Steam

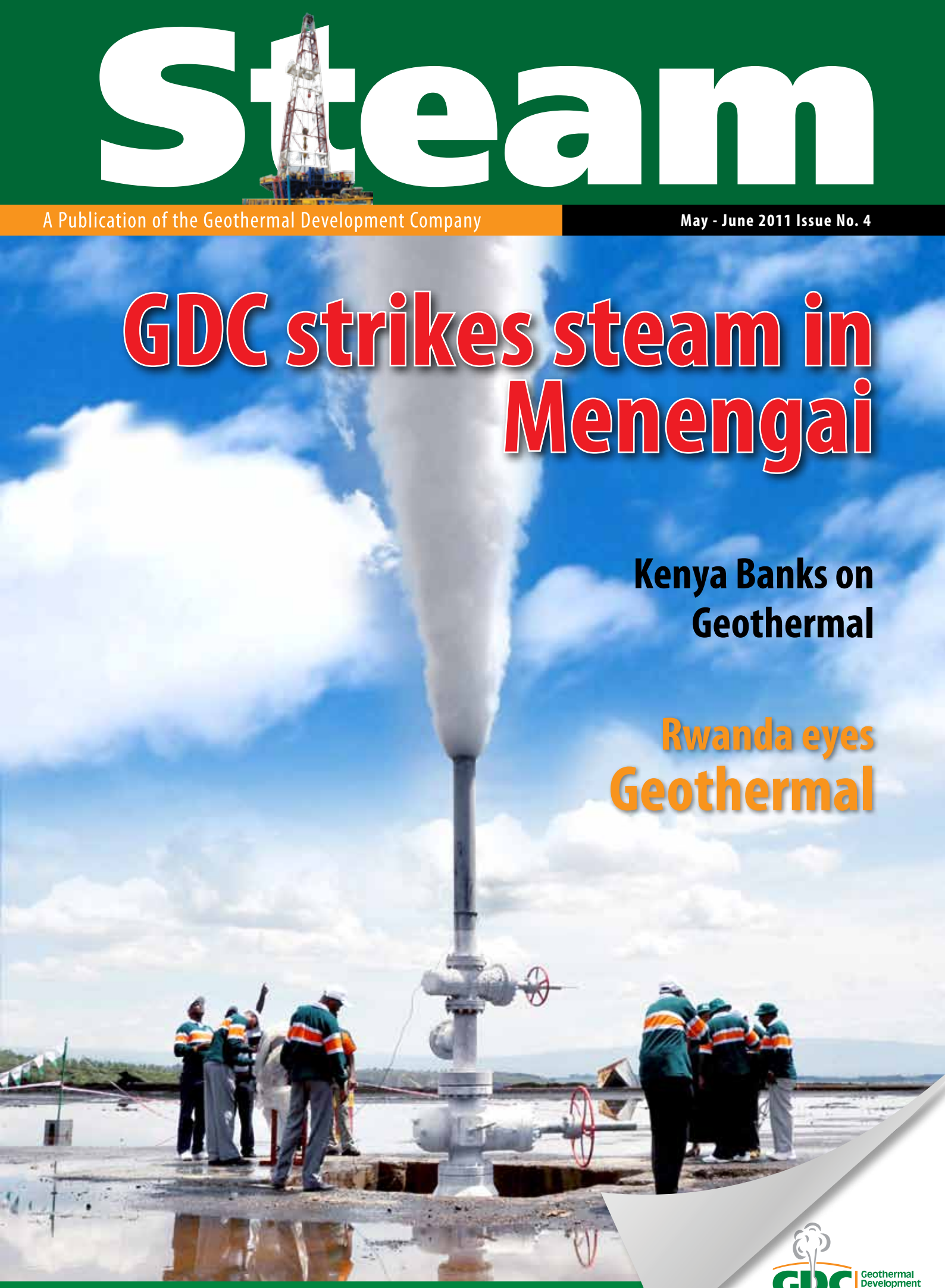
A Publication of the Geothermal Development Company

May - June 2011 Issue No. 4

GDC strikes steam in Menengai

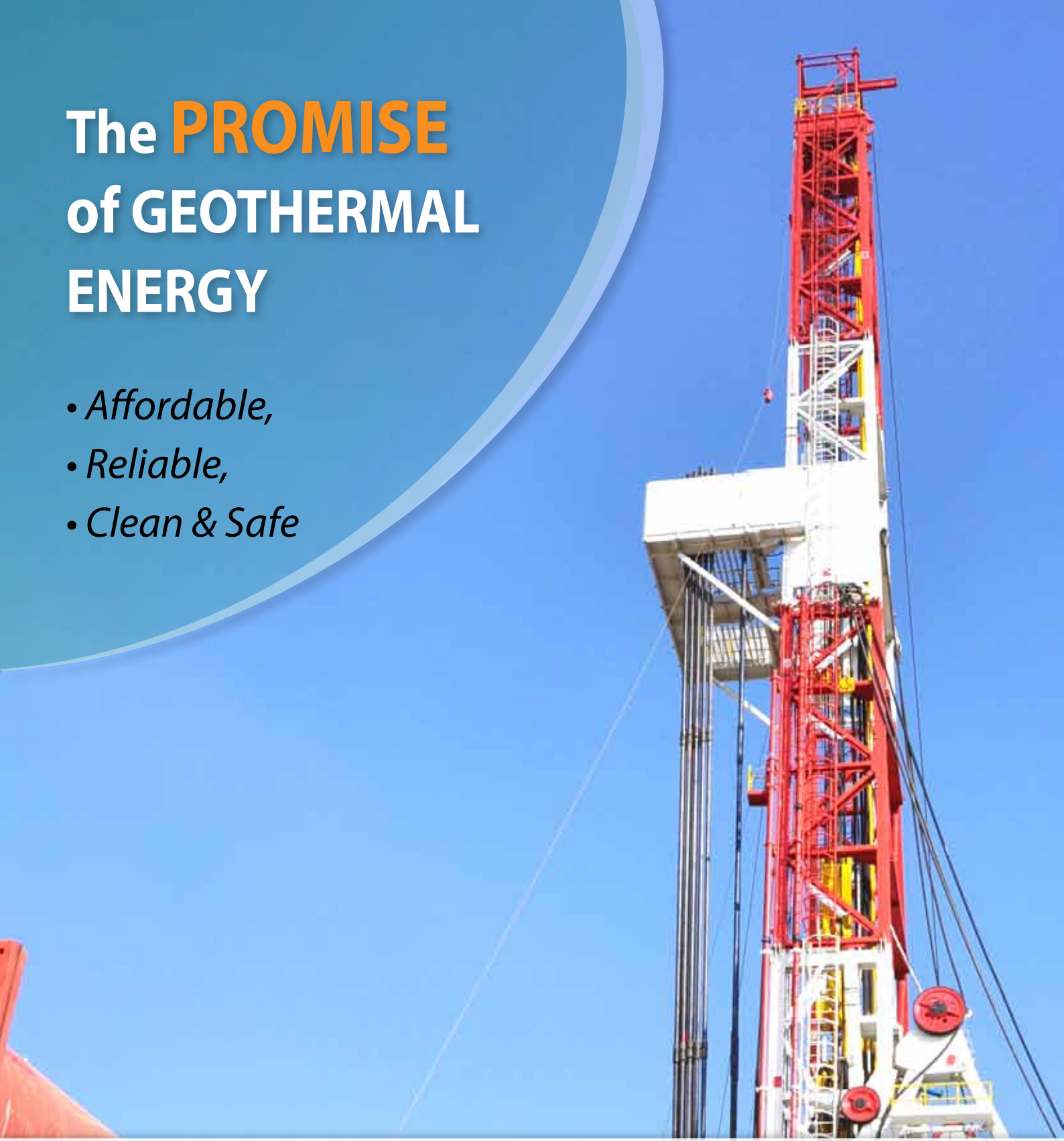
Kenya Banks on Geothermal

Rwanda eyes Geothermal



The PROMISE of GEOTHERMAL ENERGY

- *Affordable,*
- *Reliable,*
- *Clean & Safe*



Geothermal energy being developed by GDC will supply millions of Kenyans with safe, clean, affordable and reliable energy. A product of heated subterenean water, geothermal is by far the safest energy sources on the planet. Kenya is lucky to have over 10,000 MWe of geothermal resources.

Editorial Committee

Steam is an authoritative platform that reports on geothermal development activities in Kenya. It gives readers an understanding of the great potential that exists in Kenya and how GDC is providing an enabling environment for investors to play a key role in providing Kenya with green, reliable and affordable energy.
Steam is published quarterly by the Geothermal Development Company Limited (GDC). Views expressed in this publication do not necessarily reflect the position of GDC.

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Editorial

For Kenya, geothermal is the panacea for energy shortages. The thing about geothermal development is that it happens in remote locations. In Kenya, we are talking of the North Rift, Central and South rift regions. A few geothermal sites are found outside the rift valley. In most of these areas, drought is a permanent feature and residents compete with their flock over meager water resources. They are never assured of their livelihoods.

These are the areas where GDC will deploy state-of-the-art geothermal installations to produce enough electricity to meet domestic and industrial energy requirements of this country into 2030 and beyond. These geothermal centers will be a beauty to behold, complete with rigs, rig camps and power stations.

But of what use will huge geothermal installations be to a hungry, thirsty lot? This is why GDC has chosen to walk a path hitherto unfamiliar in geothermal development in Kenya, and indeed in Africa. In this issue, we highlight the tenets of our innovative integrated approach to geothermal development. It is a refreshing approach that will leave you amazed at the potential of geothermal; a potential that goes beyond electricity production. The integrated approach is informed by our commitment to offer holistic solutions to local challenges. This means we will produce electricity while transforming the fortunes of host communities.

And in another of GDC's first, we have completed a 10 MW discovery well in Menengai. Ordinarily the first geothermal well in a new field yields less than 5 MW. Ours is more than double. We also bring you a story of the Early Generation Model whereby a well head generation unit is fitted to a single geothermal well immediately after drilling and well testing. Upon inception, GDC popularized this strategy as a way of ensuring quick production of geothermal power. Before GDC's entry, geothermal wells lay idle for more than ten years awaiting the construction of a conventional geothermal power plant. Thanks to GDC, it will soon be "electricity pap!" No more need to wait for 10 years! And now, the national power generator is about to commission the first wellhead generation unit thanks to GDC's innovation. It will produce 6MW! With this approach, this country will no longer need emergency power; geothermal will suffice.

As we explore new geothermal frontiers, we once again bring you an investment opportunity in North Rift. There is 800MW worth of business up for grabs. For those with a keen eye for business, look no further than the Bogoria- Silale geothermal block that stretches all the way from Lake Bogoria to the Silale caldera. This block boasts of a geothermal potential of more than 3000MW.

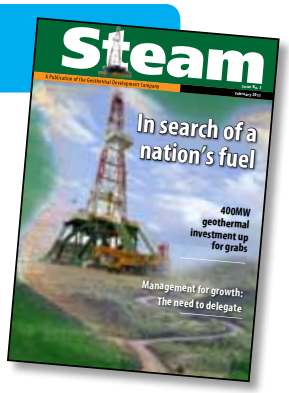
Being a thought leader in matters geothermal, we are already undertaking consultancy work for several countries in Africa; more of this in our international geothermal news pages. And we have a lot on management, stock markets, environment, CSR and book reviews waiting for you. I promise you that you will be unable to keep this captivating publication down until the last page. Trust me.

Ruth

Cooperation news... *Kenya's Energy Min. Hon Kiraitu Murungi (r) and his Rwandese counterpart Eng. Coletha Ruhamya are joined by other delegates in Nairobi to announce a bilateral cooperation on Geothermal energy*

Inside

Your letters



Dear Editor,

I came across the February edition of STEAM and was delighted to read it. It is very well written and has quite a diversity of interesting articles. Kudos to your editorial team and GDC in general for doing a wonderful job of ensuring we get access to reliable and clean energy. The targets are quite ambitious but I am sure these will be achieved.
Best regards,

Yusuf Jin, Mombasa.

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I want to appreciate the Steam edition of February 2011.The articles therein are very informative especially those touching on technical areas. I was especially impressed by Mr Wambugu's article, as he explained the functions of his department. I suggest you have such articles in every steam edition where different managers highlight their departments' functions. This will form part of continuous learning. I'm looking forward to your next issue.

Jane Mwangi, Nairobi.

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Allow me to congratulate you for the great magazine that you have been publishing. I have been reading the copy online. It makes a great read. The paper and pictures are of very good quality. The magazine is very informative and professionally written; in fact it is one of the best corporate publications I have come across. It has a wide scope and is proving to be an authority on geothermal energy.

Geothermal energy is surely the only option for Kenya and everyone should be able to come and support your efforts. It is exciting for instance to see that your rigs are drilling in Menengai. This gives us more hope. Keep informing us through Steam.

Pius Kirwa, Nairobi.

The Editor welcomes letters on topical geothermal issues. Write to the Editor, Steam, Geothermal Development Company, P.O. Box 100746 - 00100, Nairobi Kenya. You can also send email to steam@gdc.co.ke.
The Editor reserves the right to edit the letters for space and clarity.

Geofacts

1. For Kenya to attain a mid-income economic status, she needs at least 15,000MW by 2030. Geothermal energy will provide 5000MW.

2. Kenya's geothermal resources are found in over 14 high temperature prospects.

3. In contrast with hydroelectric power, geothermal energy is not susceptible to seasonal fluctuations, and is available all year round.

4. The origins of geothermal energy are deep rooted in formation of the planet. It is a sum of macro activities such as radioactive decay of minerals and materials, incessant volcanic activities and absorption of solar heat.

5. Geothermal power plays a vital role in reducing the effect of global warming.

In solidarity... *The GDC Board of Directors join drilling technicians to celebrate the opening of the Menengai Well One.*

Towards a geothermal economy

The global economy is still reeling from the tremors of instability bedeviling the oil- producing North Africa and Mid-East. The Arabian social-political turbulence has dealt the world a wild card by tempering with crude prices. The result is grim - runaway inflation and protests across nations. If this instability persists, we may experience the oil-crisis of the 70s.

That is how treacherous it is, to be on the life-machine supported by oil. To a country like Kenya, an oil crush means double trouble considering we are yet to fully recuperate from the whack of a failing rain-powered electricity.

Luckily part of the solution to this grave uncertainty is right here with us–geothermal energy. GDC has proven that the Menengai geothermal field has plenty of steam. The first well in the field also known as the discovery well is complete with a productivity of 10 MWe this is the mother of all wells. In Kenya this is the first discovery well of such capacity. First wells in other fields rarely produce more than 5MWe. Kenya has a great geological advantage to her neighbors producing more than 14 high temperature geothermal sites with a potential of up to 15, 000 MW. This resource will usher Kenya into her golden age.

Use of clean energy is ranking high in global geopolitics and shares the same primacy as human rights, democracy and justice. Furthermore, it is a preriquisite of economic engagement with an increasingly green conscious world.

It is exciting to know the wonders of geothermal. Apart from generating electricity, geothermal can support a raft of other profitable ventures. And that is why GDC is deviating from the narrow path of electricity to a bigger scope.

Our grand gambit is laired at ingenuously tapping on the hot geothermal fluids -extracting heat, water, other precious elements, and stir an economic renaissance.

For starters, the process of electricity generation produces millions of liters of water. Elsewhere, such waters go to waste. We at GDC will use the same water to support irrigation and relieve the nation from rain-fed agriculture.

Our commitment is to facilitate communal entry into entrepreneurship through cooperatives. These co-operatives will operate geothermal-related enterprises such as geothermal recreation parks, processing of hides and skins, or running abattoirs especially in the livestock-rich north, using geothermal by-products. The possibilities are countless.

Take the example of the Rhine Valley in Germany. Rhine Valley boasted energy from coal and water from the mighty River Rhine. This way, the valley emerged as one of the world's premier industrial zone. Our own valleys and hills teeming with geothermal energy and an equal amount of water have all the makings of a Rhine albeit belated.

Indeed, availability of affordable electricity and abundant water are twain principles for a serious industrial growth. Geothermal will attract such industries like soap-makers, milk pasteurizers and grain driers. The advantages are manifold: taming the rural urban migration tide, creation of massive employment and most of all, transiting into a geothermal economy.

Though the west's model of industrialization was powered by fossil fuel, there is no ordination that we must ape that precarious design. Geothermal resources will provide a safer, sustainable growth.

When more of our industries and homes use geothermal heat, we become less dependent on petroleum. As a result, we shall save our country massively in foreign exchange bills.

This way, we are going to rehabilitate ourselves from the oil intoxication. If the Emirates prosper from petro-dollars, so should Kenya with her geothermal steam-dollars. Geothermal is a heritage that Kenya needs to be proud of. With geothermal, we will shift from instability to stability, from despair to hope, from paucity to riches.

Dr. Silas Simiyu, Managing Director & CEO, GDC

"When more of our industries and homes use geothermal heat, we become less dependent on petroleum."

GDC strikes steam in Menengai

True to our pledge, GDC has struck substantial amount of geothermal steam in Menengai, Nakuru Kenya. The discovery well has a potential of 10 MWe. It was sunk to a depth of 2200M within 72 days.

The Menengai Well One (MW-01) started discharging on the Thursday May 12, 2011 and instantly attracted massive international attention.

"I'm very excited about this new development," said Paul E. Gondi, the GDC chairman who was among the first dignitaries to visit the site. "The success of this well brings a lot of joy not only to GDC but to Kenya as a whole. It gives me comfort to know that Kenyans will soon start to enjoy the benefits of our efforts."

His happiness was shared by the by the company Managing Director & CEO Dr. Silas Simiyu. "This is a milestone for the country," Dr. Simiyu announced. "This was a discovery well and with a potential of 10MWe it has succeeded convention. We also managed to cut the drilling cost by a half. Normally a well costs Shs. 500 million to drill but we only spend Ksh. 250 million on this one. Therefore we have saved a lot of money which means that the electricity tariffs will also be lower."

Menengai has a geothermal potential of 1600 MW. It is expected to produce 800 MW by 2018.

Paul E.O. Gondi, GDC Chairman

The iconic well... *the Menengai Well One (MW-01) spectacularly discharges steam. Inset GDC Engineers admire the Well One early hours of Thursday May 12, 2011 when the well was opened.*

"The success of this well brings a lot of joy not only to GDC but to Kenya as a whole. It gives me comfort to know that Kenyans will soon start to enjoy the benefits of our efforts."

GDC installs latest technology

Some GDC staff during one of the SAP ERP training at the Riverside Office, Nairobi.

GDC has joined the elite club of modern corporations after it acquired and installed the SAP Enterprise Resource Planning (ERP) system. The system will see improved efficiency and speedy delivery of services.

"We are happy that the process of installing the system has been a success. Already some modules are live and others are being finalized. It has been a tough exercise but exciting nonetheless," says Godfrey Shitsama, the GDC Deputy Manager, Finance, who is also the ERP project manager.

ERP is an integrated system that links all the departments and branches within GDC. The consultants for the project Deloitte Consulting Ltd and EIM solutions who installed the system trained a section of GDC staff who later trained others.

"The model of training our own staff as trainers has worked well with us. We are now focusing on training the end-users and encouraging speedy adoption of the system in daily transactions," Shitsama says.

ERP will provide the company a modern platform to integrate with other institutions like banks and other service providers. It is also a crucial system in developing reports because it tracks every single transaction within the organization. By installing the best business system in the world, GDC is reaffirming its commitment to transparency, planning, and streamlined operations.

GDC goes big in international consultancy

The Geothermal Development Company will this year provide a series of international geo-scientific consultancy services to different countries.

Already invitations have been received from the Malawi-based Geothermal Projects (PTY) Limited, Saudi Arabia, Ethiopia by Reykjavik Energy, Djibouti, Tanzania, and Rwanda. GDC has already entered into contracts with some of these partners.

"A major consultancy will be carried out in Rwanda," announced Mr. James Wambugu, the Manager, Resource Development at GDC. "GDC will provide an all-inclusive program including drilling of exploration wells, building infrastructure (roads, water system, and drill pads), well testing, and training of local scientists and engineers."

This latest development places GDC at a strategic position as the lead geothermal firm on the continent. The consultancies will also form a base of revenue for Kenya's premier geothermal company.

"With the kind of expertise we have at GDC, there is a lot we can offer. We are even going to offer drilling services and expertise on direct utilization of geothermal resources," affirmed Dr. Silas Simiyu, the Managing Director & CEO.

Gideon Yator a GDC rig geologist sampling well cuttings in Menengai.

Consequently, Dr. Simiyu has urged scientists at GDC to be innovative and research-oriented as they prepare `to take leadership of geothermal energy services in the region. In Africa, 11 states lie on the Eastern Africa Rift System, a geologically active belt with massive potential for geothermal energy development.

Kenya forms geothermal association

A key professional body which will champion the development of geothermal energy has been formed.

The new body, called the Geothermal Association of Kenya, (GAK) is a non-political and non-governmental association which is an affiliate member of the renowned International Geothermal Association (IGA).

The main objective of the body will be to encourage, facilitate and promote coordination of activities related to local and worldwide research, development and application of geothermal resources.

Other objectives of GAK will be to encourage research, development and utilization of geothermal energy in Kenya.

It will also advance and promote the establishment of criteria for the exploration and development of geothermal resources. This will be done in a manner compatible with the natural environment, support enactment and adoption of uniform and appropriate legislation, rules and regulations for the development and utilization of geothermal energy resources.

GAK will provide a platform for objective information on the nature of geothermal energy and its development, facilitate collection and dissemination of data related to geothermal resources and development as well as lobby national and international governmental, institutional and private agencies on development and utilization of geothermal resources.

It will also promote geothermal education by conducting and participating in seminars, field trips and conferences.

GAK is chaired by Dr. Silas Simiyu, the MD & CEO Geothermal Development Company. Membership is open to persons involved or interested in any aspect of geothermal development. For more information please visit www.gak.co.ke.

Bankers pay GDC a call

Menengai has played host to several key delegations in the recent past. Of note too has been delegation from international financial institutions and supporters of geothermal development in Kenya.

The money people included World Bank Group, French Development Agency (AfD), African Development Bank (AfDB) and Japan Bank for International Cooperation (JBIC).

The team from the Bretton Woods Institutions has been keenly following the geothermal operation especially in Menengai. At hand the GDC experts have always been ready to explain this and that.

World Bank Group is one of the key supporters of the renewable energy sector in developing countries.

Sampling the ambience of Kenya's beautiful flora and fauna has always capped the tours, and no other better place that is done than our very own Lake Nakuru National Park.

Appraisal tour.. *Visiting AfDB delegates at the Menengai Geothermal project.*

Geologists salute GDC

Kenya's top geologists who attended the Geological Society of Kenya exhibition at the University of Nairobi commended GDC on its efforts to revolutionize the energy sector in the country.

"We are encouraged by GDC in the pursuit of geothermal energy for this country. Indeed, geology plays a critical role in that endeavor. It is at GDC that you will get a clear demonstration of how geology acts out for the social economic growth of a nation," noted Dr. Dan Olago, the Chairman Geological Society of Kenya.

John Lagat, the GDC Chief Geologist, made a presentation on the role of geology in exploration of clean energy. Lagat's presentation covered the historic journey GDC has trudged in exploration process.

Geological Society of Kenya (GSK) is a professional society for geologists. Registered in 1974, it aims at promoting discussions in geology through seminars.

The exhibition held at the University of Nairobi, was attended by hundreds of geologists including students from universities and secondary schools.

Meanwhile the GSK has created two student awards in honour of GDC namely "The Geothermal Development Company Award" and "The Dr. Silas Simiyu Award".

UN chief hails Kenya's geothermal plan

Ban Ki-moon, the UN Secretary General, has hailed Kenya's effort in geothermal development saying it is the onset of a low carbon, resource-efficient, green economy.

During his visit to Kenya recently, the UN Chief said he was fascinated and privileged to learn how Kenya is tapping on the abundant volcanic heat in the rift valley to generate electricity.

"Kenya is not rich in oil, natural gas or coal reserves. But it is has a wealth of "clean fuels" — from geothermal energy, to wind, solar and biomass."

"It is a remarkable story," he continued. "Not just in terms of renewable energy and climate change — but in partnership for development."

The geothermal projects, noted the UN chief "are among a growing number of examples of how the United Nations,

Mr. Ban Ki-moon

the World Bank, donor Governments and the private sector are supporting forward-looking public policies — policies that can help to reduce poverty and lay the foundations for a truly sustainable future."

He promised that UNEP and the Global Environment Facility (GEF) are working with Government, regulators and power companies to address technical deficiencies through improved electricity generation and distribution.

This collaboration, he noted, has the potential to catalyze renewable energy in Kenya and the region's East Africa Power Pool. "Kenya and many other countries are showing there is a growing menu of economically viable choices for generating energy."

In an effort to meet the country's energy needs, the Government of Kenya created the Geothermal Development Company (GDC) to speed up the attainment of 10,000 MWe from geothermal resources by 2030. Currently, GDC is drilling for geothermal steam in Menengai and Olkaria. GDC is also opening up the Bogoria-Silale Block which has an estimated potential of 3000 MWe.

FOMEC congratulates GDC

Friends of Menengai (FOMEC), a conservation Trust, has congratulated GDC for the successful discovery well drilled at Menengai. Calling it a big achievement, Cheryle Robinson send best wishes to GDC as it continues to drill.

Arising from this historic success, and "for more mutually beneficial collaboration", FOMEC would now like to partner with GDC in educating Nakuru people on the environment, the Menengai caldera and the GDC geothermal project. "FOMEC (will) do the manning of the education centre during the week and assist with the displays and information from the environment side", she said in an email to GDC. GDC and FOMEC have enjoyed cordial relations since the commencement of the project. The Menengai Geothermal Project is being undertaken in compliance with the approved environmental management plan (EMP).

"The GDC has fully involved the members of Friends of Menengai Trust in its efforts to monitor and reduce any possible environmental impacts. A joint site rehabilitation plan has been developed," *says the FOMEC website*

Standing tall…one of the GDC's drilling rigs in Menengai. Well One is complete.

Germany to offer geothermal support

Kenya stands to benefit from technical support and knowledge transfer on geothermal energy following a new partnership between GDC and a Germany-based organization.

The Federal Institute for Geosciences and Natural Resources (BGR) from Germany will provide this support beginning November this year.

"GDC requested BGR for technical assistance on High Resolution Thermal Infrared Remote Sensing survey of geothermal areas in the Northern Kenya Rift," says James Wambugu, the Manager, Resource Development. GDC and BGR have already entered into a contract on the same.

In readiness for the project, a team of five staff members from Resource Development (RD) at GDC has already gone for training on remote sensing at the Regional Center for Resource Mapping in, Ruaraka, Nairobi.

GDC stands to benefit through knowledge transfer to staff who will be working with the experts in the field. They will be trained on remote sensing both locally and in Germany. BGR will fund the project in the North Rift and support the procurement of high resolution satellite images for use by GDC scientists. This exercise is expected to roll out in November and will cover Silale, Paka, Korosi and Barrier prospects.

A section of the Barrier Geothermal Prospect

"It is important to note that among the many methods of remote sensing, the high resolution thermal infrared method is very reliable in locating "hot spots" which are areas of high thermal flux and very good indicators of geothermal occurrence," Wambugu, told Steam.

"The BGR of Germany boasts of the most internationally recognized expertise in this area and previously conducted such a survey in Menengai in 2005."

All ready for geothermal conference

Mr. Cornel Ofwona

Kenya will host a geothermal conference from 21-23rd November, 2011. The event organized by the Geothermal Association of Kenya (GAK) is focusing on geothermal exploration, drilling, reservoir management, project financing, generation, direct utilization environment and investment opportunities.

Already a steering committee is in place to prepare for logistics toward the event. The organizers are promising a great opportunity to "to meet players from across the African region and beyond."

The committee chaired by Mr. Cornel Ofwona the Manager, Reservoir Engineering, also the Manager North Rift Area at GDC. KenGen's Dr. Nicholas Mariita is the secretary while GDC's Godfrey Shitsama is the treasurer. Members to the committee are: Ruth Musembi, Dr. Peter Omenda and Nelly Rwenji from GDC. Eunice Muthamia and John Omenge are representatives from the Ministry of Energy while Raphael Mworia, Maggie Ogutu, Cyrus Karigithi and Antoinette Kamau are from Ketraco, KenGen and ERC respectively.

Manufacturers and contractors will have an opportunity to show-case their technology and products. There will also be field trips to geothermal fields in Rift Valley. *Visit www.gak.co.ke*

Turkish town seeks innovative technologies for producing geothermal energy

Picture: Courtesy

The local community of a small Western Turkish town that has one of the biggest Geothermal resources of Turkey is looking for international innovative technologies for evaluation and the utilizations of these resources primarily for producing energy and other applications. The community is looking for license agreements, commercial agreements with technical assistance as well as joint venture agreements and technical cooperation opportunities.

Turkey is located on the Mediterranean volcanic belt which is one of the most promising geothermal fields. Of an estimated 31 500 thermal Kw (Tmw) of geothermal power, around 28 MW of electricity is produced with 3,600 Tmw.

Work continues on the construction of a 45 MW power station. Due to the new Turkish alternative energy laws, Turkey is going to accept an international enterprise to mentor these resources for geothermal power plants, heating suburban areas or building fully automated green-houses etc.

Aside from the reality that Turkey's geothermal heat potential is around at 50 billion dollars, it is an exciting fact that the current number of 125 000 houses are heated with geothermal energy. This number can soon reach 1 million, and 1.5 million in the longer term.

If Turkey's geothermal potential is mentored with qualified project, it could create a new jobs, not only heating houses but also this energy will be used in production of electricity which could be bought back by Turkish Government. Also energy could be used in building as green houses for growing agricultural products. Turkey has a very fertile land, is a country with big agro-food sector for domestic use or export.

(source: European Union)

Japan can bridge energy gap using geothermal resources

Although Japan has large geothermal resources, it overlooked this important source that could replace 100 per cent Japan's planned nuclear power generation capacity in the coming decades.

A renowned Indian energy expert has now asked Japan to boost its geothermal capacity instead of relying on nuclear power. Varun Chandrasekhar, the Managing Director of Mumbai-based Geosyndicate Power, has said its time for Japan to start tapping its vast geothermal resources to fill the gap. "With Japan facing 2.5 per cent reduction in its power production due to failure of all four nuclear power plants in Fukushima following severe earthquake and tsunami, it cannot ignore tapping its vast geothermal resources to fill the gap," he said

He added Japan will take a long way to recover from this disaster but its immediate emergency is to bridge the energy gap that resulted due to sudden shortage of 2.8 GWe.

Varun further observed that Japan "…cannot ignore this important vast resource, given the advantage of having all the turbine and geothermal power plant manufacturing giant companies, like Mitsubishi Corp, Fuji Electric and Toshiba, on its board," he said.

Considering the time taken to recover from the disaster like Fukushima, constructing geothermal power plants is a much simpler option to put the power back in the grid, he said. A power plant based on geothermal energy harnesses the heat from the earth's inner layers to produce electricity.

"As of today, Japan is generating 3,000 GWh (units) from 18 geothermal power plants contributing 0.3 per cent of total electricity production. Eight geothermal power plants are located in northern Japan and four of these are located in and around Sendai," he said.

(Adapted from: http://www.thehindubusinessline.com/industry-and-economy/economy/article1604827.ece

A visitor looks at a discharging well in Kenya. Japan is being encouraged to go geothermal energy.

Managing the geothermal supply chain

10 questions for the Manager, Abraham Saat

Mr Saat seated, and the team

What does the Supply Chain Department concern itself with?

The department is tasked with the procurement of goods, works and services on behalf of the company. We are guided by the Public Procurement and Disposal Act of 2005, and the Public Procurement and Disposal Regulations of 2006. We acquire by purchase, rental, lease, hire purchase, license, tenancy, franchise, or by any other contractual means works, assets, services and goods.

How unique is it to procure for a geothermal firm like GDC?

The geothermal industry is quite specialized and highly technical, with a limited supplier base. The industry is also heavily reliant on imports. We are therefore often vulnerable to extensive import procedures, long lead time for acquisition of goods, sometimes extending to more than a year from the time the procurement commences to when the goods are delivered. Given that GDC is a state corporation run by the government budgeting process, this can be very tricky. Besides, most of our procurements require huge financial outlay; a single procurement may cost us billions of shillings. All these realities mean that at times we must seek the indulgence of the Public Procurement Oversight Authority. Procurement in this sector therefore demands that the supply chain office is on the alert at all times.

What has been the most challenging aspect for the procurement office?

It was starting the department. It was really tough. Still, the pride we take is that from a single officer the supply chain department has grown to a strong team of 24 dedicated members. Of course providing continuous professional guidance to the tender and procurement committees on the much procurement we have undertaken has been a mammoth, yet thrilling task for us in the department.

Your department successfully procured two geothermal drilling rigs, how was the experience?

The procurement of the two rigs that are at Menengai now was a first in this country. We had to undertake negotiations and continuous follow-up to ensure that the rigs were fabricated as per specifications. GDC engaged independent inspectors (SGS) to carry out pre-delivery inspection. The experience was new but great nonetheless. It was a big success.When the rigs landed in Menengai, it was pure joy and lots of celebrations. It was our highest moment in the department having procured machinery of that magnitude without incidences or setbacks.

What should internal and external customers expect from the Supply Chain department?

We are at the service of everyone. Our work is to ensure that purchases are achieved timely and affordably. Supply Chain is a service department and heavily relies on the guidelines of the Public Procurement Act. People need to also know that we do not operate in isolation; we facilitate the acquisition of goods, works or services as per the specifications and terms prescribed by the user department. Suppliers can expect a fair chance to do business with GDC.

How does Supply Chain link to other departments at GDC?

Being a service department, Supply Chain department helps in sourcing for goods, works and services for other departments. The department is the link between the users and the suppliers. A big percentage of user departments' budget is spend on procurement of goods, works or services with our facilitation.

What is it like to work in a Supply Chain Office?

It is challenging. One must always be alert; you are the problem-solver and adviser. Therefore, it calls for patience and an understanding of the trends both locally and globally. In Supply Chain, integrity is paramount. Since it means giving business to others, it is easy to get cheeky suppliers who would want to be favoured. Of course that is unfair; still it explains why a strong character is critical for this department.

What are some of the challenges of the job?

Low awareness on Public Procurement regulations by users is a great challenge. At the same time, managing emergencies of all types, high volumes of procurement, non performing suppliers and sometimes poor response to tenders are some of the challenges.

Describe your team

The supply chain team is dedicated, full of energy and very accommodative. It is a great team to work with.

What is the most important aspect you want to see GDC achieve?

It will be a great joy to see GDC achieve its objective of providing an affordable source of power targeted at 5000MW in the next 20 years.

The man, the jungle and his machines

"I love rocks and big old cars. I like to sweat and to get tired," - Johnson Mungania, a geothermal veteran.

The venetian blinds behind his back flap to open a captivating vista, inviting crisp fresh air. It is one of those Nairobi's rarities - canopies swinging to your delight; air unsullied. But to him such grace matters less. If anything he notices trucks that deliver concrete, and the chatter and clank of a construction site.

"I love machines," he declares. "I love big machines, big cars and lorries; the old the better. I love to sweat," he says, then reaches for his ringing blackberry.

Welcome to the world of Johnson Kimathi Mungania. A trained geologist, you would expect him to be cracking rocks and searching for fumaroles. Nope.

Mungania, who is the Manager, Infrastructure & Logistics at GDC is very much at home in civil engineering. He is charged with developing and implementing civil work concepts for geothermal projects. The Menengai project attests to the versatility of a man who shoots from the hip.

"Menengai had a tricky formation; we handled it well nonetheless," he admits. Then, he fishes a satellite image of a caldera whose architecture is twists and turns.

"We had to be smart," he says audaciously. "We were forced to blast some areas for passage. For water, we sunk boreholes. That's how we can drill today."

Indeed, Menengai boasts a huge water reservoir totaling 20 million liters and a road that zig-zags the hills and valleys of the caldera. This is no mean achievement though Mungania takes it in his stride and credits his team instead.

Mungania is the current crop of geothermists who is entering the crèmes stage. This is a phase where one has a global picture of the geothermal enterprise.

"As a geothermist, you have to be an all–rounder. One needs to understand how departments converge, when they converge and why," he says as he serves coffee.

The coffee aroma fills the air as he pours water in my mug. For him, honey-sweetened-tea is just great.

It is in this small talk over tea and coffee that he gleans through his life as an explorer:

"The world was bushy then," he recalls. "It was adventurous trekking in the wild as we explored for steam all day long. One time we were denied entry to a hotel because senior politicians were around… While in Marigat I used to enjoy herbal medicine …"

The manager with a youthful frame dons an old black disco-watch with a leather strap that fits tight.

"Short sleeves are also good for me because I can't predict my day. One minute I'm in the office another I'm in a workshop. That's why I don't like ties. It's for safety measures," he explains unapologetically.

Mungania also enjoys gardening and tending to his cattle. On weekends he will be busy working on fences or servicing one of his many machines. "I hardly go to the garage," says the man who also plays with his grandchildren.

To Mungania, Menengai is at heart. He lights up flashing back his expeditions in the caldera two

(...Cont.on page14)

The grandmaster of Geothermal drilling

Japheth Kituli strode with grandeur across a hushed hall. Neat haircut, clad in a dark suit, white shirt, with shiny black shoes to boot, he humbly accepted the GDC 'Chairman's Excellence Award'.

On that evening, Dr. Silas Simiyu, the GDC Managing Director described Kituli as the "grandmaster of drilling who has contributed immensely to the growth of geothermal in the country."

"Of course it was a sweet surprise. I was really touched," Kituli says over coffee at the Menengai Caldera amid the whirr of a rig and revs of trucks.

This midday, the sun is offending. Kituli is ecstatic; clad in jeans, safety boots and a sweatshirt complete with a red helmet. He is at work.

The red helmet is fading to orange. However, the embed, "Japheth" is still visible. It has a number of stickers from drilling companies.

"This helmet has seen many years. It has drilled most of the wells you see around. I also used it in Canada during training… I got it in the early 1990s. I've kept it to date. It's my second helmet in service and I have always moved with it." he explains fondly of a helmet that will no doubt become an antique to him and family. For a composed man, who gives you a firm handshake, speaks with a baritone, well-built and patient - you get your drilling archetype.

"Drilling is exciting and equally demanding," he announces as he ushers us into the drilling area full of rumble and tumble.

Exciting because every time the drillers strike steam and the well successfully discharges, it's like an elegy in the ears of holiday-makers. Challenging because, drilling is normally done away from civilization where adaptation is mandatory. If there is a man who has mastered this, it must be Kituli. All his adult life has been spend at the rig.

He loves it. After school, he joined Barclays Bank. "Though the salary was good, I didn't find it very challenging."

He would later in 1981 bump on an advert by the East Africa Power & Lighting Company inviting trainees. He applied and was absorbed as a mechanical engineer apprentice. After four years he joined the Kenya Polytechnic for a Diploma in Mechanical Engineering.

You need to understand Kituli's predicament. He was in a technical high school and enjoyed machineries. Blue collar was not his thing.

The rhumba man

He went back to college for an advanced course in engineering at Mombasa Polytechnic and returned to the rigs - again.

Indeed, in the game of geothermal drilling, he is the grandmaster. He knows which bishops and queens to move for success. And Kituli is not a master for nothing. In Olkaria where he worked, he successfully drilled high productive wells over the past quarter of a century.

Today, Kituli, a Chief Drilling Superintendent, is supervising drilling in Menengai.

He enjoys Rhumba and particularly Franco's hits. "Rhumba is real," he says, stands, and tries a jig to demonstrate. His sheer agility would dwarf many young dancers. He still frequents clubs that play Rhumba, and keeps a huge collection of Franco's albums.

Driller's nightmare

"My highest moment is to successfully drill a well without losing any equipment. It is very exciting to prove steam and move to the next location, he says. "You feel you have achieved something."

However, the biggest fear for a driller is to get a fish. This is when a piece of equipment gets stuck in the well. The process of getting it out is called fishing - the most stressful, time consuming exercise. It is the driller's nightmare. One time, in Olkaria he got a fish and it took six months to fish it out.

His day starts off at 6:00am where he gets all the briefings of the previous night. He reports the same to his seniors in Nairobi by 7:30 am. Then he checks his mails and respond to others. By 8:30am he is at the drilling site. He compares notes with the rig managers and then shuttles from one rig to another. He gets his meals and accommodation at the drilling site.

Kituli's office at Rig One is containerized, air-conditioned and self-contained. Facing the wall is a work table complete with a desktop computer.

(...Cont.on page14)

The man, the jungle and his machines (From page 12)

decades ago as a fresh graduate.

"Then Menengai was thick with red cedar. It was wet and full of creepers like pythons. That was 1985 when we first went for exploration. We were very young and full of energy," he reminiscences.

"We saw Menengai and knew it had the resource. We hoped that development would come the following day," he says, clasps his hands and goes silent as if in penance.

He is a bit disappointed though, he confesses. The forest cover that glorified Menengai in years of yore is all gone. "There was a major drought in the mid-80s. Then the forest was infested by fire and loggers; that's how it was destroyed."

An alumnus of University of Nairobi, Mungania had his first stint at Eburru geothermal prospect in 1984. After a series of geological duties, he headed to the University of Nottingham in the UK for MSc. in Geology and Foundation Engineering. It's this stint that spurred him to a whirlwind tour of Britain on a series of attachments.

He worked as a sites investigator for ports; he also worked for British Coal at Yorkshire. Still, home beckoned. In 1988, he shortly worked at the Nairobi River Water Project before joining KenGen. He headed to the Olkaria Geothermal Project as a rig geologist.

In 1993 he trained in Geothermal Project Management. This afforded him a sound grounding in geothermal scientific evaluation, field development, infrastructure and installations.

That marked his transition from scientist to projects hence his entry into infrastructural implementation.

The great concept

It is Mungania's team that developed a technical conceptual model for Olkaria Domes. The report informed the development of the Domes which is being drilled now. "It was fulfilling to see how for the first time a field was developed according to scientists' recommendations," he reckons.

The concept to create GDC was an award-winner too. "We started toying with this idea way back in 1996. Then the scientists were alive to the fact that geothermal was not highly regarded, yet we knew its potential. We had to think. "

"The coming to being of GDC was really a great milestone in geothermal development. To, me and other colleagues, it was a deserved excuse for champagne."

> "We saw Menengai and knew it had the resource. We hoped that development would come the following day"

About drilling... *Japheth Kituli (in blue jacket) explains a point to visitors who toured Menengai recently.*

The grandmaster of geothermal drilling

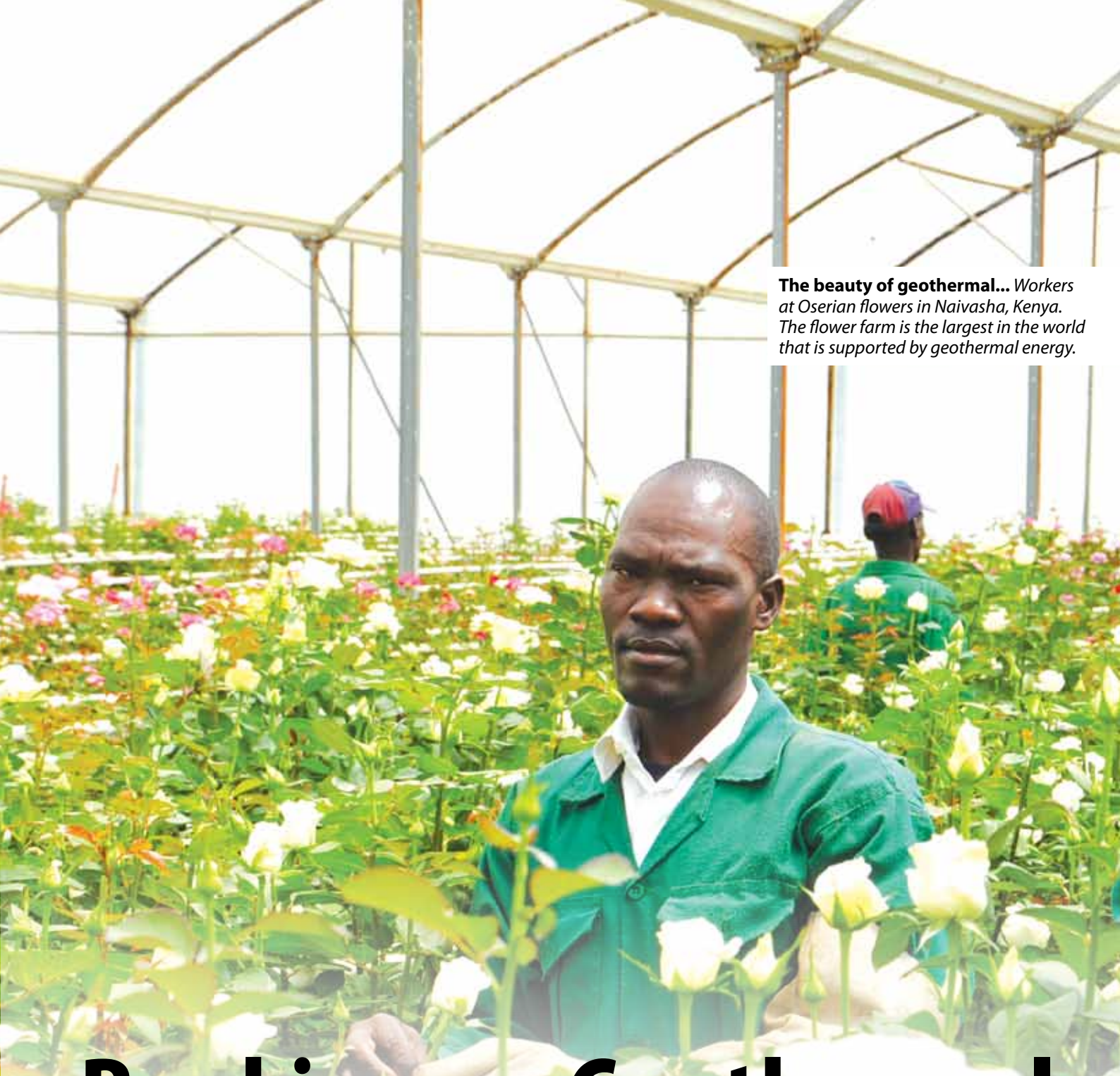
(From page 13)

"I co-ordinate daily supplies of drilling materials," he says. Kituli is also in charge of staff and ensures that their welfare is taken care of.

"This job requires someone who is ready to soil; who appreciates mechanical skills and one who never gives up," he reckons. Over time, Kituli has been a witness to the epic advance in drilling technology. He has seen old mechanical rigs come and go to pave way for electrical and more sophisticated like the ones in Menengai which GDC acquired recently.

"I anticipate highly productive wells here in Menengai. It will be good if GDC puts up the first power plants. While I know we have chosen to focus on steam development for now, that would be my wish if asked," he concludes.

> "This helmet has seen many years. It has drilled most of the wells you see around... I got it in the early 1990s"



The beauty of geothermal... *Workers at Oserian flowers in Naivasha, Kenya. The flower farm is the largest in the world that is supported by geothermal energy.*

Banking on Geothermal

Erick Wamanji *unveils the next big thing that will guarantee new riches and hope for Kenya.*

If you want to know Kenya's new economic frontier, you need to get out of the chocker-blocker that is Nairobi. Get west of the capital into the hitherto badlands characterized by scrub, scalding sun, and perpetual drought running from L. Magadi to L.Turkana. It is in this semi-arid circuit that the $50 billion (Ksh. 400 trillion) geothermal largesse will shape the economic future of this nation.

Here, the source of the would-be riches lies beneath the feet -the hot steam that bubbles at the belly of the earth. This fluid juts to surface as steam and will soon drive massive power plants, irrigation schemes, space cooling, community abattoirs, grain driers, milk pasteurizers, greenhouses, honey processers, and aquariums. That is not all. Geothermal has great potential for tourism, leisure and recreation, and carbon credit sales.

"We have an obligation to take this path," maintains Dr. Silas Simiyu, the Managing Director, Geothermal Development Company (GDC). "In fact, it will be a gross moral failure for us to slacken yet we are schooled of the benefits that geothermal offers.

We must adopt a holistic approach to geothermal development for this nation to realize her dream of social economic prosperity."

This fresh approach is an avant-garde of some sorts as GDC opens a new window for investors and community into the geothermal economy.

Never has Kenya had such a prolific natural fortune as the stupendous 15,000MWe geothermal. Geothermal gives energy and millions of tonnes of water- rudiments of a classic economic take-off. Indeed, to Kenya, the volcanic complexes spread in more than 14 high temperature sites are like El Dorado - a vast trove of buried treasure.

And in what can easily pass as a Marshal Plan, GDC's strategy will midwife Kenya's admission into the mid-income economy club.

Star ventures

Generating 5000 MW of electricity has a daily output of about 1.92 million tonnes of water. It is this water that is tipped to run the irrigation and industrial sector and relieve the country from the deficiencies of rain-fed agriculture.

At the earliest, projects lined up for this new uptake include: Cereal driers and greenhouse heating in Nakuru, hot baths in Menengai and Bogoria, irrigation schemes in Suguta Valley and Marigat, and sulfur and carbon dioxide extraction in Menengai and Baringo, refrigeration and cooling plants in Turkana, Homa Hills and Mwananyamala. GDC will invite bidders into this incredibly lucrative frontier.

"GDC will not necessarily run these projects," Dr. Simiyu clarifies. "Ours is to facilitate investor entry, offer professional advice and manage the geothermal resources."

"The beauty of the direct geothermal utilization concept is that it requires less financial input as compared to constructing a power plant and it also utilizes the already available energy which would otherwise go to waste. Therefore, many local and international investors can easily come on board. This concept also has direct impact on local communities, who will take charge of their economic affairs by operating some of the projects," Dr. Simiyu enthuses. The interlocking of geothermal and business also spurs national GDP growth by stabilizing commodity prices, reducing fuel imports, and boosting rural economies hence hugely decongesting our cities.

Kenya lies on the East Africa Rift System, a 6,500Km continental rift, stretching from Egypt to Mozambique. On the floor of the rift valley, the crust of the earth thins making the ground closer to molten rock. This molten rock heats subterranean water that rises to the surface as steam.

Lessons from Iceland

Martha Mburu, the South Rift region Area Manager who is also in charge of direct geothermal utilization at GDC, is optimistic of the impending revolution. She has already hit the ground running constituting a team and a blueprint.

And this is with precedence. In Iceland for instance, the Blue Lagoon is an iconic world class recreational spot attracting more than 400,000 tourists annually. Every second, 50 liters of hot brine is flushed into the 5 km2 manmade bathing lake. At any one time the lagoon holds six million liters of brine, which is renewed after 40 hours.

"We need to have our own version of the Blue Lagoons here in Kenya," says Martha. Beyond the Blue Lagoon, Iceland, normally a freezing world, heats 99 percent of her homes and business premises using geothermal energy and grows most of her fresh produce in greenhouses powered by geothermal energy. Today Iceland is working on a world-class project that will connect a super-undersea cable for geothermal electricity export to Europe.

> "It is clear that geothermal can offer much more than just generation of electricity. Our strategy is on holistic utilization of these resources to create wealth and to tackle food insecurity"

Back home, the Bogoria- Silale block boasting gorgeous steam-jets, scenic hills, and massive room for spas and saunas of Blue Lagoon proportion, will host magnificent world-class tourist resorts. Normally, spas will use brine (water component of the geothermal fluid after steam is separated from the hot water). The steam condensate goes to irrigation schemes.

Economic sense

Direct utilization makes lots of economic sense. For instance, in Kenya, the Oserian Flowers long discovered this secret. The farm in Naivasha, about 100km west of Nairobi is the largest in the world with 50 hectares under cut flowers using geothermal energy directly. Today, Oserian has cut production cost by at least 40 percent. Its flowers are among the most competitive in the world flower market, owing to use of geothermal

At Oserian, carbon dioxide from geothermal wells is used to enhance photosynthesis and the heat is used to sterilize fertilised water allowing for continuous usage of the nutrients in the water hence a considerable saving on water and fertilizer. Oserian employs close to 5,000 people in the farm, notes Bruce Knight, the farm's Engineering Director.

"We will replicate this concept," Martha affirms. "There is no reason why we can't have a series of "Oserians" in other geothermal areas."

According to a 2007 publication of the Geothermal Energy Association (GEA), developing 5,635 MW of geothermal power in US, would create

Multi-billion industry…*tourists enjoy the pristine allure of the Blue Lagoon in Iceland. Kenya will soon have its version of Blue Lagoon. Picture: Courtesy*

Geothermal water will support massive irrigations projects. Geothermal will also support growth of green houses in Kenya.

-a 30-year economic output of almost $85 billion. GDC's integrated approach will see close to 20 million jobs created. Elsewhere, it is also projected that every dollar invested in geothermal energy results in a $2.5 output. That is where Kenya is going.

Putting this to perspective, the Kenya National Least Cost Power Development Plan projects electricity needs will hit 15,000 MW by 2030. Of this, 10,000 MW will come from geothermal, one of the cheapest, cleanest and the most reliable source of electricity compared to coal, wind, hydro, nuclear or diesel.

The Vision 2030 has enlisted flagship projects that demand high electricity consumption. For instance, the proposed ICT Park in Makueni County will need 440 MW, while the Iron and Steel Smelting in Meru will need 315 MW.

Industrial Parks

GDC's grand proposal has earned endorsement from policymakers, government and industry. In a recent consultative forum on acceleration of geothermal energy utilization, Assistant Minister Ministry of Energy, Hon. Amb. (Eng) Mohamed M. Mahamud, was in concert with his colleagues in cheering on GDC.

"As a government, we are strongly persuaded of the transformative prowess of geothermal energy to local communities. We are therefore committed to ensuring GDC develops this resource to the fullest," Hon. Mahamud said.

The forum comprised of parliamentary committees on Energy, Agriculture and Budget. Direct utilization has much higher energy efficiency and social economic benefits; its development time is much shorter. Small wonder the concept is already causing a stir.

"We also encourage the establishment of industrial parks at the geothermal zones. The industries will tap power directly and this will cut on the cost of transmission. Normally transmission loses close to 30 percent of the power. If that amount is saved then the cost of electricity will go down followed by the cost of goods," says Dr. Simiyu.

A geothermal boom also means the country eyes the lucrative carbon credit market. Normally, 1 MW of geothermal energy reduces about 47,000 tonnes of carbon dioxide a year. From 5000 MW GDC will earn the country close to Ksh. 4 billion annually. This money will be pumped back to communities for development, explains Dr. Simiyu. GDC will also trap and process sulfur for sulfuric acid to be distributed to schools, industries for medicine manufacture and for tanning leather.

Green Valleys

In such areas like Silale, Paka, and Korosi, where drought is the norm, steam condensate from the power plants will be channeled to the valleys for irrigation. Thousands of acres will be used for fruits, aloe vera, maize, pineapples and watermelons production for export.

"Our climate is also suitable for oil seed crops such as palm oil, sunflower, soya, groundnuts, and sesame seeds," says Martha. "Palm oil is a valuable ingredient for the preparation of soap, edible oil, and even bio-diesels. This way, we are going to register significant social economic growth in the region"

In Kapedo, the splendid hot springs are a potential for skin therapy tourism. Such venture will be operated by local trustees. Besides, this region being a cattle and bee keeper's paradise, geothermal will be used for meat and hides processing, honey processing, growing of animal fodder among other uses.

In Nakuru, an agricultural region, thermal energy from the brine will go to drying of cereals and milk pasteurization. This is cheaper, more reliable and environmentally benign method than using electricity. GDC is already enlisting the services of agricultural economists, water engineers and irrigation experts as it stretches the frontiers. "It is clear that geothermal can offer much more than just generation of electricity. Our strategy is on holistic utilization of these resources to create wealth and to tackle food insecurity," Dr. Simiyu concludes.

Drilling Corps… *GDC engineers in Menengai. This is a section of our men and women who work tirelessly to win steam for electricity.*

Menengai caldera comes alive

Two deep drilling rigs are on site as Menengai promises to turn around the energy landscape of Kenya, writes **Erick Wamanji**

Menengai, thought to be a dormant volcano, is back to life again. And now instead of belching tongues of red-hot magma, the caldera is promising a green spark.

The Geothermal Development Company (GDC) is on site drilling for steam. GDC will facilitate the generation of 1, 600MW from the caldera by 2030. With this, GDC bears all the hallmarks of a blue chip as it develops the crown jewel of Kenya's energy mix.

"We have completed the first discovery well," says Mr. Michael Mbevi, the Manager in charge of Drilling Operations at GDC, told this writer. "We are using our own rigs which we bought recently. Mbevi, like the Managing Director, Dr. Silas Simiyu, views Menengai as Africa's flagship geothermal project.

Rightly so.

Menengai is the first geothermal field to be opened in a big way outside the traditional Olkaria field in Kenya. Another field is Eburru with six wells already drilled. In just four years, Menengai is going to achieve 400 MW which will be streamed to the national grid. By 2018, Menengai will be generating 1000MW. It took Kenya 30 years to develop 200 MW of geothermal energy in Olkaria.

GDC has deployed the two deep drilling rigs of 2000-horse-power as startup. Five more rigs are in the pipeline to tweak the process. Once all is done, this caldera, 197 km west of Nairobi, will be Africa's version of the Geysers in the US. At this rate, the Menengai Geothermal Project will dwarf many of its predecessors in just less than ten years.

A big chunk of this electricity will be offloaded locally in Nakuru. Consequently, Nakuru town will soon become perhaps Kenya's premier green city. Nakuru is a fast-growing agri-commercial town of about 500,000 people. GDC is on the fast lane to change jobs from blue-collar to green-collar here.

"We want the Menengai effort to run Nakuru town and its environs. We will encourage direct off-take of the power from the caldera as much as direct utilization of the geothermal fluids," explains Dr. Simiyu.

Another first

Menengai has another first. It is here that a chain of wellhead generators will first be put up en masse, a first not only in Kenya but Africa as well. Generating with wellheads is an innovation that GDC has championed since inception so that once a well is drilled; investors can start to generate electricity as they wait to construct conventional power plants. This has been done elsewhere in the world and Kenya is taking the cue.

Through early generation close to 100MW will be generated by 2013. This will provide investors with a handsome

head-start, while easing Kenya's electricity shortfall. Independent Power Producers (IPPs) will only need to sign a Power Purchase Agreement (PPA) with the Kenya Power and Lighting Company, install well head generators and begin to make handsome money.

Pinning Hope

Now, Kenya is pinning her hopes on Menengai. "It will transform life in this village," says Patrick Kimani, a local farmer. Kimani whose home overlooks the caldera, marvels at the speed with which development has come to his door step. The road which was barely a footpath has been paved and murramed. GDC has also connected electricity and water. "There will be more jobs for our sons; life is really promising," Kimani says thoughtfully.

Today when you visit Menengai you will see close to 24 kilometers of graded road, 18 kilometers of water pipeline and two state-of-the-art drilling rigs. You will marvel at the rig camp complete with a restaurant, a modern kitchen, laundry, satellite television and air conditioning. The accommodation wing of the camp can accommodate close to 30 personnel.

This is the initial stage of a major geothermal drilling programme that GDC is rolling out to harness 5000 MW by the year 2060. And every day engineers are busy leveling ground for well-pads and scientist are siting more wells. In Menengai, GDC will drill close to 300 wells. "Our initial major worry was availability of sufficient water to run a drilling exercise of this magnitude. But we have enough," says Mbevi.

"For Well One drilling has been flawless," explains Japheth Kituli, Chief Drilling Superintendent. "The first 80 meters had tough formation. But after the first 400 meters, all went well. The temperatures are very high. Menengai is a bountiful prospect."

And GDC is taking a different approach to this enterprise – drilling with own rigs. By using hired rigs with international crew, the upfront cost of drilling escalates by more than 50 percent. This is due to staff costs that include hardship allowances, per diem and airfare. This translates to high drilling cost that spirals tariffs. Indeed, drilling with hired rigs costs the country close to Ksh. 500 million. Yet in the just completed well GDC spent only Ksh. 250 million. Clearly a cut in cost.

The GDC approach will consequently tame runaway electricity tariffs, besides offering jobs to Kenyans. This way, Kenya becomes the Emirates of geothermal steam boom.

Investor entry

And Menengai has created frenzy among investors. When GDC advertised for expression of interest to put up power plants, the response was overwhelming. Soon GDC will announce the selected investors.

Indeed, in 2008, the International Monetary Fund (IMF) warned that in most sub-Saharan African, infrastructure deficiencies such as in energy, transport, and information technology caused loses of 30-60 per cent of business productivity and cut economic growth by two percentages every year. Ultimately, GDC is reversing this fear and contributing to the industrialization of the country.

True, power cuts and rationing are the greatest culprit of inflation and capital flight in Africa. Once this is solved, you have fixed the economy.

The appeal of geothermal is irresistible. Like most renewables it is clean. And there is one more feather to the hat - geothermal abounds in this country with more than 15000MW, more than ten times the current annual electricity consumption in Kenya. Geothermal is not affected by erratic weather patterns; thus it naturally becomes the country's strategic baseload power.

Of course geothermal energy, promising steam-dollars, is on the fast-lane of making Kenya a mid-income economy by 2030.

"Our initial major worry was availability of sufficient water to run a drilling exercise of this magnitude. But we have enough"

The mother of all wells… *Visitors admire the first discovery well to be completed in Menemgai.*

Rwanda eyes geothermal

Rwanda is set to join the league of geothermal producing countries come December 2011. The process of exploration on the southern slopes of Karisimbi is on track and drilling is expected to commence by the end of the year.

"We are ready to start with three exploration wells. Then after that we should be able to continue progressively," Rwandan State Minister for Energy and Water, Eng. Coletha Ruhamya, told the press in her recent visit to Kenya. Eng. Ruhamya was leading a mission to Kenya's established geothermal sites.

So serious is Rwanda in this new venture that bilateral talks have been initiated with the Government of Kenya on areas of cooperation. Recently, Eng. Ruhamya met her Kenyan counterpart, Hon. Kiraitu Murungi to discuss on way forward.

"Geothermal is the area that the government of Rwanda want to prioritize. We have prospects of about 700 MW and we want to start exploration drilling. Since Kenya has progressed far in the area, we are looking for collaboration and partnership in capacity building, drilling and putting plants in place. There is a lot that we can learn from Kenya on geothermal energy," Eng. Ruhamya said.

Some of the Rwandese students with their trainers from GDC.

In May, 2011 some 12 Rwandese students trained in Nakuru, Kenya on geothermal technology. The training was offered by the Geothermal Development Company (GDC).

"Expertise is our major challenge," says Dr. Stephen Onacha, the lead geothermal consultant in Rwanda. "However, with the close cooperation we have with GDC, we hope to overcome the challenge," he said.

The geothermal areas in Rwanda are located at the western and southern part of the country associated with the Western branch of the Rift Valley. This area is further sub-divided into three regions Kasirimbi, Gisenyi and Kinigi.

> "Expertise is our major challenge... However, with the close cooperation we have with GDC, we hope to overcome the challenge."

Engineer Coletha Ruhamya during her tour of the Menengai Geothermal Project

Rwanda is expected to pilot with 10MW which is likely to be completed by December 2012.

"When the drilling is complete, then partners, donors and the private sector will realise the project's potential and invest in it," Ruhamya said recently.

Rwanda is targeting to develop 300MW from geothermal sources by 2017 at a cost of US$ 935 million. This will effectively meet at least 50 per cent of the country's power needs by 2020.

Though Rwanda has made significant steps in economic development, inadequate electricity supply is slowing the growth rate. Rwanda's limited power supply is currently sourced mainly from domestic hydropower, a small amount of solar energy, and costly diesel-fired power plants.

Mega pipes carrying steam like this one, will soon interlace Bogoria-Silale Geothermal Project. (Inset), Steam jets of Lake Bogoria a good indication of a rich geothermal system.

800 MW more from the North

By Paul Ngugi

The Geothermal Development Company (GDC) is opening up a series of investment opportunities for investors into the geothermal sector. Investors have been invited to bid to put up power plants in the Bogoria-Silale Geothermal Block. GDC is targeting 800MW by 2017. Eight power plants of 100MW each will be put up to achieve this.

The Bogoria-Silale Block has an estimated potential of 3000MWe. This resource will be developed in four phases. The first phase being 800 MW.

In January 2012, GDC will start to drill the planned 200 wells in the block. GDC will shortlist potential investors who will develop eight (8) 100MW geothermal power plant units. Investors will also have an opportunity of installing well-head generators as drilling continues.

The investors will be required to finance construction, operate and maintain the power plants. GDC on its part will undertake resource development and management – development of civil infrastructure, exploration and appraisal drilling, feasibility studies, production drilling, reservoir, condensate and brine system management. GDC will require the selected investors to partner in financing the steam development.

Investors are invited to submit proposals – short listing is expected to be complete by September, 2011 and the selection of investors will be complete by December, 2012. Interested parties would need to raise at least us $400 million for each 100 MW development, supported by letters of credit from credible financial institutions.

The Silale- Bogoria Block comprises of Baringo, Bogoria, Paka, Chepchuk, Korosi, and Silali geothermal fields.

Paul Ngugi is the Manager, Corporate Planning & Strategy at GDC.

FACTS

The search for geothermal energy started in 1957, but it has only yielded a paltry 209 MW against a massive potential of 15000. In 2008, the 100% state- owned Geothermal Development Company (GDC) was created as a Special purpose Vehicle to fast track the development of geothermal energy due to the speed of harnessing geothermal resources being too slow.

Kenyan government forecast (in Kenya Vision 2030) is to generate 15,000MW of which the geothermal sector is projected to provide more than 5000MW (currently, electricity generation in Kenya stands at a mere 1350MW).

A Geothermist's paradise

With over 3000 MWe potential, the Bogoria-Silale geothermal block will open the Nothern frontiers

You will be excused for thinking that the swathe of land running from Lake Bogoria to Silale is nothing but wasteland. For a passive eye, you are right. Hilly, thorny, dry and rocky – this is the sight of this world.

Yet, with an estimated geothermal potential of 3000 MW, the Bogoria-Silale Geothermal Complex is going to be Africa's if not world's biggest geothermal park. The prospect combines Arus, Lake Bogoria, Lake Baringo, Korosi-Chepchuk, and Silale.

And GDC is ready to tap into this wealth. This prospect will be developed in four phases. In Phase One, GDC is targeting to develop 800 MW by 2017. Bids have been floated for 8 power generating stations each with a capacity of 100MW.

This is a geothermist's paradise. It is a region replete with hot-springs, altered grounds, steam jets and fumaroles. The block also is characterized by faulting – a good indication of permeability and recharge and high reservoir temperature.

The bloc's structural set up is marked by extensive faulting resulting to enhanced permeability thus allowing for recharge and storage of the geothermal fluids.

GDC carried out geo-scientific studies, which included geological and structural mapping, satellite imagery and aerial photography; volcanological studies, geochemical and geophysical surveys and heat flow measurements. It also undertook an Environmental and Social Baseline Survey. The region is ready to give green power.

Lake Bogoria

Arus and Lake Bogoria geothermal prospect are located North of Menengai and South of Lake Baringo within the Kenya Rift. Common place here is geothermal phenomena in form of fumaroles, hot springs, steam jets, sulfur deposits and high geothermal gradient expressed by hot ground. Groundwater water is characterized by temperatures above ambient in the area.

Results from analyses of data acquired from the field indicate existence of medium to high temperature fracture-controlled geothermal systems in the prospect areas. The heat sources for the geothermal system(s) are perceived to be shallow dyke swarms and intrusive bodies that are conducting heat to shallow depths. Estimated fluid temperatures from gas geothermometers gave temperatures of above 200°C.

The best utilization options include electricity generation using binary systems and direct uses (horticulture, aquaculture and thermal resorts for tourist attractions). The Rift Valley's weather conditions and its attraction as a tourist spot, suggest the possible development of used hot water for medicinal, recreational and tourism in spas, swimming pools and saunas.

Lake Baringo

The prospect area is about 600 Km^2. Geothermal phenomena here manifests itself by occurrence of active fumaroles, high geothermal gradient expressed by hot ground and hot springs. A borehole which was drilled to about 90 meters at Chepkoiyo for groundwater encountered hot water and self-discharged at 98°C which is the local boiling point.

Surface investigations indicate existence of fracture controlled geothermal systems in the block. These areas are marked by low resistivity, high geothermal gas content. Reservoir temperatures of about above 200°C have been recorded.

Korosi-Chepchuk

Korosi is a trachyte-basalt volcanic complex situated immediately to the north of Lake Baringo. The volcano occupies an area of about 260km^2 and rises to about 500m above the surrounding floor of the inner trough of the rift valley.

Exploration work was completed in 2011. Heat source is associated with shallow magmatic bodies under the volcano and intrusive dykes. Heat source in Chepchuk is also magmatic, but is old and long-lived

Geophysical studies show that dense bodies exist beneath the Korosi massif and in Chepchuk. Geophysics research suggested existence of heat sources. Reservoir temperatures of more than 250°C for both Chepchuk and Korosi were recorded.

Silale

Silali geothermal prospect is located about 50 km north of Lake Baringo in the northern Kenya Rift. It covers an area of about 900 km^2 and it is characterized by a large caldera volcano.

GDC carried out a detailed surface exploration in Silali prospect in 2010. The major geothermal manifestations occur within the caldera floor and on the eastern highly faulted slopes of the volcano. Some manifestations also occur along River Suguta in the west and along fractures in the far north of the volcano.

Silali han an estimated potential of 800MW.

John Lagat is the Chief Geologist at GDC.

Sounds and sights of Menengai

Deborah Kalei samples Menengai and visits the dog-house and the monkey-board.

When you first enter the Menengai Geothermal Project, you are met by a road flanked by brown murram and unending glide of black water pipes. Occasionally you may see a silvery splash of water gushing to relieve the pipes of pressure. The road is one that you would ignore, save for the fact that it did not exist till 2010.

They say good things do not come easy and true to that, GDC had to blast the road to the caldera three to four times to create access into the geothermal energy hub.

The Menengai caldera was once an area with ominous mystery. Now, the caldera is an open area, abuzz with activity. In the distance, there is dust from loaded lorries ferrying murrum for road construction and water tankers subduing dust.

At this caldera, modernity seamlessly mixes with the wild to create a special blend. The volcanic rocks and wild vegetation intermingle with man and machine as if in determination to support GDC's effort toward green, affordable energy.

Today it's windy and the weather has not made up its mind on whether to be hot or cold. The night before had rained heavily, but the dust at the caldera has not yet settled.

We make our way toward the rig site to behold the action that is set to make Kenya's energy deficits a faded memory.

At the heartbeat of Menengai are two towering rigs. These are Kenya's very first deep drilling rigs with a capacity of 2000 HP and can drill up to 4 kilometres.

Some stakeholders from Ol Rongai are visiting the site on this day. At the rig, their faces glow with unmistakable pride that the once feared "valley of demons" is now the pride of Kenya.

Amid the roar of the generator, and blue-clad engineers, the visitors make their way around the rig site. Here, they are taken to the various areas such as the offices at the rig and of course up the rig. James Chege, a drilling supervisor explains the various steps GDC has taken to ensure safety of the drilling process, as well as how far the drilling process has gone.

The rig is a colossus of engineering with complex parts. Two parts stand out though because of their names. These are the dog-house and the monkey-board. Today, Daniel Mbugua, a Derrickman, is on duty. We find him at the doghouse where he is checking on the water levels to ensure that they do not go below the required volume. The dog house stands atop greenish-blue water, but is actually crystal clear. On the other side of the doghouse, there is the active tank with swirling muddy brown water. The muddy brown water is known as bentonite and is used to suspend drilling cuttings. The water is constantly agitated to ensure that it does not coagulate.

During a trip-out or a trip-in, Daniel Mbugua is usually at the monkey board to make connections. "The terms trip-in or trip-out refer to removing the drill pipes from the well for changing the drill bits and taking them back." he explains. Changing a drilling bit can take up to 12 hours and the Derrickman usually stands the whole time the change is being done. The monkey board stands at a majestic 40 metres above the ground and is not an area for the fainthearted. To go up to the monkey board, the Derrickman uses a counterweight which assists him move up.

As the Ol-Rongai stakeholders gather to leave the rig site, they note that there is no lady around. They are however quickly assured that there are no objections for ladies to work at the rig.

Kalei is a Communication Officer at GDC

IRENE ONYAMBU

Irene Onyambu, The Manager Administration, holds an Master of Art Degree in International Relations from the University of Leeds, U.K. and a BSc Degree in Home Economics & Business Management from The University of Eastern Africa, Baraton (UEAB). She also holds a Higher National Diploma in Human Resource Management and is a Certified SAP Consultant (HR Application) and Certified Lead Auditor of both Quality and Environmental Management Systems (ISO 9001:2000 & ISO 14001:2004). Irene brings on Board over 15 years hands on experience in the field of Human Resources Management & Administration.

"I look forward to being part of a great team that shall provide Administrative Services in a fair and equitable manner, with ultimate aim of superseding customer expectations.

CHRISTOPHER LEPARAN

Leparan, the Deputy Manager, Human Resources holds an MBA in strategic management from the University of Nairobi and a B.Com degree in Business Administration from Catholic University of Eastern Africa. He also holds a Higher Diploma in Human Resources Management from Kenya Polytechnic and a Diploma in Business Administration from Rift Valley Institute of Science and Technology.

He brings on board a wealth of experience in Human Resources Management spanning over 10 years, gained both in the public and private sectors. He has also widely trained in various aspects of Human Capital Management both locally and abroad. He has an impressive record of developing and implementing HR strategy, Policies and Talent management.

He is a full member of the Institute of Human Resources Management and a certified ISO 9001:2008 QMS internal auditor. Until this appointment, he was a Chief Officer, Human Resources Service. Prior to joining GDC, Leparan was the Principal Human Resources Officer at National Environment Management Authority (NEMA).

JOHNSTONE MALECHE

Johnstone Maleche is the Deputy Manager, Drilling Operations. Johnstone is a completions engineer (drilling, cementing and reservoir) with education in Chemical & Petroleum/Natural Gas engineering. He has versatile experience and extensive knowledge in well design and development, drilling, process modeling and simulation.

Mr. Maleche holds a Master of Science degree in Chemical Engineering majoring in Petroleum/Natural Gas with a minor in Environmental Engineering from Texas A & M University. Between October 2007 and March 2010 he worked as a Petroleum engineer/Senior Field Engineer at Schlumberger Technology Corporation at Elk-city, Oklahoma. In 2007, Johnstone worked as a Plant Process Engineer at Inteplast Group at Lolita, Texas, and as a Project Chemical Engineer at Mabati Steel Rolling Mills in Mombasa, Kenya.

Johnstone has been involved in developing end-of-well reports, as well as reading and interpreting well logs to propose the right additives for various formations. He has been responsible for field engineering support, solving operating issues, reducing downtime, managing staff on-and-off the well sites, and simulating flow models. He is also well versed in undertaking economic analysis for different projects, writing drilling bids and developing job proposals.

Maleche is proficient in process and well simulators such as CEMCADE, PRO II, PETREL and FracCADE. He is experienced in the use, and design of reservoir engineering models and software such as CMG, ECLIPSE, as well as preparing PFDs and P&IDs.

Investing in the stock market

Stock market trading is no child play, yet more and more Kenyans should shun the fear and plunge into real money. The Nairobi Stock Exchange is the place to be writes Sarah Musumba

Photo Courtesy: Nairobi Stock Exchange

Time and again Alex has been told about the importance of saving, and saving he has. He has his money in the bank, just as he left it, dormant and not earning him interest, but saved nonetheless. Betty on the other hand has a real problem saving cash. What with all the expenses she has, and she has been taught it is always good to indulge occasionally, it does not hurt!

All is not lost for Alex and Betty. They can hit the Stock Market trade in shares and make handsome bucks out of it.

Though the Nairobi Stock Exchange has been existence since 1954, it is only recently that Kenyans actually started to invest big in stocks. There are numerous success stories of how right timing has opened the fine mahogany door to ordinary people ushering them into the exclusive millionaires club.

There are a few rule books before the club is declared officially open. The stock market is tricky. During the 2008 world stocks plunge, a certain Sheldon Adelson who is a Las Vegas casino mogul lost $24.9b. In order to reap the most of the stock market, you have to approach it with understanding.

Step One: Conduct 'Financial self-examination'

Take a critical and honest look at your financial objectives, your income sources, constraints and risk tolerance. After the much publicized 2009 IPO by a leading firm, many Kenyans took out loans to get a share. However, when the shares did not behave as anticipated, many found themselves in situations that were less than ideal- no income from the stock market on one hand, and a bank loan to service on the other hand. Lesson: It is not advisable to borrow to invest in the stock market, especially in a volatile market.

Step Two: Deal only with licensed Entities

The recent collapse of some stock brokerage firms is an example of how risky it is dealing with a faulty financial investment advisor. Investors spent sleepless nights contemplating how much money they had lost because a stock broker had been involved dubious dealings. Thank God the government intervened and they got their money back. You may not be that lucky. Always ensure your financial investment advisor is a licen¬see of the Capital Markets Authority (CMA). To confirm an advisor's status, you can log on to www.cma.or.ke or call 221910

> "All is not lost for Alex and Betty. They can hit the Stock Market trade in shares and make handsome bucks out of it"

Step Three: Open a Central Depository System (CDS) account

Where there is money, there is an account. For the stock market, there is a Central Depository System (CDS) which facili¬tates holding of securities in electronic accounts opened by shareholders. It manages clearing and settlement of all financial instruments traded through the Nairobi Stock Exchange (shares and bonds) in a safer, faster and easier manner.

A Central Depository Agent (CDA), who is either a stockbroker an investment bank or a custodian bank, must be authorized by Central Depository and Settlement Corporation (CDSC) to open CDS accounts on behalf of investors.

Step Four: Take Control of your Trading Account

For people to lose their money in the stock market, it is usually a result of disinterest of the stock market. Ensure you take full responsibility of your trading account and do not let anyone, including your dealer's representative use your account for their own trading. This is the account that will help you know what transactions have been made by the investment bank or stockbroker on your behalf.

Finally, make sure you do not discard your CDS statements as junk mail as this could be you discarding a red flag that will save you from financial ruin. All the best at the stock mart. Additional information from CMA website.

Sarah is a Quality Assurance Officer at GDC

1. **It's our comfort…** *Father Christmas came early for this girsl at Eor Ekule Primary School in Narok when GDC donated sanitary towels for 125 girls. The towels will last the girls a whole year.*

2. *University of Nairobi students at a GDC stand during Geological Society of Kenya exhibitions*

3. **Hats off…** *Drilling engineers in Menengai are all cheers as the first well reaches its 2200 meter depth*

4. **An umbrella fo a rainy day...** *Grace Mwai gives a GDC umbrella to a Wanyororo farmer as Rosemary Olonde cheers on*

5. **Meticulous…***Uhuru Barasa a reservoir technicians prepares a well logging equipment in Menengai.*

6. **The well dance...** *GDC management and staff dance by the first well when it discharged on Thursday May 12th, 2011 in Menengai*

7. **See, there's steam...** *GDC technicians at a rig in Menengai*

8. **Fabulous read...** *Wilson Rutinu GDC Chief Engineer enjoying his copy of* **Steam**

9. **Chairman's gift...** *Mr Paul E. O. Gondi the GDC Chairman hands a present to a pupil*

10. **Cop's day out. ..** *GDC's Joseph Wambua, explains how geothermal works to this policemen*

11. **White coats…** *GDC's lab technicians at a past event*

It was joy for Menengai farmers as GDC handed cheques to compensate them. Grace Mwai and Praxidis Saisi share their experiences in

Honoring the deal

Charles Mwendia was ecstatic as he majestically strode from the lifts of Generations House, Nakuru. One of his valuables that February afternoon was a cheque he was rushing to deposit in his account.

"I'm very thankful today," Mwendia muttered between his breath. "I'm very happy that the land compensation process has been a success. I feel privileged that I was able to offer my land for national development," he said with a smile.

Dr. Mwendia is just one of the farmers from the Wanyororo village next to the Menengai caldera who GDC compensated.

There is also Jane Kamau -the cheery business lady with deep dimples. She narrated how she grew in Wanyororo lacking in electricity, water and roads – just a typical Kenyan village.

"GDC has brought good tidings," she was overheard whispering to another farmer. "There is life now in the village. We pray for quick electricity from Menengai."

Any developer who receives a series of "accolades," from landowners in relation to land reparation, is justified to be breezy. That is just what we did at GDC recently.

In the efforts to create room for our projects, we had to negotiate with the local community to offer part of their property to the company. GDC required land to expand the road so that heavy trucks could pass. The initial road was nothing more than a cattle track. GDC also wanted land to sink boreholes that would supply water for geothermal drilling.

The process that began in 2009 culminated with the cheques issued to farmers and the subsequent transfer of land ownership to GDC. The completion of the exercise marked a critical milestone in the company's journey toward 5000MW which has kicked off earnestly at the caldera.

The success of the exercise was a combined effort of the Legal and Environment & Liaison Departments at GDC. As a principle of GDC, we approached the issue with a human face. The farmers were also patient and generally cooperative.

We have honored the deal… *Rosemary Olonde hands a cheque to Jane Kamau for the land compensation in Nakuru. Looking on are the writers: Praxidis Saisi (left) and right is Grace Mwai.*

Granted, land acquisition the world over is a very intricate exercise owing to the emotional value communities attach to it. Normally, land is associated with perpetual communal existence through continued economic activities, cultural heritage, aesthetics, inheritances and sustenance of life.

This valid affection to land informed the GDC team's principles of engagement in the negotiations. At times the negotiations were slow. At times we had to deal with justifiably skeptical farmers. Still, it was a worthwhile journey.

Land for the development of geothermal resources in Menengai largely lies in the Caldera; a large portion of which belongs to the Kenya Forest Services (KFS).

The land outside the caldera was acquired for the expansion of the road from the Solai junction to the caldera to allow movement of heavy rig equipment, construction of a sub-station, storage area, pump house, and sinking of water boreholes. A total of 22 parcels of land were affected.

The deal was a long process whose successful stages towards the compensation process marked a credit to both the land owners and to GDC. It began with the identification of land owners. This was followed by validation of the information from the Ministry of lands as well as confirmation of the existence of title deeds.

The identified landowners were then approached. With assistance from the local administration (Nakuru North District office) the owners entered into provisional agreements with the company allowing GDC to commence development. It was deep trust that was honored thus cementing further GDC's relationship with the community.

Of course, the process was speckled by manageable challenges like coming up with the actual value for the properties. GDC therefore used valuation reports from private and government valuers as well as the current cost of land in the surrounding areas to arrive at an agreeable cost with the farmers. It worked.

This explains Dr. Mwendia's beaming face.

Praxidis Saisi is the GDC Company Secretary while Grace Mwai is the Deputy Manager, Community Liaison.

Saplings amid steam

As steam spurts in Menengai, so are saplings sprouting in readiness to embrace the caldera's landscape and new-found fame. The local community will also access the seedlings from the tree nursery that is incubating at the caldera.

"Today, the nursery is supporting about 30, 000 tree seedlings which will be used in the rehabilitation of degraded patches in the project area," says Mr. Ben Kubo, the GDC Manager, Central Rift Area.

The seedlings project will be a continuous exercise in GDC in efforts to restore Menengai's lost green cover. Appropriate indigenous tree species will also be planted in the caldera to blend with the exotic ones, says Kubo who is himself an environmental scientist.

Beneficiaries

The major beneficiaries of the tree seedlings will be the local community, says Kubo. "The community is being encouraged to plant seedlings that will not only improve the environment but will also be a source of timber and fuel. This way, it will relieve Menengai from wood poachers who invade to burn charcoal," he says.

In one of the most elaborate tree-planting exercise by a corporate, the strategy also targets schools and institutions, forest stations, government amenities, GDC employees and the general public.

The seedlings will also be donated on occasions such as the World Environment Day, World Forest Day and World Wetlands day among others, Kubo says.

Already the nursery is creating employment opportunities for the local community. Most of the residents come to tend to the seedbeds, mulching, spreading manure and watering.

Nature trail

Rehabilitation of environment in project sites has now become a standard universal practice. Forward thinking organizations, are grabbing every single opportunity to offer Mother Nature with green cover.

And Kubo is even more optimistic. He explains that part of the water condensate from power plants will be used to irrigate trees in the caldera. "We are committed to a protected environment. We take it as an obligation toward sustained growth. This way we are also going to come up with a unique nature trail," says Kubo.

Menengai is prone to fires especially during the dry seasons. Local residents also source for firewood and charcoal from the caldera. These activities have left the area barren. This explains why GDC is keen on afforestation and re- afforestation to enhance the biodiversity of the area.

"It is our pleasure to see Menengai and its environs turning green. This will have a multiplier effect where the community and GDC may also earn some carbon credits," explains Kubo.

Foresters tour Menengai

Recently, GDC hosted the Board of Directors of the Kenya Forest Services (KFS) at the Menengai Geothermal Project. The foresters led by Board Chairman Prof. Richard Musangi and MD Mr. David Mbugua commended GDC's efforts toward the provision of clean energy.

"GDC and KFS share principles. We are encouraged with what we have seen today," said Musangi. The foresters were received by Mr. Ben Kubo, the Area Manager, Central Rift. Later, they were treated to snacks at the rig camp dining hall. The Menengai Project is in a forest reserve managed by KFS. Kenya Forest Services has allowed GDC to use 1000 hectares for the development of geothermal energy.

The delegation made stops at the pump station, laydown area, water tanks and the rig site. There were moments of "ahas!" and "oohs!" as KFS marveled at the gigantic drilling rigs. "It is my first time to see a rig. Is it this huge and complex?" wondered a forest ranger in the entourage.

There…that's steam… *GDC's Ben Kubo explains a point to David Mbugua, the MD, KFS when the latter toured Menengai Project.*

Geothermal to warm the livestock sector

By Deborah Kalei

The year 2030 is fast approaching and Kenya needs to achieve the ambitious Vision 2030 by then. Among the key targeted sectors is the agricultural sector. Agriculture is the backbone of the Kenyan economy and commensurately the largest contributor to Kenya's gross domestic product.

Likewise livestock keeping is a way of life and a source of income for a substantive number of Kenyans. Livestock keeping in the arid and semi-arid areas provides 90 per cent of the livelihood in these areas. These areas are largely not industrialized and this has also translated to low access to basic amenities.

These areas have large numbers of livestock, but this potential for economic development has not been harnessed. This is where GDC comes in.

GDC is committed to not only providing power for the greater Kenyan populace, but also empowering host communities. The empowerment goes beyond one-off solutions and entails long lasting solutions to local challenges. All in all, it is about the sustainable improvement of the lives of the communities.

The geothermal resource is a multi-purpose resource going beyond electricity generation. One of GDC's objectives is to create opportunities for direct utilization of geothermal resources, a basis that can be used for the livestock industry to change its currently dwindling state.

Geothermal energy can provide heat for powering milk processing industries. Since geothermal tends to occur in the arid and semi-arid areas, it provides a great opportunity to open up the areas by establishing milk processing industries. Not only will the farmers get an avenue to make money by selling their produce, but those without the livestock in the first place will get employment opportunities. The milk processing plants will also produce milk products such as cheese, yoghurt and butter. The opportunities are endless. Milk products can be exported to earn foreign exchange.

Meat processing

Kenyans love meat, and the popularity of nyama choma is proof enough. Geothermal resources can also be used to power meat processing industries as well as provide water for the slaughtering process. The establishment of state of the art slaughter houses in currently marginalized areas will provide opportunities for people to migrate there from other towns and thus open up the area for further industrialization processes.

With passage of time, most Kenyans have become more and more interested in the finer things in life. This means, that Kenyans are willing to invest in genuine and authentic products instead of imitations. The leather industry is one that stands to benefit greatly from the utilization of geothermal resources. Geothermal can be used to dry and treat hides that can be further used to produce quality leather products such as shoes and belts.

Geothermal energy is proving to be the answer to many of the problems that have been facing Kenyans including the now old age question of how to reduce population concentration in the urban areas. It is simple really, use geothermal resources to set up industries, the cities will become decongested and it will be a double-win situation. Rural areas will be developed and the people in these areas will be given an opportunity to access social amenities; urban areas will be decongested and the country will be that much closer to attaining vision 2030!

Kalei is a PR Officer at GDC

A pastoralists harvesting hay in Kenya. *GDC will support irrigation of fodder and thus put at bay losses occasioned by drought. Photos Courtesy: SNV*

A head-start with wellhead generators

By Geoffrey Mabea

Technology has for ages brought solutions to everyday problems. Wellhead technology in geothermal development is one of those technological creations that can turn around fortunes of nations and investors.

The technology involves installing a portable generator on the top of a geothermal well to let steam run a small turbine. The end result is electricity.

In geothermal circles this is called early generation. Early because within less than one year after drilling a well, electricity can be generated. Normally it takes about four years to produce electricity with a conventional geothermal power plant.

The starting point… *Visitors view the well head unit installed in Olkaria. Such well heads will be installed in Menengai and other regions.*

These generators come in capacities of 2.5 MW out-put to 10 MW. Once a well is drilled, the steam can be tapped to generate electricity early enough while awaiting the construction of conventional power plant that may take up to four years. The good news is that the fluid characteristics of our reservoirs are very conducive to this technology.

While the early generation strategy is widely adopted across the world, it is now, more than ever before, urgently desired in Kenya. This is because of the high number of the population that is still unconnected. The use of early generation will do away with the need to employ emergency power generation which increases electricity tariffs and pollutes the environment.

Wellhead technology is environmentally friendly; the portable generator can be placed on hillside areas or placed underground to avoid offensive structures in the environment, a welcome gesture to environmental groups.

It is why Kenya should give this new venture a shot. One well head generator costs about Ksh. 450 million. GDC will supply ready steam to investors; their work will be to generate and sell the power to KPLC who is the national off-taker.

For Kenya, well-head generation is a desirable stop-gap measure as we battle with the ever-increasing electricity demand. Wellhead generation will strike the death knell on expensive emergency diesel-generated electricity. Kenya needs to accelerate the clean power generation and the wellhead is the strategy.

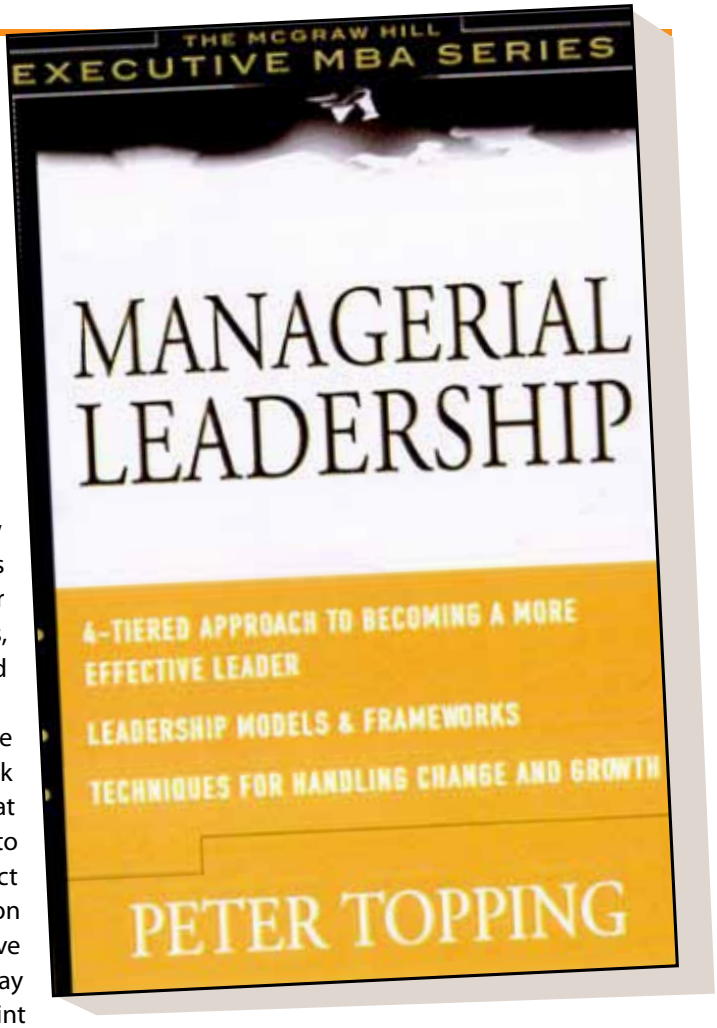
Considering the reduced capital cost in installing well head generators (in comparison to conventional geothermal power plants), and the relative affordable price of steam given that GDC is now drilling using own rigs, electricity tariffs will reduce significantly by more than 43%.

The demand for electricity in Kenya is projected to be about 15,000MW by 2030; our current baseload is only 600MW. Kenya's Cost of Unserved Energy (COUE) is US$0.84/kw with a Loss of Load Probability (LOLP) of about 3%. (the cost of not providing the essential energy needed)

GDC intends to initiate early generation through this concept in the Menengai and other fields. This technology will afford Kenya a faster way of tapping the indigenous geothermal resource which hitherto has been very slow. As a matter of fact, in the past, geothermal wells have laid idle for more than 10 years awaiting the construction of a conventional power plant. With well head generation GDC is moving this country closer to attaining Vision 2030

Mr. Mabea is a Senior Planning Officer, Corporate Planning & Strategy at GDC.

Title: **Managerial Leadership**
Author: **Peter A. Topping (PhD)**
Publisher: **Tata McGraw-Hill Publishing Company Limited**
Pages: **225**
Price: Kshs. **920**
Year of Publication: **2002**
Reviewer: **Godffrey Olali**
Available at leading university bookshops and libraries



Managerial Leadership outlines a comprehensive approach to leadership that works; one that recognizes the interactions between the leader, the task, and the team.

This book is a great read for leaders who want to simultaneously get the best of both worlds of leadership and management. This means successfully managing projects and activities while at the same time effectively leading people. Managerial Leadership outlines some of the reasons why tailoring management styles to individual employees is important; when to delegate, support, or direct; how to identify the leadership style suited to a particular person; and techniques that produce better management.

This remarkably easy-to-follow book is a priceless guide to creative, personalized leadership that elicits the best performance from staff and the best bottom line for any business.

Written by Dr. Peter Topping, this book also discusses the competencies and principles that define leadership throughout an organization while featuring case-studies of benchmark organizations like soft-drink manufacturer Coca Cola, Home Depot, Xerox and Fluor Daniel.

It provides a focused yet wide-ranging analysis into recognizing and developing own leadership personality.

The author starts by introducing aspiring leaders' to the Abraham Maslow's seminal work on the hierarchy of needs as critical to executing one's duties as a manager. This, he does through tight and efficient writing style.

3600 Feedback

Dr. Topping advises leaders on variety of tools available to help promote self-awareness in the context of leadership. He gives an example of 3600 Feedback Style, which he mentions as one of the most powerful leadership and management styles. The term is derived from a full-circle 360 view of an individual's leadership behaviour as perceived by peers, subordinates and supervisor.

On fear of the unknown, the book guides leaders that the best approach to overcome this aspect is to help the person envision a positive attitude. "You may not be able to paint a complete picture of where the organization is headed, but you should at least be able to articulate a vision of the direction in which the company is going."

Peter A. Topping (PhD) is a senior lecturer and Executive Director of Executive Education at Goizueta Business School at Emory University. Dr. Topping's work has appeared in several professional publications, including Business and Economics Review and Journal of World Business. He has also worked with a broad range of leading global brands including Coca Cola, Bosch, Unum, Xerox, and Eastman Chemical.

HIGHLIGHTS

- Dedicate time to open discussions about risk-taking.
- Ask your team under what conditions they feel comfortable taking action without your approval.
- Ask them what stops them from trying out new ideas.
- Create a recognition-reward system for risk-taking.
- Make sure there are frequent briefings to highlight what has been learned from any new activities. People can learn more from things that did not work out than from successes.
- Be open about your failures and mistakes from the past. Share lessons learnt.
- You must serve as the insulation between your staff and the rest of the organization in order to protect them from the company's culture if it carries a high price for failure.
- Make sure you are not the barrier. Avoid micromanaging.

Kenya Geothermal Conference

KGC 2011

Geothermal: The Energy to Power Kenya Vision 2030

First Announcement and Call for Papers

OBJECTIVE OF KGC 2011

COUNTRIES the world over are constantly searching for diverse energy sources to help power their growing economies, industries and populations. Kenya is now developing geothermal energy to reduce reliance on hydro and thermal generated electricity.

This year, the Geothermal Association of Kenya (GAK) together with its partners will host the inaugural Kenya Geothermal Conference from 21st – 23rd November 2011 in Nairobi, Kenya. The conference will feature distinguished speakers, scientists, engineers, financiers and other key players in the geothermal and energy sector in Kenya.

The conference will also open its doors to exhibitors to showcase their projects, equipment and services. Delegates will have a field trip to geothermal projects in Kenya's Rift Valley.

The Geothermal Association of Kenya (GAK) hereby invites abstracts on any of the following topics:

- **Surface Exploration**
- **Drilling**
- **Power generation and transmission**
- **Reservoir engineering and management**
- **Steam field development**
- **Direct use**
- **Environment and social issues**
- **Economics and finance**
- **Manpower development**
- **Policy, legal and regulatory matters**
- **ICT and Geothermal**

Please note the following important deadlines and conference dates

Abstract Submission	**31st May, 2011**
First Draft Submission	**29th July, 2011**
Final Paper Submission	**30th September, 2011**
Pre – conference field tours	**19th – 20th November 2011**
Conference	**21st – 22nd November 2011**
Post – conference field tours	**23rd November 2011**

Kindly submit your papers through the following email address:
info@gak.co.ke; kgc2011@gdc.co.ke
For more enquiries please contact our secretariat on +254 020 242 7536 or via the emails above

Convenor | **Co-convenors**

GAK Geothermal Association of Kenya | Ministry of Energy | GDC Geothermal Development Company, Powering the Vision | KenGen | KPLC | KETRACO Kenya Electricity Transmission Co. Ltd. | erc Energy Regulatory Commission

..We are in a Great Team!

GDC Geothermal Development Company

Powering the Vision