Steam

A Publication of the Geothermal Development Company

September 2010

Why the World is thinking Geothermal

The dawn of a geothermal era in Eastern Africa

Attitude will determine your career altitude

GDC Geothermal Development Company

Powering the Vision

Editorial Committee

The steam is an authoritative platform that reports on geothermal development activities in Kenya. It gives readers an understanding of the great potential that exists in Kenya and how GDC is providing an enabling environment for investors to play a key role in providing Kenya with green, reliable and affordable energy.

The steam is published quarterly by the Geothermal Development Company Limited (GDC). Views expressed in this publication do not necessarily reflect the position of GDC.

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Editorial

The Swahili people of East Africa have a saying that *"ukiona vyaelea, vimeundwa"* loosely translated to mean that nothing happens by chance. There is always a force behind everything good.

Ever wondered who is the force behind the rise to stardom of a Company hitherto unknown? Meet the geothermal guru, Dr. Silas Simiyu, the Managing Director of the Geothermal Development Company (GDC). He is a result-oriented, stunningly able and dedicated captain who has what it takes to accelerate the exploitation of Kenya's huge geothermal potential.

And did you know that Geothermal is the energy that will change the world? Recently, the largest assembly of geothermal experts, policy-makers and scholars assembled in Bali, Indonesia for the 4th World Geothermal Congress.

In this issue, we bring you a story of the global resolve to accelerate the development of geothermal energy for a better world. Our cover story explores the challenges and opportunities of the renewed interest in geothermal development that is sweeping across the Eastern Africa Region

And in our 10 Questions segment, we bring you Paul Ngugi, Manager, Corporate Planning & Strategy and the secret behind his passion for geothermal development. For investors wanting to venture into geothermal development, turn to page 25 for answers to some of your questions.

As in every issue, we continue to bring you workplace tips to equip you for career advancement. Did you know that your attitude determines how far you can rise in your career ladder? People love working for and with people who have a great attitude. Get more tips on page 22.

And next time you are thinking of taking a well deserved break from work, why not sample some of the finest geothermal spots that offer a great potential for recreation? Read about the steam jets of Lake Bogoria as well as the Kapedo Hot Springs.

As always, we treasure your comments. Please feel free to talk to the editor.

Ruth

Contents

Your letters

I liked your last issue of *Steam* titled 'Kenya goes big on geothermal energy.' I enjoyed reading your stories which were very informative and in-depth.
Morine Achieng,
Nairobi

I 'm impressed with what GDC is doing. This is the only way we can beat the electricity problem of this country. Indeed, yours is a fabulous job! Keep it up.
Emily Kimani,
Nairobi.

Having interacted with geothermal literature, I think it is time Kenya upped her game on energy generation. If we have such a big resource, I don't see why this country should continue enduring blackouts. I urge GDC to make the dream of lighting this country a reality. Good Luck,
Pius Kirwa,
Nakuru.

GDC needs all the support to succeed. It has demonstrated a great resolve in getting this country out of perpetual black-outs and high electricity costs. I'm anxious to see geothermal energy assuring a better life. Therefore GDC should not relent in its determination and commitment.
Hesbon Tele,
Nakuru.

The Editor welcomes letters on topical geothermal issues. Write to the Editor, Steam, at Geothermal Development Company P.O.Box 100746 00101, Nairobi, Kenya. You can also send email to *steam@gdc.co.ke*. The Editor reserves the right to edit the letters for spaces and clarity

Geothermal Facts

Did You Know?

1. The definition of geothermal is the "Earth's Heat"
2. The world's first geothermal power plant was constructed in 1911 in Larderello, Italy, and continues to generate power to the present day
3. When one MWhr of geothermal power displaces one MWhr of coal-fired power, approximately one ton of carbon dioxide emissions is offset.
4. Geothermal power plants generate base load power which meaning the plants operate 24/7
5. One MW (equivalent to 1 million watts) can meet the power needs of about 800 homes
6. Geothermal energy is used in more than 20 countries to generate electricity, including the USA, Japan, Italy, Indonesia, New Zealand, Mexico, the Philippines, Kenya, Costa Rica, and Nicaragua
7. Iceland generates 17% of its electricity and 87% of its heating from geothermal energy
8. Presently, the USA produces approximately 3,000 MW of electricity from geothermal sources – equivalent to electricity generated from burning 60 million barrels of oil each year

9. Electricity generated by geothermal energy helps conserve non-renewable fossil fuels, significantly reducing greenhouse gas emissions that pollute our air and water
10. 5% of California's electricity production comes from geothermal energy
11. Geothermal energy is a clean, sustainable source for power generation and heat
12. Geothermal power plants are immune to fuel price volatility

Rooting for direct uses of geothermal energy

That the Eastern Africa Rift System is endowed with vast geothermal resources cannot be overstated. In fact, though the current potential is put at 15, 000MWe, with improved technology, utilization of available thermal energy from the resources and in depth research, this figure is much more.

But this will only remain just that, an admirable resource, if it is not commercially tapped to positively impact on the people of the region.

That is why the Geothermal Development Company (GDC) is keen on developing direct utilization of geothermal resources in the region. Besides, because of our expertise base, GDC will be happy to support other nations in the region to develop direct uses.

Versatile resource

Exploiting geothermal energy for electricity calls for financial, political and professional commitment.

In a region beset by runaway poverty, stagnant rural economy and little opportunities for enterprise, concepts such as direct uses should be embraced.

Direct uses, is the utilization of geothermal energy for other applications other than in generating electricity.

The beauty of direct uses is that even communal cooperative enterprises can productively engage in it. This will lead to economic emancipation while of course allowing people to take pride in their heritage.

Besides, governments can partner with geothermal companies to develop recreational facilities where geothermal energy is used to provide green heat in steam-baths, heated pools and saunas.

> Direct use of geothermal energy has significant economic benefits, because it cuts on electricity demand.

That is why for this region to have an impact in the global arena, it must also think beyond generating electricity. Geothermal energy has diverse uses for low heat energy application and industrial applications.

The region can employ geothermal energy into green houses, recreational facilities, aquaculture, and poultry farming, drying of grains, refrigeration, milk pasteurization, in tanning and even as a source of water.

Geothermal economy

In Colorado, US, geothermal is used to heat water for alligator farming. In California, a company - Earthrise Nutritionals, grows algae using geothermal heat. This algae is a food supplement with a huge market.

Direct utilisation of geothermal resources, does not require heavy capital investment. And in many occasions it can also be a by-product of geothermal electricity generation where substantial amount of thermal (MWt) can be utilized before the geothermal brine is re-injected back into the ground. This way, it is possible to turn the rift system into a huge geothermally driven economy.

Ultimately, direct uses of geothermal resources will have as much impact to the economies and communities just as would electricity generation.

Dr. Silas Simiyu,
Managing Director.

Lake Bogoria hot springs

A well discharge in Olkaria Domes.

Geothermal to replace costly diesel generators - minister

Hon. Kiraitu Murungi

The future of green energy lies in geothermal as plans to shelve thermal electricity generation gain more currency.

And no one understands this truism better than Kenya's Minister for Energy Hon. Kiraitu Murungi and his PS Patrick Nyoike.

The duo have repeatedly expressed their desire to shift the country from diesel to geothermal energy.

The use of diesel generators have in the past caused electricity bills to rise astronomically. Customers have complained. Some industrialists have relocated. The economy has suffered.

Geothermal revolution

Recently during a workshop on geothermal energy, Hon. Murungi affirmed categorically that diesel generated electricity will have to pave way for geothermal energy.

"GDC will explore, drill and deliver ready steam to KenGen and all the independent power producers to invest in power plants without undergoing the upstream risk associated with geothermal exploration," the minister said.

He cited the drilling of 36 wells at Olkaria Domes, which GDC is undertaking, as a case in point. The minister said that the steam will support the 280MW Olkaria IV power plant.

Dependence on oil remains a dangerous gamble. The minister promises that it is time to phase out diesel generators which have largely caused a steep in electricity bills.

Chairman feted in Bali

Paul Gondi (pictured) the GDC chairman, was among dignitaries feted at the 4th Geothermal Congress held in Bali.

In the Congress, Dr. Peter Omenda, GDC's Chief Manager, presented Dr. Simiyu's paper titled Status of Geothermal Exploration in Kenya and Future Plans for its Development.

The congress in Bali themed, Geothermal: The Energy to Change the World, aspired to explore better ways of developing geothermal resources in the world so as to provide energy for the future.

Over 2,500 delegates from 80 countries attended the conference in April. The list of the delegates included key players in the world geothermal sector, among them presidents, ministers, investors, and world-class geothermal scientists and engineers.

Others in the GDC delegation were Martha Mburu, Manager, South Rift Region, James Wambugu, Manager, RD, Cornel Ofwona, Manager Reservoir Engineering & North Rift Area, and Ben Kubo, Manager Environment & Safety and the Central Rift Area Manager.

GDC's date with the Fourth Estate

We conducted a successful media workshop and a tour of some geothermal sites in the Central and North Rift.

The three-day event which brought together scribes from leading media houses was meant to sensitize journalists on the mandate of the Company, and the state of the geothermal development in Kenya.

At least 20 journalists participated.

The exercise took the team to some key geothermal sites in the rift valley. These included Menengai Caldera, boiling steam jets of Lake Bogoria and hot springs of Kapedo.

Prior to visiting the sites, geothermists, led by Dr. Silas Simiyu, GDC's Managing Director, held a workshop for the journalists in a Nakuru hotel. The media was introduced to key issues in geothermal development and how GDC intends to realize its mandate.

Journalists join GDC managers at the viewpoint of Menengai caldera

Dr. Simiyu later hosted the scribes to a dinner. He promised to work closely with the media.

GDC has 168MW

Michael Mbevi, GDC's Manager, Drilling Operations.

Out of the 280MWe required to for the Olkaria IV and V power plants, 168 MW is already available.

Michael Mbevi, GDC's manager in charge of drilling operations, while releasing the figures, exuded optimism that GDC will meet the set target.

"The operations have been smooth with impressive results," Mbevi says. "Some wells have yielded a record 14MW! I'm happy to report that we are on course."

Currently, GDC is drilling 26 wells at Olkaria under the 26-Wells Drilling Services Contract being executed by Great Wall Drilling Company of China and funded by China Exim Bank. "We are using three hired rigs", says Mbevi. Concurrently, GDC is also executing another 10-well contract at Olkaria. "In order to accelerate the drilling operations GDC has acquired 2 rigs which will be available to commence drilling in Menengai later this year" he added.

GDC plans to develop up to 3,000MW of electricity by the year 2020 and 5,000MW by 2030.

Since inception in 2009, GDC has undertaken exploration work in Menengai, Silali, Paka, Korosi and Homa Hills to facilitate future drilling.

We're on the path to ISO 9001:2008

The Geothermal Development Company (GDC) has engaged the Kenya Bureau of Standards (KEBS) to facilitate the ISO certification process.

Already KEBS is training GDC staff on various aspects and processes mandatory in the certification journey. KEBS will also carry out internal audit throughout the period.

Mr. Julius Kioko, the KEBS acting MD has hailed GDC and described the partnership a good beginning and a key roadmap for the company.

"You have started on the right footing; this move will make the company have good procedures. We feel proud to be associated with GDC," said an ecstatic Mr. Kioko during the signing ceremony.

The GDC Managing Director, Dr. Silas Simiyu affirmed GDC's commitment towards quality services and products.

The ISO project is spearheaded by the GDC's ICT & Quality Assurance Department. Nicholas Weke the Manager, ICT&QA has exuded confidence in the success of the ISO process.

Cheers, hugs as geothermists graduate

The Resource Development (RD) staff who were training in Silali completed their course. They were also awarded certificates of completion in a brief ceremony, held in Bogoria, some 300km north-west of Nairobi.

James Wambugu, the Manager RD, applauded the team's effort and interest in the training. He described the exercise as a "good start" towards geothermal development.

The trainees attended a one month course on geothermal exploration .

There were light moments too. The hall raptured into cheers every time a graduand hugged one of the trainers.

About 40 employees from geochemistry, geology and geophysics participated in the month-long intensive course.

"The training was a success. The team was enthusiastic and eager to learn, this way, they covered a bigger ground," said Daniel Ng'enoh, the Deputy Manager in charge of National Programmes.

Three instructors from the Icelandic Geosurvey (ISOR) were called in to train the GDC team. They were Knutur Arnason (Geophysicist), Thrainn Fridriksson (Geochemist), and Björn S. Hardason (Geologist).

Congratulations... Hilary Komen of RD is all smiles as he receives his certificate of completion.

Cost-effective

"It was cost-effective to train in the country," Ng'eno explained. "We managed to train more people instead of airlifting just a few to Iceland. Besides, they trained in familiar grounds using their own equipment."

The instructors were full of praise to the trainees. They also encouraged them to engage in continuous learning process, to be innovative, to share knowledge and to work as a team.

Ng'eno emphasized the importance of developing a competent team as core to the success of GDC. He said the new crop of scientists has displayed admirable confidence and resilience in their work.

GDC ups geothermal exploration

The Geothermal Development Company (GDC) is carrying out detailed studies to evaluate the potential of the Homa Hills geothermal site situated in Karachuonyo, Nyanza Province.

GDC experts, who are already at the Homa Hills geothermal site will document the extent of the resource.

Already there are geothermal manifestations in the area including hot springs at the temperature of 70 degrees Celsius on the surface.

"This is an indication of a massive geothermal resource in Homa Hills," says Dr. Silas Simiyu, the MD.

Dr. Simiyu joined a delegation of the Parliamentary Select Committee on Energy to a tour of Homa Hills. Also present was assistant Minister for Energy, Hon. Mohamud Mohammed. The ass. minister was accompanied by the area M.P. Eng. James Rege who is also the Chairman of the Parliamentary Committee on Energy, Information and Communication.

Hon. Mohammed affirmed the government's commitment in supporting GDC to develop all the geothermal prospects in the country. He said that the future of energy lies in geothermal as hydro-based electricity has proved unreliable.

GDC was created in 2008 as a special purpose vehicle to explore, develop, and market geothermal resources in the country.

According to the Vision 2030, Kenya eyes 5000MW of electricity from geothermal sources in the next 20 years.

The whole country is estimated to have geothermal potential in excess of 10000MW spread in about 14 sites.

GDC team prospects for geothermal in Silali

Collecting data... a GDC scientist in Silali.

Preliminary results from the Silali exploration work are impressive – we have the resource! A mid-term review report indicates that commercially exploitable steam deposits abound in the prospect.

"Indications are that there is a great resource in Silali. The extent and well sites will be determined after the field data collection is complete and a conceptual model of the field developed," said James Wambugu, the Manager, RD.

The team in Silali comprised of geologists, geochemists, geophysicists, community liaison, environment & safety officers and reservoir engineering staff who carried out heat loss survey in the area.

The detailed surface exploration, one of the major activities that GDC has undertaken, took close to 35 days. Over 70 scientists participated in this exercise.

The team also set up a satellite office at Kampi ya Samaki where the field events were coordinated from. All the field reports were streamed in daily for analysis.

Daniel Ng'enoh, The Deputy Manager, RD, and popularly known as 'Uncle' in Kampi ya Samaki, said the Silali Community is appreciating the presence of GDC. "Locals have been very supportive and cooperative. I want to thank them for that."

Mr. James Wambugu

The Geo-scientific work carried out in the Silali prospect involved:

- Geological mapping of the rock formations, structural mapping, hydro-geological and volcanological studies of the volcano
- Geophysical measurements included resistivity (MT and TEM)
- Geochemical sampling for fumarole steam, water points and soil gas survey.

Energy Minister hails GDC's drilling progress

Energy Minister, Hon. Kiraitu Murungi has lauded GDC's drilling progress. He has also remained optimistic that GDC is central to solving the energy problems of Kenya.

The minister, made the remarks when he opened the Geothermal Workshop for Eastern Africa Rift System in Nairobi. He told delegates that geothermal energy in Kenya will replace emergency diesel power in the next one year.

"We're moving with speed. Within a few months of its inception, GDC is already drilling for steam which will be used by KenGen to generate additional 280 MW for the national grid. Work has also commenced on other geothermal fields along the Kenya's rift valley," said Hon. Murungi.

Kenya is betting on geothermal energy to realize the Vision 2030, a development blue print that aspires to turn this East African state to a mid-income nation in the next 20 years.

GDC is a fully-owned state corporation. It has the mandate to develop all the geothermal fields in Kenya and avail steam for electricity generation.

Corporate strategy for geothermal development

10 Questions for the Manager

This is our strategy... The planning and Strategy Team discussing a point. Right inset, the manager, Paul Ngugi

1 Briefly, what is your department concerned with?

The Corporate Planning and Strategy department develops corporate plans and strategies to help actualize GDC's mandate. It identifies resource requirements and how to raise the required resources, financial, human and capital. It guides the company in resource allocation, thus aligning the resource to right areas.

2 Recently you launched the GDC Business Plan, what are its core provisions?

The 20 year Business Plan aspires to put GDC in the mode of productivity as it gears up towards the 5000 MW. Key issues: we have the resource, there is need for electricity in the country, and there is market for this product. We are demonstrating that geothermal energy is the least cost source of energy for this country. The plan also shows the number of wells we need to drill and the kind of resources required for the same.

3 Why 20 years?

Development cycles are informed by a number of factors mainly a country's development blue print and even the local and international realities. Ours is tied on the Vision 2030 Plan.

4 Are you convinced that GDC has what it takes to get the 5000MW?

Of course yes! Why not? This country has huge deposits of steam that need to be exploited. Besides, what dictates success is leadership. Today I can guarantee you that we have a result-oriented, very able and dedicated captain. We have the expertise, we have the goodwill from the government, Kenyans and donors... we don't have room for failure. Shock awaits whomever is doubting our resolve!

5 How does the Planning team link with other departments?

Oh, we are all interlinked. Ours is to provide a base, a direction for other departments to implement. For instance, we project that we need 5 000MW by 2030. That means that the drilling department has to give us the wells, HR has to provide and train human capital,, Supply Chain department has to ensure that the desired material is sourced in good time and of high quality, PR and Communication has to manage our strategic relationships and create an understanding about our mandate, Finance must administer the budget and it goes on and on for all departments.

6 What is it like to work in Planning?

For us it is exciting because we have an opportunity to visualize and see the entire company as it is now and in the future. It is challenging because it is not routine work, every time we are confronted by new challenges, we have to adapt accordingly. That is why this area needs passion and ambition.

7 Describe your team

Ours is a small team but the most cooperative and dedicated I have ever worked with. The team members are willing to work at very odd hours and days. The team is oozing with passion and drive for the company. We all share in the excitement.

8 What else can we expect from Planning?

Currently we are working on the corporate strategy to isolate the actual activities that we need to accomplish for the Business Plan to become a reality.

9 You are evidently very passionate about GDC and geothermal development what drives you?

That's true I'm an ardent believer in GDC and geothermal energy. I started connecting with GDC in 1997 when talks of its creation were mooted.. Then I was in KenGen. We used to pray a lot about it together with Mike Mbevi of Drilling and Julius Wambua, among others. Then, 12 years later, here we are! It is really exciting. Besides, I like working. I now have an opportunity to make a difference and therefore can't afford to squander it. For me, I'm living my dream!

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

GDC has a great opportunity to become a great company. I want to see GDC becoming the corporate giant not only in Kenya but also of the region and globally. I want to see the reality of the 5000MW coming alive.

Photo courtesy WGC 2010

The Indonesian president, Susilo Bambang hits the gong, marking the opening of WGC 2010 in Bali, Indonesia.

Bali congress charts the future of geothermal

Recently, geothermal experts, policy-makers and scholars assembled in Bali, Indonesia for the World Geothermal Conference. **Erick Wamanji** *closely followed the discussions.*

When the community of geothermists congregated in Bali, Indonesia, in April 2010, during the World Geothermal Congress, there was one purpose that incessantly rung on the delegates – accelerate development of geothermal energy for a better world.

And to achieve this, delegates resolved to avail support in the areas of financial, technical expertise, training and technology transfer where required. Delegates also took cognizance of the fact that "energy constitutes a basic and continuing human need," which should be made available for mankind to develop.

That is why Bali was alive that there is need for know-how transfer from developed to developing countries through "effective international cooperation among government, private and academic institutions, especially by joint training and education, capacity building and technical assistance."

"The members of the geothermal community so assembled… therefore do urge that large investment is secured for national, regional and local geothermal projects in developing as well as developed countries…" reads part of the declaration.

The congress was also persuaded that greater acceptance of geothermal by international funding agencies can play a major role to enhance geothermal growth in the world.

The Bali congregation was pretty aware that geothermal energy plays a critical role at the world stage of development in an era when the world is so desirous of cutting carbon emission responsible for global warming.

"Geothermal can be harnessed to combat climate change and provide clean energy and thus enhance the prosperity of geothermal in the world," said Iceland President, H.E. Ragnar Grimsson.

Indeed, Bali declared that: geothermal energy is indigenous, sustainable and environmentally responsible, counteracting global warming by displacing carbon intensive energy usage.

This conference was convened by the International Geothermal Association and the Indonesia Geothermal Association. Themed Geothermal: the Energy to Change the World, Bali aspired to explore better ways of developing geothermal resources in the world

Kenyan delegation

Over 2, 500 delegates from about 80 countries participated in the five-day event. Some 1,032 papers were presented and there were 312 sessions.

Billed as the largest assembly of geothermal experts, the list of attendees read like a roll-call of who-is-who in the global geothermal enterprise including presidents, ministers, investors and topnotch geothermal experts.

Hon. Kiraitu Murungi, Minister for Energy, led the Kenyan delegation.

There was awesome excitement and commitment in Bali. The conference

was thought-provoking and insightful on how to develop the resource on technical, financing and even political dynamics that determine how such a resource is exploited.

Grimsson described the conference as "defining moment." Iceland is one of the most advanced nations in geothermal development.

"Geothermal should be utilized in greater scales. Since we are aware that we need a lot of investments to develop this energy, we need to build partnerships, and this forum is a good chance to work it out," said Surya Darma, the president of Indonesia Geothermal Association.

The congress also urged policy-makers and politicians to persuade the public on the importance of geothermal energy. It recommends that governments mitigate on risks, provision of insurance, loan guarantees and production tax credits.

Iceland geothermal facilities near Grindavík.

Opportunities

Kenya is one of the countries that already took that cue long before Bali.

Through sessional paper No. 12 of the Energy Act, the government created the Geothermal Development Company (GDC) to absorb the upstream risks in geothermal development. GDC explores, develops and markets geothermal resources in the country. This GDC design is a classical case study.

At the congress, there was general consensus that geothermal will generate employment opportunities, boost industrial development and agricultural production and thus improve the quality of life for everyone in the word.

"Geothermal will create access to education, medical care and better nutrition. It helps to lower instances of infant and child mortality and increase in life expectancy," argued Gordon Bloomquist, Chair IGA WGC 2010 Steering Committee

> "Geothermal resources make our Iceland a very attractive location..." - *Grimsson*

Hot lessons from Iceland

And this is the reason why Iceland is walking tall. Grimsson told the WGC2010 News Daily that geothermal energy has helped Iceland to survive the recent banking shock, especially because the cost of heating and electricity for ordinary people, families, homes and businesses was only a tiny fraction of what it is in other European countries.

"Geothermal resources make our Iceland a very attractive location for industrial investment and will do so even in the coming years," Grimsson boasted.

Iceland is a model country when it comes to geothermal development. It has developed a unique heating system using direct geothermal energy. Her geothermal development has received massive support from the central government and policymakers.

Besides, Bali discussed the need for research and development and called for funding towards capacity building which is deemed critical to the development of geothermal energy.

Photo courtesy

Iceland President, H.E. Ragnar Grimsson

Indonesia is a vast archipelago stretching from the Indian to the Pacific Oceans. It is said to contain numerous volcanoes estimated to hold around 40 % of the world's geothermal energy potential.

The first WGC was held in 1995 in Florence, Italy. It attracted participants from 70 countries. The congress yielded a guidebook of theories and cases on the use of geothermal energy. The Bali conference was the fourth one.

After Bali, the next host will be Australia- New Zealand in 2015.

Drilling the national dream

By Erick Wamanji

The sky is almost bubble-gum pink, and tourists are calling it a day as they stroll to their vans. Flamingoes are dipping their beaks for algae as the turquoise lake gently laps as if humming for our tired bodies. It has been a whirlwind day as we traversed geothermal sites from dawn

As the western horizon in Lake Bogoria turns ember, a man calmly walks by the pristine lakeshore. He stops by the spectacular boiling steam jets that gush with glee, and gives it a stare.

"We will not drill for geothermal energy here," he says, skips a poodle, and gets closer to the superhot steam. "This place will be preserved for tourism and for our children. The best we can do is to promote the use of spas and hot-pools for tourism and recreation," he responds to a concern of possible defacing of the iconic steam jets.

Meet Dr. Silas Masinde Simiyu, the man at the helm of Geothermal Development Company (GDC).

Dr. Simiyu has contributed immensely to the growth of geothermal energy not only in Kenya, but worldwide. He has helped establish geothermal projects, researched widely, mentored many and now he has another electrifying task ahead – giving Kenya 5000MWe by 2030.

At GDC he is the captain of a great team that is passionate about powering the aspirations of all and sundry through geothermal energy.

GDC will avail affordable, reliable, green energy to catapult Kenya into a mid-income nation in 20 years' time.

"There's no doubt that geothermal is our greatest indigenous source of energy," he says. "We have to go for it. Through our efforts, Kenya's energy needs should be easily met."

One thing is apparent, that Dr. Simiyu bubbles with energy and passion about geothermal energy.

Barely a year after the core team was assembled, GDC is drilling in Olkaria; has three branches in Nairobi, Naivasha and Nakuru; has recruited key staff and is opening up new geothermal fields in Menengai, Silali, Homa Hills and many more.

"With the development of the huge geothermal resources in this country , we will drastically cut the cost of doing business. We will attract investors and our economy will thrive," he says confidently.

Mid-way this interview, Dr. Simiyu's cell phone vibrates. It vibrates again, he reaches for it, reads an email and replies. The wilderness of the Lake Bogoria shores is a far place but whether in the field or in the office, the smart phone links him to the rest of the world.

No doubt he is a tech-savvy CEO. I quickly gather Dr. Simiyu is not all geothermal, steam, stakeholders or management. He loves farming and machines; he readily embraces new technologies, is an ardent supporter of Arsenal Football Club and loves nice cars. "One time," he recollects, "I walked to a showroom in Nairobi and drove off with a brand new car. Then, I was a young man. Initially the salesman almost scoffed at my interest in the car."

Today, he still loves big cars. He loves to drive himself too.

"I also love tractors," he declares. "I've been farming for a long time and tractors are always handy."

Dr. Simiyu's love for tractors dates back to his university days. Then, an enterprising young man, he made money and invested in tractors.

"As a student in the University of Nairobi, I was able to make some handsome cash. Naturally, I would have easily bought myself a car, but I chose tractors; it was beneficial," he says almost with a fatherly counsel.

Dr. Simiyu is charming, witty, approachable and exceptionally smart. He talks with passion about lighting up the whole nation, exploiting untapped business opportunities and the financial and environmental dividends of investing in green energy.

And green energy that is what he tirelessly recites like a mantra. An alumni of the renowned University of Texas at El Paso, USA, Dr. Simiyu, has published widely in prestigious peer-reviewed journals. He had the choice of remaining abroad consulting for multinational companies and States, but he chose to invest his energies where they were needed most- home.

"I believe home is always good," he always says, and then he smiles. "I'm here because I believe in my country; I believe we are the people to make this country attractive."

The right man

At the Olkaria geothermal power project where he worked before coming to establish GDC, he is fondly remembered as a people's person.

"Though he was the boss, he was easy with his staff. We used to like his company; when he left we felt orphaned," recalls a former staff.

"Dr. Simiyu is the right man for this job. He is exceptional," says Mr. Paul Gondi, the chairman of GDC Board of Directors.

True. He is a pragmatic man who rose through the ranks to the top. With over 20 years experience on the job, and a post-doctorate degree to boot, he understands every bolt and nut of geothermal power plants. That is why he delivers the geothermal gospel, and preaches the revolution it will herald with confidence.

And his entrepreneurial acumen is just admirable. While in the USA as a research fellow, he took a one-year course on the stock market. The course proved productive because today, daktari is a master of stock trading and understands the intricacies of the bond market.

> "It is our desire to see electricity consumers enjoying affordable, reliable and clean energy."
> - Dr. Simiyu

Dr. Simiyu is very pragmatic about empowering communities in GDC's areas of operation. "Not the usual CSR where people give little donations and call for TV cameras. At GDC, we want to see real transformation of a people's way of life for the better," he insists.

"I'll be proud to see the sprawling of cottage industry in the countryside; it is our desire to see electricity consumers enjoying affordable, reliable and clean energy."

An early riser, his diary is ever full. One moment he is attending a board meeting, the next minute he is selling the geothermal philosophy to potential investors or stakeholders; meeting his managers or he is in the field inspecting work progress.

At GDC he is building a family of performers, where everyone enjoys institutional support to deliver their mandate. Dr. Simiyu is concerned about his employees and he wants "everyone to grow." He knows too well that when the employees are empowered so will the company. To him, employees are "customer number one", as he likes to put it.

Public speaker

Dr. Simiyu is an eloquent, articulate and knowledgeable public speaker. Indeed, he appreciates corporate communication. Every two weeks, through the in-house journal – Geonews- Dr. Simiyu runs the "State of the Company" column that advises, informs, persuades and motivates employees.

And that is why when historians write about Kenya's energy revolution; Dr. Simiyu will feature prominently as a man who drilled the earth to get millions of his countrymen into the light.

The dawn of a geothermal era in Eastern Africa

A rebirth of geothermal interest is sweeping across the Eastern Africa region. In this analysis, **Erick Wamanji** *explores the challenges and opportunities.*

The Geothermal family... Hon. Kiraitu Murungi, Minister for Energy (centre in grey tie) is joined by Mr. Patrick Nyoike, PS in the Ministry of Energy, Dr. Silas Simiyu (2nd left) and other senior geothermists after the workshop.

The Eastern Africa Rift Region is headed for a geothermal energy revolution if the zest manifested in the delegates who attended a recent workshop in Nairobi is any indicator.

In fact, when about 200 delegates from 11 Eastern Africa countries assembled in Nairobi, a sense of urgency was obvious to utilize the massive geothermal resource that straddles idly in the belt. The region desperately needs this energy to stimulate economic growth and to light its dark alleyways.

"So fundamental is electricity to the development of Africa and this region that we no-longer have the luxury to procrastinate or the leisure to reinvent the wheel and duplicate efforts," urged the Kenyan Minister for Energy, Hon. Kiraitu Murungi.

Affordable, reliable and clean energy – that is what the region needs. That is what Geothermal Development Company (GDC) is out to offer Kenya. GDC is Kenya's premier company that is set to develop 5000MWe by 2030.

Thus, it is a watershed moment for the region as it crosses the hydro-electricity threshold and usher in a geothermal era. In the resolutions, delegates vowed to take geothermal development to the next level – plentiful electricity generation.

Best kept secret

Delegates were unanimous that urgent measures need to be engaged to develop geothermal energy.

Why not? EARS is one of the generously endowed geothermal spots on earth. Experts put the potential conservatively at 15,000 MWe running from Ethiopia to Mozambique in a 6, 500km stretch. This steam is Africa's best kept secret. Yet, this reliable base-load power has remained largely untapped.

Interestingly, high cost of power has painfully slumped industrial growth by blurring competitiveness and retarding economic growth. This explains why major industrialists are moving towards South Africa and Egypt.

But how can this region be a geothermal energy powerhouse? When will this dream be realized?

"If we can fully tap into this resource, then we will simply excel. Energy is the driver of development the world over," Dr. Silas Simiyu, the GDC Managing Director explains.

The Government of Kenya established GDC in 2008 to fast-track the development of geothermal energy in the country.

And GDC has moved with speed. It took to the assignment like fish to water – easily, effortlessly- and now drilling is in progress at both Olkaria I & IV. GDC is

sinking wells to supply steam to Olkaria I&IV power plants.

But the region has also to confront the challenges of financial resources, shortage of expertise, and lack of awareness on geothermal benefits. While experts insist that the resource is overwhelming, they decry the dimmed commitment from member states.

The story is the same from the North to the South – lack of equipment, expertise, financial challenges, and awareness among policy-makers and citizens. For instance, Gabriel Mbogoni, a geologist from Tanzania decried the lack of awareness in his country.

Geothermal benefactors

And that is why the region needs to offer incentives to charm investors into this system. Kenya's president, H.E. Hon. Mwai Kibaki, understands this too well. He advises that locals need to be enticed to invest in energy generation.

The president is right. In the past, the private sector has shied off due to punitive costs and largely disinterest from governments. Unfortunately, most overlooked is the reality that once harnessed, geothermal continues to supply endless electricity.

Indeed, if this region is to develop her geothermal energy productively, it must remain attractive to local and foreign investors: offer tax breaks and meet upstream cost. The beauty of the region is that electricity market is readily available and therefore returns are guaranteed.

While Kenya is plugging deep into her geothermal resource zealously, it is high time other states joined this movement and turn the rift system into a global icon of geothermal development. It is not lost on economists that the region's lackluster economic growth is correlated to expensive and unreliable electricity.

It is time geothermal benefactors in form of Development Financial Institutions (DFIs) come handy. Such organizations like European Union, JICA, AfD, KfW of Germany should be engaged more constructively. This region will then generate enough power for home and for export.

True. funding is still a major challenge. Developing geothermal energy demands heavy initial capital inlay thus demanding unwavering commitments and support from governments. The creation of GDC is a case study of how states can jumpstart the process.

Hence, states and financiers have to be sensitized of the desirability of geothermal energy. Lack of awareness has contributed to the slow pace of geothermal development in the EARS, argues Dr. Peter Omenda, the Chief Manager at GDC and a geothermal expert.

The EARS, one of the major tectonic plates of the earth.

There is also need to up the relationship with Africa Union (AU). Through the department of Infrastructure and Energy, AU has been excited by the transformative power of geothermal energy in the system. The department's director, Baba-Moussa, who also attended the workshop, was optimistic of the success of geothermal development.

In the workshop, Kenya pledged her readiness to offer expertise. The workshop also explored possibilities of setting up a geothermal centre of excellence to spearhead the development of experts.

Farah Ali Ainan , a delegate from Djibouti, told Steam that his country is gearing up to geothermal energy. "Our government takes it (geothermal energy) as a priority. We want to see the full development of Lake Abe and Lake Assal Projects."

However, he notes that financial investment into the project is overwhelming.

Therefore, developers from Iceland and India have been welcomed to develop the projects. "We need capacity building. We need new equipment and technology," he said.

Regional cooperation

"Based on this, we strongly need cooperation. We need to share expertise and equipment in the region. That is the only way to see the light," he opined corroborating Hon. Murungi's core message.

Indeed, regional collaboration was at the heart of the talks as a sure way to harness the resource. The cooperation ideal also dominated the Eastern Africa "Decision Makers' meeting on

Geothermal Energy, which was held in Addis Ababa, Ethiopia in June 2009. In fact the Addis parley came up with the "Addis Ababa Declaration" which aspired to develop further the resource in the rift.

"There is an African saying that he who walks alone walks fast, but he who walks with others walks furthest," Hon. Murungi urged. To debunk this darkness, then the region has to shelve lone-ranger tendencies, the minister guided.

Financial progress

In 2006, the Global Environment Facility (GEF) Council approved the Africa Rift Valley Geothermal Development Facility (ARGeo) an ambitious programme that hoped to provide Technical Assistance and Geological Drilling Risk Insurance. The project was slated for funding in the tune of $18 million from UNEP/GEF and the World Bank.

The idea was noble and timely - to guarantee insulation against drilling risks in the rift system, and stimulate interest in geothermal development. The following countries were lined up for funding: Uganda, Tanzania, Djibouti, Eritrea, Ethiopia, and Kenya. Though funding has not been forthcoming, there are hopes that the World Bank would untie the purse-strings for 2010.

Other geothermal support programmes in the region include: AUC/ International Centre for Science and High Technology of the United Nations Industrial Development Organization (ICS-UNIDO) regional geothermal project for East African Region (EAR), German Federal Institute for Geosciences and Natural Resources (BGR) Geothermal energy Programme in East Africa in collaboration with the German KfW Development Bank, UNU-GTP, International Atomic Energy Agency (IAEA) and the World Bank.

Steam jets of Bogoria, Kenya are a manifestation of geothermal resource which is abundant in Kenya and the EARS

The rift's jewel goes unclaimed

As a renewable energy, geothermal no doubt is the jewel in an increasingly green-conscious earth. It is obvious that economies with such a resource will enjoy an enviable spot on the global economic mix. Already benefits are flowing towards countries that invest in geothermal energy.

Interestingly, the Eastern Africa Rift System(EARS) region is yet to wake up and smell the steam!

"We need to get serious with this resource. I think it's time to go with the global trends," says Gabriel Mbogoni, a Tanzanian geothermist. "Sadly we are good at meetings but we haven't really actualized our efforts."

Mbogoni's concern is understandable – the electricity figures in the system are discouraging. For instance, while South Africa generates close to 42,000MW, Kenya is doing 1,300MW, and Tanzania has an installed capacity of 1,200MW which serves only 14 per cent of her 40 Million population; 560 MW comes from hydro, 340MW from natural gases.

In Rwanda for instance, 60% of her electricity is generated from diesel and 40% from hydro, says Uwera Rutagarama, a Kigali-based geothermal expert. Still, it is hoped that with the over 300MW geothermal potential that Rwanda possess, the scales will tilt towards geothermal generation.

In a paper titled *Geothermal Development in Rwanda: An Alternative to the Energy Crisis*, Rutagarama and Theoneste Uhorakey argue that Rwanda is ripe to shift energy platforms.

In the Rift System, only Ethiopia has come close to Kenya. It has a 7.3MW geothermal power station at the piloting stage. Ethiopia's installed electric capacity is 814 MW; 90 percent of this comes from hydro.

In a paper titled *Strategy for Geothermal Resource Exploration and Development in Ethiopia*, Dr. Meseret Teklemariam and Solomon Kebede told a geothermal conference in Bali recently that:

"Presently, the most explored geothermal field is the Aluto Langano followed by Tendaho. These two fields can be most easily and rapidly advanced to the development stage for execution of power projects in five to ten years."

In 1986, Zambia made a test at Kapisya, the shores of L. Tanganyika. There is an installed 200kW power plant that was never commissioned.

Interestingly, the Eastern Africa Rift System (EARS) region is yet to wake up and smell the steam!

The road to caldera

Debbie Kalei *discovers the potential of recreative outposts offered by Kenya's geothermal spots*

We weaved ourselves through the display alleys of the supermarket on Ngong Road tired and drained. The clock at the teller machine indicated 11:15 pm. It had been a long day, trying to put every stitch into its rightful place. The following day, a Friday, was our big day with the media.

We had been intending to hold a media workshop for a while and when GDC managers and the media finally converged in Nakuru for the workshop, it was clearly an accomplishment.

Drawn from various media houses, the journalists came armed with their tools of trade. Of course their presence kept us on our toes lest they get something funny to report about.

Our one day stint at the workshop in Nakuru triggered curiosity. We were eager to sample Kenya's geothermal sites. Though, it was a media education trip, to me, it turned out to be a major discovery of major touristic sites, thanks to geothermal activities in Kenya. These sites, I reckoned, can be major sources of income.

Saturday was sunny as we snaked our way from Nakuru Town to the Menengai Caldera. As we peeled off miles off the rift valley, revealing unrivalled Kenyan beauty, we were all struck with awe. The fact that we live in a beautiful country sunk home.

The road to the Menengai Caldera is a wide stretching golden carpet of ready-to-harvest wheat. The bird's eye-view of the Menengai Caldera is nothing short of spectacular with the geothermal well-pads sitting enviably in the middle of the depression covered in stretched blankets of greenery.

Great! This is what summarizes Menengai. And when you are here, you appreciate the efforts GDC is making to ensure that Kenyans can access reliable, affordable and green energy. Our Resource Development team has already completed a detailed surface exploration – there is steam here, a lot of steam. – the scientists confirm with certainty.

Our arrival at Lake Bogoria spa was a welcome break from the long and winding drive. However, we could not rest yet- the best was yet to come. The Bogoria steam jets beckoned.

We cruised by the game reserve's security to be received by a disarming vista. From a far, the shoreline was awash with pink because of the flamingoes that dot the lake shores and then there are the steam jets cheerily jutting to the sky- a beholden site indeed.

This is one of the gifts that geothermal has bestowed to this country – a touristic attraction. And we ladies quickly found skin therapy from the steam.

The site of jets of hot water spurting from the ground, and coupled with the setting sun, remains one of the rare treats one can get here.

Hot Springs!

The whole time, I was eagerly waiting to go to Kapedo.

The four-hour journey to Kapedo was long, windy and dusty. We meandered through bushes and shrubs, and over dry riverbeds.

Then we were in Kapedo! Enchanted residents were ready to receive us. As they led us towards the Kapedo waterfalls, we could hear the water falling in supreme magnificence. The falls stood before us, unmoved by our arrival, yet stretching out their welcoming sounds of soothing waters.

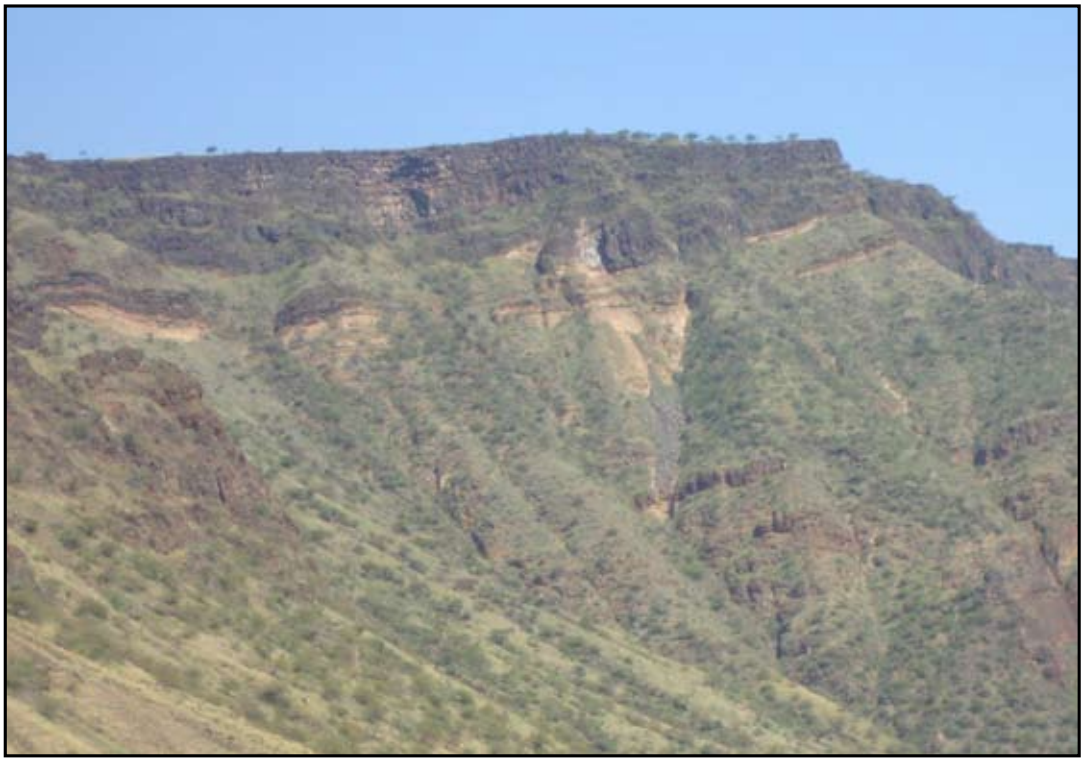
"This is beauty unbeatable," I said to myself. "Another wonder of geothermal."

Unaware of the water temperature and seeing as there were people in the water, we headed inside the pool. Midway, the water started getting hotter and hotter- to go on or to cower back? I wondered.

Curiosity carried the day and off we dashed to the falls. And, as if on cue, camera flashes filled Kapedo at midday. Pressmen, and women, were heads over heels capturing the unfathomed beauty, each of them taking position to file an untold story from the field.

As we travelled back from our tour, I could not help but envy Wycliffe, a young boy who lives at Kapedo. He can get free sauna daily!

The hamlet that won't sleep will keep Kenya awake



A section of the Silali Caldera. Silali s great for geothermal energy as it is for recreation.

The water falls at Kapedo, is like a lily in the desert. After driving miles of dusty and rugged road, in this scantly populated world, you suddenly stumble on the striking waterfalls that cascade down a cliff with a silvery splash. From far, its a gentle hum.

This water is warm, even hot. It is a site to behold and a must visit for adventurers. The hot springs are actually a manifestation of geothermal activities at the adjacent Silali Caldera.

This caldera, some 500 km North-west of Nairobi churns tons of hot water every second in one of the most spectacular geographical phenomena in the Eastern Africa Rift System.

"The surface features in Silali are manifested to the western slopes of the volcano in form of hot springs at Kapedo, while the eastern part is characterized by numerous fumaroles and widespread hot and altered grounds with surface temperatures ranging from 65-90o C. The series of springs to the western side discharge at temperatures of 45-55°C with a combined estimated flow-rate of about 1,000 l/s," explains John Lagat, the Chief Geologist at GDC.

It is these manifestations that attracted the GDC team of scientists to a detailed surface exploration. So far, the caldera is inaccessible by road. The GDC exploration team was forced to use a chopper to move from location to another.

Optimistic

In the meantime, Silali and adjacent areas are waiting -anxiously. In a recent stakeholders' meeting held in Chemolingot, residents and leaders expressed their concern with the manner in which the region has remained underdeveloped for ages.

"We are optimistic that when GDC starts its activities here, even our people will benefit. This area needs a commercial jumpstart for us to enjoy life," said John Paka, a local resident.

Indeed, Silali seems to be off the conventional development tangent. The roads are rugged almost impassible in the absence of an all-wheel cruiser; the climatic condition is harsh only suitable for pastoralist lifestyles; there are limited and poorly equipped schools. Healthcare is a problem and many are the times, a leader told this writer, that many residents have died for lack of medical attention.

"Beside, though full of cattle, milk and honey, we are heavily exploited by middle men. We can't get value for money," laments Joseph Lotodo, a former Member of Parliament.

GDC team exploring for steam

That is why GDC will develop an elaborate CSR plan for Silali, says Ruth Musembi, Manager PR & Communication.

"Geothermal projects will transform life here," explains Musembi. "Our people will definitely spend money directly to benefit the community. Besides, we will take access roads there, water and in the process improve the quality of life."

The floor of the caldera is characterized by sparse vegetation which includes shrubs, acacias and geothermal grass near altered grounds. Other manifestations occur in form of altered grounds, steaming grounds, hot springs and fumaroles. The hottest and most extensive activities occur in the eastern half of the caldera floor and also the eastern flanks of the caldera, a GDC preliminary report says.

The caldera towers over the rugged land with pride as if aware of the steam boiling under its belly.

The 8-km-wide Silali trachytic volcano is the largest Quaternary volcano in the Northern Rift. Due to its mode of formation, Silali is a shield volcano. It has a summit elevation of 800m meters above sea level.

This volcano has the stunning 8x5km diameter summit caldera said to have formed between 200-400 years ago. The steep caldera walls are up to 300 m high. The summit of Silali volcano rises 800 m above the surrounding terrain.

"Concise figures of the size of the resource can only be given after thorough geological, geochemical, geophysical and reservoir studies have been done and the results from all the various fields incorporated to give a conceptual model."

Preliminary results show that there is a resource... Silali will be the next big thing after Menengai.

About Silali

- McCall visited Silali in 1965 as part of a reconnaissance survey. He recorded widespread occurrences of gabbroic nodules on the upper slopes of Silali.
- Geological and geochemical surveys done in Silali indicate that a hot magmatic body exists under the volcano which can sustain a large geothermal system(s).
- Further research reveal that the volcanoes are young, large and have high geothermal potential.
- Silali trachyte shield volcano is composed predominantly of basalts, trachytes, hawaiite, mugearite, benmoreite and phonolite.
- The development of the volcano was initiated during the early Quaternary times with the eruption of largely basaltic lavas.
- Caldera formed 200 - 400 years ago.

It's a beautiful piece of art

By Marietta Mutonga

SILALI. That's where I spent most of my June with the Resource Development team as we explored for steam.

The Silali terrain was unforgiving - full of thorns and thistles; rocky and patchy and inaccessible by vehicles. Therefore, we were forced to use a chopper to reach our destinations. Flying the chopper for the first time was a bit unnerving. Most of us were scared and some even clung on others when the chopper swayed to land.

It was also very hot. So I guzzled a lot of water. Each day, I carried two-liters, but that was barely enough!

It's a fault!

The most exciting time for me and my team is when we discovered a transform fault that cuts through the caldera. Actually, we were just walking following the feature. At first, we almost gave up, then, voila! Here we were and the fault right on our very eyes!

A shaft of excitement stab the air, we almost jumped from the cliff. It was good news to us. Such faults indicate permeability and heat source. You will also find a lot of manifestations such as fumaroles. All these factors are crucial to geothermal development. Interestingly, this fault has not been previously reported.

And since there was a lot of legwork to be done, we kept fit. Fitness is good for the heart and the head.

Stunning Silali

But the Silali Caldera is a beautiful piece of art. It's scenic and captivating. It is punctuated by beautiful crater cones. The walls are neat and artistically layered; it's like God took His time to make it.

After a long day's work in the caldera floor we flew in a rift graben which is about 500m apart and as my eyes set on the walls, of this graben I thought I was in the Grand Canyon, in Colorado, US. Silali is stunning, breathtaking and intricate. I bet, once opened up, Silali will provide a fantastic ground for leisure and recreation. It will open a new horizon for touristic activities. And the beauty will remain intact even as we develop geothermal power plants.

Tête-à-tête ... GDC managers engage in small talk with Tom Miranyi (right) of Magadi Soda Company after the breakfast meeting with the Kenya Association of Manufacturers (KAM).

Consulations...Mr. Patrick Nyoike, Kenyas Energy PS (seated) compares notes with Hudson Adambi during the workshop on the East Africa Rift System.

Wow! this is just fantastic... Stephine Cheptai, a former East Pokot MP seems fascinated by GDC's Corporate Calendar

Communicating with the earth... a geophysics team commissioning equipment in Menengai

Ooh, nice tunes... nice tunes after a day's work... Loraine Odundo a community liaison officer tries her fingers on a guitar

School Children throng the GDC stand at the Nakuru ASK show in mid-July

A peek into the Employment Act 2007

In this final installment, **Agnes Muthengi** *explains why paternity leave remains controversial among many other critical issues.*

Part IV of the Act addresses payment, disposal and recovery of wages, allowances and deductions from the wages of an employee. This part also deals with debts of an employee; repayment of monies wrongfully deducted from an employee and related matters. Many people break the law here. They have their loans repaid using salary check-offs to a point that they can end up with zero balance.

The law clearly stipulates that the employer shall not make deductions on employees' wages for an amount exceeding two thirds of such wages. The repealed Act allowed for deduction up to half the earned wage. The employer cannot deduct more than 50% of an employee's salary in respect to payment of any loan advanced to the employee.

The Act, in Part V addresses such matters like, hours of work, leaves housing, water, food and medical attention.

Paternity Leave

Additionally, the law provides for a 14-day paternity leave. However, there are queries regarding this leave due to polygamy.

This matter is still contentious but experts suggest that the law stipulates that paternity leave be only once a year.

Termination and dismissal are captured in part VI.

For the first time the Act provides for payment of service pay for every year worked to an employee whose contract of service has been terminated.

> The employer shall keep a register of particulars of all employees and send a return by 31st December

Dismissal is usually when the employee has by his conduct indicated that he has fundamentally breached his obligation arising under the contract of service.

And yes, if an employee is arrested for a 'cognizable' offence punishable by imprisonment and is not released on bail or bond or freed within 14 days, his contract is terminated!

Minors

In part VII, the Act prohibits employment of minors. It sets the minimum age of employment at 16. But a child between thirteen years of age and sixteen years of age may be employed to perform light duties which is not harmful to his health or is not likely to prejudice the child's attendance at school. Any work instructions given to a child have to be such that the child benefits from it. These have to be approved by the relevant Minister.

Employees are also protected in Part VIII, in the event of insolvency of an enterprise. The Act stipulates the amount an affected employee is entitled to out of the National Social Security Fund in respect of the employer's debt.

In Part IX the employer is also required to keep employment records and make them available for inspection.

Part X deals with employment management whereby an employer shall be required to notify the Director of Employment of the existing vacancies, termination of employment and abolition of offices. The information to be obtained is meant to enhance employment policy and planning. Part XI outlines the requirements for a foreign contract of service. For instance, such employment must ensure that the employee is medically fit and that the contract was done in a transparent manner.

Part XII sets out the complaint procedure and jurisdiction in cases of disputes between the employee and employer. And finally, disputes emanating from employment can be solved by a labor officer or the industrial court.

Agnes Muthengi is the Chief Officer, Legal at GDC

Attitude will determine your career altitude

By Rose Tindi

One of the most important but often overlooked ingredients of success in a career is attitude. One's attitude towards work at whatever step of the ladder, might be, and can be a great building block or an impediment to career advancement.

Naturally that everyone has strengths and weaknesses. While some things come as second nature to us at work, there are those things that we must struggle with and often need help to get done. The people who advance up the career ladder are those who have learnt and accepted this fact. Those who find themselves seemingly stuck in a rut are those who either have not learnt, or have refused to accept it.

Very often one sees people who might not be the best at what they have been detailed to do, but who give it their all. These people are indeed fun to work with. In time, because of their enthusiasm and positive attitude, they reach a point where they can perform much better with very little help from others.

Conversely, there are those with great talent and ability, but who nobody enjoys working with because they spend all day pointing out the faults of others, or looking down on others because they think they can do everything perfectly well, alone.

A good manager is often a shepherd, herding the flock from the front and going out of his/her way to retrieve one lost sheep and get it back to the flock.

Role of the good manager

A good manager is often a shepherd, herding the flock from the front and going out of the way to retrieve one lost sheep and get it back to the flock. Whenever someone is struggling, or needs something, the manager is there to help out by providing the needed answers.

And remember, being a leader is not necessarily about knowing everything. No one knows everything. It is about knowing what one knows and what one doesn't know that counts! A good leader, therefore, will find someone who knows what he/she doesn't know and give that person the enabling environment and opportunity to do what he/she has been hired to do to the best of the person's ability.

A good leader will show the greatest respect to those working for him/her because they are doing what the leader should actually be doing. A perceptive leader has a chance to learn from his/her staff thus becoming a better supervisor.

It is for this reason that success is about attitude. People love working for people who have a great attitude. They are more willing to work for someone who is ready to expose their abilities and talents and who is willing to admit that he/she doesn't know-it-all.

Managers love employees who ask questions and are willing to learn and try out new things they might not be comfortable with. It shows that they are willing to take risks, make mistakes and learn from those mistakes which will make them perform the same task better the next time round.

An employee with a positive attitude - happy, excited and willing to learn - will always climb higher and higher up the career ladder. It is not always what one knows, but how much one is willing to grow, that will determine one's career success and, of course, success in life.

Rose Tindi is the Manager, Human Resources at GDC

How GDC will protect planet, earn carbon credits

GDC will save the earth 25 million tons of carbon every year!

By Geoffrey Mabea

By developing renewable energy, GDC will save Mother Earth about 25 million tons of the deadly carbon dioxide every year. Carbon dioxide is the largest single source of greenhouse emissions.

GDC will also be eligible to translate this carbon saved into credits and hence trade in the international emissions market Clean Development Mechanism (CDM)

Quick arithmetic indicates that when GDC will prove 5,000MWe, it will save the planet some 24, 703, 200 tons of carbon per year. This figure is calculated at the availability factor of 94 percent of geothermal energy. One ton of carbon trades at a staggering of Ksh. 900 or 12 USD in the international emission market.

This effectively means a cleaner global environment and also financial benefits for companies like GDC.

Carbon Trading

In fact, in this year's national budget, Kenya's Minister for Finance, Uhuru Kenyatta, has already factored proposals to develop a framework for carbon trading that would guide on how to register and participate in carbon emissions trade.

Carbon emission trading is specifically for carbon dioxide. It is one of the ways countries can meet their obligations under the Kyoto Protocol and mitigate climate change.

Indeed, the global community is in concurrence that greenhouse gas emissions are a threat to the very survival of the planet.

As a result, Article 12 of the Kyoto Protocol established CDM such that projects that cut on emissions in developing countries can be funded by industrialized states.

The protocol sets limits on greenhouse gas emissions by developed countries but allows them to meet their national targets by funding clean energy projects in other nations, mainly developing countries.

In Kenya for instance, the Mumias Sugar Company is set to receive millions of shillings in carbon trading. Mumias generates about 35 MW from baggase a by-product of sugar.

The protocol placed a monetary value on the cost of polluting the air, and aspired to reduce carbon footprints. One credit is equivalent to 1000kgs (1 ton) of carbon. Kyoto protocol stipulates that all developed countries should cut down their emissions by some percentage or else pay heavy fines. This can be done by either buying credits from the market, or investing in CDM projects.

Geothermal energy, which GDC is promoting, is one of the safest and most environmentally friendly forms of renewable energy today.

GDC is targeting some 5000 MWe in the next 20 years. This way, the country will hugely cut down on diesel generators to produce electricity or to power industry.

Communities

Communities too stand to benefit from the CDM designation. For instance, the World Bank Community Development Carbon Fund (CDCF) contributes an additional dollar for every purchase of a tone of carbon credits to benefit communities. In conjunction with CSR, once such money is disbursed, the communities can engage in development activities of their choice be it in electricity connections, agriculture or tourism.

Communities will realize that carbon financing will transform their livelihoods.

In this regard, CDM aspires to facilitate developed countries to achieve sustainable development and to contribute to the main objective of the United Nations Framework Convention on Climate Change (UNFCCC) – to prevent dangerous climate change.

GDC will therefore enter into an Emission Reduction Purchase Agreement (ERPA) for sale of carbon credits absorbed through this CDM project. That is why this geothermal enterprise proves to be more lucrative!

Keen....opinion leaders follow proceedings during the meeting.

East Pokot welcomes GDC

By a *Steam* Correspondent

The East Pokot community has happily welcomed GDC to the area to prospect and drill for geothermal steam.

In a stakeholders meeting held at Chemolingot, the leaders were optimistic that the presence of GDC will revolutionize the area's social and economic fortunes.

About 80 top leaders attended the meeting. The composition of participants was diverse –area MP, Asman Kamama, former MPs, the Kabarnet Council Clerk Gideon Ole Saruni, the Provincial Administration led by area DC, Amos Mariba, professionals, the clergy, women representatives and other opinion leaders. The Managing Director, Dr. Silas Simiyu, led the GDC team. He later affirmed GDC's full commitment to partnering with communities by engaging in development activities.

Menengai residents tipped on development

By Godffrey Olali

Some 27 GDC staff members joined the Menengai community in a three-week Participatory Rural Appraisal training (PRA) in Nakuru.

The training aspired to trigger residents to develop action plan modules and empower them on utilization of local resources with a view to making them self-reliant.

At the same time, the community got tips on fundraising, and monitoring and evaluation.

Members from the three sub-locations of Wanyororo, Kipmochoch and Rigogo that surround the Menengai Caldera participated.

"The PRA training was a very interesting yet humbling experience for us at GDC too. It incorporated team spirit between community members and the company. The session was a lifetime experience," says Mr. Pascal Manan, a Community Liaison Officer at GDC.

The first baraza (informal session) was attended by 80 community members while the main one for unveiling the Community Action Plan (CAP) was attended by 170 members, including GDC's, Ben Kubo (Manager, Central Rift) and Ms. Grace Mwai, Deputy Manager, Community Liaison.

Manan says that communities from the three sub-locations of Menengai and its environs were upbeat about GDC and are raring to work with the company.

The community has encouraged GDC to maintain constant contact in a bid to forge a long-lasting mutual relationship.

In a brief interview with The Steam, Manan, said the attendance was quite impressive on the part of GDC staff. "The ground rule was that one had to achieve 95 per cent full-time attendance in order to be certified."

"This is why the training went much beyond the expectation of most of us. It was quite demanding and some participants had to burn mid-night oil working on their assignments up to 9 pm in the night in order to cope with the 'healthy' competition that was witnessed during the training period," he adds.

He says that GDC needs such relevant training in order to be able to cope with the ever fast moving technological innovations and become a world leader.

The geothermal cake is now bigger and sweeter

By Ruth Musembi

Investing in the geothermal sector in Kenya has been made easier following the creation of the Geothermal Development Company. GDC will bear all the upfront risks giving investors a head start and an assurance that they will recoup their investment in record time.

Picture this, before the entry of GDC, it would take at least five years from geothermal exploration, drilling and power plant development to the time an investor would begin to reap from the massive investment. No wonder only a few investors dared sink their money in such a risky affair.

With GDC drilling and availing ready steam, investors now have a luxury of two investment options. In the first, an investor can bid and install a wellhead unit immediately a well has been drilled and tested.

This way, the investor will begin to produce an average 5MW with GDC having taken care of all land, environmental, and social issues that were hitherto a disincentive. The investor will have a ready market given the increased demand for renewable base-load power. Electricity generated from geothermal will be immediately connected to the national grid.

The second option available to investors is to put up large conventional power plants. Again, GDC will take care of all up-front risks and provide ready steam as fuel for the power station. The investor will only incur the cost of putting up and running the plant.

And with more than 14 geothermal sites spread out in the rift valley region, Kenya can accommodate as many investors as possible. For more than 30 years, only the Olkaria geothermal prospect has been exploited. GDC is now developing all the other fields with drilling in the Menengai prospect set to commence later this year. Further North, exploration work has commenced in Paka and Silali and in Nyanza Rift, surface exploration studies are underway.

Investors, both local and international, need to seize this grand opportunity to partner with GDC in providing adequate energy that is needed if the goals of the Vision 2030 are to be attained.

According to the government of Kenya blueprint, this country requires 15,000MW by 2030 to achieve a mid-income economy status, out of which, geothermal will supply 5,000MW.

The beauty with geothermal energy is that it is reliable, affordable and green- it is good to the pocket and to the environment.

The beauty with geothermal energy is that it is reliable, affordable and green - it is good to the pocket and to the environment.

A binary power plant. Investors can also invest in conventional power plants.

Where geothermal heats and cools

Ex-Peter's in Eburru is not your ordinary sleepy village. It boasts of the only geothermal drier in Africa.

Ignore the fact that the structure is nondescript. It is old and rusty and can easily pass for a ruin were it not for the steam that wafts lazily from pipes and chimneys.

Still, this 70-year-old facility is a gem. It is a simple plant that directly uses geothermal steam to dry farm produce such as pyrethrum, cereals and vegetables.

The condensed steam is tapped and channeled to a reservoir as water for domestic use. The water quenches the thirst of about 4,000 people in this farming village. This is why it has continued to fascinate locals and geothermal experts alike.

"It's a communal property," explains Joseph Njuguna the newly-elected chairman. "When we bought this land from a farmer called Peters, the drier was here. We decided to leave this area as communal land."

Apparently, Peters, as the colonial settler was known, build the drier in the 1930s to dry pyrethrum. Today, locals have continued with the legacy.

"Members are allowed free use of the facility. However, non-members pay some Sh. 50 to dry their produce," Peter Mwangi, the caretaker explains.

Martha Mburu

How it operates

Steam is tapped from a well then it is channeled through pipes that interlace the drier chambers. The steam emits heat. There are eight chambers made of timber. The chambers have shelves. Trays made of wire mesh are inserted in the shelves. It is these trays that hold the commodity to be dried.

After running through the pipes, the steam cools and is tapped and channeled to a water reservoir nearby. It is the tank that serves the 4,000-people village with domestic water. Each member is entitled to 40 litres a day.

"There are no rivers here and therefore water is scarce. However, we have managed to tap our own water from the steam; it keeps us going," Njuguna says.

Direct uses

The drier is an excellent example of direct uses – a whole branch that looks at uses of geothermal energy beyond generating electricity. Direct uses, experts say, promise to revolutionize the way we do business.

On this day, when the Steam team paid a courtesy visit to the drier, Mwangi was drying vegetables. "At times we have a vegetable glut. We dry it to be used in dry seasons," he explains.

But the drier is run down and Njuguna is afraid that it may not be long before it collapses.

Njuguna and company may be lucky. GDC has a full-fledged programme that seeks to develop direct uses. Martha Mburu, the GDC Manager in charge of South Rift Region, is passionate about rehabilitating the drier. An expert in direct uses, Mburu is persuaded that the Ex-Peter drier can be remodeled to the path of productivity.

"We are discussing with the community to establish how GDC can come in to support this project. It's a noble one. If rehabilitated, it will be part of the demonstration on what we mean by direct uses," she explains thoughtfully.

Mburu is upbeat about direct uses. She explains that a facility like Ex-Peters can do more than drying produce. It can operate as a hatchery and therefore save heavily on electricity costs.

The Ex-Peter's Drier in Eburru.

Breaking fresh grounds with water

By Wilson Rutinu

You may not know this: water is at the heart of drilling just as oil is to an engine. Drilling of geothermal steam cannot be achieved in the absence of water. And it is not any amount of water; we are talking about tens of thousands of litres.

For instance, one drilling rig consumes as much as 2,000 litres of water per minute. This is simply mindbogling.

But why is water such an invaluable element of drilling? Water is used to control the temperatures underground, to cool and lubricate the drilling bit and to lift up drilled rock cutting from the bore.

This explains why in the geothermal mix, water features so prominently.

The Menengai geothermal prospect is a case in point. GDC will be developing this field soon because water is now available. We had to break fresh grounds and venture into previously un-chartered waters.

And the prospect was full of challenges.

Ready to drill

Unlike areas like Olkaria and Eburru, whose proximity to Lake Naivasha gives the two fields a big advantage as far as geothermal development is concerned, Menengai geothermal field is very different. In this field, there are no streams neither is there a fresh water lake.

Infrastructure & Logistics Department had to look for other ways of getting water in Menengai. One option was to drill water boreholes in order to get adequate water for drilling needs. Seven boreholes were drilled and commissioned. The results are impressive. The water boreholes yield is in the range of 20 – 40 M3 /Hr. Rough estimates then give an average total yield of 210M3 /Hr. This translates to 3,500 litres per minute.

Again, GDC has struck a deal with the Nakuru Municipality. The municipality will supply water through 4-inch GI pipes. From this connection, GDC is guaranteed a minimum of between 80 – 100M3/Hr. This again translates to 1,500 litres per minute. This will be good enough for drilling to commence.

With these two sources of water within reach, we are assured of about 5,000 litres per minute. Therefore we are confident that with the two Rigs that GDC is anticipating this year in Menengai, the drilling will go on uninterrupted.

Reservoir tanks

Water demands storage and pumping.

A contract to supply, construct and commission five reservoir tanks each of capacity 4 million litres is underway. This will provide a total installed capacity of 20 million litres.

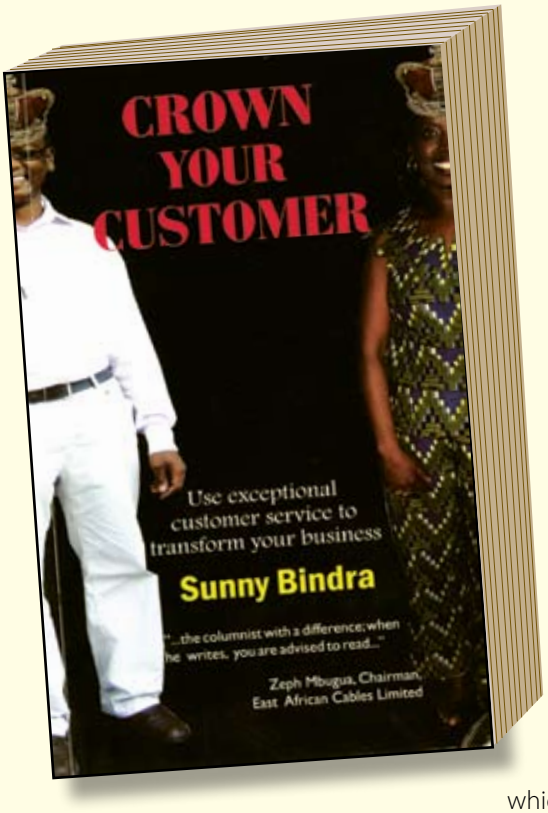
This means that with the two rigs consuming 4,000 litres per minute, it will take 5,000 minutes to drain all the tanks assuming there is no inflow. This will translate to 83.3 hrs or 3.5 days.

Storage ponds

Preparation of storage ponds is critical to tap the discharged brine. This brine will be cooled and then pumped for reuse in any other well that will be undergoing drilling at the time.

A pump house and two massive booster pumps will be installed, one running and one on standby. Submersible pumps will also be installed. Each booster pump will have a capacity to pump 4,500 litres of water per minute. This means one reservoir tank requires 14.8 hrs to fill up. One pump can feed the two rigs easily.

Wilson Rutinu is the Chief Projects Engineer, GDC



Crown your customer or perish

Title: **Crown Your Customer**
Author: **Sunny Bindra**
Publisher: **Story Moja**
Pages: **62**
Price: **300**
Year : **2007**
Reviewer: **Erick Wamanji**
Available at leading bookshops & Supermarkets

The customer, they say is always right. He is also the king. But often customers are ill-treated. They are given lip service. They are considered serfs, paupers and desperate in some establishments.

This poor service ranges from the matatu industry to the banking sector; from restaurants to hospitals. Most employees in charge of customers consider the latter a nuisance. How ironical!

A successful business is one which puts the customer at the centre stage -win his heart. That is why poor customer-care should be considered a sin of suicidal proportions in any serious organization.

In this book, ***Crown Your Customer***, Sunny Bindra is astounded and even bemoans the myopia with which businesses are mistreating their customers. The author challenges organizations to rise up and treat their clientele as 'Very Important Persons,' (VIPs).

Little joys

To win the customer, give attention, understanding and some little joys. "In turn, they will give you success." Bindra notes that great customer-care is a philosophy. It is not about seminars, workshops or special training. It is not even about beautiful ladies and gallant uniform, for all this are useless if it doesn't come from the belief system. And Bindra insist that for customer service to succeed, it must begin from the top. The rest will be motivated to follow.

> "A successful business is one which puts the customer at the centre stage -win his heart."
> - Sunny Bindra

10 key lessons

Bindra offers 10 key lessons for success.

But why is it that Kenyan consumers never complain? "They are meek, and easily impressed..."

He cries that "businesses treat you like dirt, but you keep giving them your money."

In fact, Bindra rightly notes, "the vast majority just takes it on the chin and come back for another the following day." But that should end. ***Crown Your Customer*** challenges all customers to rise up and demand for their rights. To Bindra, a sense of civic duty must permeate in customers.

Crown Your Customer is inspiring, challenging, passionate, practical and a powerful arsenal for businesses as much as for customers. It is a copy that every serious business person should read.

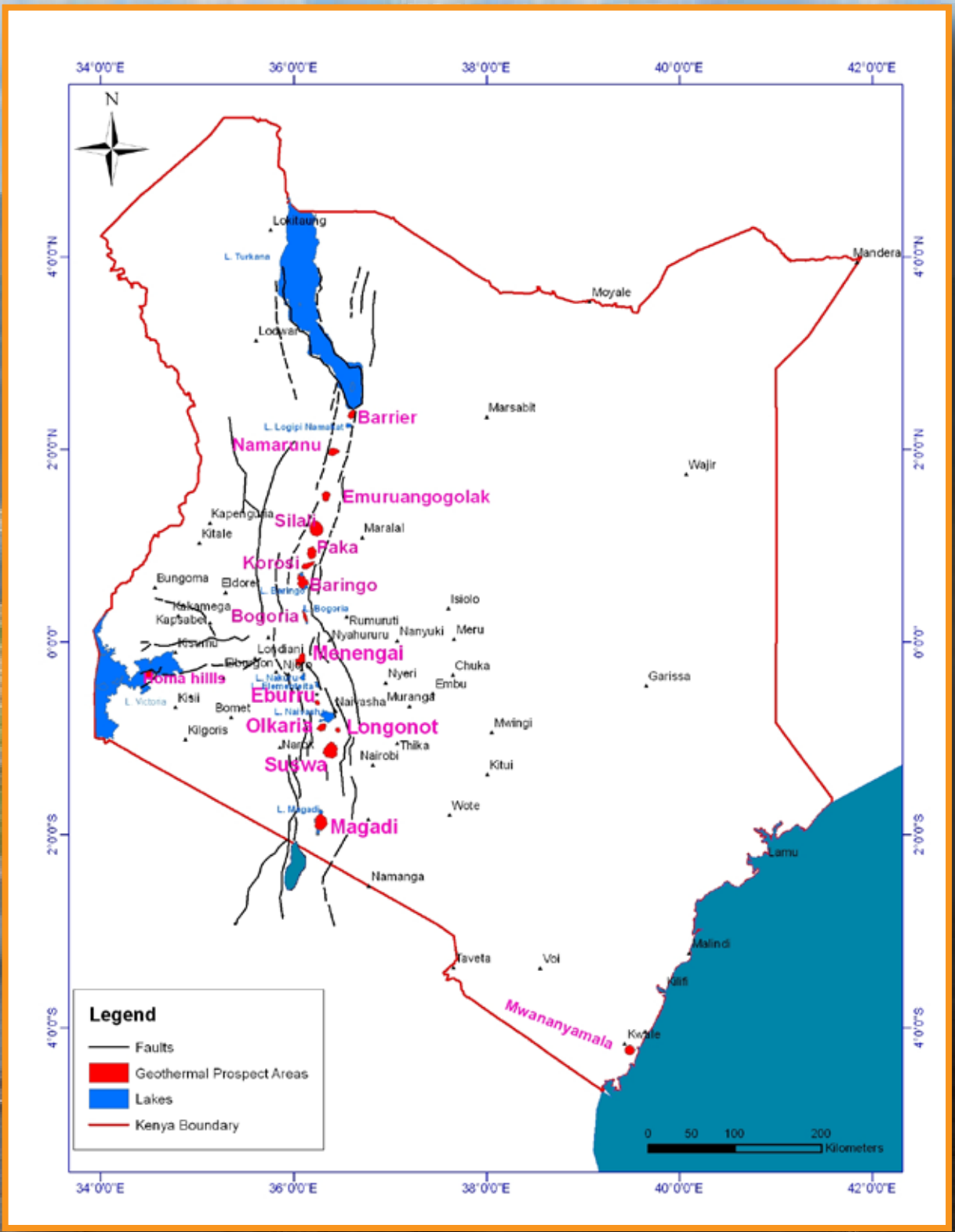
Useful handbook

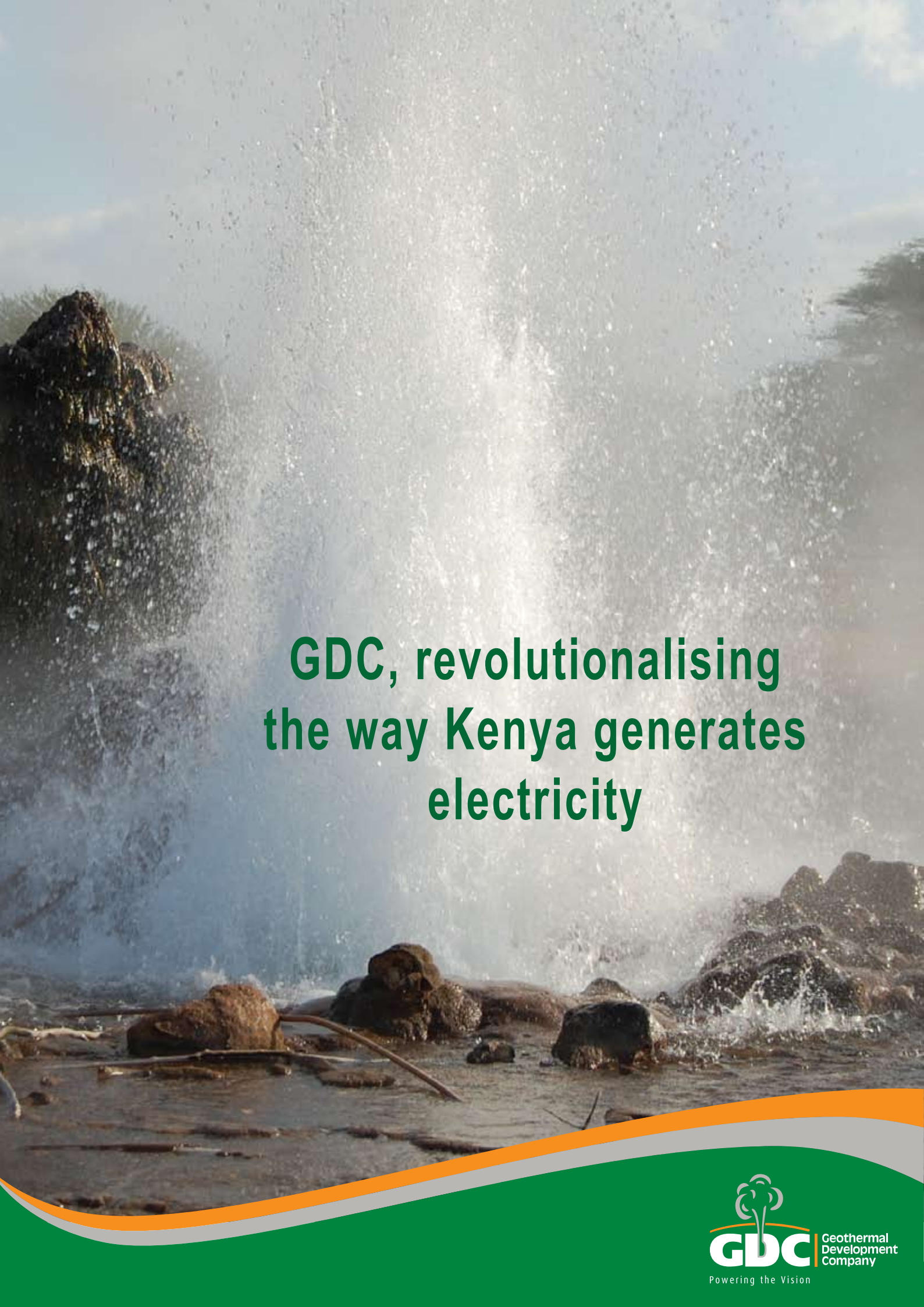
Written in simple and easy to understand language, ***Crown Your Customer*** can be read in one sitting. It is published by '***Storymoja***,' and divided into six short chapters. It can prove a useful handbook for the customer and the CEO.

Much as it is a must read, Bindra could have made a bigger score by visiting specific cases where businesses have succeeded as a result of great customer care. While he mentions in passing a few establishments in Kenya, he could have delved deeper. Perhaps this could be his idea for another book.

Bindra is a knowledgeable man in business. He is a member of the Advisory Board of Strathmore Business School where he is also a lecturer. Besides he is a Management consultant.

Geothermal sites in Kenya





GDC, revolutionalising the way Kenya generates electricity

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Powering the Vision