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ISS[1] - A SUCCESSFUL TRIAL FOR INTERNATIONALIZATION OF SPECIALIZED EDUCATION AND TRAINING

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ABSTRACT

The example of ISS is, in some way, unique in all the world. Without continual financing, without permanent staff but with enthusiasm and hard work of a list of the most renown scientists and experts from all the countries where geothermal energy is applied, it runs successfully for already 14 years. Positive and negative experiences are summarized in this paper and opinion for possible solutions to enable secure future are discussed in this paper.

Fig.1. International course participants in Thessaloniki (Greece), 2002

[1] International Summer School on Direct Application of Geothermal Energy of the International Geothermal Association (IGA), registered in Skopje, Macedonia

INTRODUCTION

There is no doubt that development of any energy technology, production or application cannot be performed without having on disposal good educated staff of all necessary levels, i.e. scientists, experts, engineers, technicians, workers, etc. However, according to the collected experience during the past 25 years, organization of specialized education and training on alternative energy sources and their application is very complicate because the "market" at national level is normally to small to justify the investment and running costs. When geothermal energy is in question, its internationalization has also not been successful. International School of Geothermics in Pisa (Italy) doesn't work already 10 years, the Geothermal Course at the University of Auckland (New Zealand) was canceled last year. The UNU University in Reykjavik is still working but only for 20 students per year. Some actions to improve the situation through the institutional education systems of European countries are presently in flow under the coordination of UNESCO. However, some quick success cannot be expected because the market for employment of such "working power" is still to small, even in the developed countries. In the small ones practically it doesn't exist.

On the other hand, negative experiences of the pilot and demonstrative projects are mainly connected to the absence of educated local staff and workers for proper exploitation and further development of the plants. The same is with the commercial projects, where first ten years (until local team gets enough knowledge and experience) are normally full with unnecessary and expensive complications due to the absence of proper "know-how".

Up to now, at least when geothermal energy is in question, it is possible to state that absence of regular education (beside the other reasons) influences negatively the development of this very prosperous and "green" energy source.

Fig.2. Behind the success of ISS has always been the friendship between geothermal enthusiasts (Dr. I.Cohut and Prof.L.Rybach)

1. FOUNDATION OF ISS

In 1989, after a period of rich collaboration in development of projects in Greece, Italy and Macedonia, a group of scientists (Kiril Popovski and Konstantin Dimitrov from Macedonia, Mary Dickson and Mario Fanelly from Italy and Gerassimos Martzopoulous and Chrissoula Nikita-Martzopoulou from Greece) decided to support the idea of Prof. Popovski to start wit organization of a special type of international geothermal training. Except to follow the trials to run continual courses at the same location, doesn't matter in the frame of the institutional education or not, and to be unsuccessful due to the absence of regular funding, to go to the countries where geothermal development is (or just before) in flow and to offer them organization of special courses accommodated to the local needs. In order to decrease the costs of organization, to try to ask renown international specialists to teach at such courses free of charge. Plus, to try to organize some kind of system for supporting regular participation of students from developing countries free of charge.

Taking into account that institutional education systems in no one of the countries in question showed any interest for such an activity, it was decided to register the school as an independent international

non-profit collaboration activity and, later on, to try to get some "umbrella" of any of the international organizations dealing with alternative energies development. That was successfully fulfilled in November 15, 1989 when ISS has been registered in Skopje, Republic of Macedonia.

Fig.3. Not only the young students but also experienced specialists took participation to the ISS events

2. DEVELOPMENT OF ISS

First course of ISS has been organized in collaboration with the Aristotle University of Thessaloniki. It was the International Course on Direct Application of Geothermal Energy in 1990, held one week in Bansko (Macedonia) and one week in Thessaloniki (Greece). It was a full success, justifying the supply of application to the TEMPUS Program of EC for financing the further development by supporting the supply of necessary equipment and organization of next three courses. Application was successful and the next course in Ohrid (Macedonia) in 1992 has been organized without any financial problem. Unfortunately, that was the time when the war in Yugoslavia began, and the support of TEMPUS has been canceled. Nevertheless, success of the first two courses justified the efforts to follow with the work of ISS and, up to now, it is working successfully. Each year, at least a course or, during the last 6 years, a course plus a workshop have been organized in the frame of so called International Geothermal Days. Up to now, following events have been successfully performed:

1. International Course on **Direct Application of Geothermal Energy**, Bansko (Macedonia) and Thessaloniki (Greece), September 1990
2. International Course on **Engineering As-pects of Geothermal Energy Use in Agriculture**, Ohrid (Macedonia), May 1992
3. International Course on **Geothermal Energy, Technology**, Ecology, Bansko (Bulgaria), May 1993
4. International Workshop on **Geothermal Energy for Greenhouses and Aquaculture in Central and East European Count-ries**, Bansko (Bulgaria), May 1993
5. International Course on **Direct Application of Geothermal Energy in Industry and for District Heating**, Oradea (Romania), May 1994
6. International Workshop on **Geothermal Energy for Industry in Central/East Euro-pean Countries**, Oradea (Romania), May 1994
7. First Meeting of the **INTERGEO – International Collaboration Network of Central/East European Countries on Direct Application of Geothermal Energy**, Ora-dea (Romania), May 1994
8. International Seminar of the INTERGEO: **Geothermal School**, Radenci (Slovenia), November 1994
9. International Course on **Reservoir Engineering and Balneology**, Ljubljana (Slo-venia), September 1995
10. International Workshop on **Strategy of Geothermal Development in Europe at the End of XXth Century**, Ljubljana (Slovenia) September 1995

11. International Seminar of IGA European Branch: **Geothermal Energy**; Ankara (Turkey), November 1996
12. International Course on **Geothermal District Heating Schemes**, Çesme (Turkey, October 1997
13. International Workshop on **Strategy of Geothermal Development in Agriculture in Europe at the End of XXth Century**, Balçova (Turkey), October 1997
14. International Workshop on **Heating Greenhouses with Geothermal Energy**, Ponta Delgada (Portugal), September 1998
15. International Seminar on **Electricity Production from Geothermal Energy**, Ribei-ra Grande (Portugal), September 1998
16. International Course on **Economy of Integrated Geothermal Projects**, Ponta Delgada (Portugal), September 1998
17. International Course on **Direct Utilization of Geothermal Energy**, Klamath Falls (OR), October 1999
18. International Workshop on **Small Scale Electric Power Generation**, Klamath Falls (OR), October 1999
19. International Seminar on **Geothermal Heat Pumps**, Klamath Falls (OR), October 1999
20. International Workshop on **Geothermal Energy Application for Balneology and "Water Tourist Centers",** Bad Urach (D), September 2001
21. International Course on **Geothermal Heat Pumps**, Bad Urach (D), September 2001
22. International Seminar on **Hot Dry Technology**, Bad Urach (D), September 2001
23. International Course on **District Heating, Agricultural and Agroindustrial Uses of Geothermal Energy**, Thessaloniki (Greece), September 2002
24. International Workshop on **Possibilities of Geothermal Development of Aegean -Islands**, Adamas, island Milos (Greece), September 2002
25. International Guided Tour **Volcanology of Santorini Island**, Thira, island Santorini (Greece), September 2002
26. International Course on **Geothermal Geochemistry,** Doganbey (Turkey), June 2003
27. International Course on **the Sustainable Use and Operation Policy of Geothermal Resources**, Reykjavik (Iceland), September 2003

Meanwhile, thanks to the engagement of Mrs d'Adigne de Asis, ISS came under auspice of UNESCO - Division of Earth Sciences in 1994 and official school of the International Geothermal Association from 1998, with regular renewal of the contract each three years.

Fig.4. Up to now, about 1000 students of more than 40 countries all over the world participated the courses of ISS

3. PARTICIPANTS

Up to now, more than 1000 students from more than 40 countries from all over the world participated the courses and workshops of ISS. They are mainly geologists, hydrogeologists, mechanical and electro engineers, agronomists and economists intending to learn more about particularities of geothermal energy application in order to resolve some problem of own practice or gaps in "know-how". Normally, about 60-

70% of participants are from the country where concrete course or workshop is organized and 30-40% fellowship holders from developing countries or participants from surrounding countries.

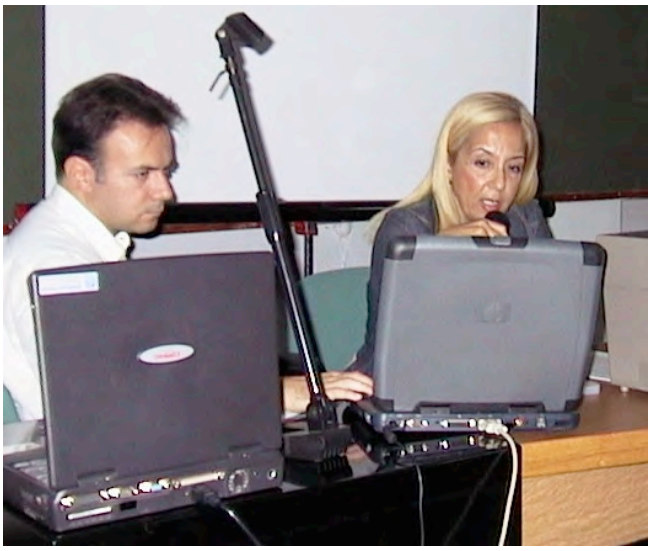

Fig.5. The highest possible quality of international and national lectures and invited speakers has always been the most respected characteristics of ISS courses, workshops and seminars

4. LECTURERS

The most renown scientists and experts from all over the world teached at ISS courses or have been invited speakers at the workshops. The core of the teaching team is normally Prof. Popovski (Macedonia), Prof. John Lund and Prof. Gordon Bloomquist (U.S.A.), Dr. Pierre Ungemach (France), Prof. Marcel Rosca (Romania) and Dr. Burkhar Sanner (Germany). Prof. Ladislaus Rybach (Switzerland), Dr. Renato Lesmo (Italy), Prof. Konstantin Dimitrov (Macedonia), Dr. Ioan Cohut (Romania), Prof. Klara Bojadjieva (Bulgaria), Prof. Michael Fytikas (Greece), Dr. Peter Kralj (Slovenia) and some others lectured at more than 2 courses or workshops. A list of about 30 internationally renown scientists gave lessons of their particular field of work and about 80 scientists or experts from the countries where courses or workshops have been organized transferred the national experience or data & information to the participants during the period 14 years history of ISS.

Particularity of ISS is that no one of the lecturers is paid for his contribution. Even more, all of them are covering the traveling costs from own finance resources. It is a pure enhusiastic activity of the organizers and lecturers from all over the world.

Fig.6. Interesting field trips are one of the most important characteristic of the ISS courses

5. METHODOLOGY OF TRAINING

With normal variations during the development of the school, following methodology is normally applied:

- Organization of one course on particular part of the geothermal energy development and technology(ies) of application (two days lectures plus one day technical excur- sion) plus one workshop connected to the specific local problem(s) of development and application of geothermal energy (two days presentations and discussions);
- In order to enable to participants to follow easily the lectures, text books for courses and proceedings of presentations of invited and local speakers are regularly published in advance;
- Lectures normally last 45 min. and presentations 20 min. plus discussion;
- Local geothermal projects and facilities are used for the practical part of the training.

Good side of the methodology is that enabling concentrated training thanks to the high quality of lecturers and that courses and workshops do not last more than one week together with travel time. That enables participation also for business people.

Weak side of the methodology is that the quality of practical training strongly depends on the local conditions, i.e. geothermal projects and special facilities on disposal. That was the reason why normally countries with already developed geothermal energy use have been mostly chosen to host the courses.

Valuable contribution of Dr. Mary H. Dickson and Dr. Mario Fanelli from CHR in Pisa (Italy) for development of the methodology during the initial years should be underlined.

6. LITERATURE

As already mentioned above, regular practice of ISS is to produce the text books and proceedings in advance. During the 14 years of work, ISS produced 23 volumes of geothermal literature (see References) which means that about 3000 geothermal books and 400 CDs are spread between geothermists all over the world. When direct application of geothermal energy is in question, the ISS publications are presently the main source of the data and information, together with the proceedings of World congresses of IGA.

Fig.7. Thanks to the fellowship program of ISS participation to students from more than 40 countries has been enabled

7. FELLOWSHIP PROGRAM

One of the strongest side of the ISS work is the existence of so called “fellowship program”. With the kind contribution of the International Geothermal Association (IGA), UNESCO, and from time to time EGEC, plus significant contribution of the firm GPC (Geoproduction Consultants) from Paris (France), 10-20 participants from developing countries are regularly supported to participate the courses and workshops of IGA. Normally, fellowship covers all the local costs of participation. Traveling costs are under responsibility of participants.

Good side of the program is that enabling to participants from countries where geothermal application doesn’t exist or where is in the beginning phase of development to get additional knowledge and to exchange the experience with colleagues and scientists from countries with already developed geothermal energy use.

Weak side of the program is that doesn’t cover the traveling costs resulting with weak participation from very distant and very poor countries.

It is necessary to underline that collection of necessary funds for the fellowship program became very difficult during the recent years. There is a

strong group in the IGA BoD against continual support of ISS from the poor IGA funds resulting with its reduction for 75% in 2003. UNESCO has general problem with funds and such "small" activities cannot find its place between wider and more important programs. Also their support significantly droped down during the recent years. Except GPC, still no one private firm showed interest to support the work of ISS.

8. GENERAL ESTIMATION OF REACHED RESULTS

Some general statements after 14 years of activity can be taken, such as are:

- ISS fulfilled the tasks taken in 1989, i.e. it became a worldwide recognized training center. There is no any other center with such experience and quality in the world, when organization of short courses and workshops is in question;
- ISS courses and workshops are of fully international character. Their location is each year in different country and the lecturers and participants from more than 40 countries all over the world;
- Activity of ISS is continual. Each year at least one event is organized in different country. There are always at least two countries, demanding the organization of the next school.
- There have never been a problem for ISS to compose the high quality team of lecturers and invited speakers or to have enough participants. In difference, separate trials funded by IGA (Argentina, Kenya, Indonesia, etc.) have not been successful.

However:

- ISS still didn't resolved the problem of continual financing, even needing minimal funding in comparison with any other activity of this character;
- ISS still didn't resolved the problem of recognition of own certificates. Due to the character of organization (no permanent staff) it cannot be incorporated in national institutional education systems, and due to the absence of regulation it cannot be "officialized" in the frame of IGA education programs. On the other hand UNESCO didn't incorporated it in the own educational activities;
- Due to the lack of funds, ISS is still mainly present in the European countries. Except in Oregon (U.S.A.) and Asian part of Turkey, ISS didn't succeed to be present in the other parts of the world where transfer of "know-how" is necessary (South America, Africa, Central and East Asia and Oceania).
- ISS is still an activity of a group of enthusiasts without a guarantee for future continual work, i.e. when a number of them retire or loose interest, the school can come into a situation that should stop the work.

9. WHAT IS THE FUTURE OF ISS?

15th anniversary of ISS in 2004 shall be opportunity to decide the future of the International Summer School on Direct Application of Geothermal Energy. It shall be the organization of the International Geothermal Days "Poland 2004". After that, 2005 is the World Geothermal Course year and, except International Geothermal Days, pre and post conference short courses shall be organized. In 2006, following questions should clear the future of the ISS:

- Are the experience and references of 15 years work of ISS enough good guarantee for the International Geothermal Association to accept it "really" as an common activity of IGA, i.e. except to go in risks with financing short courses in different countries all over the world organized by national associations or local universities, to authorize ISS to coordinate this type of activity and to finance the fellowship programs only for the events recommended by ISS? Without such authorization ISS cannot apply for financing through long term programs of EC, World Bank, EBRD, USAID or similar. In other words, financing education activities in undeveloped countries shall be not possible.

Organizational form of such "allocation" of the concrete activity of IGA should be in the frame of the Education Committee, where also the division of responsibilities between ISS and national co-organizers should be precisely defined and regulated.

- UNESCO auspiced the work of ISS for already 10 years and participated significantly in the fellow-ship program of ISS by supporting the participation of female specialists from developing countries. However, that's an "unprogrammed" support, depen-ding on the available sources each year. Is it possible to establish a multi year "programmed" educational activity in developing countries and to give the responsibility for that to ISS? ISS can guarantee for the success of short courses under its responsibility and most economical organization of them.
- World Bank, EBRD and USAID also finance educational activities in developing countries. Up to now, ISS didn't succeed to get their support because has not been connected to concrete national programs or projects. IGA should offer the service of ISS and, in that way, to be directly involved in performance of concrete programs enabling engagement of wider circle of internationally renown experts. The same is with EC, where still only concrete national education projects with support of several EC countries are financed. Still, no long term "common" geothermal education activity proposed by IGA has not been encouraged.

- Big countries, like Russian Federation, China or India, are looking for collaboration

with IGA in organization of educational activities according to their needs. However, their internal organization of decision making in different than in smaller countries and, up to now, no long term programmed collaboration has been established. In such countries a particular organization of training should be organized, composed of several "local" courses per year. Proposal of IGA, supported by EC, World Bank or EBRD, to take responsibilities for such type of organization in collaboration with local universities and institutes has good chances to be acceptable for all the involved international and national institutions.

In any case, the 15 years successful story reached its zenith. Now, it's time to close it or to improve it with new organizational form and content of work. We hope very much, on behalf of all the "army" of enthusiasts participating the development and work of ISS, that a justification to follow the activity shall be found and confirmed.

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