Steam
Issue No.7
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Geothermal: investment spree in Kenya

Now Tanzania thinks geothermal

When the president visited GDC pg. 4

Marvelous Menengai

Steam is an authoritative platform that reports on geothermal development 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 participate in the sector.
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The ultimate solution

Kenya needs redemption; we need relieve from perennial high electricity bills that continue to slow the attainment of individual and national development goals. It is not a secret that the cost of electricity in Kenya has remained high in the recent past due to increased reliance on expensive diesel-generated electricity to meet our energy deficit.

I had not quite appreciated the impact of over reliance on diesel generated electricity until fairly recently. On this particular day, I purchased a pre-paid electricity voucher worth Kshs. 2,000. On a cursory look at the receipt, I was in utter shock! Out of Kshs. 2,000, I got only Kshs. 700 worth of electricity units; the rest of my money went to a battery of charges listed in the receipt - foreign exchange cost, fuel levy, fuel cost adjustment, name it!

This is what consumers in Kenya have to contend with, courtesy of erratic power supply. Kenya's electricity supply capacity is 1279MW, the bulk of which (738) comes from the hydro sources. Due to continued poor hydrology, with the probability of a dry year estimated in Kenya at 53%, thermal generation deployment has increasingly become the default fall-back option. Today, 27% of Kenya's electricity (345MW) is produced from thermal sources. In terms of cost, diesel generated electricity costs up to Kshs. 25 per KWh.

The ultimate solution to Kenya's energy needs lies in increasing the amount of geothermal power in the energy mix. While current electricity generation from geothermal sources comes a distant third with (185MW) in the national grid, the good news, however, is that geothermal power is extremely cost effective. Geothermal power is much cheaper than all other renewable sources.

So, what has GDC been up to in the last three years? In the Olkaria Geothermal Field, GDC has developed 354MW of steam. This is the steam that the national power generator will use to generate 280MW of electricity once the construction of two power plants is complete. Once the 280MW comes on line, geothermal will have bridged the country's current 512MW electricity shortfall.

GDC has also opened up a new geothermal field 200KM South East of Nairobi and deployed four (4) 2000 horsepower state-of-the art drilling rigs. This is a strategy to lower drilling costs, and fast track the pace of drilling. The procurement of two more rigs is underway. By using own rigs and local drilling crew, GDC has reduced the cost of drilling geothermal wells by half. Such huge savings will translate to a lower electricity tariffs for the benefit of Kenya's economy.

In this issue we continue to bring you success stories on our strategy to provide adequate geothermal energy that will replace the expensive thermal-generated electricity. On page 11 Paul Gondi, the Chairman of the GDC Board of Directors delves into the aspect of greening the economy, the geothermal way. And, courtesy of GDC, Kenya has become a geothermal hub; turn to page 15 to catch a glimpse at how the private sector can take advantage of the geothermal investment frontier in Kenya. And with Kenya leading the way, as detailed on page 21, other East African countries like Tanzania and Rwanda have joined in the search for steam as a better alternative to a green economy.

Enough said, I leave it to you to open the other pages and savor the informative and interesting stories in this issue. And as always, we love to hear from you. Please drop a note to the editor.

Cheers!

Ruth

Life jackets for the rocks? hmmm, one may wonder. *May be not. Our correspondent caught up with these UNU-GTP fellows who were on a tour of the Great Rift Valley. Here, they were ready to take on Lake Baringo, about 150 KM west of Nairobi.* PICTURE : JOHN LAGAT/STEAM

Inside:

Your letters

It's impressive work, GDC - readers say

One of a kind

I read your issue of *Steam* titled 'Unlocking Africa's geothermal potential' and I was impressed by the efforts GDC is using to ensure that we have a pool of well-trained experts. I take a lot of pride in your work in Menengai and by you giving Kenya hope of a bright future. I want to commend the MD, Dr. Simiyu and the entire GDC team for the dedication at work. Other companies have something to learn from you.

Gregory Kiti, Nakuru

Great read

I enjoy reading your magazine because of the diversity of professionally written articles. You have really managed to explain a complex discipline like geothermal energy to the common man. Every time I go to the ASK show I make sure I get my copy. I like the way GDC is progressing in Menengai and I'm confident that a lot of electricity will come from there. God bless GDC.

Elias Kamau, Nakuru.

You're dedicated

Thank you for sending me a copy of *Steam* Issue No. 7. This is indeed a kind gesture from GDC. I have read your magazine from cover to cover and I'm impressed.

There is a lot of work that GDC is doing in Menengai and Baringo. When I see GDC staff at work with all the dedication and passion, I just smile.

This shows how different your company is even if it is a parastatal. You have results to show for. I think this is why the international financial community has a lot of trust in you. You will succeed and Kenya will progress in a big way.

Doris Auma, Nairobi.

Let's tap the resource

When I read about GDC's activities in Nakuru and Olakaria, I can't help but to admire how a state corporation is determined to see that the future of this country is bright. This country has a lot of resources and geothermal is a core one. It is green energy and environmentally friendly which is a good thing for the world because we are all fighting global warming. That is why the government and financiers should be handy to support GDC's endeavors. This country can only prosper with our own energy. Go for it GDC.

Tobias Mukweli, Nairobi

I salute you for your great work! The kind of customer service I saw at a parastatal like yours, I only experience it at KRA. Please keep it up. I enjoyed being taken through what GDC does; please pass word to the ladies manning your stand and the gentleman who was taking care of the rig model.

I did get a copy of *Steam* and would like to be receiving future ones.

Martin Theuri

What others say about GDC:

Great, you have changed our lives.
George Muhia, Kasambara.

GDC is real agent for attainment of Vision 2030.
Yusuf Mburu, Nairobi

Very impressive; our future is bright.
A. Muthami, Nakuru.

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

IN FOCUS

Congratulations... *H.E. Hon. Mwai Kibaki presents a trophy to Mr. Paul E.O. Gondi, the Chairman of the GDC Board of Directors. GDC was judged the best Company which competently interpreted the theme of the show in Nakuru*

The day President visited GDC

HE strode in with the characteristic stately majesty. Hush fell over the place as alert security detail kept vigil. Photographers kept a distance jostling for shots. Its the day H.E. President Mwai Kibaki visited the GDC stand at the Nakuru ASK show.

The Head of State was received by GDC chairman Mr. Paul Gondi and MD/CEO Dr. Silas Simiyu. He spent well over 20 minutes at the GDC stand as Dr. Simiyu explained to him the progress GDC has made in search for geothermal energy.

The president was keen. He followed every explanation, managing a smile here and a surprise there.

Dr. Simiyu assured the President of GDC's commitment in speeding up the process of geothermal development.

In his brief comment at the stand, President Kibaki urged GDC to speed up the process of giving Kenyans affordable energy.

On his way out, the President signed the visitors' book and happily picked copies of *Steam* and *Geothermal Africa* magazines.

"Let me go and read what you've written here...the rest you can read; you are still young," the president charmingly chatted with GDC staff who were manning the reception desk.

...we bagged awards

At the Nakuru ASK Show, GDC bagged key awards. GDC was judged as the Best Company which competently interpreted the theme of the show: Enhancing Technology in Agriculture and Industry for Food Security and National Growth.

The company's stand also emerged tops as the Best Environmental Trade Stand. We were also nominated as the second runners-up in the Most Striking Display category and stand which Best Demonstrates Technology Innovation at the fair which attracted a total of 625 national and international exhibitors. GDC Chairman Mr. Paul Gondi received the two trophies from President Kibaki.

ASK Nakuru branch Chairman John Karanja and the national chairperson Alice Kalya, thanked GDC for supporting the Rift Valley chapter of ASK.

The economic balloon needs fuel

There is a renewed sense of optimism on continental Africa. More stable governments are emerging, an educated mass is rising spawning a formidable middle-class block. Politics and policies are increasingly favouring direct foreign investment. Nairobi is among the major cities that are primed for the social and economic revolution. In economic-speak, Africa is gradually becoming bullish.

In fact, recently, the African Development Bank was of the opinion that one in every three Africans is now in the middle-class bracket. This big boom can be attributed to Africa's strategic structural geographic and even demographic design similar to the Asian Tigers of the years gone by.

To sustain the emerging demands of the continent, and to allow investors' hot-air balloon to thrive, the energy factor in this equation can never be overstressed. Kenya got it right in the Vision 2030 development blue-print where geothermal energy is established as the base-load source of electricity. GDC is charged with the responsibility of providing innovative excellence that will deliver adequate and affordable energy to catalyse economic growth. Thanks to GDC, today, the Menengai Geothermal Project in Nakuru hosts four rigs; the project is expanding and developing at an estimable pace.

> "Thanks to GDC, today, the Menengai Geothermal Project in Nakuru hosts four rigs

Geothermal energy will spur a green economy in many ways. It will provide the energy that will attract production and employment. It will tame carbon dioxide emission and thereby afford humanity a clean environment and a promise of perpetuity. This is because geothermal energy is far much affordable as compared to other sources of energy. It is as clean as it is safe, and its abundance mindboggling – In Kenya, 10,000 MWe; in the region, 23, 000MWe. In a nut-shell, after interrogating our energy mix, geothermal energy stands tall. We at GDC are pretty much aware of that. We are also cognizant of the fact that a lot of faith has been vested on our shoulders to haul the nation from the rut of energy deficiencies to the glories of plentiful sustainable supply.

In its resolution 65/151, the United Nations Environmental Programme (UNEP) declared 2012 as the international year of sustainable energy for all. With its capacity of replenishing reservoirs, geothermal remains the most reliable source of energy that is sustainable. When our rural-folk will start to enjoy this power, and that is in not so distant future, we are going to save millions of trees that would have otherwise fallen on the axe-man's blade. Geothermal will also boost the health of the people unlike wood fuel which is dishonorable for respiratory tribulations.

But all that said such a grand dream of turning Africa into a Celtic Tiger will only make sense with the emergence of widespread utilization of geothermal energy. The resource is mainly a domicile of the Eastern Africa, along the Great Rift Valley. While Kenya is home to Africa's geothermal economy and know-how, other countries are constrained due to technological, policy and expertise inadequacies.

Geothermal is such a specialized province that continuous training is mandatory. It is under the auspices of UNU-GTP-KENGEN-GDC, we are building the capacities of many African scientists and engineers who will transform the continent. About 15 countries do participate in this annual three-week intensive training. For the past six years we have trained about 300 experts from the region.

This pool of experts is undertaking exciting action back in home countries. Rwanda is a shining example.

We at GDC are continuously engaged in strategic improvement and capacity building; it has paid off. Clearly, the ace on our sleeve is no mystical. It is simple. Be proactive and be a great utiliser of the resources available.

And, for investors to really enjoy the heritage of geothermal energy in Africa, a deliberate effort to support such endevours is not far-fetched.

When countries open up to geothermal, by extension they open up opportunities for investment. Investors should then be party to the capacity-building efforts so that they can tap on this resource at the opportune time and in a more convenient way.

Indeed, once opened up, the Eastern Africa Rift System will be abuzz with investment ventures. Demand for geothermal goods and services will far outweigh supply – and isn't this good for business and development?

Dr. Silas Simiyu, M.B.S
Managing Director & CEO
Geothermal Development Company

Godwin Mwawongo, Chief Manager Technical Division presents a corporate certificate of membership to SKM's Daryl Judkins and Mercy Gachichio during the AGM

Optimism as GAK holds AGM

The Geothermal Association of Kenya (GAK) held its first AGM recently in Nakuru and confirmed the interim board of directors as full board members. This move will ensure that the office is operational until elections are held in February 2013.

Godwin Mwawongo, the association's vice chairman represented Dr. Silas Simiyu who is the chairman.

"In spirit of growth, GAK in collaboration with other international bodies will organize geothermal conferences locally and abroad with the aim of empowering our members," Mwawongo stated.

GAK is growing rapidly within the region. It has 120 registered members, with membership drawn from as far as Uganda. It draws its membership from corporations and individuals who are associated with geothermal energy. Mwawongo challenged more GDC staff to register as members of the growing association.

During the AGM, a report of the audited accounts for the year 2011 was presented and adopted. Members also adopted a budget for the year 2012. The funds will run the secretariat which will be based at the GDC's office in Naivasha, support the upcoming ARGeo-C4 conference and publicity, including the production of the association's quarterly magazine – Geothermal Africa.

The AGM was also graced by the GDC board of directors led by Chairman Mr. Paul E.O. Gondi.

GAK is credited for organizing the Kenya Geothermal Conference (KGC, 2011) last year.


Kenya Bureau of Standards

QUALITY MANAGEMENT SYSTEM CERTIFICATION SCHEME

CERTIFICATE OF REGISTRATION

Awarded to:

GEOTHERMAL DEVELOPMENT COMPANY

P.O. Box 100746-00101, NAIROBI

Exploration, Resource assessment, drilling reservoir management and steam harnessing

Now GDC is ISO certified

GDC is now ISO certified. The Company's Quality Management System (QMS) was audited and found to meet the requirements of ISO 9001:2008. The certification by the Kenya Bureau of Standards (Kebs) is a solid endorsement that our practices are standardised and therefore of good quality. The certification lasts up to June 25, 2015 upon which another audit will be conducted for renewal.

"We're comitted to quality," said Karume Weke, GDC's Chief Manager, Systems Management that implemented the ISO project.

Karume Weke, Chief Manager Systems Management

Your Menengai is bankable – Japan

Japan is keenly considering supporting the Menengai Geothermal Project. A delegation from Japan International Cooperation Agency (Jica), which visited Menengai recently, said that the field is a high potential area which will give Kenyans an alternative source of reliable energy.

"Geothermal is our key priority and from what we have seen, the field is a high productive area; we need to see Independent Power Producers brought on board so that we can consider channeling the funds" said Kenji Yokota, an Assistant Director of Africa Division at Jica.

He was accompanied by Doi Kenichi, also from the African division.

The duo added that Jica will also be ready to offer help for capacity building initiatives like training and technical empowerment to GDC engineers and reservoir technicians.

"GDC should submit a proposal on this since human resource empowerment is critical in successful execution of geothermal production," said Yokota who added that Kyushu University based in Fukuoka, Japan is one of the best institutions of higher learning which offers geothermal-related courses.

Regarding the Bogoria-Silali Block, they urged GDC to consider preparing a Marshal Plan which if considered, will develop the prospect and champion development in the North Rift.

Mr. Caleb Indiatsi, Manager, Corporate Planning and Projects assured the duo that Bogoria-Silale Block will open a new frontier for investors and financiers.

Wow! you got a wonderful resource... *so, it seems that this JICA delegate was saying as Caleb Indiatsi, the Manager, Corporate Planning & Projects, takes the team around Menengai.*

London eyes Menengai

A business delegation from London including officials from the Foreign and Commonwealth Office toured Menengai to assess its suitability for investment.

Led by a leading geologist from New Castle University, Professor Paul Younger, the visitors were thrilled by the drilling progress at the site and its potential to attract diverse investment.

They assured GDC that British investors would be excited by Menengai adding that Britain was willing and ready to accord GDC all the necessary support.

"This is an excellent and exciting experience for us. Kenya should be used as an excellent example in the world geothermal dispensation," said Prof. Younger who is also an engineer.

Professor Younger was accompanied by Jon Ryan, the Africa Prosperity Co-ordinator at the Foreign and Commonwealth Office based at the Westminster's King Charles Street, Greg Gibson, the Commercial Officer at the British High Commission in Kenya and Susannah Goshko, a Prosperity Officer from the Consulate.

Speaking during the brief tour, Mr. Gibson stressed that geothermal energy is the cornerstone to achieving a clean environment.

"GDC should be supported by all means to register Clean Development Mechanism (CDM) projects as it endeavours to lead the big geothermal campaign towards achieving the Vision 2030 blueprint. Geothermal energy is clean, reliable, affordable and sustainable," he added.

Meanwhile, 20 British companies were in Kenya scouting for investment opportunities in the renewables. Geothermal featured prominently.

The delagation was led by Greg Barker, Britain's Minister of State, Department of Energy and Climate Change. His entourage consisted of UK's leading renewable energy developers and financial services.

Director's bid GDC bye

Nostalgic moments, celebration and fanfare marked the exit of two directors from the GDC Board.

Not even the drizzly evening could dampen the mood of attendees as they bid farewell to two directors - John Gitonga and Joseph Kariuki- who have since left the board. Gitonga is pursuing other interests while Kariuki, formerly alternate director to PS, Treasury, was seconded to another parastatal.

The farewell ceremony was attended by GDC staff, the Board and management. Speakers fondly recounted their light moments with the outgoing directors. "We will miss you," that was the message that echoed throughout the charming evening.

The two were described as 'resourceful and dedicated team members' who guided GDC toward achieving its mission.

Speaking during the fete, Kariuki thanked GDC for the good gesture and support while he served as a member of the inaugural board.

"I'm still ready to offer any support to GDC because of the strong team and foundations we built together," said Kariuki who still serves in the public service.

Gitonga noted that the future of this country belongs to GDC urging staff to work hard.

"GDC almost made me a scientist and I thank the whole team which is truly dedicated to achieve the envisioned mission," he said of his times and seasons in GDC.

...and a memento too... *GDC Board Chairman Paul Gondi, presents plaques to Gitonga (left picture) and Kariuki during the farewell dinner*

> "GDC almost made me a scientist"
>
> Outgoing GDC director John Gitonga during a farewell party held on his honor and that of Eng. Muchemi

Directors Sankori, Rhoda exit too

Two GDC Directors have resigned from the Board to pursue other interests. David Ole Sankori and Rhoda Loyor while submitting their resignation letters appreciated GDC for the great and pleasant time. Hon ole. Sankori, a career politician and an astute businessman said he will still serve GDC's interests wherever he will be adding that it was a great pleasure having had the opportunity to work for the company and getting a chance to empower Kenyans.

"I will support and fight for GDC wherever I will be and whatever capacity God will bestow on me. It was an exciting and momentous journey. I enjoyed my tenure here and I appreciate the faith and cooperation I have been receiving from you," he said in his brief letter.

Ole Sankori, who is among the pioneer members of the GDC Board of Directors, was the chairman of the Board Audit Committee and a member of the Legal and Regulatory Committee.

Hon. Sankori and Loyor. The former directors are in pursuit of other interests

Director Rhoda Loyor chaired the Board Strategy Committee and was a member of the Staff Remuneration Committee. She was appointed on the GDC Board as an independent Director on January 9, 2009 and re-appointed in February 2012 for a second three-year term. GDC wishes Hon. Ole Sankori and Madam Rhoda best of luck in their future endeavors.

By Jane Mwangi

Four staff out of the six with physical disability at GDC are now tax exempt. The four staff have obtained tax exemption certificates from KRA and are enjoying tax relief in their pay slips. Processing of certificates for the remaining two is underway.

GDC takes the issue of disability so seriously that it created the Gender and Disability Mainstreaming Committee.

Now, this is what disability mainstreaming is all about. It is a strategy for making everyone's concerns and realities an integral dimension of the design, implementation,

Menengai gets two more rigs

Two more rigs landed in Menengai bringing the number to four.

The latest rigs have already been assembled and commissioned for operation. This is a major boost to the energy sector as more rigs will translated to quick realisation of steam for electricity.

"This is a major milestone," enthuses Michael Mbevi, the Manager, Drilling Operations. "We are going to speed up our operations abundantly."

Drillers in Menengai could not hide their excitement as the fleet of trucks delivered the rigs.

The French Development Agency (AfD) financed the purchase of the two rigs.

Meanwhile, the African Development Bank has also financed two more rigs which are expected to be manufactured and delivered late 2013.

Quick numbers

4	Number of rigs in Menengai today
4	GDC staff who are tax-exempt

Financier meets driller... *GDC's Stephine Kangogo (in blue) explains a point to AfDB's Supervisory Mission*

AfDB gives Menengai thumbs up

The first African Development Bank (AfDB) supervisory mission has expressed satisfaction with the progress made in Menengai Phase I.

The delegation led by Mr. Gabriel Negatu, the Regional Director in charge of the East African Regional Centre (EARC), noted that the pace of implementation of the first 400MWe phase is satisfactory.

"We're impressed by the progress GDC has made. We're confident that we will achieve the megawatts," enthused Mr. Negatu.

The mission met GDC managers and the Menengai Project Implementation Team (PIT), before visiting the project site. The bank also held discussions with officials at the Ministry of Energy and at the treasury.

The outgoing Team Leader, Thierno Bah was full of praises for GDC. "When you have a good implementing agency like GDC, then your work as a financier becomes easy."

During the tour, the MD & CEO Dr. Silas Simiyu updated the group on the development so far in Menengai and assured the bank that GDC is well on course in its pursuit of the 5,000MW.

Some of the top bank officials who visited included the Chief Renewable Energy Specialist Arfaoui Youssef, and Solomon Asfaw.

monitoring and evaluation of policies and programmes to tame inequality.

The word mainstream connotes ordinary; conventional; normal. At the Geothermal Development Company everyone is in the mainstream of activity, regardless of gender or disability.

To spearhead gender and disability mainstreaming, a Committee was constituted in November 2010 as part of the requirements of the government Performance Contracting initiative. It comprises of eleven (11) members drawn from various departments, with a mandate to:

• Facilitate implementation of Gender and Disability Mainstreaming activities

• Ensure that all issues that pertain to Gender and Disability are handled professionally.

• Report on the progress of implementation of activities on the two indicators

Achievements

• Initiated the process of tax exemption for staff with disability.

• Allocation of parking slots for staff with disability

• A work place policy on Gender and Disability developed

• Sensitization of staff on Gender and Disability issues

• Submission of regular reports to the National Commission on Gender equality and Development, and National Council for People with Disability on quarterly basis

• Undertaken a survey to determine the level of gender mainstreaming; recommendations will be implemented in the current FY2012/2013.

• Developed a policy on gender-based violence and implementation is in progress.

Currently the Gender and Disability Mainstreaming Committee is creating awareness among staff; and provide communication equipment/systems to ensure accessibility to all company premises, and facilitate accessibility to information.

These initiatives are aimed at ensuring that all staff and visitors are in the mainstream; they can comfortably operate within GDC.

Finland to aid Uganda on renewables

Uganda will team up with Finland to develop renewable power sources including geothermal.

The initiative, will see the two nations establish the Energy and Environment Partnership program.

The plan has already received support from the Austrian Development Agency, the UK Department for International Development and the Development Bank of Southern Africa.

Speaking at the launch of the program in Kampala in September the Ugandan Ambassador to Finland, Richard Mugera said the program has been established to achieve more efficient use of renewable energy sources abundant in the country.

"Uganda has launched the Energy and Environment Partnership program with Southern and East Africa (EEP-S&EA) in collaboration with the government of Finland to boost the renewable energy sector in the country. The programme is aimed at increasing access to sustainable energy services derived from renewable energy sources like solar, hydro, wind, bio-fuels and geothermal energy among others," he said soon after the launch.

Other donors of the project are the Ministry of Foreign Affairs of Finland, Austrian Development Agency (ADA), United Kingdom Department for International Development (DFID) and Development Bank of Southern Africa (DBSA).

The regional coordinator of the programme, Yaw Afrane Okese said the government of Finland and other partners already injected about EUR 24 million ($35 million, about sh72b) in the first phase which ends in December 2012.

Ethiopia targets 450 MW

Ethiopia has laid out an ambitious plan to help it achieve at least 450MW of geothermal power by 2019.

According to authorities, Ethiopia is closely looking at some of the potential areas like Abaya, Alto, Fentale, Kerbito, Tendaho and Tulu Moye in the coming five to seven years.

Ethiopia has also received US$50 million from the Climate Investment Fund (CIF) and part of this funding will go towards developing the country's geothermal capacity.

The investment plan will see the African Development Bank (AfDB) provide investment and technical support to execute phase II of the country's Aluto Langano Geothermal Project.

Under the terms of the CIF's Scaling up Renewable Energy Program for Low Income Countries, the AfDB will provide US$23 million for these two projects.

Addis Ababa has already commissioned The Ethiopian Geological Survey (EGS) which says, will be the agency responsible for helping achieve the goal of 450 MW.

"Ethiopia is really interested in generating 450 megawatts of electricity from geothermal power in Abaya, Alto, Fentale, Kerbito, Tendaho and Tulu Moye by 2019, said EGS Director Masresha Gebreselassie.

Ethiopia's Investment Plan, calls for AfDB to offer investment and technical support to execute Phase II of the country's Aluto Langano geothermal project.

Vietnam commissions first geothermal plant

Vietnam recently commissioned its first geothermal power plant which will be expected to generate at least 25MW.

The plant, set to be the very first of its kind in Vietnam, has been licensed by provincial authorities and aims to promote exploration for new sources of energy in the near future.

It will be based at Dakrong District located in the expansive Central Quang Tri Province.

According to the country's Thermal Association deputy chairman Ta Huong, Vietnam has the potential for developing geothermal power in almost all provinces and cities nationwide, especially in Phu Tho, Quang Binh and Quang Tri.

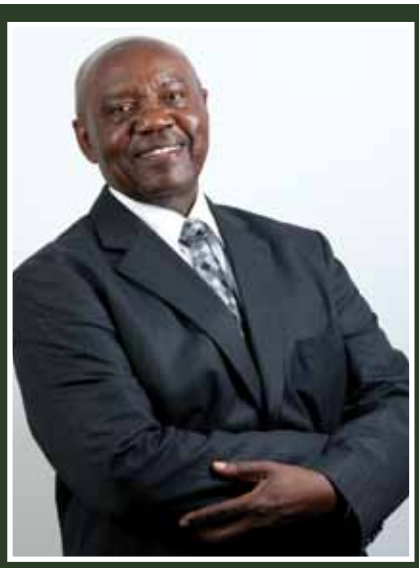
He added that the geothermal power plant will use Hot Dry Rock (HDR) heat mining technology to mine the heat from the hot rock found almost everywhere at some depth beneath the surface of the earth.

Using the HDR technology, the water is pumped into hot, crystalline rock via an injection well, which becomes superheated as it flows opening joints in the hot rock reservoir, and is then returned through production wells.

At the surface, the useful heat is extracted to generate power and the same water is recirculated to mine more heat.

Huong says the technology has been used by many countries in the world including the US, Germany and even geothermal powerhouse Iceland.

Geothermal for a green economy



By Paul E.O. Gondi

As the world gears towards a green economy, Kenya's geothermal resources and technology have much to offer. Beyond electricity production, geothermal has the potential of improving food security for our people and thereby contributing abundantly to the foundation of economic growth.

A Green Economy is a key catalyst for economic growth and poverty eradication in any developing country. It is estimated that investing about one and a quarter percent of global GDP each year in energy efficiency and renewable energies could cut global primary energy demand by nine percent in 2020, and close to 40 percent by 2050.

With this kind of investment, employment levels in the energy sector would be 20% higher than under a business-as- usual scenario, while savings on capital and fuel costs in power generation would, under a Green Economy scenario, be on average US$760 billion a year between 2010 and 2050.

Sadly, the transition to a Green Economy has a long way to go. The good news is that several countries are demonstrating leadership by adopting national "green growth" or "low carbon" economic strategies. Kenya, on its part has committed to fully adopting a Green Economy by 2017.

There are diverse reasons why nations starve. The greatest, of course, is as a result of drought. Such is the state of land in parts of Northern Kenya and the Rift valley. Here, a big chunk of semi-arid land spreads miles after miles.

It is along the Rift Valley that the government has set –up base to prospect, explore and drill for geothermal steam. Today, Kenya's electric capacity is heavily dependent on hydro and thermal generation. As a result, the country has suffered high electricity tariffs since emergency power generation is employed to supplement hydro generation which is dwindling due to persistent droughts.

Geothermal is therefore the best solution to Kenya's energy needs. As such Kenya has committed itself to developing the more than 10, 000 geothermal resource potential. Through electricity generation from geothermal, Kenya hopes to free itself, not only from unreliable and expensive electricity generation, but also from other sources that have negative environmental effects. Kenya's long-term plan is to make geothermal as the base-load.

Countless benefits

The benefits of geothermal energy are massive. By tapping into this vast energy reserve, the country is definitely going to realize enormous benefits such as reduced over-reliance on diesel-generated electricty, low cost of power to electricity consumers, cleaner and environmentally safe electricity, reduced outages once geothermal operates as baseload, attraction of foreign-direct investment and the attendant benefits as a result of the low cost of production stemming from affordable electricity.

Besides electricity generation, it has been demonstrated that we can derive other huge benefits from geothermal in form of direct use. By tapping geothermal condensate, vast portions of land can be irrigated, turning wastelands into rich and agriculturally productive zones. Condensate collected from power plants can be utilized as clean portable water as well, for industrial processes, and for space heating and cooling.

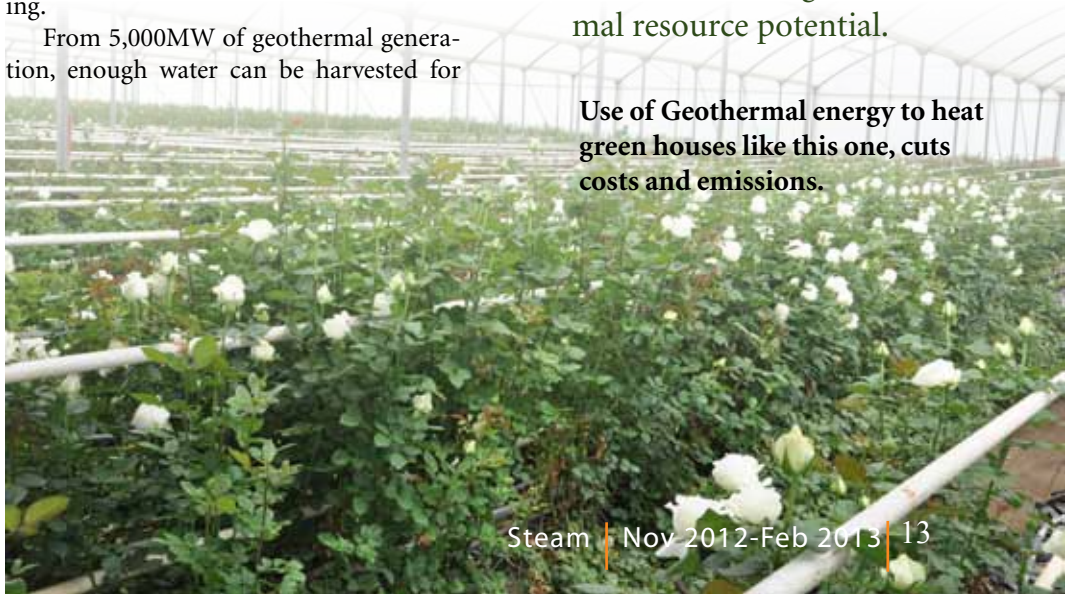
From 5,000MW of geothermal generation, enough water can be harvested for green house farming creating up to 3 million jobs, not to mention the jobs created from the resultant spin-off economic activities. Through irrigation, the semi- arid Rift Valley can be turned into lush green –land with rich pasture and vibrant cottage industries. Community slaughterhouses can be established to make use of the available geothermal condensate to dry and process hides and skins, and to refrigerate meat.

Through provision of heat from geothermal steam, crops such as grains and cereals can be dried; milk can be pasteurized; honey, aloe vera, and pyrethrum can be processed; thereby enhancing the value, which then translates into increased income to the farmers. In addition, low electricity tariffs from geothermal electricity can spur economic growth in the rural areas through activities such as poultry farming and fish farming.

Quite often, growth is considered private sector-led while government's role is to facilitate. The geothermal sector offers numerous investment opportunities that the private sector should take advantage of. The government is currently developing a Public-Private-Partnership (PPP) Bill as a framework that will facilitate the entry of the private sector into geothermal development, among others.

The writer is the Chairman of the Board of Directors of GDC. This is an abridged version of the speech he delivered in Arusha Tanzania

> "Kenya has committed itself to developing the more than 10, 000 geothermal resource potential.



Use of Geothermal energy to heat green houses like this one, cuts costs and emissions.

James calls it a day

By Godffrey Olali

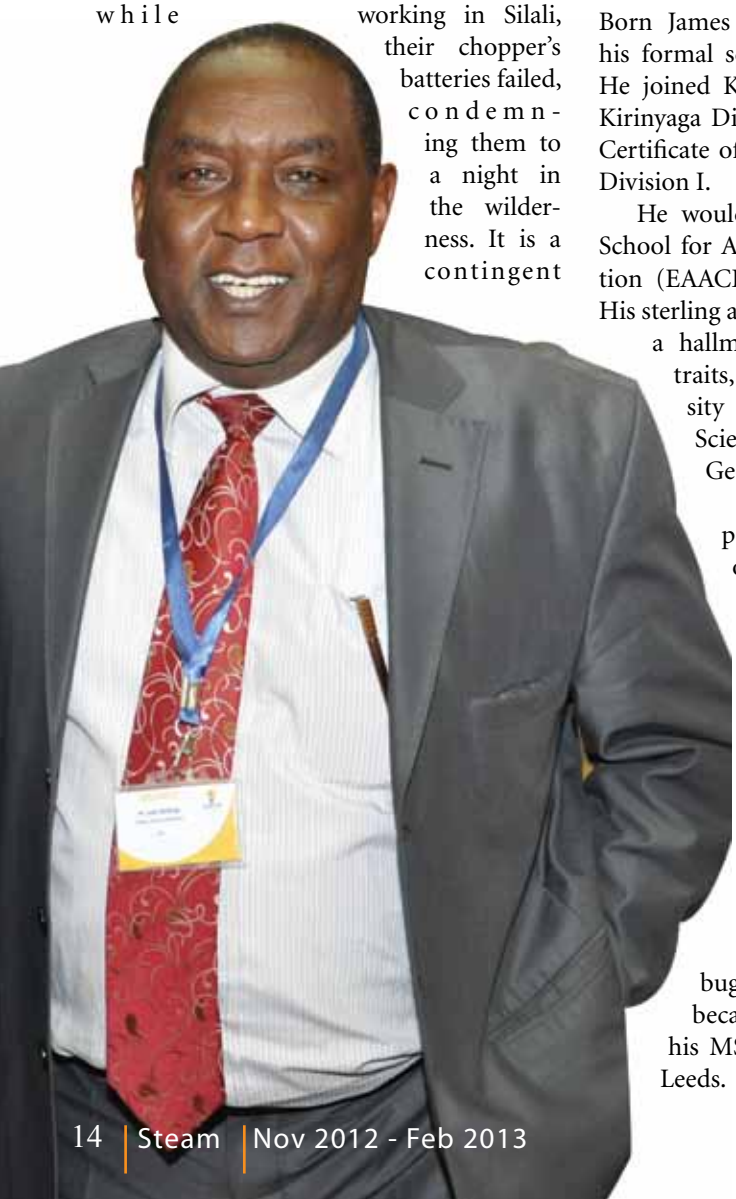
The occupants of the dugout boat trembled as a thick blanket of clouds swiftly sped across the darkening skyline towering over the small village of Kapisya, northern Zambia. The wild waters of Lake Tanganyika unleashed anger with might and gusto as the spikey currents danced to the tune of the wild wind.

The strong currents buffeted the boat threatening to crumble it as geothermal explorers on board shivered until fishermen from the sleepy Mushi village rescued them.

"We saw death coming for us," James Wambugu, who was in the team exploring geothermal in Zambia, says. This episode in 2006, and many others are the memories that Wambugu, until his retirement in August, the Manager, Geothermal Resource Assessment (GRA) at GDC, would be taking home.

The soft-spoken geochemist has traversed wild of African and beyond searching for steam -from the far-flung corners of Zambia, the pristine islands of Comoros, to the volcanic hills of Rwanda, Uganda and Malawi.

Wambugu vividly recalls in 1989 while working in Silali, their chopper's batteries failed, condemning them to a night in the wilderness. It is a contingent from the 50th Air Calvary wing of the Kenya Army that came to their rescue.



And in 2008 while working atop the Cathala volcano in the Comoros Island, bad weather prevented their copper from returning for them. The scientists, on geothermal exploration, were forced to trek using a GPS map through the thick forest in a foreign land.

"My exploration expeditions speaks volumes and I have a lot to share with the budding scientists in this trade," says the University of Nairobi alumnus during a recent interview with Steam.

The scholar

Born James Macharia Wambugu, started his formal schooling in Nyeri in the 70s. He joined Kianyaga Secondary School in Kirinyaga District and sat for East African Certificate of Education (EACE) obtaining Division I.

He would later join Nyandarua High School for Advanced Certificate of Education (EAACE) obtaining three principals. His sterling academic record, which became a hallmark in his later professional traits, saw him enroll at the University of Nairobi for a Bachelor of Science Degree in Chemistry and Geology up to 1984.

Wambugu proceeded for postgraduate at the University of Leeds in the United Kingdom between 1986 and 1987 where he specialised in geochemistry. In 1989, he went to Kyushu University, Japan for a specialised training in Geothermal Technology before furthering his education in Iceland for an Advanced Research in Geothermal Science where he specialised in Chemistry of Thermal Fluids.

The turning point in Wambugu's long geothermal career became palpable while pursuing his MSc degree at the University of Leeds.

"My project paper was based on the Lake Bogoria Geothermal Prospect, and it was amazing. I knew I had entered into the world of geothermal. There were only few scholars in this area and most employers were after us," says the man who enjoys Whitecap, and whose typical day begins at 5.00 am and ends way past 8.00pm.

Wambugu's formal working life began in 1984 after graduating from the University of Nairobi.

"I was posted to the Ministry of Energy as a Geochemist in the Geothermal Department where I worked up to 1992. I had another short stint at the Ministry of Natural Resources in the Mines and Geology Department in the mineral exploration sector. I worked here for only one year before joining then Kenya Power and Lighting Company's Geothermal Department in Olkaria."

Mid-night oil

He would later work here until the creation of KenGen. At KenGen, he was in charge of geochemistry operations where he excelled in his career until he was elevated to head the critical Geothermal Resource Assessment section.

He was part of the team that burnt midnight oil doing scientific studies to ascertain the geothermal potential at the Olkaria geothermal field.

"The results of our efforts are obvious. In Olkaria, we have some wells capable of producing up to 15MWe. This is how the state could commission the 280MWe plant there," he says.

Wambugu was among the pioneer managers picked through a public interview to spearhead the Geothermal Development Company (GDC), which had just been formed as a Special-Purpose Vehicle to accelerate geothermal exploration in the country.

He was the founding manager of the Geothermal Resource Assessment (GRA) Department at GDC.

His unwavering, passionate, guidance and professional expertise saw the depart-

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The dream of Bah

By Erick Wamanji

Thierno Bah squeezes himself past animated patrons at the Carnivore restaurant in Nairobi. He gently threads his way to a vacant seat at the counter and orders a mix of tonic soda and slices of lemon. This is his perfect drink for the night.

"I love it here," he whispers, his voice drowning in the "boom-boom!" "Kenyans love fun. I think this is a good indication of a growing economy."

I met Bah, the Senior Power Engineer at the African Development Bank (AfDB) for the first time in 2011 on our way to Menengai. I found him urbane, inquisitive, personable and knowledgeable. He bubbled with passion about renewable energy. He could not feign the awe that gripped him as Kenya's commitment to geothermal energy unfolded in Menengai, the newest geothermal project in Kenya.

Then, he was leading a team that was undertaking a scoping mission to evaluate the viability of the Menengai Geothermal Project. Eventually, the bank loaned the project US $ 127.5 million assorted with US $ 17.5 million grant in support of the first 400 MW.

This was a turning point that stirred plaudits, renewed hope and endorsed the project. Sadly, barely six months after the approval of this epic credit, Bah is moving from the project. He is heading to West Africa, way before megawatts spark from Menengai.

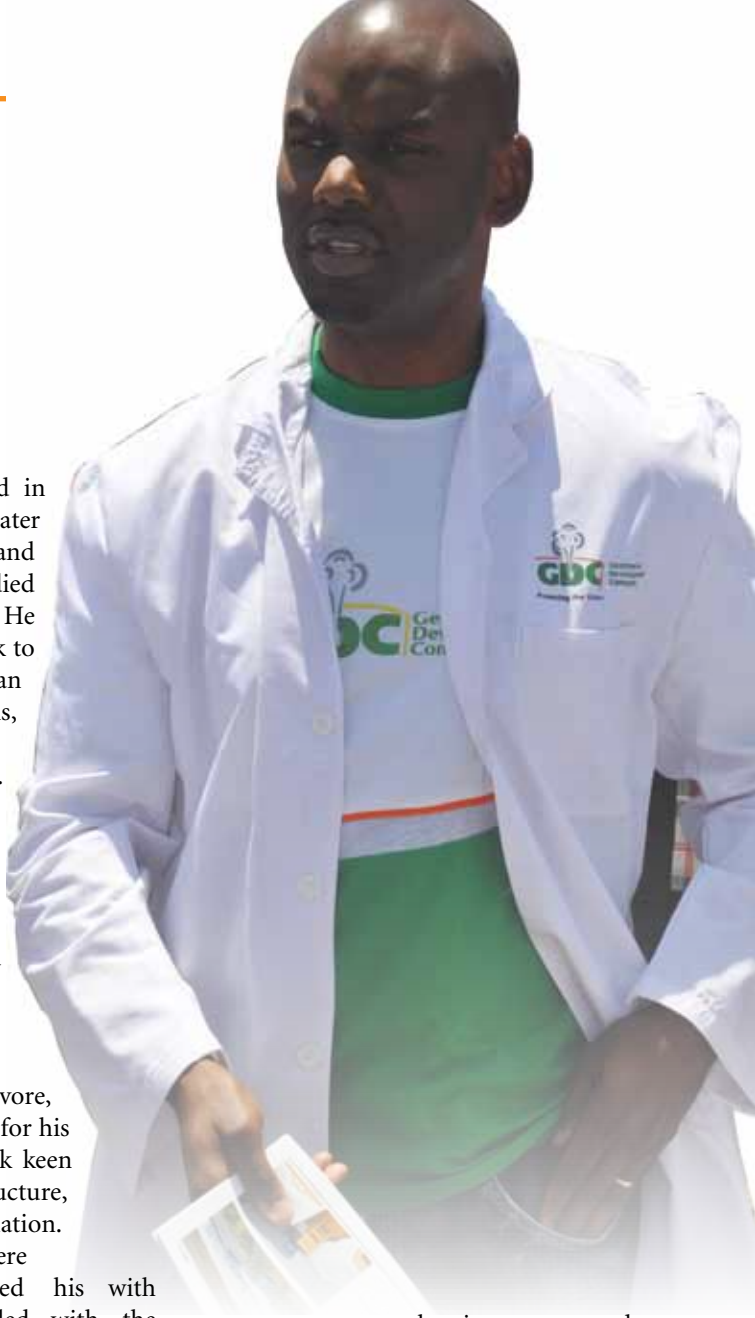
"I'd have loved to hang around and see Menengai mature. But that's not possible. I'm moving to the West Africa region division within the Energy Department of the bank. It's a personal choice," he explains.

This evening, I have joined Bah for a taste of Nairobi-at-night, where I gain a glimpse into his dreams, feats, aspirations and plans.

He hankers for an era of grand continental growth driven by Africans for Africans.

I quickly gather he didn't grow up in Africa. Instead, born of parents with international assignments, Bah left his native Guinea at four. Then, his dad worked in the Middle East. Bah would later go to high school in France and university in Canada. He studied engineering to master's level. He worked in Canada, then back to Saudi and then to the African Development Bank in Tunis, Tunisia.

At the bank his diary is full. He visits projects, evaluates concepts and proposals, and guides the bank on where to entrust its money in relation to energy projects. Such is a mercurial career that many in Africa would envy.



Rejoice my heart

The day before Carnivore, we were in Menengai for his second visit. Bah took keen interest in almost every structure, rock, machine and installation. At the botanical garden where visitors plant trees, Bah planted his with excitement, though he struggled with the spade and soil.

"When I see Menengai developing and producing steam, my heart rejoices," he told me at the top of Mlima Punda. From this vantage point, Bah grabbed a bird's eye view of the expansive geothermal prospect complete with Well-03 gushing steam, four rigs towering the landscape, and the sheer beauty of the caldera formation. "This is spectacular!" he declared.

At Mlima Punda the very wealth of the caldera, and indeed the future of geothermal complex in Kenya, looms large and unfolds in your very own eyes. Here, the mystical, picturesque Menengai undresses itself and has a way of seeping into your psych; it holds you into a surreal state as you marvel at this puzzling creation.

Menengai is close to Bah's heart, just like a newborn to the mother. It has sentimental value, it seems.

Back to my roots

"I liked the whole concept of Menengai when it was presented to us. The GDC team was passionate, clear and focused. Menengai had all the makings of a bankable project: renewable, green, affordable, indigenous and more so it had all the required government backing."

He continues: "This was my first major project at the bank and I'm glad it was executed in record time."

Bah is happy that Menengai is on course. He is happy that it will transform the way of life for millions of Kenyans.

Born Thierno Bah, in the hilly Fouta Djalon, Guinea, the father of a four-year "beautiful daughter," says that by moving to the west, he will be getting closer to his roots, and perhaps afford him an opportunity to invest and contribute to the development of his home country.

True, Bah didn't live an African boy childhood. He missed the childhood games and songs. He doesn't know what it means to be under a starry sky at the fireplace with-

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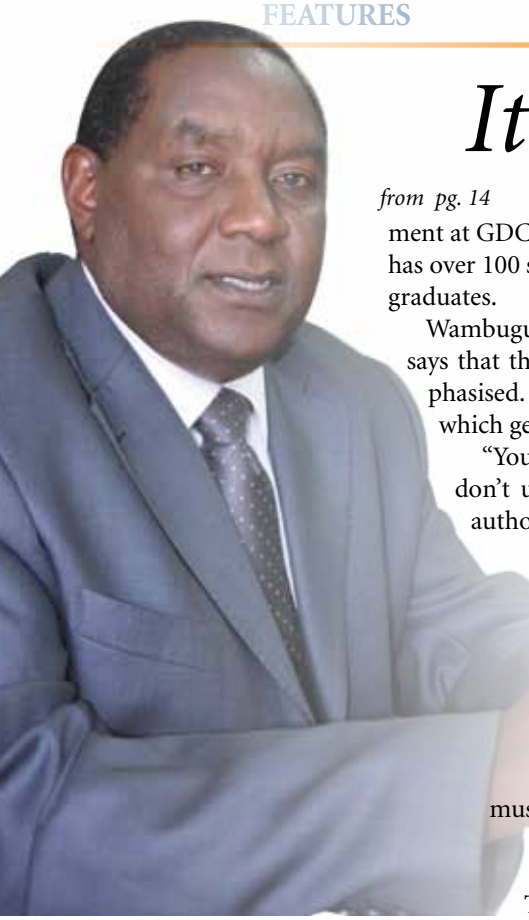

It's a day!

from pg. 14

ment at GDC grow abundantly. Now the department has over 100 staff, more than half of them are university graduates.

Wambugu cherishes and celebrates his career. He says that the importance of GRA cannot be over emphasised. To him, GRA is basically the bedrock upon which geothermal exploitation is anchored.

"You cannot talk of geothermal energy if you don't understand its core components. To be an authority in this business, you have to understand how this source of energy is formed, where it can be found, how to research for it and how it can be utilised. GRA entails carrying out all the exploration works for steam and recommending sites where the resource can be drilled," he says.

The GRA team, composing rig geologists, must work closely with the drilling team to log the well formation and later advice on when and where to place the well casings. They also sample and analyse steam to determine the chemistry of the well fluids. This is done to ascertain where the fluids can be used for power generation and also to determine the characteristics of the reservoir and eventually lifespan of the well.

He remembers the most exciting moment in his career at GDC, as the time when the team normally analyses results while the whole GDC family waits with hopes.

In a typical day, he spends most time solving technical aspects of GRA and attending management meetings.

"My philosophy in life is that we don't have all the time in the world for ourselves to do everything. Do what you can and to the very best of your capability."

His best moments revolve around attending to his personal activities, which at times, are so short owing to the tight schedule in office or visiting at times Menengai during weekends.

And his parting shot to upcoming geothermists: "Success does not come your way. You have to work hard for it. Think widely and thrive to practice and experiment what you read in books. Dedication to your work is key."

We at *Steam*, and indeed the entire GDC fraternity, wish Mr. Wambugu well in his new pursuits. S

The dream of Bah

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grandma oozing tale and sage. He didn't make african crafts from clay, crooked wire or tins.

Yet, at 34, most of his age-mates in Africa have not travelled to the nearest town, let alone their capital city. Bah has been to over 20 countries worldwide! He has boarded and alighted countless planes than he could care to count.

I joined Bah for a farewell dinner hosted by GDC at the Crown Plaza in Nairobi in his honour. Speakers showered him praises. Gabriel Negatu, the Director of AfDB Nairobi Regional Resource Centre noted that Bah has "a very bright future." Arfaoui Yousuf said he liked Bah's attitude towards work. "He is hardworking," he extolled. Dr. Silas Simiyu, the GDC MD and CEO fell short of describing Bah as a chip from the GDC family block. "Bah is a friend. He has been very supportive to us," Dr. Simiyu offered. But Bah in all his modesty, took all the praises in his own stride, smiling shyly.

"Once you have a good implementing agency for your project, then you have succeeded. GDC is a good agency," he told his guests that evening upon applause.

"Geothermal was new to me and to the bank. Still it was exciting to learn new stuff. The bank sent me to Iceland to see how it works. I also met energy ministers in Rwanda who helped me understand the sector. In addition, GDC taught me a lot."

Open society

"There is a big future for geothermal. I have been lucky to work with great teams. My colleagues have been very supportive. GDC staff is ever friendly and helpful."

Bah notes that Kenya was ready for geothermal and for the funding. It had the Least Cost Power Development Plan. It had formed GDC and there was already progress in Menengai. It showed that the government believed in the project.

To him, funding geothermal energy is one of the best decisions the bank has ever made. He is optimistic that GDC is going to deliver abundantly.

And he is full of praises for Kenya. "It's an open society. You get information very fast. It's easier to make decisions," he says.

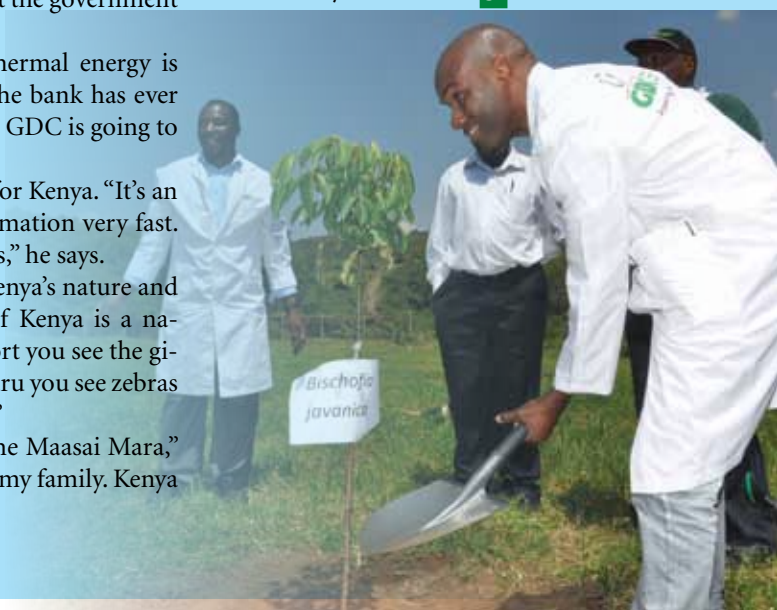
And Bah is smitten by Kenya's nature and the scenery. "The whole of Kenya is a national park. From the airport you see the giraffes; on your way to Nakuru you see zebras and gazelles. It's amazing!"

"I really want to go to the Maasai Mara," he says. "I'll be back – with my family. Kenya is a good place. I think the world exaggerates the issue of insecurity in Kenya. "It's very safe here. When I stay at Intercontinental Hotel I just walk about at night."

Wherever he travels, he shops for his wife and little daughter.. In Nairobi, he was at malls, doing just that - shopping. "Family is important," he reckons.

"I miss my wife back in Tunis; I miss my daughter too," he says after the dance. Before long, his phone twills and, "it's my wife calling!" He smiles and goes out to answer the call. After a quarter an hour he returns, beaming with energy.

This is Bah's last Saturday around and we have to go out again in search of nyama choma (grilled meat) and Ugali - his favourite delicacy. *Adieus* Bah. S



Geothermal investment spree

The Geothermal Development Company (GDC) is rapidly opening up new and diverse investment opportunities in the emerging geothermal sector; private investment is the way to power the juggernaut
as **Erick Wamanji** *found out*

In the leafy Nairobi's Riverside Drive, Caleb Indiatsi and a team of strategists are busy reviewing the GDC geothermal investment scheme. It's slightly past 5:45 pm going by the chime at the Consolata Catholic Church calling for vestries, and the scarlet rays of the setting sun on this western wing of the GDC office complex.

In the investment plan, the think-tank is brainstorming on which financier to approach for what component of the steam development.

"Geothermal is an attractive investment area," Caleb says, raising his head from the paperwork. "There are countless opportunities. The country has a huge resource potential and the market for the energy is huge."

It is Caleb's department that is charged with the continuously updating the strategic plan that will see Kenya enjoying eternal seasons of reliable and affordable energy from geothermal.

Indeed, in the next 10 years, Kenya's national grid will be 2, 000 MWe hotter, thanks to geothermal energy. The making of this mammoth megavoltage is by extension unlocking vast business opportunities for the investor with a penchant for energy dollars.

For starters, GDC is developing 400 MWe in Menengai Phase I. This will be ready by 2016. Other projections in the pipeline include: 800MWe in Menengai Phase II and 800 MWe in the Phase I of the Bogoria-Silali Block. (see map)

These projects have enthused the investor-community. While geothermal investment calls for heavy dose of dollars, the return on investment is also grand.

As a country, Kenya is desirous of attaining a mid-income economic status by the year 2030. This economic growth demands gigantic gigawatts of 23, 000MWe. Geothermal is poised to stream in at least 5,000MWe.

Consequently, GDC has designed a tranche of investment opportunities for manufacturers, consultants and power plant developers to plunge into the energy sector's most coveted high street.

"Geothermal energy is the new venture for investors. There is every indication that our

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Terrific investment

from pg. 14

economy and that of the region is set for growth… reliable, affordable energy is mandatory if this growth is to be realised," explains, Dr. Pascal Kariuki, a Nairobi-based policy and economic consultant.

Dr. Silas Simiyu, MD and CEO

Kariuki notes that GDC's approach of applying Private Public Partnership (PPP) will see a massive direct foreign investment channeled into the country. "Heavy international investors understand this very well. They know that the country has potential to absorb every kilowatt produced. They also appreciate Kenya's efforts into policy, new constitution and legal and financial frameworks that are friendly to the investor," Kariuki explains.

And the interest in this emerging frontier is enchanting as investors scurry for a pie of the steam. Investors are eying to construct large power plants, small portable modular power plants and even to participate in joint steam development.

Never in the history of electricity in this country, has a sector ignited much steam for investment as geothermal has in the past three years. This is thanks to the government's policy of encouraging the private sector participation through the Public Private Partnership framework. As part of these efforts, the government also unbundled the energy sector, and formed

GDC as a Special Purpose Vehicle customised to deliver the green energy promise.

Geothermal for instance has been a realm unchartered by the private sector since 1957 when the first exploration was done in the Kenya. Though the year 2000 saw the entry of Orpower4 in Olkaria, there was a barren period till the year 2009 when GDC sauntered into the scene changing the fortunes of the most vibrant energy sector in the country. GDC has remodeled geothermal and made it bankable for the entrepreneur.

GDC has developed a unique investment model in form of the Joint Development Agreement informed by the PPP philosophy that will bring onboard investors to jointly develop steam fields, says Dr. Silas Simiyu, the GDC Managing Director and CEO.

This model will be applied in Menengai Phase II and Bogoria-Silali, and many other fields that GDC is opening up.

"Through this model, we are going to see an acceleration in geothermal development. It's a way of raising capital for our projects," explains Dr. Simiyu. And this is a masterstroke from a man who is the face of geothermal energy in Kenya. Dr. Simiyu is the captain charged to drive Kenya's geothermal bid as the safest, surest and most reliable vehicle of powering the country's economic shuttle.

> *"Through this model, we are going to see an acceleration in geothermal development."*
> *Dr. Simiyu*

The MD is right. It would take eternities for an individual entity to deliver a meaningful geothermal product because of the typical cash-flow hitches that characterise many public projects around the continent.

Opening the door

GDC has committed to enforce Power Purchasing Agreements (PPAs), and provide reasonable tariffs that can yield appropriate return on the investment. Previously it was challenging for companies to invest in the industry due to cumbersome entry procedures. The processes have now been simplified through the establishment of a one-stop advisory and investment facilitation service at the GDC.
Kenya is currently implementing a new constitution that will establish a more transparent political system, which would reassure investors.

www.kenivest.com

Kenya's g

By Erick Wamanji

Africa's Rhine industrial Valley will be in the most unlikely of places - the Bogoria-Silali Block. A vast swathe of geothermal resource with attendant land, diverse investors will find this region lucrative to bet their dollar on.

This is a geothermal minefield literally. Scientific studies have found the resource to be 3,000 MWe. Developing this resource means that Kenya will witness one of the heaviest investments. This block will no doubt be Kenya's, if not Africa's, geothermal hub, and can only be equated to the California-based Geysers. The expansive block ropes in Bogoria, Baringo, Arus, Korosi, Chepchuk, Paka and Silali prospects.

GDC targets 800MWe in Phase I of this block. In this phase, four private investors will each, jointly with GDC, develop 200 MWe of steam. A total of 70 wells are

geothermal hub

Caleb Indiatsi

modular power plant and have it generating electricity. These portable power plants usually come in different capacities from 2.5 MWe to 5 MWe. Modular power plants are very useful for off-grid location.

The model of installing modular power plants is strategic. It means that while early power will be streamed to the grid, the investor will start earning back as the big power plant is being constructed.

Lucrative

GDC is making geothermal investment even more lucrative. The company is engaged in the development of the necessary infrastructure like roads and water reticulation systems to afford an ample operating environment. GDC also meets the pre-requisite statutory obligations like the Environmental and Social Impact Assessment.

In this investment arrangement the Multilateral Investment Guarantee (MIGA), a World Bank insurance scheme is available. Orpower4 Inc., is a classic beneficiary of the MIGA. Better still, the Government of Kenya may provide Letters of Comfort to investors on a case by case basis.

With GDC's expertise in reservoir management, brine reinjection will easily be handled. Besides, GDC has carried out all the necessary intensive scientific exploration in the area and has sited wells.

In the joint development investment plan, GDC will invest 20- 40% of the required capital while the investor brings in the balance. The good news is that, by its very nature and structure GDC is supposed to absorb the upfront risks in geothermal development. In this case, GDC will also absorb the costs of non-productive wells.

And this major investment opens window for suppliers in different areas. In a presentation made in UK, titled 'Investment opportunities in geothermal and coal resources in Kenya,' Energy minister Hon. Kiraitu Murungi pointed out to investors that many opportunities exist in such fields as: supply and services for drilling rigs, geo-exploration tools, and equipment. Drilling material and services, steam field design, equipment supply and steam pipeline construction services.

Other opportunities exist in consulting services including feasibility studies, direct geothermal resource uses and electricity generation through the supply of power plants and associated equipment. Kenya is pivotal in Africa when it comes to geothermal energy. In the East Africa Rift System, Kenya is the only country with a developed geothermal culture.

"The resource, by all indications, is fantastic", George Percy the Managing Director of Cluff Geothermal once assured reporters, "and we certainly believe that in time, East Africa really could become a global leader in geothermal output." Cluff has interest in Africa's geothermal.

The Harbinger

Menengai, by far is the most advanced prospect after Olkaria. Today, it hosts four drilling rigs. Plans here are clear – 400MWe in 2016. Financiers have already endorsed the Menengai Phase I project. The latest is the Africa Development Bank (AfDB) support through a loan and grant of USD. 1450 million. This makes Menengai the harbinger of good tidings that the geothermal industry in the country is set to enjoy.

GDC is will work with four investors competively selected to install four power plants of 100 MW each. While there is room for only four companies at this phase, already 19 international investors are wetting their appetites. The 19 firms will soon be invited to submit detailed bids.

In this phase, GDC targets to drill about 120 wells. The investor's role will include financing, design, construction, operation and maintenance of the power plants.

For the 800MW Menengai Phase II, the government of Kenya will require the selected investors to partner in financing the steam development component. While the steam field is under development, the investor will have the opportunity to install wellhead generation units for early power generation.

Behold, a new Menengai!

Menengai has more to offer. In Menengai Phase II, just west of Phase I, GDC is targeting to jointly develop, with investors, at least 800MW. To achieve these megawatts, about 250 wells will be drilled. Four equity investors are targeted to participate in this arrangement. Investors will chip in 40% - 60% of the capital.

Just as is the case with the Bogoria-Silali Block, GDC and the investor will sell the steam to power plants. Investors in power plants will also take advantage of the 800 MWe in the Menengai Phase II. This is a massive investment portfolio that will attract a consortium of players.

Indeed, for investors eyeing the geothermal sector in Kenya, this is a field day. In a country where there is a huge chasm between energy demand and generation, the promise of a ready market for investors, coupled by arrangement of Power Purchase Agreement with the national off-taker, the Kenya Power and Lighting Company, offers the most lucrative venture in the market than any other conceivable PPP in the region.

This steam revolution is squarely putting Kenya on the road to the Vision 2030.

-Erick Wamanji

Work cut out for implementation team

One of the condition precedent to funding the Menengai Geothermal Project was the establishment of a **Project Implementation Team (PIT).** *The team's work will ensure the successful implementation of the first 400 MWe in Menengai Phase One. Team Leader* **Jectone Achieng** *writes*

When the African Development Bank approved the disbursement of US$ 120 million toward the Menengai project, it marked the beginning of a new implementation strategy. And thus, part of the requirement by the bank was the creation of a formidable Project Implementation Team (PIT).

The PIT, a composition of diversity of expertise, among GDC's finest, is the main driver charged with the implementation and execution of this critical project.

The success of Menengai Phase I will transform the energy sector and indeed the economy of the country in a big way.

The 13 experts in the team provide leadership in diverse fronts. There are experts in procurement, drilling, human resources, infrastructure, finance, administration, and reservoir engineering. The team also has legal, ICT, Environmental, Geothermal Resource Assessment, and communications experts.

The bank had to approve the C.V's of the experts. They all met the cut.

This team is complementary to departments and is working in concert with established corporate structures. The aim is to create a focused integrated approach toward a holistic project implementation.

This team is now charged with monitoring procurement of goods, works and consulting services, monitoring project, financial management, record keeping and accounts, and disbursements. It also handles project monitoring and evaluation.

The team further handles the legal issues arising from the project, human resources and ensures coordinated documentation and communication of the project's progress and milestones

Menengai PIT documents the process of implementation in compliance with the financier's reporting format, making presentations to the Drilling Oversight Committee on the progress status of the project and preparing reports for submission to the bank as appropriate.

Menengai PIT liaises with the AfDB regarding the execution of the bank's supported activities and organizing the bank's review missions.

This PIT formation followed the approval of US$ 120 million from the African Development Bank.

This financing, to the Kenya Government, leveraged an additional US$ 15 million from Scalling Renewable Energy Projects (SREP) which is a "green" fund meant to unlock barriers to investor participation in Renewable Energy Development.

The PIT model is innovative.

Historically, project management units were staffed and remunerated by the funding agencies and had a parallel reporting structure to the executing agency. This model was seen to be opaque and even made it difficult for the staff involved to integrate into the organization after the "expiry' of the projects.

However, because of the shortcomings associated with such arrangements, most donor agencies have preferred to entrust staff with the executing agencies to manage such projects. This latter approach also ensures that implementing agencies build the critical mass of professionals within its ranks to execute large projects.

Many successful organisations running ambitious projects have always come up with special drivers to catapult the projects and carry execution. That is exactly what Menengai PIT does. These vehicles form the main ingredients that are deemed necessary for any agency that wishes to manage projects efficiently.

Project management involves activities needed to lead and co-ordinate project implementation, including administration, monitoring and reporting on project progress, finance, and accounting, procurement tasks, and supervision of consultants and construction contractors.

Project implementation on the other hand includes project management and technical tasks such as detailed design of works or training of staff or project beneficiaries.

That said, the use and composition of the PIT depends on the funding agency, the nature of the parent executing or implementing agencies, and the type of project. The AfDB has emulated the latter approach to Menengai PIT.

> The PIT, a composition of diversity of expertise, among GDC's finest, is the main driver charged with the implementation and execution of this critical project.

> *One of the condition precedent to funding the Menengai Geothermal Project was the establishment of a* **Project Implementation Team (PIT).**

Jectone Achieng, Team Leader

He is a career Financial Accountant with over nine years of experience. Holds Master of Business Administration (MBA) and Bachelor of Commerce from the University of Nairobi and a Certified Public Accountant, Jectone has provided financial advisory services to both private and public sector for many years.

In PIT, Jectone is tasked with overall duty of directing and managing execution and implementation, monitoring and reporting. He is also mandated with developing and delivering progress reports, required documentation and presentations.

The Experts

Adrian Oyugi, the **ICT Expert** has over 10 years experience. Holds BCom from University of Western Sydney, Australia. In PIT, he is tasked with identifying and providing the necessary project ICT infrastructure and systems. He is also charged with ensuring the project information is secured and correctly backed up.

Doreen Tiren, the **Legal Expert,** has eightyears experience. Doreen has an LLB from the University of Nairobi and a PGD from the Kenya School of Law. She is an advocate of the High Court and is tasked with Drafting, Negotiation and Administration of all contract agreements related to the Menengai Geothermal Project.

Erick Wamanji, the **Communications Expert** has 10 years o experience in Public Relations & Media. His brief is to provide guidance on stakeholder engagement, awareness and publicity for the project.

He holds an M.A in Corporate Communication and B.A in P.R from Daystar University. He trained in journalism at Tangaza College and Radio Netherlands Training Centre. He is an award-winning journalist.

Gabriel Wetangula, the **Environment & Social Expert** has 15 years experience. He holds MSc from University of Iceland, Post Graduate Diploma in Geothermal Technology from UNU-GTP and a BSc in Natural Resources Management. Currently he is undertaking a PhD at the University of Iceland He Provides leadership on Environmental Management and Monitoring for the project.

Henry Taabu, the **Financial Expert** Holds MBA (Finance) and a B-Com (Accounting). He is CPA (K) and CISA. He has 10 years experience in Audit, Financial Management and Analysis.

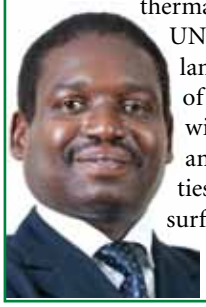
He is in charge of financial managment in a bid to meet the objectives of the project. He also coordinates audit of the project finances.

Hillary Mwawasi, the **Reservoir Expert** holds Bachelor Technology Degree in Chemical Engineering from Moi University and a Dip. in Chemical Engineering. Hilary is tasked with coordinating projects execution, designing of well testing equipment, computation and interpretation of well logs data, generating specifications for reservoir engineering and equipment.

Japheth Kituli, the **Drilling Expert,** has over 20 years experience in Geothermal Drilling. He holds Higher Diploma I in Mechanical Engineering (Plant Option) and Mechanical Engineering Technician I, II & III from the Mombasa Polytechnic.

He is tasked with drilling operations and management for the project.

John Lagat, the **Geothermal Resource Assessment (GRA) Expert,** holds a BSc in Geology from the University of Nairobi, an MSc in Geology from the University of Iceland and a Postgraduate Diploma in Geothermal Technology from the UNU-GTP, Reykjavik, Iceland. He has over 18 yeears of experience. He is tasked with coordinating all GRA and development activities, executing geoscientific surface exploration of new geothermal fields and siting of wells.



Marium Yunus, the **HR Expert,** has over eight years experience in HR. She holds B.A in Human Resource and is completing her MBA. She is tasked with assessment and planning for the Human Resources needs of the project. She also advises on staff recruitment and other personnel related issues.

Patrick Kaptoo, the **Procurement Expert** holds Master of Business Administration (MBA, Strategic Management) and Bachelor of Commerce (Marketing) from the University of Nairobi.

Patrick is tasked with ensuring timely implementation of all procurement programmes, preparation of bidding documents and reports, and execution of the procurement plan.

Rosemary Okello, the **Administration Expert** is a holder of Bachelor of Education from Kenyatta University. She has 25 years of experience having worked as a career teacher, administrator and management professional.

In PIT, she is tasked with providing logistical administrative support to the team.

Wilson Rutinu, the **Infrastructure Expert,** has 17 years working experience. Holds a Bachelor's Degree in Mechanical Engineering, from the University of Nairobi and a Post-Graduate Diploma in Geothermal Engineering from Auckland University.

He is charged with provision of technical engineering advise on the project.

PICTURE : COURTESY

The fellows in Japan .

Tokyo's turn

By George Mwenda

Recently, I was in Japan for a short training in geothermal development. The month-long fellowship touched on diverse geothermal and economic issues that seek to empower the East African region in its geothermal interests. It was a clear indication of growing interest in geothermal energy particularly the East African region.

The training brought together eleven participants drawn from Kenya, Djibouti, Ethiopia, Rwanda, Tanzania and Uganda. It was funded by Japan International Cooperation Agency (JICA) and facilitated by the West Japan Engineering Consultants, Inc. (West JEC)

Africa's geothermal industry is on an unprecedented expansion with most governments, industries and state agencies unanimously concurring that it is the best bet to displace fossil fuels.

The training was held under the theme "Enhancement of Planning Capacity for Geothermal Energy Development in African Countries (JFY2012)"

I was lucky enough to be part of the fellows. I represented GDC and Kenya.

The training was held at the JICA Kyushu International Centre and West JEC offices, in Fukuoka City.

The programme was comprehensive. Contents related to geothermal energy development such as policy framework, technical, economic and environmental aspects of geothermal survey and multipurpose utilization of geothermal energy. It also aimed at enhancing the participants' planning capacity for geothermal development in the respective countries.

Participants were taken through areas of geothermal development and resource exploration, environmental studies for geothermal power development, implementation plan of geothermal developments, geochemical studies, geophysical exploration, geothermal conceptual model and drilling target. We also trained on evaluation of geothermal potential, well drilling technology and multipurpose utilization among others.

> "This training was part of the Government of Japan Bilateral Technical assistance to Kenya-through JICA"

This training was part of the Government of Japan Bilateral Technical assistance to Kenya-through JICA, under the implementation and follow-up of the initiatives of the Tokyo International Conference for African Development IV (TICAD IV).

TICAD is a post-cold war policy forum for African development initiated by Japan in 1993 with partners like the United Nations, United Nations Development Programme and the World Bank. The last TICAD summit was held between May 28 and 30, 2009, and prioritized on boosting economic growth, human security, tackling environmental issues and climatic change in Africa.

The outcome of the programme will be to enhance the planning capacity for geothermal energy development by the participants in their countries. These include necessity of geothermal energy development in national energy strategy.

GDC will immensely benefit from the wealth of enhanced knowledge and skills gained during the training, owing to the approach adopted to enable participants have a hands-on expertise in some of the world's best geothermal practices.

This training came as Tokyo continues to develop keen interest in Kenya's geothermal sector.

Three months ago, a delegation from JICA visited the Menengai Geothermal Project and appreciated its potential. Kenji Yokota, an Assistant Director of Africa Division at JICA and Doi Kenichi, while on a visit to Menengai, said that geothermal is one of JICA's key priorities.

Mr. Mwenda is a Senior Planning Officer at the Geothermal Development Company.

Now Kigali set for drilling

Kigali is set for a geothermal revolution as it prepares for drilling.

According to the country's Permanent Secretary in the Ministry of Infrastructure, James Kamanzi, drilling for geothermal in the north-western part of Rwanda is set to begin early 2013.

The government has already signed a contract with a qualified firm to start drilling with three potential sites with a depth of 2-3km already been identified on the southern slopes of the Karisimbi volcano.

"We are already doing some drilling in Karisimbi. We have signed a contract with a drilling company. There are three boreholes in Karisimbi. But most drilling work will start in December," Kamanzi said while addressing journalists.

Substantial resource

Preliminary findings conducted in early 2011 through a thorough surface exploration, indicated that Rwanda's potential is estimated to be more than 700 megawatts. Last year, a team of government officials from Rwanda led by the then Energy minister Collette Ruhamya, visited GDCs Menengai Project for a fact-finding mission. GDC experts have also trained a number of students from Rwanda's Energy and Mineral ministry under the umbrella of United Nations University Geothermal Training Programme (UNU-GTP).

GDC has been collaborating with UNU and Kenya Electricity Generating Company (KenGen) to support the initiative as part of the geothermal development in the region.

The search for geothermal resources in Rwanda started way back in 2006 as government looked to diversify energy sources in the generation of electricity.

Prospective areas for geothermal potential include; Volcanoes National Park (Karisimbi and Kinigi), the hot springs of Gisenyi and Bugarama in the western part of the country.

700

Potential geothermal megawatts in Rwanda

PICTURE: COURTESY

A man at a hotspring in Mbeya, Tanzania

Tanzania sees steam

Buoyed by the sudden energy boom and exploration of natural gas and oil deposits, Tanzania is quickly repositioning itself in what could be the country's opportune and tilting moment in its quest for geothermal resources.

Energy technocrats and key opinion leaders in the East Africa's second-largest economy are busy working with a team from the newly established Geothermal Power Tanzania (GPT) in investing in this form of energy. Close to $5 million (Ksh 8 billion) has been allocated so far and will go towards geotechnical, geological and drilling work to establish already identified target areas.

The seriousness in which Tanzania is treating geothermal energy was manifested recently in Kenya, when President Jakaya Mrisho Kikwete toured Kenya's Olkaria Geothermal Project. He revealed that his country was closely considering exploring its geothermal resources to provide energy to millions of its citizens.

"Renewable energy will enable many people in Tanzania access cheap and clean electricity supply. Actually, Tanzania could soon shift to geothermal once exploration on this form of energy commences," Mr. Kikwete revealed to journalists at the sidelines of the tour in September.

Kikwete noted that he was impressed by the Kenyan expertise on geothermal exploitation.

In 2011, Tanzania had a total installed renewable capacity of 579 megawatts. In this mix, geothermal is missing even though the country sits on potential prospects.

President Kikwete's sentiments were backed by Minister for Energy and Resources Professor Sospeter Muhongo, who reiterated that Dar es Salaam is keen in allocating funds for geothermal research. Dar takes hope in the volcanic regions of Mbeya, Rufiji, Ngozi, Arusha, Mbaka and Livingstone faults, which can comfortably pass as some of the potential candidates fitting the bill for geothermal exploration services.

"Our target is Mbeya because this is a volcanic region, Arusha region was also fit for such an exploration, but there is a drawback because the larger part of the potential fields is located within game reserves," said GPT chairman Graeme Robertson.

"Such a geothermal investment will highlight Tanzania's involvement in sustainable power generation, aiming at eradicating the current shortage of electricity generation," he stressed.

At Ngozi Crater Lake, a conventional geothermal resource has been identified at less than 2,500m depth with temperatures in excess of 220 degrees and capable of supporting 100MW, which is 10 per cent of the 600 MW needed to cover the deficit.

The exploration at the Rufiji leased area which is in the preliminary stages also demonstrates geothermal potential.
GPT was founded to explore and develop the geothermal resources in the country. Its partners include Geothermal Power Ltd based in Mauritius, the Tanzanian National Development Corporation (NDC) and the Tanzanian mining company Interstate Mining & Minerals Ltd.

The company has been granted prospecting licenses for geothermal exploration in the Mbeya area and Rufiji. GPT will explore the area with the aim to develop a series of power stations up to 10 MW each along the Mbaka and Livingstone faults.

Picture: Isaac Kanda/ Steam

Paka: where deities and steam dwell

By Isaac Kanda and Jeremiah Kipng'ok

An aerial view of Paka caldera in the Bogoria-Silali Block is a show-stopper. The caldera looks like a huge bowl of porridge and then near its centre there is another smaller cone that gapes to the blue skies indicating a collapse as the belly of the earth emptied itself of lava. These are the wonders of our creation.

Paka is located in the Rift Valley, North West of Kenya's capital and North of Lake Baringo.

Studying Paka is not for the faint-hearted. The semi-arid area is punctuated by high temperatures, thorns, thickets and a boring spread of barren land. The brown and beige colours monotonously feed yours eyes miles on end.

As part of the Bogoria-Silali block, Paka is like a promising kid in a family renowned for productive and disciplined children. Though studies are ongoing, Paka has already demonstrated its rightful place in the ensemble of geothermal jewels that GDC boasts of.

It is in Paka where the plumes of steam waft the air with abandon. In the days gone by, legend was alive here. A section of the area was revered as the dwelling place of the rain-god. Then, before the coming of the Bible, prayers and sacrifices would be made to appease the deity to shower rain. Well, all that has changed.

Walking through the dry and thirsty volcano circuit that is replete with a series of volcanic cones, demands grit, passion and resilience – and that is what the GDC scientists had.

The Paka volcano is one of the localities in the Kenya Rift endowed with geothermal resource potential. Occurrence of a geothermal system at Paka is manifested by the widespread fumaroles, hot grounds and hydro thermally altered rocks.

Young Volcano

The Paka prospect is located atop a young volcano; previous studies of the volcano and the surrounding area indicated occurrence of a hydrothermal system, signifying probable occurrence of a high temperature geothermal resource and recommended the prospect for further detailed investigations to determine its resource potential.

> "As part of the Bogoria-Silali block, Paka is like a promising kid in a family renowned for productive and disciplined children.

I was part of the GDC scientists that investigated Paka in 2010.

To understand Paka, we employed a number of methods employed during field survey and included geological mapping to model the evolution of the volcano. Hydrogeological regimes and structural set up surveys were also undertaken to relate their association with the development of geothermal systems.

Besides, geophysical techniques employed during the campaign included, transient electromagnetic (TEM) and magnetotellurics (MT). Joint TEM and MT inversions were carried out to image the subsurface for the existence of electrically conductive zones that form the geothermal reservoirs.

Gas and steam condensate samples were collected from fumaroles to determine the nature of the geothermal reservoir while ground radon and CO2 surveys were undertaken to indicate the presence of geothermal reservoirs and to map permeable zones. Heat loss survey was carried out over the area to determine the nature and size of the heat source.

An environmental and social baseline survey was also carried out to obtain preliminary information before conducting a fully-fledged Environmental and Social Impact Assessment (ESIA) study.

Well, Paka is said to have given rain to the folks around here decades of yore, and now, it will give more water as steam cools after running the power turbines. The water will transform the way of life here. And yes, importantly, Paka will give us something more - electricity. *The writers are Geochemists at GDC*

The making of Menengai's iron snake

Deborah Kalei *braves sun, distance and lava rocks to witness the coupling of pipes in Menengai*

Pictures: Christopher Ngolo/ steam

It's a bright Sunday morning in Menengai, and the team connecting the water pipeline is on site.

This crew was here at 7: 00 am. The supervisor has already assigned the day's duties. There are pipes to be hauled across lava rocks and tough caldera grass, over ridges and hills; this is in an effort to connect Menengai and Menengai West.

The new pipeline is shaping up. It's long and windy like an iron snake. It will transport water, a critical commodity in drilling operations.

Workers carry the silver GI pipes – six people for one pipe. Others carry spanners and couplings. We all trek here our boots crushing on dry grass, leaves and pebbles.

There is a song here and a chant there as the plumbers trudge across the vast caldera with their iron cargo. Then the team encounters a steep valley that poses a great mobility challenge. Dead-end? nope. Quickly a solution is found. The pipes are rolled down the valley, one by one. They are hauled uphill again. I am aptly informed that this skidding is the easy part; there's still the stretch to Menengai West, on a path full of lava rock.

For the pipes to be transported across, pipes are laid across the ridge to serve as a makeshift bridge. We use the bridge too. It takes six strides to cross over.

Across the ridge, the pipes are then carried on their journey. "Kiamunyi squad: one, two, twende... Wanyororo squad: one, two, twende..." is the recited mantra for getting the job moving. It works. The job is done with a monkey's swiftness and agility. From here, the pipes are carried for 14 to 15 kilometres destination for coupling to form the pipeline.

The path that the pipes will follow is marked. The marking, meandering over lava rocks, is a product of three-day job.

The stretch to the main road, which is called 'Thika Super Highway' is lava-carpeted; this will slow down the speed of the movement and laying of pipes. Jacktone Alela, Nicholas Gitonga and Raphael Kimani set out to try and look for a way to cut an access road to shorten the distance over the lava rocks. As we set out to find the path, the three indicate that a backhoe will be used to flatten the lava so that work can proceed effortlessly.

Finding the alternative path turns out to be a march through five-foot tall slippery grass at first, then through lava-filled stretches. With such a think grass cover, it's hard to tell whether there is a ditch or not along the path. The team closely follows the leader, who is courageous enough to trail blaze.

The water men realise they can use a backhole to clear the way. However, another opinion indicates the backhoe may be too small to conquer the lava rocks – perhaps a bulldozer may. The big machine will not pave but just roll over the tall grass to create a path.

Further ahead is the 'Thika Super Highway.' This is the express link road to Menenengai West, which is three kilometres away, though the 'superhighway' is still under construction.

At the pipeline, coupling is on-going. Coupling is the process of joining two pipes with special devices called couplings. It is just like a wedding ring in marriage that binds a couple through thick or thin. The pipes are six metres long and eight inches wide.

"Non-petroleum jelly is used to ensure that the gasket, a black circular rubber, does not get cut as it is connected to the pipe. The gasket prevents leakages," says Peter Otieno, a plumber. He taps the coupling with a hammer to align it with the pipe.

The process of coupling the pipes involves having a number of people holding one pipe and a couple of people pushing another pipe. The connection has to be done simultaneously and swiftly because the pipe is heavy. Once the pipes are together, they are knotted using the couplings, a process that takes four people to tie one coupling. Today, John Kuria is leading the team that is pushing the pipes up. you may call him the matchmaker.

It's about 2:pm and Menengai is hot. The sun is high and the wind is still. Otieno makes a call to order for more couplings. Ahead of him lies kilometres of pipes that need coupling. But even with the distance left to go, the team at the site is determined to couple many more pipes that will provide water to Menengai, endlessly.

The writer is a Communications & Marketing Officer at GDC

Keeping the green promise

10 *questions for the Manager, Environment & Area Manager Central Rift,* **Ben Kubo**

1 What does your department do?

We plan and coordinate environmental monitoring and management activities. This involves environmental impact assessment and auditing, meteorological, precipitation, noise, water, air and soil quality monitoring, social afforestation, biodiversity conservation, rehabilitation, and waste management.

2 Why is an environment department an important part of a geothermal company?

The department ensures that project activities conform to three pillars of sustainability (social, economic and environmental) and to national and international environmental practices. This way, the department guides the company on best practices to avoid environmental degradation. It also advises on mitigation on areas that are tampered with in the course of development.

3 What are the milestones you have covered?

The development of an environmental management plan (EMP) for the Menengai Geothermal Project. We have established a tree nursery in Menengai to facilitate social afforestation and environmental rehabilitation initiatives to benefit communities around the project. So far, we have issued close to 600,000 seedlings to schools, churches, and to the community. We have carried Environmental and Social Impact Assessments (ESIAs) and have applied for three other ESIA licenses for the Bogoria – Silali Geothermal Block project. This year, GDC was crowned the Best Environmental Stand at the Nakuru ASK show.

4 You are undertaking social afforestation in Menengai, what is it all about?

Our social afforestation entails the development of a tree nursery in Menengai to provide seedlings for rehabilitation of degraded sites within our project, and distribution to the local community and institutions around Menengai.

GDC is promoting the planting of treeson-farm woodlots. The ultimate goal is to enhance tree cover within the Menengai project and the surroundings, and to rehabilitate all degraded areas.

5 What else can we expect from your department?

We are looking to register and implement Clean Development Mechanism (CDM) projects for Menengai and Bogoria-Silali projects. We will reforest Menengai and return it to its former green glory. We are also spearheading the process of drilling water boreholes for communities living in the Bogoria-Silali block.

6 Everyone is talking about CDM, what is your department doing about it?

CDM stands for Clean Development Mechanism. It is a climate mitigation fund. The idea is to determine the tonnes of CO2 and CH4 (referred to as tCO2-eq) gases a project can displace. GDC stands to benefit from this climate change mitigation fund. given that geothermal does not produce greenhouse gases.

For GDC three projects are under consideration i.e. the Menengai MPPs , the Menengai 400MWe project, and the 800MWe Bogoria – Silali power projects. GDC is working with established consultants well versed with CDM requirements under the United Nations Framework Convention on Climate Change (UNFCCC) to ensure that the Executive Board approves our projects. After acceptance GDC will enter the carbon market.

7 There have been misconceptions about geothermal and its effects on the environment. Please debunk the myths.

Geothermal energy is clean, green and renewable. Gases emitted are way below WHO standards and have no negative impacts on the environment. Geothermal is a sustainable source of energy; solid waste is contained in designated disposal sites, and liquid waste (brine) is re-injected and does not contaminate surface or ground water.

8 How does Environment Department link with other departments in GDC?

Before any geothermal project (surface studies, civil works and drilling) starts, we undertake a baseline study to establish the existing environmental conditions, identify potential impacts and recommend viable mitigation measures. We supervise and monitor implementation of the Environmental Management Plan (EMP) and undertake annual environmental audits to assess compliance with the EMP.

9 What's your team like?

It's a great team; drawn from several earth science disciplines related to environmental conservation and management. We have environmental chemists, foresters, ecologists, biologists, biochemists, environmental scientists and sociologists.
It is an extra-ordinary, professional and dedicated team.

10 What is the most important aspect you would like to see GDC achieve?

Achieving 5,000 MWe by 2030 and becoming the world leader in developing geothermal energy.

PICTURE: GODFFREY OLALI/ STEAM

The Green Story... Mr. Ben Kubo holding plant and section of his team

Cybernacoticism, one click at a time

By Eric Wamanji

ILLUSTRATION: COURTESY

At 8:05 a.m. Miss Kamau has stopped panting and is feverishly tapping on her keyboard. You may think she is the busiest journalist in town filing a breaking scoop, but alas! She's chatting, online. It's another day in her life where the virtual world is beholden, and life is depressing without Internet connectivity. She is entangled in the obsession that chatting online is the ultimate ecstasy.

Yet, Kamau is a template of a generation whose lives are gradually mashed by the digital phenomena.

Are you like Kamau? You relish that chat? You feel sick when Internet connection is down because you'll miss what the world is chattering about? Beware; you're gently being clicked to insanity!

But first things first: the cyberspace is king. It's possibilities mindboggling. It has spurred trade, democracy, knowledge… I recall as a political communication student, the Internet's revolutionary prowess was just incredible. I even went gaga when I stumbled upon the thought-provoking works of Jurgen Herbamas' *Structural Transformation of the Public Sphere.* So riveting was Herbamas that I mused studying the blogosphere as the emergent neo-agora for democratic pursuits.

Yet, amazingly, the cyberspace also churns out a galaxy of psychotic characters. And this hurts employers as much as users.

Technology's sublime destructive capabilities especially the social sites, keep researchers pondering. Clearly, Internet is rapidly transforming the very social nature and structures of humanity. It shredded letter writing and is threatening to mute conversations. We are being remodeled into cyborgs and rapidly become what artist Robert Armstroy calls 'couch potatoes'.

People love chatting online because real-life talk demands sincerity. It requires sensitivity to emotions, voice tone, and body language. Technology affords us a cold heart. We lose our sense of empathy and emotion. Furthermore, the internet has plucked us out of reality to the short-lived fantasy of the virtual.

Philip Hodson, a fellow of the British Association for Counselling and Psychotherapy says 'building a Facebook profile is one way that individuals … feel important and accepted.' This is a pointer that the profile of an avid social media user is that riddled by inadequacies especially acceptance. True, the social sites massages the ego, are therapeutic; vicariously though.

No doubt addiction to social sites is posing challenges to work output, our relationships with colleagues, friends and family. So bad is the situation that most corporates have blocked access to these platforms.

Temporary insanity

Take Kamau for instance, her world revolves around the cyberspace completely detached from the everyday realities of work ethic.

Psychologists aver that Internet addiction has a negative effect to the human mind; it causes reactive psychosis (temporary insanity). Some argue that the brain of an internet addict is no different from that of drug addicts.

In fact, the new frontier for employers is to include 'cybernacotic' in their battle against substance abuse. Peter Whybro the director of Semel Institute for Neuroscience and Human Behaviour calls the internet "electronic cocaine."

Newsweek of July 16, 2012 reports that researchers are even "investigating technology's potential to server people's ties with reality, fueling hallucinations, delusions and genuine psychosis..."

Aha! Now, you thought that chat online is classy? Think twice, you are getting hooked into an opiating constituent, one click at a time.

It's commonplace for internet addicts to curse a million times when Internet connectivity is poor. The nut cases have devised ways to crack the blocked codes to gain access online; some like Kamau have bought broadband internet access to skirt these barriers.

When you waste your time online pouring a barrage of unprintable, you sully your moral, shrink your cognition and you turn yourself a couch potato. Psychologist Larmy Rosen argues that this is the path to insanity. I agree.

It is why an inquiry into employees' lives in the cyberspace is fundamental not only because of its ruinous designs on employees, but also hazard of tarnishing a brand.

I find it unnerving, if not sickening when my company name or logo is mentioned in a profile chockfull of nudities and drunkenness of the weekend expeditions on an employee's social site.

It is embarrassing to learn that the brand and the reputation we so painfully construct is stained by such recklessness. Hence, a challenge to managements: if the brand is to retain its sanctity, employees should desist from using the company identity in their personal profiles in social sites. If they must, then they must enter into covenants to maintain conversations and images that are decent and generally acceptable in society.

In the meantime, we need counseling for cybernacotics.

The writer is the Deputy Manager, Corporate Communications & Marketing at GDC

Understanding Performance Contracting

The government is the new private sector, reckons **Felister Ngina**

When I was growing up as a child, the goverment was the last employer I wanted to work for. Everyone complained of how lethargic public servants were. Yet, today, here I am, working for government, and I'm loving it!

So what's has changed? you may ask.

The today's work place in any government institution is dominated by talks of results and targets. In fact, the government has become the new private sector if pressure to deliver and dedication to duty is anything to go by.

The new wave of operation in public institution has been occasioned by many reasons and crowned by the Performance Contracting (PC) mechanisms that are in place in government. The face of public sector has changed, employees work to deliver results even if it means doing at odd hours. For instance, I'm contributing this article over the weekend! Clearly this is no longer the public service of my childhood.

Performance Contracting is a management tool for measuring performance against negotiated targets between the government and its implementing.
Such contracting clearly specifies the intentions, obligations and responsibilities of the two contracting parties.

While there are a number of instruments to measure performance, Kenya chose the Balanced Score Card for its ease link to mission, vision, and strategic objectives of an organization.

This approach aspires to improve service delivery by being customer-focused and to cut costs. It was reckoned that this way, the public will get value for money. These targets are cascaded all the way from the government to the employee. At the end of the year an appraisal is carried out to assess compliance to the contract.

Hybrid

It was introduced in Kenya in October, 2004. The Kenyan style is a hybrid benchmarked with world's best including South Korea, Britain, USA and China. However, it all began in 1991 through the Parastatal Reform Strategy Paper. A pilot was then carried out at the Kenya Railways and the National Cereals and Produce Board. Today about 462 public institutions implement the performance contracting.

The Kenyan government acknowledged that over the years there had been poor performance in the public sector, especially in the management of public resources which hindered the realization of sustainable economic growth. To improve performance, the government continued to undertake a raft of reform to put the public sector in the straight and the narrow.

The PC policy in Kenya covers the entire public sector. The Prime Minister's Office ensures the PC is implemented.

There are three types of public institutions that sign PCs in Kenya; the parties to the contracts are PCs for Government departments/Ministries, (Signed between the Cabinet Secretary and the relevant Permanent Secretary). PCs for State Corporations (Signed between the Permanent Secretary of the administrative ministry in-charge of supervising the State Corporation and the Board of Directors of the State Corporation) and PCs for Local Authorities (Signed between the Permanent Secretary, Ministry of Local Government and the Council of Local Authority.

PC evaluation is carried out in three stages.

The first stage entails self-evaluation using the evaluation methodology in the performance contract guidelines.

The second stage is referred to as "primary" evaluation where a group of experts, who carry out exhaustive assessment of the performance of all public institutions in the contract year and assigns a composite score to each institutions.

The third stage is the moderation stage which is the final and quality control phase, in which a team of experts ensure that the different evaluating groups have applied evaluation guidelines.

The PC has numerous advantages. It enables proper training of performance, it is time-bound and measurable, it's mutually agreed between the parties involved, creates room for responsibilities and importantly it sets attainable goals and it's flexible.

Some of its limitations are that usually the emphasis is on end results and not necessarily the means. It's concentration on the quantitative ignoring the qualitative part of a task perhaps needs to be reevaluated.

For now I have targets to meet.

Ngina is Statisitician at GDC.

1991

The year the government piloted with Performance Contracting

PICTURE: ERICK WAMANJI/ STEAM

Happy employees...*GDC staff at work in the labs. Performance Contracting has improved service delivery*

Sapplings of hope

Leading from the front...*GDC's Directors Sally Towett far left and Felicity Biriri assist students to plant trees in Menengai. GDC is painting Menengai and adjucent areas green.* **Below,** *Ngugi with his seedlings*

By Godffrey Olali

The watery leaves of Grevillea robusta spreads like loose dreadlocks as farmer, Tom Ngugi carefully bundles them inside the boot of his white saloon car parked few meters from the Menengai tree nursery.

It is yet another sweltering afternoon in Menengai and villagers from the neighbouring communities troop to the caldera to take home various tree species given to them for free by GDC through a community social afforestation initiative.

On this day, Ngugi is joined by his colleagues Martin Nganga and Shadrack Kamau, who are also farmers from the neighbouring Banita Mutukanio villages who have been initiated into the big green campaign.

"I'll plant these trees along the boundary of my 12 acre farm where I practice the shamba system method of farming," says the middle-aged subsistence farmer whose farm is approximately 12 kilometers from the Menengai geothermal project."

Since GDC started the social afforestation initiative two years ago, many farmers have embraced and benefited a lot. Apart from individuals, some of the beneficiaries include local farmers, neighbouring schools, government institutions, youth and women organizations and even churches. The initiative has seen them get tree varieties ranging from juniperus procera, spathodea nilotica, makhamia lutea, podocarpus falcatas, albizia gummifera, fraxinus pennsylvanica among others.

"There could be more destruction in Menengai if we don't put proper measures. This is why our strategy is to give these people fast-maturing species which can be used as firewood and timber to avoid further depletion of Menengai. Once you stop the inflow of people searching for firewood in the caldera, you actually contribute to its greening which is the main driving force behind this whole initiative, "says Ben Kubo, the Manager in charge of environment and the Area Manager, Central Rift.

He adds that as a company, GDC gives priority to enriching forest cover within its prospect areas. He says that the same concept will be used in other potential areas in the North Rift.

According to Kubo, GDC is encouraging farmers to raise seedlings while the company will work towards a follow-up mechanism to be able to monitor how the distributed seedlings are progressing.

"Actually, we have monitored the progress of the survival rate and some of them are progressing well at a rate of 90 per cent in which is very encouraging," he adds.

Since inception, the initiative has benefitted villagers coming from the neighbouring villages of Wanyororo, Kipng'ochoch, Maringo, Rigogo, Kabarak, Ol Rongai and Bahati.

It has also benefited neighbouring schools such as Jacaranda, Osembo and St. Joseph's Kirima.

One of the key objectives of the programme is to involve the local youth in socio-economic activities. According to Kubo, the casuals who work in the nurseries are the major marketers since they spread the word to other villagers.

The villagers are already in full praise of the initiative terming it a perfect platform of empowering them socially and economically.

This is attributed to GDC's plan to encourage various youth and women groups to join hands and come up with tree nurseries for commercial purposes. Under this scheme, the company will buy seedlings from them, raise them at the Menengai nursery and later distribute to them for free.

"This will empower them economically and engage them in a profitable and sustainable activity," he adds.

When Steam visited the nursery, it was almost empty since villagers were on a trooping mission taking advantage of the wet season.

"During dry season, we get fewer people compared to the wet seasons," says David Manyara, an environmental scientist.

Already, the government through the Laikipia DC, has requested GDC to provide at least 50,000 seedlings to the sprawling Mawingu IDP camp in the town.

Manyara adds that GDC has also partnered with some conservation groups like Lanameduba, which is an acronym for Lake Nakuru, Menengai, Dundori and Bahati. Other notable conservation groups include Friends of Menengai (Fomec) and the Kenya Forest Service, prisons department and churches.

PICTURE: GODFREY OLALI/ STEAM

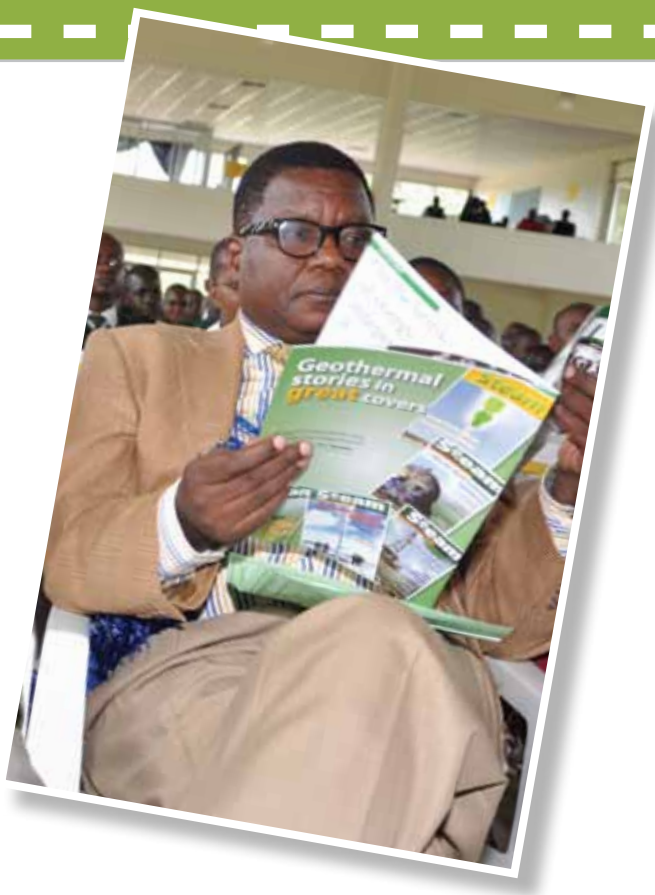
*Verba volant, scripta manent s*o goes a **Latin proverb, loosely meaning, spoken words fly, but written words remain....** *and so, when you receive a rare guest like the president, you can only be thrilled if he can say 'I was here' by him signing the visitors' book. H.E the President of Kenya happily did that in Nakuru at our ASK stand; we were humbled*

GDC's Joseph Wambua, sharing with Professor Paul Younger, a geologist from the New Castle University, and a member of British Foreign and Commonwealth Office when his team visited Menengai Geothermal Project.

Loaded and cheery... *George Mwenda knows too well that there is prestige in a well-written publication. It explains his joy when he landed on copies of* **Steam** *and* **Geothermal Africa**. *We hope George read all of them!*

If you like geothermal, hands-up... *Isaac Kanda, seems to be leading these students to a certain chorus, and from the joy on his face, and the hands aloft, you can be assured that our exhibitions at ASK shows are the places to go*

In Pictures



The Minister, the *Steam* and other stories... *This publication is just irresistable. Ask Assitant Minister for Higher Education, Prof. Kilemi Mwiria. He grabbed his copy of the last issue, relaxed and got engrossed!*

Let's plant a forest ...*This GDC staff knows too well that the future belongs to the young. And in the spirit of education and securing a healthy future, here he is teaching the youngster how to plant a tree. For sure, one seedling in time creates a forest.*

The map has the answer...*In this business of geothermal, maps are like extracts from scripture - very essential, very reliable. So, when the trio of John Lagat, Dr. Peter Omenda and James Wambugu were not so sure about certain issues, they reverted to the map, and they got an answer*

Thank you, we are ready for the run...*Dr. Peter Omenda (left) takes a photo shoot with Atheletics Kenya's Vice President soon after the official launch of the Menengai Marathon.*

PICTURES: ERICK WAMANJI/ STEAM

See, its a deal... *Dr. Silas Simiyu and Prof. Mabel Imbuga displaying the MOU soon after signing it.* **Below:** *Martha Mburu, Manager Direct Uses and South Rift Region*

Industry meets academia in geothermal development

You will know an industry is crucial in the dynamics of society when the academia fraternity creates interest and passion towards it. Such is the case with geothermal energy in Kenya, of late.

Those who attended the formalization of collaboration between GDC and the Jomo Kenyatta University of Agriculture and Technology (JKUAT) recently, seem to have understood the doles of such an engagement. The boardroom at JKUAT was alight when the deal was sealed.

"Today we are marking the beginning of a productive journey between the two institutions," noted Dr. Silas Simiyu, the MD and CEO of GDC soon after the collaboration was signed.

Indeed, this collaboration that will foster research in geothermal development is an interesting partnership. Kenya and indeed Africa is going to witness an era of innovation and growth in geothermal energy exploitation and utilisation especially in the areas of direct uses.

"We are so delighted by this new development. We are ready to share our facilities and resources towards this new collaboration. We look forward towards implementing the MOU," says Prof. Mabel Imbuga, the Vice Chancellor, JKUAT.

Direct use technology

Pragmatic and homegrown knowledge jointly developed by academia and industry, has the propensity to drive industry, innovation and economic growth. This effort will also discover and nurture talent for the perpetuity of the growth of the geothermal sector.

"We are hoping to boost direct use technology, project management and implementation in engineering, geospatial sciences, food technology, environmental management and capacity building through research and development," says Martha Mburu, the Manager in charge of Direct Uses at GDC and the South Rift Area Manager. She is credited for having steered the negotiations that brought the deal to fruition.

The agreement also comes in the wake of a clarion call from the government, which urged technical institutions in the country to embrace geothermal studies in their syllabuses.

Higher Education assistant minister Hon. Dr. Kilemi Mwiria has been on record saying that technical institutions need to introduce geothermal courses in their syllabuses. He added that through this, a suitable platform will be mounted for students who are interested in pursuing geothermal courses but are not able to join institutions of higher learning like universities.

Capacity building

And Mburu who led the GDC team in the negotiations reckons that the purpose of the collaboration is to enhance the capacity building for staff through training, interactions, exchange of experience and relevant information.

"JKUAT is more technically focused, and research oriented; its a good partner," she enthused.

"The collaboration will also see the two gain from sharing of physical facilities such as equipment and office spaces where necessary, institutional capacity building through research and development of processes, staff exchange and students attachment, exchange and dissemination of relevant information, research, innovation, technology transfer and development, commercialisation and marketing of products and services that have been jointly developed."

The two institutions will also be keen on areas of joint consultancy, joint publications in areas of common interest and development of intellectual property governance.

JKUAT will also develop diverse prototypes that will be applied in the direct uses of geothermal energy.

"We at GDC are excited by this new collaboration," said Dr. Simiyu, shortly after signing the MOU. "We are committed towards new innovative designs in the application of geothermal resources in a bid to support the desires of Vision 2030 for an industrialised Kenya. It's only through such collaboration that we can change the lives of many Kenyans in the rural areas," he added.

GDC aims to inject at least 5,000MW of electricity to the national grid by 2030.

The possibilities are endless with geothermal, Dr. Simiyu says. Beyond electricity, technology can be oriented towards pyrethrum processing, leather treatment, green houses, production of industrial sulfur, milk processing, drying of grains and in many other diverse areas.

> *"We at GDC are excited by this new collaboration,"*
>
> - Dr. Silas Simiyu.

Acting smart

How GDC is empowering the youth around Menengai through a sacco

By Evans Mutai and Anne Wanyoike

Samuel Magana is a busy man in Menengai. He is the man the local community has entrusted to run a youth sacco that seeks casual employment for locals who work at the Menengai Geothermal Project.

This is a unique arrangement between GDC and the Menengai Community where local youth come together through a single entity that negotiates their employment. The Sacco also introduces its members to the savings and loans culture.

More often than not, you will hear people advocating for savings and investment as a means of securing a bright future. This is well attested by various successful persons, who have attributed their wealth to adherence to strict savings and sacrifices. And the youth around Menengai seem to be good pupils of this dictum.

GDC has facilitated the youth around the Menengai Geothermal Project to form the sacco, the first of its kind in the locality.

The Nakuru North District Youth Sacco brings together 40 self-help groups from the nine villages of Wanyororo, Kimochoch, Rigogo, Kiamaina, Bahati, Maili Kumi, Mutu Kanio, Kameruri and Dungeri Kirima.

The Sacco aims at tackling the rising unemployment situation among the youth living within the district. It also aspires to create a platform for future investment and thereby improve the social lifestyles of the locals. This gainful employment also distracts the youth from idleness.

"This is the only way we are going to succeed," Magana notes. "Through the sacco, it's easier to secure employment for our people. It is also manageable to track the youth and support them socially. We insist on hard work and integrity."

The Sacco has over 300 members, and the number is increasing by the day. With this, you will be forgiven for imagining that the sacco was started two or three years ago.

Registered early 2012, the initiative has attracted high level of goodwill, and the attention it is drawing from the locals in the area will surely be credited for its success.

The Sacco has also facilitated a three-month contractual employment for over 60 of its members.

Mr. Magana says that the initiative aims at ensuring that the community enjoys the benefits of the ongoing geothermal project.

"We are a happy lot," he says with a smile. "The growth of the project means that our youth have somewhere to earn from. Its better when we are organised."

Well said. This programme has inspired mutual working relationship between GDC and community. Since the community selects the casuals, it owns the process and therefore develops a harmonious existence.

Saving culture

Saccos are also known to provide an avenue for savings and provide access to easy and low interest loans. This is also one of the driving factors behind the formation of the Sacco.

The registration fee of Ksh 500 and the monthly contribution of Ksh. 500 is enough to qualify one to borrow a substantial amount for investment.

"The money collected is taken back to the community to assist them uplift their living standards," enthuses Grace Mwai, Manager Community Relations at GDC.

Leaning back on her seat, Grace narrates a case of a charcoal burner: "He never had any job to feed his family. But as soon as the expansion of the caldera road was completed, his son was offered some job there (Menengai project)."

"Believe me, if you visit him now you will be surprised, he is living a completely different life. He can now afford to feed his family."

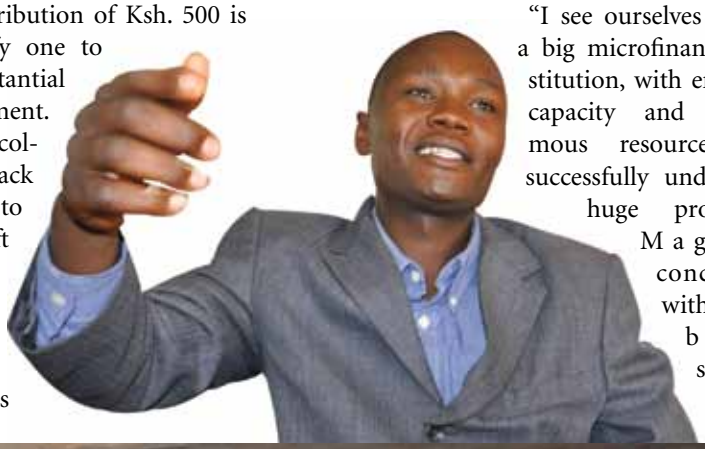
True to her word, Pascal Manan, who has been working closely with the community, affirms the story. He cites several other similar scenarios and the support that GDC is according the community.

"We always incorporate them in our day to day activities and more so whenever we are having opportunities for labor contracts," boomed Manan, "This arrangement has really brought harmony given that the Sacco officials engage directly with the community," he added.

And like the tenth U.S. President John Taylor once said, 'Wealth can only be accumulated by the earnings of industry and the savings of frugality.' In Menengai, prosperity and big fortune is in the offing for these hardworking Sacco members.

"And so, what does the future hold for the Sacco?" we ask.

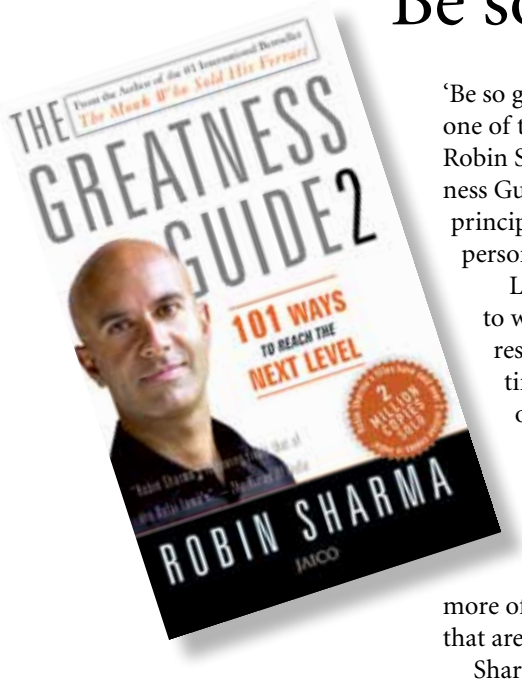
"I see ourselves being a big microfinance institution, with enough capacity and enormous resources to successfully undertake huge projects," Magana concludes with a broad smile.



Some of the youth at work. **Inset,** *Mr. Magana*

PICTURES: EVANS MUTAI/ STEAM

Be so good, they can't ignore you



Title: The Greatness Guide 2

Author: Robin Sharma

Reviewer: Deborah Kalei

Available at leading bookstores and supermarkets

'Be so good they can't ignore you.' That is one of the 101 ways to reach the next level. Robin Sharma, in his book, 'The Greatness Guide 2', reveals some of the guiding principles that make him a leadership and personal success advisor.

Leadership is about 'holding oneself to world-class standard, taking personal responsibility (versus playing the victim), being excellent with your sphere of influence, building beautiful relationships and elevating others by example'. Being world class has a lot to do with doing little things well since they reflect on how one will do the bigger things, and more often than not, it is the little things that are really the big things.

Sharma tackles issues on personal growth such as the age old human vice of desiring to be someone else. To him 'there will never be a better you than you'; On personal fears he encourages that 'on the other side of every fear door lie gorgeous gifts.' He tackles leadership in a witty, informal yet very informative way citing examples of individuals and companies that have succeeded while applying the guiding principles he has enumerated. One of the cases he gives is of David Mejia, a man born without ears, but has managed to be a source of inspiration despite doctors' predictions that he would most likely die soon.

In conclusion to Mejia's story, Sharma says 'you can curse the darkness or you can light a candle and show up as a leader. World class people get both strategy and action correct. Indeed, everyone needs to behave like a leader, no matter what they do. This leadership means doing your work with excellence.

On the personal front, among the principles that the author mentions is a concept that he calls 'invisible fences' which stop us from becoming remarkable. He further calls people to question the fences and rather than run away from the fences, find a way to run through them.

As much as the book puts an emphasis on excellence and shuns mediocrity, Sharma also reminds the world that people should live life with a sense of amusement and festivity.

The anecdote approach, as well as the short expounding on each principle makes The Greatness Guide 2', an easy read, one that can be read in one sitting, or can be taken under the ' a principle a day' approach. The quotes pulled from each story also serve to give that extra reminder on what has been presented.

The book is an inspirational read for people looking to grow themselves as individuals and in their personal relationships, as well as those that are looking to either grow into leadership positions or are already leaders in their various disciplines.

Sharma is a renowned writer of best-sellers. He is the authour of *The Monk Who Sold His Ferrari* and other books.

Facts... Did you know?

The original turbine used in the first successful geothermal electric power plant in the United States at The Geysers in California lasted for more than 30 years and produced 11 MW net power?

That Italy was the world's only industrial producer of geothermal electricity until 1958?

That Indonesia has approximately 17,000 islands occupying the area from the Indian to the Pacific Oceans, comprising of hundreds of volcanoes that are expected to hold around 40 percent of the world's potential of geothermal energy? Indonesia is determined to generate 4 GW of power by the year 2014, which will multiply the present capacity of 1,189 MW four times.

Beppu, Japan, has 4,000 hot springs and bathing facilities that attract over 12 million tourists a year?

That the Geothermal Development Company (GDC) in Kenya was formed as a Special Purpose Vehicle to accelerate the development of geothermal resources in the country?

That The European Geothermal Energy Council (EGEC) aims for the geothermal sector to contribute 5% of the total energy production in Europe by 2030.

The centre of the Earth is around 6,000 degrees Celsius - easily hot enough to melt rock.

GDC knows how to capture the earth's power

...there's only one *gem* that can pull people from the *crowd*...