



# Nationally Appropriate Mitigation Action for Accelerated Geothermal Electricity Development in Kenya

NAMA Profile # 5

Seeking Support for Implementation

July 2015

## Background

As at 2014, electricity provided 9% of Kenya's overall energy requirement, while petroleum and renewable energy (RE) provided 22% and 69%, respectively (MoEP, 2015). As of June 2014, only 35% of the Kenyan population was connected to electricity. However, Kenya has been experiencing a steadily growing demand for electrical energy due to accelerated economic activities and growth. Peak electricity demand increased from 899 MW in FY 2004/05 to 1,512 MW by December 2014, and demand is projected to grow to 3,400 MW by 2016 and to 5,359 MW by 2018. To meet this demand, an additional 5,000 MW of new generation will be developed by 2017 to bring total installed capacity to at least 6,600 MW (MoEP, 2015).

In FY 2013/14, RE sources contributed about 69.1% of total electricity generation while 30.9% of electricity was generated using fossil fuels. Among RE sources, hydro is a major contributor (44.6%), followed by geothermal (22.7%), wind (0.2%) and co-generation (0.6%) (ERC, 2014). Accelerating the development of Kenya's geothermal power capacity is vital for meeting the country's energy and development ambitions in its efforts to become a newly industrializing, middle-income country by

2030. Geothermal energy has been identified as the single most promising technology to ensure the power sector remains on a low-carbon development pathway, and is a priority mitigation action in the Kenyan National Climate Change Action Plan (NCCAP) (CDKN, 2015). Kenya intends to install 1,500 MW of new additional geothermal capacity by 2017 and 5000 MW by 2030 as compared to the current capacity of approximately 200 MW. However, according to the business-as-usual (BAU) scenario defined in the NCCAP, geothermal power will expand to approximately 2,500 MW by 2030 (NCCAP, 2012), which falls short of Kenya's stated ambitions.

Although, significant ambition and political will exist, reaching the short-, medium- and even long-term geothermal ambitions will continue to be a major challenge. If the geothermal sector fails to deliver new capacity in a timely manner, Kenya is likely to prioritize alternative options. Recent discoveries of petroleum, coal and natural gas indicate that fossil fuels will likely increase in the electricity generation fuel mix, which would put the Kenyan power sector on a high-carbon development pathway.



Photo credit : XINHUA PHOTO - ZHAO YINGQUAN

### Private Sector Participation in the Geothermal Power Sector

The accelerated growth scenario for geothermal power development in Kenya, as outlined in the NCCAP, foresees a significant up-scaling in private sector investment, as well as new actors (developers and independent power producers [IPP]) entering the sector. In the scenario, the private sector will need to cover approximately 40-50% of the required US\$20 billion investment to reach the 5,000 MW goal, compared with the historical 10-15% level (NCCAP, 2012).

The NCCAP analysis identified two main constraints to the accelerated scenario: capital limitations of current (largely publicly owned and financed) geothermal developers active in Kenya; and the limited number of private sector developers.

In recent years, Kenya has already undertaken significant steps to support the transition towards the accelerated scenario (the 'transformation'), including the establishment of the Geothermal Development Company (GDC), which seeks to promote geothermal development with large private sector participation. However, engagement with Kenyan stakeholders, international IPPs and developers, potential investors and development banks indicated that significant gaps remain regarding support for geothermal development.

Three major gaps hindering efforts to support increased private participation were identified during a sector analysis performed through a multi-stakeholder consultation process, which began in September 2012 and continued for over 16 months. These three gaps include: lack of an inadequate risk/return profile for IPPs and other developers; an absence of targeted technical assistance focused on commercial and financial aspects in the short and medium term; and a potential human capacity gap for large up-scaling of the sector in the medium and long term.

## NAMA Objectives

The proposed NAMA aims to support and expand existing efforts undertaken by the Government of Kenya in the geothermal power sector to create an enabling environment for a significant up-scaling of private investment necessary to achieve the desired accelerated growth. It aims to achieve two key outcomes: enhancing the opportunity for investment through an improved risk-return ratio; and aiding and developing local human capacity along the supply chain to manage significant expansions of the sector.

## NAMA Interventions

The NAMA aims to address the gaps in existing and ongoing efforts to transform the sector through new, complementary, 'low-regret' actions. The NAMA proposes four specific components:

**Component 1 (Financial risk mitigation instruments):** Three subcomponents are proposed for early stage risks, including provision of contingent grants, complemented by drilling risk insurance and a long-term risk guarantee.



"Worker in Olkaria Kenya" by Lydur Skulason - Flickr: Worker in Olkaria Kenya.

**Component 2 (Financial premium payment mechanism):**

A premium payment mechanism would entail disbursement of a predefined additional income per MWh to increase the financial attractiveness of specific fields for a limited period of time.

**Component 3 (Technical assistance facility):**

A technical assistance facility will provide advisors, training, secondments and workshops addressing integrating IPPs, mobilizing finance, and expediting environmental and social approvals.

**Component 4 (National geothermal capacity-building programme):**

This NAMA will support a national geothermal capacity-building programme that undertakes training, research, mapping, planning and database development.



Picture source : africanclimate.net

## NAMA Target and Emission Reductions

The new, complementary components of the NAMA, in the short and medium term, will directly target an estimated 820 MW of the 1500 MW of geothermal development outlined in the “5000MW+ in 40 months” initiative. They will also indirectly support the achievement of longer-term ambitions.

In terms of greenhouse gas (GHG) mitigation potential, the NAMA will contribute to directly abating approximately 3.77 MtCO<sub>2</sub>e per year in 2020.

## Potential for Transformational Change and Sustainable Development Co-benefits

This NAMA will assist Kenya in ensuring its power sector remains on a low-carbon development pathway through enhanced private sector investment in the geothermal power sector.

Sustainable development co-benefits of the NAMA include improved energy security through increased domestic supply, GDP growth through lower energy prices and increased employment. Access to clean

energy will improve the national economy and the lives of people. Climate resilience will be improved insofar as the electricity supply will be less dependent on hydroelectricity, and, thus, less exposed to changes in precipitation patterns due to climate change.

## NAMA Relevance in the National Policy Context

The proposed NAMA is in line with the national policies and plans outlined below.

- The NCCAP (NCCAP, 2012), which considers accelerated geothermal power development as a mitigation option with large GHG emission reduction potential and highly positive co-benefits.
- “5,000+ MW in 40 months” initiative (MoEP, 2013), which aims to generate and bring online approximately 1,500 MW of new, additional geothermal capacity by 2017 from the current capacity of approximately 200 MW.
- Vision 2030 (2007), which states an ambition of 5000 MW of installed geothermal capacity by 2030.

**Salient features of the Proposed NAMA**

**Sector** : Energy Supply

**Technology** : Geothermal energy

**Type of action** : National/Sectoral Goal

**GHGs covered by the action** : CO<sub>2</sub>

**Expected timeframe for the implementation/operation**: 15 years

**Implementing entity** : Ministry of Energy and Petroleum

**Total estimated cost of the action** : US\$3.315-4.250 billion equivalent to total costs of 820 MW of additional geothermal above BAU

**Required support for the preparation of the action** : Phase 1 (US\$7.8 – 10.5 million as grants); and Phase 2 (US\$172 – 278 as grants, convertible equity and concessional loans)

**Relevant contacts**

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The NAMA Registry is a dynamic, web-based platform to record NAMAs in developing countries, as well as support available and/or provided by Parties and entities for such mitigation actions. Furthermore, the Registry aims to facilitate the matching of NAMAs with available support. Participation is voluntary and the Registry contains only information that has been submitted specifically for recording purposes. For any queries or assistance related to the NAMA Registry, please contact: [NAMA-registry@unfccc.int](mailto:NAMA-registry@unfccc.int) or [NAMA-support@unfccc.int](mailto:NAMA-support@unfccc.int)

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