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Olkaria II Geothermal Power Plant, Kenya

Photo: Juhani Annanpalo

Geothermal energy makes a clean and stable energy source

Geothermal energy is a clean source of electricity, heat and cooling. Amidst climate change concerns, interest in this energy source has increased considerably during recent years.

This flexibility in geothermal energy helps the energy sector adapt to climate change. The CO_2 emissions from geothermal applications are small compared to fossil fuels and new technologies promise further reductions.

"Contrary to other renewable energy sources like solar, wind and hydro, the output of a geothermal plant is stable regardless of weather conditions or the time of the day," says **Hannu Eerola**, Country Program Manager at NDF.

Geothermal energy is the natural heat generated and stored in the earth's core, mantle and crust. The heat is transferred towards the surface mostly by conduction. The heat is accessible at various depths and temperatures depending on the geological conditions.

The most common sources for electricity generation are high-temperature fields connected to volcanoes and magmatic activity.

Usually the electricity is generated by using steam from high-temperature fields using conventional steam turbines. A geothermal production well is typically two to three km deep and produces steam or hot water. After the heat has been captured, the water is reinjected into the ground, making geothermal energy both renewable and sustainable.

Regions with volcanic activities are the most suitable places for generating electricity using geothermal energy. Geothermal fields are common on earth crust plate boundaries. New Zealand, Indonesia, the Philippines, Japan, the East African Rift system, Alaska, California, Mexico, Central America, the Andean region and Iceland are all attached to plate boundaries with intense geothermal activity.

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Many of NDF's partner countries are located in these areas of high-temperature geothermal energy. NDF is currently planning to support geothermal training activities in Central America together with the Inter-American Development Bank (IDB) and the United Nations University–Geothermal Training Programme (UNU-GTP). Similar activities could be considered in East Africa as well.

"By supporting capacity building activities in geothermal energy, NDF can promote the use of clean energy and in this way mitigate climate change," says Hannu Eerola.

NDF may also consider financing for small-scale testing and piloting activities as well as technical assistance.

Iceland has been a pioneer country in harnessing geothermal resources and has developed special expertise in this field.

UNU-GTP was established in Reykjavik in 1978 with the National Energy Authority of Iceland as host institution. Since then, more than 400 scientists and engineers from 44 countries have completed geothermal training courses of six months.

The University of Iceland has offered an MSc programme in geothermal sciences since 2000 and a PhD programme since 2008.

"The possibilities in geothermal power generation are vastly underestimated. Too little has been done to assist developing countries to harness this reliable energy source. Many countries in the African Rift Valley, in South-East Asia and in Latin America could achieve a clean energy transformation. With finance and expertise we could transfer renewable technologies to enable developing countries to continue growing — on a sustainable and renewable basis," says Iceland´s Foreign Minister **Össur Skarphéðinsson.**

Geothermal resources around the world

- Currently utilised in 70 countries
- Electricity is produced in 24 countries
- Total electricity generating capacity is more than 10 000 MW
- Up to 8 % of the world's total electricity needs may be covered
- Even greater potential for uses other than electricity generation, e.g. space heating
- Heat pump technology allows for heating and cooling practically everywhere

NDF to assist Vietnam in responding to climate change

NDF will finance a project in Vietnam with the objective of increasing the capacity to design and implement climate change response measures.

"Vietnam is one of the most vulnerable countries to climate change, among the top ten countries to be affected by global warming. At the same time, rapid economic growth threatens to increase CO_2 emissions. It is against this background that the government of Vietnam has made tackling these threats a key priority," says NDF's Country Program Manager **Martina Jägerhorn**.

In December 2008, the Government of Vietnam approved the National Target Program (NTP) as a response to the climate change threats. The NTP requires action plans for different sectors and provinces, but there is not a comprehensive approach or a set of guidelines for designing these action plans.

"That is why the primary goal of the project is to assist the government directly in setting these guidelines in certain key sectors that have not yet received any support," says Jägerhorn.

The key sectors are transport, energy, industries and urban planning.

The main objective of the project is to develop and put into operation detailed action plans and to strengthen institutions for planning and design of climate change projects. The project will also aim at supporting community awareness campaigns and designing climate change pilot projects.

The project will provide technical assistance to develop and implement the detailed action plans in support of the National Target Program. The technical assistance will support the Ministry of Industry and Trade, the Ministry of Transport, the Thanh Hoa province and two cities, Da Nang and Ho Chi Minh, in developing plans that can serve as examples for other sectors and municipalities.

The Ministry of Transport will be the Executing Agency for the technical assistance. The Ministry of Transport and the people's committees of Thanh Hoa, Ho Chi Minh City and Da Nang will function as implementing agencies under the overall coordination of the Executing Agency.

An international consulting firm together with local consultants will provide the consulting services.

The total project funding amounts to EUR 2.41 million. The NDF grant is EUR 2.21 million. The Asian Development Bank will act as partner agency. The project period is two years starting from October 2010.

Nordic Climate Facility — a second call for proposals to be launched

Photo: Juhani Annanpalo

The Nordic Climate Facility (NCF) has been promoting technology and know-how partnerships in climate change since October 2009. The main objective of NCF is to ease the transfer of climate change related technology, knowledge, know-how and innovative ideas from the Nordic countries to low-income countries. In this way, low-income countries will increase their capacity to mitigate and adapt to climate change.

The first call for proposals created considerable interest both among applicants and recipient countries. Although the concrete results of the projects of the first call for proposals are yet to be implemented, the experiences from the proposed projects as well as the process have been positive. That is why a second call for proposals will be launched in October 2010.

”There seems to be a significant demand for this type of seed financing,” says NDF’s Country Program Manager **Martina Jägerhorn**.

While the first call for proposals was directed towards water resources and energy efficiency, the focus of the second call will be on urban adaptation to climate change and renewable energy.

Originally planned to focus on biomass energy, the second call has been broadened to include other types of renewable energy. This change allows for the inclusion of energy sources that may not have separate calls, such as geothermal energy.

Economic growth and social progress are the key drivers behind the rapid rise of demand for energy in developing countries.

”If there are no convenient or affordable alternatives available, chances are that these countries will turn to fossil fuels. Most developing countries have a lot of renewable energy resources such as solar and wind. If these countries are able to develop these energy sources, they can reduce their dependence on fossil fuels,” says Jägerhorn.

It is expected that many of the competitive proposals for renewable energy will be implemented in rural areas. That is why the proposals for adaptation will support urban populations to tackle climate change challenges.

Over 90 percent of urban growth is occurring in the developing world. This rapid urbanisation, together with climate change impacts, risks undermining efforts to achieve and maintain sustainable development.

Possible projects on urban adaptation to climate change may include planning and implementing management information systems. These systems can increase nature disaster preparedness through weather-monitoring and climate-proofing of infrastructure such as storm-drainage systems.

NCF is administered in partnership with the Nordic Environment Finance Corporation NEFCO. The first call for proposals was granted a total of EUR 6 million. The second call of proposals has also been granted financing of up to EUR 6 million, making a total grant funding of EUR 12 million available for the Nordic Climate Facility.

More information will be published on www.ndf.fi and www. nefco.org.

Evaluation of solar energy projects

The Nordic Development Fund (NDF) has provided financing to the energy sector in more than 25 countries during the past two decades. While much of this support went to traditional energy solutions, NDF credits have also financed a number of renewable energy solutions such as solar energy.

An external evaluation was launched in May 2010 to assess results and capture lessons learned from solar energy projects in Honduras and Senegal. The main findings revealed that the provision of solar energy systems was highly relevant to the communities since they are outside of the national electrical grid; furthermore, due to their remote location the communities will remain without electricity for the foreseeable future. In Honduras, the solar energy systems were exclusively used for electricity in schools while those in Senegal were used for electrical water pumps.

The delivery of the solar energy systems experienced delays both in Honduras and Senegal. The training of recipients seems not to have been optimal, which in some cases led to problems with operation and maintenance. A main lesson learned is that future solar energy projects need to place more emphasis on local ownership and long-term sustainability.

The impacts of the solar energy systems in the communities in Honduras and Senegal were found to be generally positive. In the case of Honduras, the arrival of solar energy means that many schools now benefit from other national programs as they have computers and televisions available in classrooms. One teacher commented:

“It is remarkable to see how children, whose parents cannot read or write, now are using the internet.”

Support to capacity development and renewable energy for Indigenous Peoples and Afro-descendants in Honduras

NDF grants EUR 3.5 million to help indigenous peoples and Afro-descendants in Honduras tackle climate change challenges. The overall objective is to increase the capacity of these peoples to respond to climate change, to secure civil society monitoring of obligations related to climate change and to provide renewable energy solutions to local communities.

Honduras is one of the most vulnerable countries to climate change in Central America. Rising temperatures and changes in rain patterns will likely worsen this situation with more intense weather conditions and natural disasters, such as hurricanes, floods and drought.

Between seven and twelve percent of the population in Honduras consists of indigenous peoples and Afro-descendants. Furthermore, the Human Development Indicators for these groups are significantly lower compared to the rest of the population. These communities are highly dependent on local natural resources for their livelihood and are consequently very vulnerable to climate change.

”The traditional knowledge developed over generations is no longer sufficient to tackle the seasonal variations due to climate change. That is why there is a need for combining traditional knowledge with up-to-date information to develop methods and tools for these communities to adapt to climate change,” says NDF's Country Program Manager **Aage Jørgensen**.

The project will support climate change courses for community leaders, community adaptation activities, integration of climate change into curriculum and scholarships for indigenous students. The project will also provide support to civil society monitoring, information and advocacy regarding national climate change obligations and priorities.

Another component will support renewable energy solutions to indigenous and Afro-descendant communities without electricity. The renewable energy will be both used to process and conserve agricultural products and for individual household lighting.

The project will link up with the ongoing Indigenous Peoples Development Program financed by the Inter-American Development Bank.

The total Project funding is EUR 12.35 million, of which NDF will grant EUR 3.5 million. The project period is four years starting from January 2011.

GRANT FINANCING FOR CLIMATE CHANGE PROJECTS IN LOW-INCOME COUNTRIES

The Nordic Development Fund (NDF) provides grant financing for climate change interventions in low-income developing countries. NDF is the joint development finance institution of the Nordic countries—Denmark, Finland, Iceland, Norway and Sweden—and finances projects in cooperation with other development institutions.

Nordic Development Fund

NORDIC DEVELOPMENT FUND, P.O. Box 185, FIN-00171 Helsinki, Finland
(Visiting address: Fabianinkatu 34), Tel: +358 10 618 002, Fax: +358 9 622 1491, E-mail: info.ndf@ndf.fi, www.ndf.fi

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