. These schools had already expressed interest in the formation of an international geothermal association.

This charge was then handed over to an independent Organizational Working Group (OWG-IGA) made up of a number of geothermists from various countries, which met for the first time in Sparks (Reno), Nevada, on October 10, 1987. **This first meeting** concluded with the formation of 3 committees that would take care of the initiative of a world association (to be named the *International Geothermal Association, IGA*), study possible sources of financing, and prepare the Charter of the Association.

The **2nd meeting** of the OWG-IGA was held in Auckland, New Zealand, from February 17-20, 1988. The Association Charter, which defines the guiding principles of the Association's activity, was finalized and approved. Further, it was decided that the time had come to establish the IGA officially and to register it for a legal domicile. It was decided to apply to the New Zealand Dept. of Justice for incorporation. It was also agreed that the three OWG-IGA committees should continue their activity.

The **3rd meeting** of the OWG-IGA was held in Mexicali (Mexico), on October 13-15, 1988. As previously decided, the **IGA had been incorporated in New Zealand on July 6, 1988**; this had necessitated the creation of a set of

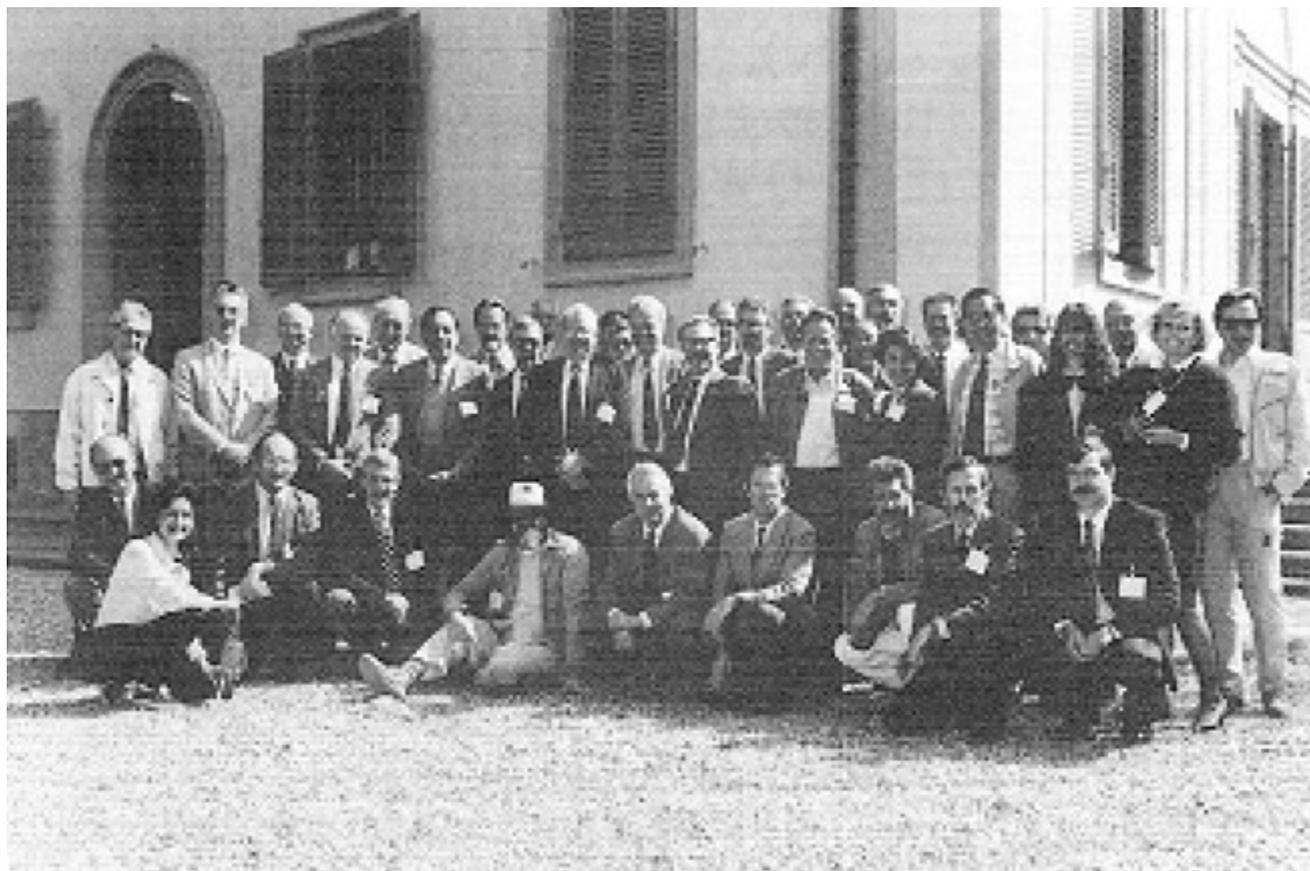
Rules of Incorporation to define the mode of operation of the Association. During the Mexicali meeting, a number of resolutions was approved, one of the most important being to locate the Secretariat in Pisa, Italy. The Italian proposal was accepted after careful examination of all 4 proposals submitted. The activity of the 3 committees was reconfirmed, and the Secretary was asked to draw up a first draft of the Bylaws, to be reviewed by the Bylaws committee. The Bylaws regulate in greater detail the mode of operation of the Association.

The **4th and final meeting of the OWG - IGA** was held at Castelnuovo Val di Cecina (Larderello, Italy), on May 2, 1989. The purpose of the meeting was to conclude the work of the OWG, to consolidate the formation of the IGA, to nominate 30 candidates for the Board of Directors (BoD) and to hand over the running of the IGA to the Secretariat. 41 people from 22 countries and 3 international organizations attended this meeting.

Following the adjournment of the OWG-IGA meeting, the participants immediately reconvened that same afternoon (May 2nd 1989) to open the **First Meeting of the International Geothermal Association**, which concluded on May 4th. During those two and a half days, the first BoD was elected (from the 30 candidates nominated previously), which then nominated and elected the first four Officers. The Association Bylaws were revised and approved, and dues levels were proposed for the various membership categories.

The **first IGA Board of Directors (BoD) meeting took place on May 5th, 1989** in Castelnuovo. Six Permanent Committees and their respective Chairmen were appointed, and the dues levels (proposed during the previous meeting) were approved. The possibility of giving financial support to needy persons was discussed, as was the idea of having an Association logo. In accordance with the Rules of Incorporation, the BoD decided to hold the 1989 Annual General Meeting (AGM) in October, and Stanford, California, was chosen as the location, taking advantage of the proximity of the GRC meeting in Santa Rosa to maximize participation by minimizing additional travel. Further, it was agreed that the 2nd BoD meeting would follow the 1989 AGM.

The International Geothermal Association was finally up and running.



**The first IGA meeting, 2-5 May 1989
Castelnuovo (Larderello), Italy.**

1989, FIRST ELECTION AND APPOINTMENT OF (1989-1992):

- **OFFICERS,**
- **BOARD OF DIRECTORS (BoD), and**
- **PERMANENT COMMITTEES**

Officers

President of the IGA: J.COMBS (USA)

Vice-President: J. GARNISH (EEC)

Secretary: E. BARBIER (ITALY)

Treasurer: T. AMOR (USA)

1st Board of Directors

- 1) ALONSO ESPINOSA, H. (MEXICO)
- 2) AMOR, T. (USA)
- 3) BARBIER, E. (ITALY)
- 4) BLOOMQUIST, G. (USA)
- 5) BUACHIDZE, G. (USSR)
- 6) CAREY, B. (NEW ZEALAND)
- 7) CATALDI, R. (ITALY)
- 8) COMBS, J. (USA)
- 9) CUELLAR, G. (EL SALVADOR)
- 10) ELIASSON, E. (ICELAND)
- 11) FREESTON, D. (NEW ZEALAND)
- 12) GARNISH, J. (EEC)
- 13) GERARD, A. (FRANCE)
- 14) GREIDER, B. (USA)
- 15) HERNANDEZ G., J. (MEXICO)
- 16) KOENIG, J. (USA)
- 17) LAHSEN, A. (CHILE)
- 18) MAHON, T. (NEW ZEALAND)
- 19) MEIDAV, T. (USA)
- 20) MUFFLER, P. (USA)
- 21) OJIAMBO, S. (KENYA)
- 22) OKANDAN, E. (TURKEY)
- 23) OTTLIK, P. (HUNGARY)
- 24) PALMASON, G. (ICELAND)
- 25) RYBACH, L. (SWITZERLAND)
- 26) SHEN, XIAN-JIE (CHINA)
- 27) SQUARCI, P. (ITALY)
- 28) TRAIN, I. (NEW ZEALAND)
- 29) VROUZI, F. (GREECE)
- 30) WANG, JI-YANG (CHINA)

Permanent Committees

(Those names which are underlined denote the Committee Chairmen)

Audit

- 31) BATCHELOR, T. (UK)
- 32) MAHON, T. (NEW ZEALAND)
- 33) MUFFLER, P. (USA)
- 34) ROHRER, C. (UN)
- 35) RYBACH, L. (SWITZERLAND)

Finance

- 1) AMOR T. (USA)
- 2) FREESTON, D. (NEW ZEALAND)
- 3) KOENIG, J. (USA)
- 4) LAHSEN, A. (CHILE)
- 5) OTTLIK, P. (HUNGARY)

Information and Education

- 1) BARBIER, J. (FRANCE)
- 2) BATCHELOR, T. (UK)
- 3) BLOOMQUIST, G. (USA)
- 4) CAREY, B. (NEW ZEALAND)
- 5) ELDERS, W. (USA)
- 6) ELIASSON, E. (ICELAND)
- 7) GARNISH, J. (EEC)
- 8) HERNANDEZ G., J. (MEXICO)
- 9) MEIDAV, T. (USA)
- 10) OKANDAN, E. (TURKEY)
- 11) PALMASON, G. (ICELAND)
- 12) POPOVSKI, K. (YUGOSLAVIA)
- 13) RYBACH, L. (SWITZERLAND)

Membership

- 1) BUACHIDZE, G. (USSR)
- 2) CATALDI, R. (ITALY)
- 3) DOWGIALLO, J. (POLAND)
- 4) FREESTON, D. (NEW ZEALAND)
- 5) GREIDER, B. (USA)
- 6) HERNANDEZ G., J. (MEXICO)
- 7) OJIAMBO, S. (KENYA)
- 8) OTTLIK, P. (HUNGARY)
- 9) PALMASON, G. (ICELAND)
- 10) SCHULZ, R. (FRG)
- 11) WANG, JI-YANG (CHINA)

Nominating

- 1) BUACHIDZE, G. (USSR)
- 2) CATALDI, R. (ITALY)
- 3) CUELLAR, G. (EL SALVADOR)
- 4) ELIASSON, E. (ICELAND)
- 5) MEIDAV, T. (USA)
- 6) OJIAMBO, S. (KENYA)
- 7) TRAIN, I. (NEW ZEALAND)
- 8) WANG, JI-YANG (CHINA)

Program and Planning

- 1) CERMAK, V. (CZECHOSLOVAKIA)
- 2) CUELLAR, G. (EL SALVADOR)
- 3) ELDERS, W. (USA)
- 4) ELIASSON, E. (ICELAND)
- 5) GERARD, A. (FRANCE)
- 6) LAHSEN, A. (CHILE)
- 7) MAHON, T. (NEW ZEALAND)
- 8) MUFFLER, P. (USA)
- 9) OKANDAN, E. (TURKEY)
- 10) SHEN, XIAN-JIE (CHINA)

EUROPE

Iceland

Geothermal power plants in the Hengill area

Sigurgeir Björn Geirsson (Orkuveita Reykjavíkur)

Overview

The Hengill area in SW-Iceland area is one of the most extensive geothermal areas in Iceland, where several potential sub-areas suitable for geothermal development have been identified. Since 1990 Orkuveita Reykjavíkur has operated the Nesjavellir geothermal power plant. Today Nesjavellir produces 120 MW_e electric and 300 MW_{th} thermal. To meet increasing demand for electricity and hot water for space heating in the industrial and the domestic sectors Orkuveita Reykjavíkur is building a CHP geothermal power plant at Hellisheiði. The development area is located about 20 km east of the capital area. The company is also planning to build at least two new geothermal power plants in the Hengill area, in Hverahlíð and Bitra. Figure 1 shows the development area of the Hellisheiði power plant and regulated areas for Hverahlíð and Bitra.

The capacity of the Hellisheiði Power plant will be 300 MW_e electric and 400 MW_{th} thermal. Estimated capacity of the power plants in Hverahlíð and Bitra will be 90 MW_e and 135 MW_e respectively.

Currently Hellisheiði power plant (fig. 2) is producing 90 MW_e from two 45 MW_e units and the construction of the 2nd and 3rd stages of the power plant are in progress. This involves the erection of a 33 MW_e Low Pressure Unit and two additional high pressure units, 45 MW_e each. An environmental impact assessment (EIA) for the power plants at Hverahlíð and Bitra is under way and will be published in the third quarter of 2007.

The Hengill area

The Hengill area is a rural mountainous area in Iceland in the middle of the western volcanic zone that runs from Reykjanes in a northerly direction to Langjökull. The bedrock consists mostly of palagonite, formed by volcanic eruptions below glaciers during the last ice age, and Holocene basaltic lavas. The Hengill region is one of the most extensive geothermal areas in the country. Surface measurements and heat distribution indicate an area of around 112 km². The high temperature geothermal area at Hengill covers three central volcanoes and their surroundings. The youngest one is the most active, whereas the oldest is eroded but still geothermally active.

Areas that are already utilized by Orkuveita Reykjavíkur or are under construction lie on the active fault zone of the youngest volcanic feature of the Hengill area, which reaches from Nesjavellir in the north to Hellisheiði in the south, about 30 km in length. A fault zone which is part of the Hengill Volcano cuts through the volcanic zone from south west to north east. The most important areas for production in the Hengill area are connected to this fault zone, i.e. Nesjavellir in the north and Hellisheiði in the south. Three recent volcanic fissures are among the features that characterize these areas. They erupted 10, 6 and 2 thousand years ago. The two most recent ones can be found along the entire fault zone. These volcanic fissures are considered the main sources of geothermal energy at Nesjavellir and the same is considered true for Hellisheiði.

Construction plan for the power plants in the Hengill area

The power plant at Hellisheiði will be a cogeneration plant. It will be built in modules and units will be added as the market demand increases. The power production capacity of each electric unit will be 45 MW_e, with 33 MW_e for the Low Pressure Unit. For each thermal unit the capacity will be 133 MW_{th}. A similar approach will be used for the two new power plants; they will be built in 45 MW_e units. Table 1 shows the main construction stages for the power plants in the Hengill area and when each stage will start operating, assuming that the EIA for power plants in Hverahlíð and Bitra will be approved.

Table 1 - The main construction stages for the power plants in the Hengill area

Commissioning	Fall 2006 Stage 1	Fall 2007 Stage 2	Fall 2008 Stage 3	Fall 2009 Stage 4	Fall 2010 Stage 5	>2010	Complete Powerplant
Hellisheiði Power plant							
Electric Power Station	90 MW _e	33 MW _e	90 MW _e		90 MW _e		303 MW _e
Thermal Power Station				133MW _{th}		267MW _{th}	400 MW _{th}
Hverahlíð Power plant					90 MW _e		90 MW _e
Bitra Power plant					90 MW _e	45 MW _e	135 MW _e

Environmental Policy

Orkuveita Reykjavíkur is determined to be a leader in matters concerning the environment, and that environmental management should be one of the company's priorities. Orkuveita Reykjavíkur has put a lot of effort into the EIA for the Hverahlíð and Bitra power plants to define how the new power plants and their development area can be environmentally friendly. In order to do that the power plants will be designed so that they fit into the landscape with minimum effect. The following list describes a few methods to fulfil this prerequisite:

- The main power house will be designed in harmony with its surroundings. It will also be hidden or semi-hidden from pre-defined key viewpoints.
- All buildings will be painted in colours so they will meld with their surroundings and if necessary they will be semi-buried in the ground.
- Production wells will be grouped on drilling sites. The area of the drilling sites will be minimized and steam transmission pipes on the drilling sites will be in underground trenches. Well head silencers and other equipment for the boreholes will be placed in semi-hidden buildings.
- The steam transmission pipeline will be adjusted to the landscape, for example with mounded earthen barriers and, if necessary, the steam transmission pipes, which are usually on the surface, will be put underground.

Conclusion

Orkuveita Reykjavíkur is planning to produce at least 600 MW_e and 433 MW_{th} by the end of 2010 in its power plants in the Hengill area. Orkuveita Reykjavíkur realizes the importance of protecting the country's natural resources and ensuring, as far as possible, their sustainable utilization.

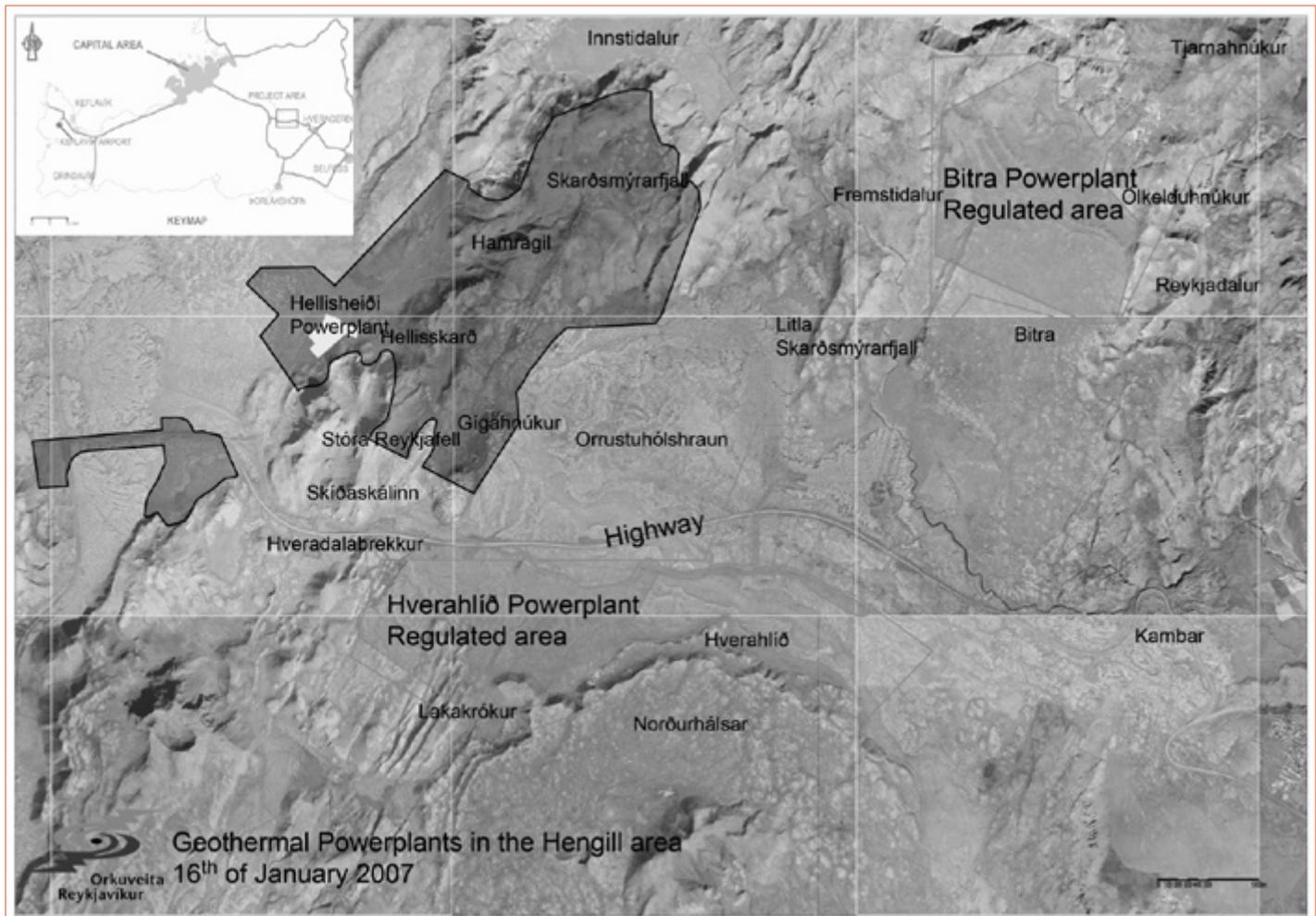


Fig. 1. Overview of the development area for Hellisheiði power plant and regulated areas for Hverahlíð and Bitra.



Fig. 2. Computer generated picture of the front of the Hellisheiði power plant.

AMERICA

Mexico

News from Mexico

Luis Gutiérrez Negrín, Comisión Federal de Electricidad, Mexico

New website of the Mexican Geothermal Association

The AGM has launched a new official website, which can be accessed through the URL: <http://www.geotermia.org.mx>. The site is in Spanish and includes the following sections:

La Geotermia: Here is a brief explanation on geothermal systems, a table with geothermal-electric installed capacity in the world, and the Mexican geothermal fields.

Organización: This section presents the objectives and characteristics of the AGM and the current Board of Directors.

Estatutos y Asambleas: Here are included the official By-Laws and the minutes of the last general assemblies.

Membresías: Presents the benefits of becoming a member of the AGM and the current fees. It includes an on-line route for registration.

Noticias y eventos: This section presents some news and further technical meetings and events related to geothermics in Mexico and worldwide, including the next AGM annual congress.

Ligas y contactos: Here is a list of links for institutions or associations involved in geothermics, in Mexico and worldwide, and direct links to the e-mails of some persons of the AGM Board of Directors.

Revista Geotermia: Presents a list of the more recent numbers of the technical magazine *Geotermia*, published twice a year in Spanish with abstracts in English or vice versa, and the possibility to consult it on line or down-load a copy of the file in pdf format.

Boletín IGA News: Here are the more recent issues of this IGA News, excepting the current issue, which can be consulted on-line or be down-loaded as a pdf file.

Otros: This section contains other materials of interest for the geothermal community, some in English and

some in Spanish, including the monthly newsletter of Baker Hughes (*Geothermal News*) and the weekly newsletter of the Geothermal Energy Association (*GEA Update*), uploaded with permission from the authors.

The AGM invites you to pay a visit to their new website.

Retirement of the manager of the Comisión Federal de Electricidad geothermal division

Alejandro Abril-Gaspar, manager of the CFE's geothermal division (the Gerencia de Proyectos Geotermoelectrícos, or GPG) since March 2003, retired in last April. The GPG is in charge of the exploration, operation and development of all the Mexican geothermal fields to produce electricity (Cerro Prieto, Los Azufres, Los Humeros and Las Tres Vírgenes) and currently operates 240 production and injection wells delivering 70 million tons of steam per year to produce 6 700 GWh. Alejandro Abril-Gaspar, 56, a drilling engineer with 30 years of service in the CFE, spent most of them in the Cerro Prieto field, where he was involved in the reservoir engineering and production areas before being appointed as the general manager of that field in 1994. He is a former President of the Mexican Geothermal Association (AGM) (2004-2006) and is currently a member of the Board of Directors of the Geothermal Resources Council (2003-2007).

Raúl Maya-González, 50, has been appointed as the GPG's interim general manager. He is a geologist who was formerly in charge of the Studies Area of the same GPG, where he has worked the last 25 years. He is presently the Vice-President of the Mexican Geothermal Association (2007-2008).

Geothermal resources involved in CFE celebration

Last August 14, the Comisión Federal de Electricidad (CFE) celebrated the 70th anniversary of its foundation. The Mexican President, Felipe Calderón, conducted the official ceremony at Mexico City together with CFE authorities and representatives of the workers union, and there were simultaneous ceremonies in some selected installations of the CFE in the interior of the country, linked to the main ceremony in Mexico City via the CFE satellite communications net. One of those selected places was the Los Azufres geothermal field, located in the Mexican state of Michoacán, in the central part of the country.

Los Azufres is the second geothermal field in Mexico and the biggest of volcanic type in Latin America (*IGA News* No. 65, p. 8-9), and has an installed capacity of 188 MW composed of one condensing unit of 50 MW, four condensing units of 25 MW each, seven backpressure units of 5 MW each, and two binary cycle units of 1.5 MW each. There are 39 production and 6 injection wells in operation, producing more than 13 million metric tons of steam per year. All of the wells, the field installations and the power plants are owned and operated by the CFE, and during 2006 Los Azufres produced almost 1500 GWh.

During the ceremony those characteristics were highlighted, as well as the fact that geothermal electricity in Mexico constitutes an important portion of the CFE renewable portfolio, thus contributing to diversification of the energy sources in the country.

ASIA/PACIFIC RIM

Australia

Geothermal research hub for Adelaide

The University of Adelaide has been awarded \$250,000 from the State Government to help develop an international research facility into geothermal energy. SA Mineral Resources Minister Paul Holloway said the seed funding would allow the University to host Australia's first research cluster examining all aspects of hot rock enhanced geothermal systems. The geothermal research facility will be based within the University's Australian School of Petroleum (ASP).

"The Government sees geothermal as an energy source for the future and, by helping the University establish the research facility here, it will ensure that South Australia is in the vanguard of all facets of developing and demonstrating hot rock systems," Mr Holloway said.

Professor Richard Hillis, Chair of Petroleum Geology at the ASP, said the University would collaborate with the Australian Geothermal Energy Group and the Department of Primary Industries and Resources of South Australia .

Mr Holloway said South Australia represented a hot rock haven for renewable, emissions-free power. "The State could provide a very significant part of Australia's base load power needs by 2030.....This investment will complement future developments that the other States, the Northern Territory or the Commonwealth may implement."

Australia-wide, 27 companies have applied for 166 geothermal licences. Between 2002 and 2012 these companies are expected to invest more than \$650 million in exploration. South Australia has attracted 17 companies to apply for 142 geothermal licences with work programs worth more than \$550 million for the term 2002-12. That is more than 80% of the national tallies for geothermal licence applications and forecast investment in Australia.

Ideal stress regime for Olympic Dam geothermal project

Green Rock Energy Ltd., press release

Green Rock Energy, a leading geothermal energy company, announced on 2 July 2007 that the studies by the CSIRO of data from the company's Blanche No. 1 well support the company's view that its geothermal leases at Olympic Dam are influenced by an ideal stress regime for a geothermal heat exchange reservoir.

The study by the CSIRO of the in-situ stresses using drill core and drill log data from the hot granites drilled in Blanche No. 1 well (which was drilled by the company to 1.93 km alongside the Olympic Dam mine) indicates that the two principal horizontal stress directions from the hot granites are greater in magnitude than the principal vertical stress direction.

According to the CSIRO study: "The vertical stress being the minimum implies that hydraulic fracture orientation and fluid flow in a stimulated zone are most likely to be in a sub-horizontal direction. This is an ideal situation for generating an optimal heat exchange reservoir that would allow a maximum distance between injection and production wells."

Water pumped through fractures that open in a sub-horizontal direction will optimize the recovery of heat from the granites. Water circulated between injection and production wells essentially would be traveling horizontally through the granites as it gathers the heat trapped in the granites. A sub-horizontal pathway through the granites means that the heat exchange process would be maximized. If the pathways had not been sub-horizontal, the water traveling through the fractures connecting the wells would pass from hot rocks to cooler rocks at shallower depths, reducing the effectiveness of the underground heat exchange process.

Green Rocks Energy's next step will be to measure the actual size and orientation of these principal stress directions in its forthcoming mini-hydrofrac to be carried out this year in its Blanche No. 1 well under contract with the CSIRO. This should substantially reduce both the risks and costs of the deep fracture stimulation program connecting those wells. The company is in the process of securing a suitable drilling rig for this purpose.

China

China-Australia cooperation study of hot dry rock

Keyan Zheng, GCES, China

Australian Petratherm Ltd and Geothermal China Energy Society (GCES) recently negotiated a China-Australia cooperation study project on hot dry rock. The project name is "Study on Geothermal Resources Potential of Hot Dry Rock in China". Since its foundation 5 years ago, Australian Petratherm Ltd has been implementing a hot dry rock testing project. Exploration drilling has achieved a temperature of 109°C at 1,807 m depth in Paralana, South Australia. The average geothermal gradient is 50°C/km. It is the best record in Australia. A pair of wells will be drilled to 3.6 km depth to reach 200°C. They will be used as production and reinjection wells for testing power generation.

Last April a GCES delegation visited Australia and negotiated primarily with Petratherm for the hot dry rock study in China. In the middle of May Petratherm Ltd visited China and negotiated with GCES then decided on the cooperation study project. The first combined investigation has been carried out consequently around Tengchong-Longling area in Western Yunnan Province. There are various high-temperature geothermal manifestations distributed in this area. After that the project group will carry out further data collection, analysis and research under the supervision of Australian experts in the main selected working areas: Tibet – W Yunnan – NW Sichuan and Fujian – Guangdong - Hainan, in order to choose the prospective target area. A CSAMT geophysical survey and thermal parameters sampling and detection will then be undertaken in order to assess the option's potential. A concluding workshop will be held finally. It is planned to complete the whole study by the end of 2008.

New Zealand

Post Graduate Certificate in Geothermal Energy Technology, the Geothermal Institute, University of Auckland, New Zealand.



The students, and assorted staff and families, on the first field trip we took them on - a walk to the top of Rangitoto Island, the 500 yr old basalt volcano in the middle of the Waitemata harbour.

The Geothermal Institute, at the University of Auckland, New Zealand, is once again offering a postgraduate qualification in geothermal science and engineering. The course is a one semester (20 week) course named the Post Graduate Certificate in Geothermal Energy Technology (PGCertGeothermTech). The course consists of three papers, a four-week project, and attendance at the New Zealand Geothermal Workshop. Field trips to the central volcanic zone of New Zealand are included in the course.

The Geothermal Institute also offers graduate papers in geothermal and geoscience topics, and currently has several PhD students. The staff is drawn from across the Engineering and Science faculties, with key staff members being the Director, Associate Professor Stuart Simmons; Deputy Director, Professor Mike O'Sullivan; Senior Lecturer in Engineering Dr Sadiq Zarrouk; Senior Tutor, Juliet Newson; and Administrator, Olwen Morgan.

The 2007 PGCertGeothermTech course began in July and will end in mid-November, and the 2008 course is also expected to run from July to November. Applications for admission to the 2008 course will soon be open.

(<http://www.science.auckland.ac.nz/uoa/science/about/research/gei/gei.cfm>).

Increase in New Zealand geothermal energy research

Geothermal energy looks set to contribute more electricity to New Zealand's national grid, thanks to an industry commitment to increase production from New Zealand's geothermal areas. The New Zealand government has shown its support for renewable energy growth by nearly doubling the investment in geothermal research.

A joint research programme worth NZ\$11.5m over six years will see GNS Science and the University of Auckland pooling their talents to enable producers to triple electricity generation from geothermal resources to 1500 MWe. Geothermal could supply 20% of New Zealand's growing electricity demand in the next decade. The research will build on established research and experience to focus on three main areas:

Deep Geothermal: Comprehensive definition of New Zealand's geothermal systems and resources to guide exploration, development or protection, by "big picture" and field-specific investigations.

Environmental Effects: Reduced impact of development, through improved understanding of fluid reinjection, subsidence and effects on surface features and ecosystems.

Sustainable Development: Sustainable, long-term utilisation, incorporating new techniques to better control corrosion and scaling problems.

New Zealand will benefit by having improved security of energy supply, increased energy from a resource that has low emission of greenhouse gases, and reduced environmental impacts of geothermal development.

The research team represents a world-class capability with well established relationships with the geothermal industry, Maori tribes, territorial authorities, government agencies, and other research organisations. The programme will be supported by significant co-funding from New Zealand's geothermal energy industry.

"There's no doubt that geothermal has the potential to deliver up to 20 percent of New Zealand's annual electricity supply," said GNS Science Geothermal Programme Leader Ed Mroczek. "The way to achieve this is through production from greater depths, production from under-developed and undeveloped fields, better managing environmental effects, and improving the efficiency of geothermal technology," Dr Mroczek said. "We're excited that we now have the opportunity to research some of these challenges."

GNS Science welcomes collaborative research and consultancy opportunities that will enhance the future of geothermal energy world wide. Contact: geothermal@gns.cri.nz; P. +64 7 374 8211

UPCOMING EVENTS

ENGINE Workshop 6. Increasing policy makers' awareness and the public acceptance, Athens, Greece, September 13-14, 2007. <http://conferences-engine.brgm.fr/>

Mexican Geothermal Association Annual Congress, Los Humeros, Mexico, September 21, 2007. Luis C.A. Gutiérrez-Negrín: luis.gutierrez@geotermia.org.mx

GRC 2007 Annual Meeting, Sparks, Nevada, USA, September 30 - October 3, 2007. www.geothermal.org

International Geothermal Development in the near Future, Reykjavík, Iceland October 9, 2007. <http://www.samorka.is/>

First European Geothermal Review, Mainz, Germany, 21-31 October, 2007. Contact: review@bestec-for-nature.com

ENGINE Workshop 7. Risk analysis for development of geothermal energy, Utrecht, The Netherlands, November 8-9, 2007. <http://conferences-engine.brgm.fr/>

20th World Energy Congress, Rome, Italy, November 11-15, 2007. www.rome2007.it/home/home.asp

29th New Zealand Geothermal Workshop, Auckland, New Zealand, November 11-15, 2007. www.nzgw07.auckland.ac.nz

Mineral extraction from geothermal brines, Rotorua, New Zealand, November 22-23. Contact: Dr. Kevin Brown kevin@geokem.co.nz

33rd Stanford Workshop on Geothermal Reservoir Engineering, Stanford, CA, USA, January 28-30, 2008. <http://pangea.stanford.edu/ERE/research/geoth/conference/workshop.html>

ENGINE Final Conference, Vilius, Lithuania, February 13-14, 2008. <http://conferences-engine.brgm.fr/>

IAHR International Groundwater Symposium, June 18-20, 2008, Istanbul, Turkey. Website: <http://www.iahr-gw2008.net>

33rd International Geological Congress, Oslo, Norway, August 6-14, 2008. www.33igc.org

IGA News

IGA News is published quarterly by the International Geothermal Association. The function of IGA News is to disseminate timely information about geothermal activities throughout the world. To this end, a group of correspondents has agreed to supply news for each issue. The core of this group consists of the IGA Information Committee:

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 Nilgun Bakir, Turkey
 Werner Bussmann, Germany
 John Garnish, United Kingdom
 Alimin Ginting, Indonesia
 Gestur Gíslason, Iceland
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The members of this group submit geothermal news from their parts of the world, or relevant to their areas of specialization. If you have some news, a report, or an article for IGA News, you can send it to any of the above individuals, or directly to the IGA Secretariat, whatever is most convenient. Please help us to become essential reading for anyone seeking the latest information on geothermal worldwide.

While the editorial team make every effort to ensure accuracy, the opinions expressed in contributed articles remain those of the authors and are not necessarily those of the IGA.

Send IGA News contributions to:

IGA Secretariat, c/o Samorka
 Sudurlandsbraut 48, 108 Reykjavík, Iceland
 fax: +354-588-4431
 e-mail: iga@samorka.is

Contributions to the next issue of IGA News must be received by 7 november 2007.

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APPLICATION FOR MEMBERSHIP



Please complete the following form and return it with payment to:

International Geothermal Association Secretariat

c/o Samorka

Sudurlandsbraut 48, 108 Reykjavik, Iceland

tel: +354-588-4437; fax: +354-588-4431; e-mail: iga@samorka.is

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