NEPAD
TRANSFORMING AFRICA

# AFRICA POWER VISION CONCEPT NOTE & IMPLEMENTATION PLAN

## EXECUTIVE SUMMARY

from Vision to Action

January 2015

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## INTRODUCTION

This package presents the Africa Power Vision (APV) concept note and implementation plan for endorsement at the January 2015 NEPAD HSGOC meeting.

## AFRICA POWER VISION – CONCEPT NOTE

At the 2014 World Economic Forum (WEF) meeting in Davos, Switzerland, African leaders – in particular, ministers of power and finance – recognised the importance of energy in driving socio-economic development. They thus committed to prioritise the implementation of energy infrastructure projects on the continent.

The APV "From Vision to Action" initiative builds on the objectives of the Program for Infrastructure Development in Africa (PIDA). Developed by the African Union Commission (AUC), the New Partnership for Africa's Development (NEPAD) Agency, and the African Development Bank (AfDB), PIDA promotes regional economic integration in order to close Africa's massive infrastructure gap. PIDA has fifty one (51) programs and projects across four (4) sectors: energy, transport, trans-boundary water, and information and communications technology. Endorsed by African heads of state in January 2012, the programme strives to improve Africa's global competitiveness with the ultimate goal of improving the lives of ordinary Africans.[1]

Concentrating on one of the four key infrastructure sectors of PIDA, the APV is a continent-wide, long-term vision to increase access to reliable and affordable energy for Africans. It is designed to achieve agreement among African leaders as to which energy projects to prioritise for accelerated implementation.

Using the PIDA Priority Action Plan (PIDA PAP) projects as a foundation, African ministers have made the following pledge in launching the APV:

### The Vision

"As the continent's Ministers of Power and Finance, we commit to the Africa Power Vision. We will build on the Energy Vision as articulated by the Program for Infrastructure Development in Africa:

> To harness all African energy resources to ensure access to modern energy for all African households, businesses and industries by developing efficient, reliable, cost-effective and environmentally friendly energy infrastructure resulting in poverty eradication and vigorous sustainable development of the continent."

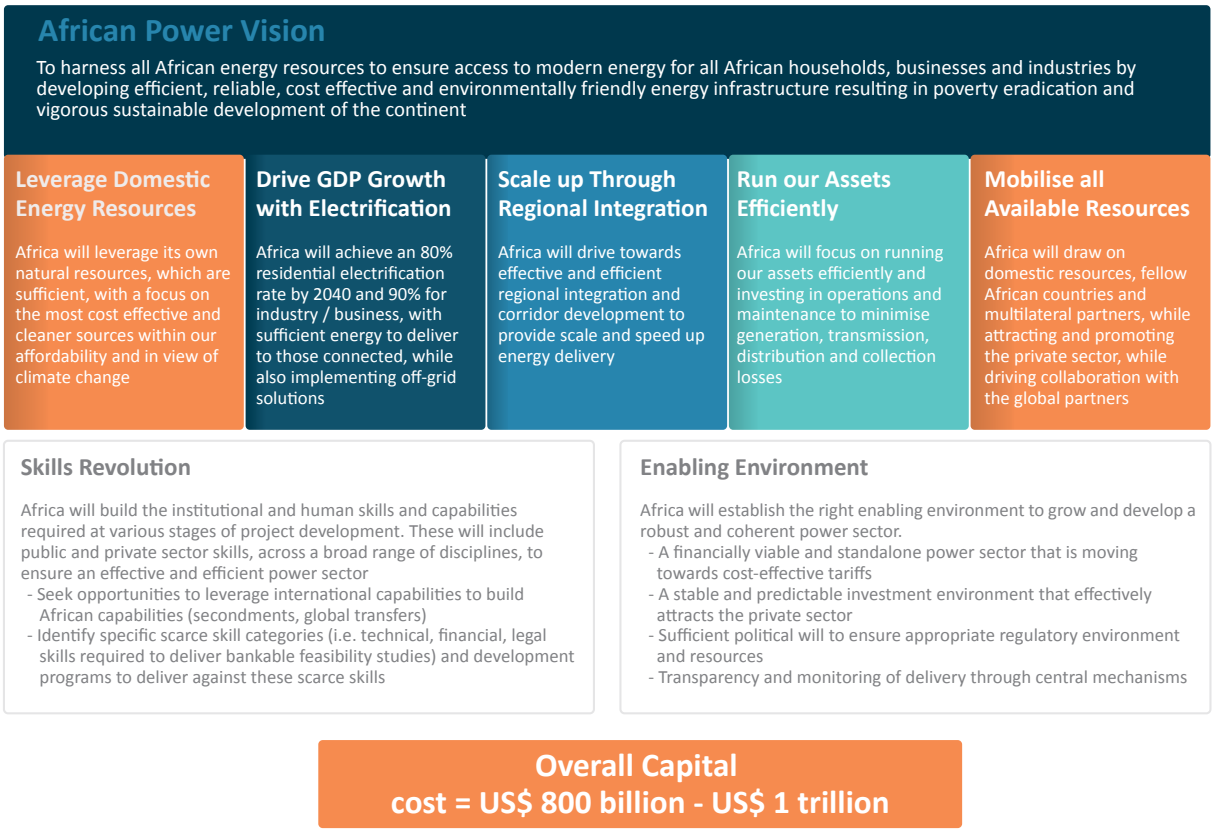
## AFRICA POWER VISION – THE FIVE PILLARS

The APV has a five-pillar strategy. Taken together, these pillars will drive the continent's economic growth while improving the quality of life for all Africans. The pillars are bolstered by a commitment to the skills revolution, while also ensuring that the enabling environment is appropriately developed. The pillars are:

**Pillar 1** – Leverage Domestic Energy Resources
**Pillar 2** – Drive GDP Growth with Electrification
**Pillar 3** – Scale up Through Regional Integration
**Pillar 4** – Run Assets Efficiently
**Pillar 5** – Mobilise all Available Resources

[1]NEPAD brochure, "NEPAD in Brief", undated.

The Exhibit below provides further detail on the five pillars:




## AFRICA POWER VISION – IMPLEMENTATION PLAN

The APV's implementation plan seeks to operationalise its concept note by proposing a methodology (rationale and process) for selecting energy projects for acceleration via a NEPAD Project Prioritisation Considerations Tool (PPCT). By filtering potential projects in order to establish a shortlist of priority projects, the PPCT assists in identifying high-priority, transformative, replicable energy projects with broad-ranging regional impact, for rapid implementation. The list of thirteen proposed APV projects can be further shortened and prioritised using the methodology described in Section 3.1. An important success factor for this initiative will be the development of projects to reach bankability, financial closure, and commercial operation.

Not every proposed power project, of course, is equally viable. Given that resources of time, labour, and capital are always limited, decision makers must give priority to power projects that yield economic and social benefits most efficiently. This, however, is far more easily said than done. First, decision makers must weigh competing projects against the requirements of multiple constituencies including the government, donors, the public, private industry, and multilateral development banks. Second, large power projects are complex multi-part undertakings. Carefully analysing any individual project – let alone making useful comparisons between different kinds of projects – can be very difficult. The challenge is most urgent in economies where a lack of an optimal enabling environment and developed infrastructure are often factors inhibiting potentially large economic growth.

**The NEPAD PPCT Methodology:** Identifying power projects for acceleration requires analysing a large number of diverse projects, which is a difficult and time consuming task if attempted without a rigorous methodology. The methodology proposed here is a set of analytic tools to be used sequentially in six basic steps. These steps may be thought of as a series of increasingly detailed filters to first sort and then analyse projects for possible acceleration. The methodology was also designed to reduce the amount of complexity in the selection process by making key project factors easily visible. While the methodology provides a disciplined structure for analysis, the criteria it employs can be calibrated to meet the specific requirements of any individual project stakeholder.

- **Step One:** APV's five Pillars
- **Step Two:** Group Projects by Technology
- **Step Three:** NEPAD PPCT:
  1. Regional Impact
  2. Transformative Potential
  3. Replicability/Scalability
  4. Favourable and Receptive Policy/Legal/Investment Environment
  5. Technology/Energy Source
  6. Balanced Energy Mix from Different Sources
  7. Abundant and Low-Cost Fuel and Secure Contracts
  8. Least-Cost Plan
  9. Credible Private Sector Sponsors/Promoters/Developers
  10. Private Capital/Financing
  11. Financial and Commercial Viability
  12. Skills and Capacity Development
  13. Environmentally Neutral
  14. Community Engagement Plan
- **Step Four:** Project Readiness Thresholds
- **Step Five:** Project Readiness vs. Value
- **Step Six:** Selecting and Fine Tuning the Project Shortlist

**A summarised assessment of the proposed APV projects against the NEPAD PPCT are presented below:**

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Boulenouar Wind Power Project** | Other projects for consideration | Wind-generation | Boulenouar, Mauritania | 100 MW | US$ 200 million | Increase regional energy trade and create demonstration effect of the first major wind project in the Sahel |

- Successful establishment of the project will have a **positive impact on the region** (the north western corner of Africa).
- Will likely raise the political and economic profile of Mauritania, while importantly **demonstrating the financial viability of a major wind project in the Sahel region**. Project will increase total installed capacity in Mauritania by almost 40%.
- A **master plan for the electricity sector has been finalised** and SOMELEC is being restructured and recapitalised under a comprehensive plan supported by the French Development Agency and the World Bank.
- Will be the largest renewable energy project in Mauritania and will go a long way in fulfilling the government's policy of **energy diversification and the replacement of costly imported oil** in meeting the current energy deficit and growing demand.
- The support **of multinational and bilateral development finance institutions (DFIs) will be important**. The scale of wind-power installations globally indicates that wind-power generation is commercially and therefore financially viable.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Desertec Sahara Solar Project** | Other projects for consideration | Solar-generation and transmission | North-Western Sahara | 100 GW (by 2050) | TBD | Increase regional energy trade (Africa, Middle East and Europe) |

- Successful implementation of the project **would raise the political and economic profiles of the six North and Central African countries involved**. The project's trans-continental impact surpasses its regional impact, particularly if a significant amount of the power generated is exported to Europe.
- **Goes hand in hand with the development of another PIDA project, the North African Transmission Corridor**, consisting of the construction of a 2,700 km transmission system, with an indicative capacity of 4,500 MW.
- The fragility of support for Desertec raises questions over the future and perhaps because of Desertec's sheer scale, there appears to be **waning support from initial shareholders and stakeholders**.
- Given the scale of the vision of the Desertec initiative, it is clear that this is **not a project that could be replicated or scaled up**. However, a phased approach to introducing renewable energy technology to the region would assist in understanding the potential to reach the scale initially envisaged.
- The **synchronisation of the policy, legal, and investment frameworks** to allow a project of this scale and complexity to be executed is a significant task.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Baringo-Silali Geothermal Field** | Other projects for consideration | Geothermal – generation | Kenyan portion of the East African Rift Valley | 2,000 MW | US$ 2 billion for the first 400 MW | Increase regional energy trade and economic development |

- **Supply low-cost, clean, base load electricity to support the fast growing economies of Kenya, Uganda, and Rwanda** with a possible spin-off to South Sudan and Burundi once the interconnections are completed.
- Kenya's Energy Policy **estimates geothermal potential within the Great Rift Valley at between 7,000 MW to 10,000 MW**. There is a great opportunity to export power and improve electricity security and economic growth.
- As a NEPAD Presidential Infrastructure Champion Initiative project, **the project enjoys support at the highest levels for the participating governments**.
- Kenya's Geothermal Development Company **(GDC) was mandated to be the lead agency in developing the geothermal field** and together with advancing development of the Menengai field, it has invited and received expressions of interest.
- GDC is currently exploring a range **of public private partnership business model options**, including a joint development agreement model, although the construction and operating and maintenance of the power plant will most likely be an IPP.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Batoka Gorge Hydropower Project** | PIDA shortlist for Dakar Financing Summit | Hydropower – generation | Zambezi River Basin | 1,600 MW | US$ 6 billion | Increase regional energy trade, improve SAPP energy generation mix, and improve Zambezi River dam coordination |

- Successful implementation would **increase Zambia's installed capacity by 50% and more than double Zimbabwe's installed capacity;** will also increase the confidence of other countries within the Zimbabwe River Basin to forge ahead with hydropower projects.
- **SAPP's energy generation mix will be significantly improved** through this green hydropower project.
- **Transmission lines, access roads, and other facilities are also included in the project design**.
- Will create **6,000 permanent jobs per annum during construction** and 1,200 during the operation phase, split equally between both countries.
- Lead implementing agency is the Zambezi River Authority (ZRA). Having been **nominated as a NEPAD Presidential Infrastructure Champion Initiative**, the project enjoys support at the highest levels for the participating governments.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Inga III Basse Chute (BC) Hydropower Project** | Additional PIDA projects | Hydropower – generation | Inga Falls, Congo River, Democratic Republic of Congo (DRC) | 4,800 MW | US$ 12-14 billion | Part of Grand Inga Project (40,000 MW). Large scale, has potential to impact entire SSA region |

- **Selected by the African Caucus** as one of the hydropower projects in Africa demanding particular **attention from the World Bank**.
- Successful implementation of a hydropower project of this vast scale **will add confidence to other regional economic counterparts** looking to undertake similar domestic hydropower projects.
- Has the **potential to raise the political and economic profiles of the DRC and its beneficiaries**.
- **Replicable** and could be the first step in the region towards fully exploiting the 40 GW potential of the Grand Inga Project.
- Significant number of complexities, however, when seen in the context of its **transformative potential**, the investment required to develop a replicable model – including developers, funding, best practices, reforms etc. – it could pay dividends for the DRC, the region and the continent.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Sambangalou Hydropower Project** | PIDA shortlist for Dakar Financing Summit | Hydropower – generation | Gambia River, Senegal and Guinea | 128 MW | US$ 1.108 million | Increase regional power trade, energy security and contribute to a multi-sector (water and power) approach to regional integration |

- Will be a multi-purpose reservoir, with **an installed capacity of 128 MW** and the mean energy production will be 402 GWh per year.
- Detailed **Environmental and Social Impact Assessment (ESIA) with the Resettlement Action Plans (RAPs)** to meet regulations applicable within OMVG countries and those of the AfDB **have been done**.
- **OMVG is responsible for co-ordination** between the four countries, presenting a unified policy to development finance institutions and private sector financiers. It will play a lead role with support of ECOWAS and WAPP in project development.
- **Will address the continued electricity and water shortages in the member countries**. Both the Sambangalou Dam and the Kaléta Dam are now PIDA projects.
- The **ECOWAS Bank for Investment and Development** with the potential to tap the African Bio-fuels and Renewable Energy Fund (ABREF) and African Development Bank, **are potential sources of debt and/or equity capital**.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **West Africa Power Pool Domunli Regional Power Project** | Other projects for consideration | Gas – generation | Western Ghana | 450 MW | US$ 600 million | Intended to connect into the regional grid, increasing regional integration, power trade and grid stability |

- Located in the western region of Ghana where a Ghana Gas processing plant is being built in order to **reduce incremental transmission losses**.
- Selected to serve as an emergency power supply to the regional interconnection grid during the electricity crisis in early 2011 and utilise the Coastal Transmission Backbone (CTB), allowing for **increased trade, regional integration, and grid stability**.
- Government of Ghana is working towards **resolving issues surrounding the supply of natural gas as well as liquidity and default risks of ECG (Ghana's utility)**.
- Process for a **World Bank partial risk guarantee (PRG) initiated and PPA negotiations being finalised**.
- The **contribution of development agencies to skills and capacity development for the region will be considerable**. Institutions will contribute to skills development in the following manner: conceptual models, technical assistance, financial management appraisals, feasibility studies, and business and strategic planning.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **West Africa Power Pool Maria Gleta Regional Power Project** | Other projects for consideration | Gas – generation and transmission | Benin (near Port Novo) | 450 MW | US$ 781 million | Increase regional integration, power trade and grid stability |

- Will address increasing demand and **utilise a more cost-effective fuel (gas) than crude oil**. Will ensure that the region has energy availability, reducing the risks associated with Benin and Ghana's current dependence on biomass.
- There is significant political will for the development of the regional power market – resources are complementary in the region (oil and gas in the east mainly and hydro in the west) which suggests **substantial integration**.
- Contingent on the availability of transmission and distribution in the region, could have a **transformative impact** on access to electricity in the region.
- Private partner, **Africa Finance Corporation (AFC) will develop the project** and lead the special-purpose company which comprises regional electricity utilities from Ghana, Togo, and Benin.
- Multilateral DFIs – including the AfDB, World Bank, ECOWAS Bank for Investment and Development (EBID) and West African Development Bank (BOAD) – have expressed interest in providing **significant project preparation funding**.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Ghana 1000 LNG to Power Project** | Other projects for consideration | Gas – generation | Western Ghana | 1,300 MW | US$ 1.916 billion for Phase 1 power + LNG | Will be the largest single generation power project in SSA (outside of South Africa) and will greatly reduce Ghana's dependence on power imports, helping to stabilise the region's power grid |

- Will add reliable base-load **generation**, as well as help lower the cost of power in Ghana when compared with plants currently running off expensive light crude oil, and replace oil, coal, and diesel with LNG as an energy source.
- Successful development of a project of this magnitude and **transformative nature** is likely to result in other member states gaining confidence and establishing similar projects.
- Nominated as a **NEPAD Presidential Infrastructure Champion Initiative**, and therefore enjoys support at the highest levels for the participating governments.
- Developed as a **purely private sector IPP project**, requiring no direct financial contribution from the Government of Ghana. Government's role is to create an enabling environment and regulatory framework to allow the project partners to fast-track the addition of critically needed power to the national grid.
- Government of Ghana will also facilitate a **long-term agreement with ECG** and potentially other power off-takers for the purchase of power.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Nigeria-Algeria Gas Pipeline** | PIDA shortlist for Dakar Financing Summit | Transmission of gas | Nigeria to Algeria (via Niger) | 4,400 km long, capacity of 30 billion cubic meters per annum | US$ 10 - 13.7 billion | Integrate the economies of and open up economic growth opportunities in the sub-region as well as assist in the fight against deforestation and desertification |

- Will have **a positive impact on Nigeria, Niger, and Algeria** (the countries that are participating directly in the project).
- Will also **directly impact the West and North Africa regions**, as the pipeline entails a 4,400 km line from Qua Ibom Terminal (Calabar, Nigeria), through Niger to Hassi R'Mel in Algeria, impacting Burkina Faso and Southern Mali.
- Aims to **diversify the export of Nigerian natural gas**, whilst on a regional level, **will foster the cooperation and integration of North and West African economies**.
- **Risks are generally related to security, financing, and contractors**.
- A **Resettlement Action Plan** (RAP) and **an Environmental and Social Management Plan** (ESMP) should be completed.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Central African Interconnection Transmission Line** | Additional PIDA projects | Transmission | Nigeria, Cameroon, DRC, Angola and Gabon (first 4 segments), Equatorial Guinea and Chad (if the project is extended) | 3,800 km long, 4,000 MW capacity | US$ 5 billion | Expand regional power trade and optimise existing and new generation sources. Improve balance of generation and improve quality and reliability of supply load across the region |

- Entails four segments of interconnections, each totalling less than 3,000 km, which will allow for the **optimisation of power generation and trading** along an arc stretching from Angola to Nigeria.
- Will **promote regional integration** among member countries as well as connecting the two power pools SAPP and WAPP.
- Will allow for the optimisation of existing and new generation sources, striking an improved balance of different generation sources as well as the **improved quality and reliability of supply load across the regions**.
- **Potential off-takers** include:

  North Eastern Highway: Republic of Congo, Sudan, and Egypt; South Western Highway: Angola, Namibia and Botswana to South Africa; South Eastern Highway: Katanga, Zambia and Zimbabwe to South Africa; Northern Western Highway: Gabon, Cameroon and Nigeria.
- A **PPP structure** is recommended. The transmission lines are envisaged to be funded through private sector or public funding. Private sector developers/operators will be sourced through competitive bidding.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **North-South Interconnection Transmission Line** | Other projects for consideration | Transmission | Egypt, Sudan, South Sudan, Ethiopia, Kenya, Uganda, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe, South Africa | 8,000 km long, 3,000 -17,000 MW capacity | TBD | Increase cross-border energy trading within and between Eastern Africa Power Pool (EAPP) and Southern African Power Pool (SAPP) |

- Entails the construction of an 8,000 km, 3,000 - 17,000 MW capacity transmission line system from Egypt through Sudan, South Sudan, Ethiopia, Kenya, Uganda, Tanzania, Malawi, Mozambique, Zambia, and Zimbabwe to South Africa, **connecting the EAPP and the SAPP**.
- Will **comprise multiple interconnected segments** spanning the two power pools and participating countries. One such segment is the construction of a 500 kV alternating current (AC) line to evacuate the planned 6,000 MW from the Ethiopian Grand Renaissance plant to the load centres of Ethiopia.
- Cross-border **infrastructure of this nature is needed to ensure facilitating and balancing demand with supply across borders**.
- **Potential off-takers include**:

  Northern Highway: Sudan and Egypt, South Western Uganda, Rwanda, Tanzania and Burundi; South Eastern Highway: Zambia, Zimbabwe, and Mozambique to South Africa.
- **Feasibility studies need to be undertaken**, but analysts are confident about commercial viability. As there seems to be no serious technical or environmental challenges, the transmission tariff should be very competitive.

| Project | Source | Type | Location | Size | Cost | Regional Impact |
|---|---|---|---|---|---|---|
| **Zambia-Tanzania-Kenya Transmission Line** | PIDA shortlist for Dakar Financing Summit | Transmission | Zambia, Tanzania and Kenya | 2,200 km long, 400 MW (400 kV) capacity | > US$ 1.1 billion | Increase regional energy trade and assist in grid stability throughout rapidly growing economic regions |

- Entails the construction of a transmission line that will **connect the Zambian grid to Kenya, via Tanzania**, covering a distance of 2,200 km.
- Jointly sponsored by the governments of Zambia, Tanzania, and Kenya. Both Zambia and Kenya are member states of COMESA. Could link the SAPP to as far as Egypt (and through Egypt to the Pan Arab Interconnector, covering the Middle East), opening up **a very large power market opportunity**.
- Potential to improve the availability of (cheaper) energy sources to mining, industries, businesses, agriculture, and residences along its export routes, positively impacting regional economic growth. **Potential to boost local and regional job creation and help alleviate poverty**.
- Intended to be **developed by the public sector in the three countries**, partly to facilitate mobilisation of concessionary funding and also to minimise the impact of private sector-driven investment return requirements.
- A project **management unit owned jointly by the three governments will be set up** to manage the project during implementation. Thereafter, will be handed over to a legal entity jointly owned by the three governments.

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