NEPAD
TRANSFORMING AFRICA

# AFRICA POWER VISION CONCEPT NOTE & IMPLEMENTATION PLAN

## from Vision to Action

January 2015

The Africa Power Vision (APV) Package was prepared to facilitate the implementation of the initiative driving it from vision to action.

In September 2014, representatives of Power Africa and the New Partnership for Africa's Development (NEPAD) Agency signed a memorandum of understanding under which Power Africa would support the NEPAD Agency in presenting the selection of the Africa Power Vision priority projects at the NEPAD Heads of State and Governments Orientation Committee (NEPAD HSGOC) meeting in January 2015. This package was prepared in response to that understanding.

Drawing on the Africa Power Vision concept note and factors for project consideration (currently NEPAD APV Project Prioritisation Considerations Tool/PPCT), three considerations were added and an implementation plan is proposed. An initial priority list with thirteen (13) projects is currently being considered for further prioritisation. Each APV project under consideration was assessed against the NEPAD PPCT to ensure the political support of the APV process at its highest level. As such, the NEPAD Agency is submitting the APV Package to the NEPAD HSGOC chaired by H.E. President Macky Sall for endorsement in January 2015.

FROM VISION TO ACTION

**SUPPORTED BY**

POWER AFRICA

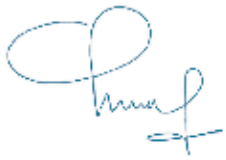
# FOREWORD

It brings me great pleasure to introduce you to the Africa Power Vision.

Africa Power Vision, APV, is an overarching vision of powering Africa that is consistent with Africa 2063 Agenda. The APV is based on the Programme for Infrastructure Development in Africa (PIDA) and targeted priority energy projects in Africa with the aim of advancing its implementation. It was jointly developed by the African Union Commission (AUC), the NEPAD Planning and Coordinating Agency (NPCA), the Federal Ministry of Finance, Nigeria, the Economic Commission for Africa (UNECA) and the African Development Bank (AfDB). APV articulates a long-term plan for increasing access to reliable and affordable energy using Africa's diversified energy resources in a coherent and well balanced approach consistent with Africa 2063 Agenda. It primarily seeks to drive and rapidly accelerate the implementation of critical energy projects in Africa through the AU Technical Body, NPCA. APV aims to achieve an 80% residential electrification rate by 2040 and 90% for industry/business, with sufficient energy to deliver to those connected, while also implementing off-grid solutions and making full usage of the vast renewable energy resources in Africa. In addition, it calls for increased regional integration to scale up energy delivery in an efficient manner as well as a focus on effective and cleaner sources of energy in line with global standards. The APV emphasises the critical role of technical skills development and institutional capacity development in Africa in ensuring the development, implementation and sustainability of required energy projects.

There are five pillars that form the bedrock of the vision; these are (i) leveraging domestic resources, (ii) driving GDP growth with electrification, (iii) scale-up of power through regional integration, (iv) running our power assets efficiently and (v) mobilising all available resources.

Going forward, the APV will not only advance the implementation of PIDA and targeted priority energy projects in Africa but will also provide a continental vision and framework under which further energy projects can be developed in a coherent and integrated manner that will eventually achieve Africa's targeted goals of energy accessibility. The NEPAD Agency, being tasked with the implementation of APV, calls upon African countries and development partners, such as the United States, the European Union and other bilateral/multilateral partners to support and ramp-up energy development in Africa, especially given that the issue of energy is at the core of development constraints on the continent.



**Dr. Ibrahim Mayaki**

Chief Executive Officer
NEPAD Planning and Coordinating Agency

# ACKNOWLEDGEMENTS

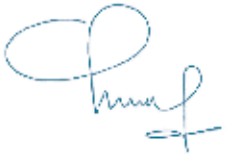
The Africa Power Vision (APV) was developed under the leadership of Dr. (Mrs.) Ngozi Okonjo-Iweala, Coordinating Minister for the Economy and Honorable Minister of Finance (CME/HMF), in collaboration with the African Union Commission (AUC), NEPAD Planning and Coordinating Agency (NPCA), the Economic Commission for Africa (UNECA) and the African Development Bank (AfDB).

Special thanks go to Dr. Ngozi Okonjo-Iweala (CME/HMF, Nigeria), the AU Chairperson, Dr. Nkosazana Dlamini-Zuma; Mr. Erastus Mwencha, Deputy Chairperson of the AU; NPCA; Dr. Carlos Lopes, Executive Secretary of the UNECA and NEPAD Team for leading and supporting this process.

We also express our gratitude to the Governments of the African countries represented at the various meetings convened to discuss the Africa Power Vision, especially the Ministers of Energy/Power and Finance and other representatives from Cameroon, the Democratic Republic of Congo, Egypt, Ghana, Liberia, Nigeria, Rwanda, South Africa, and Togo.

We highly appreciate the significant contributions from the US Agency for International Development (USAID), IMF and World Bank, who were also present in these meetings. We also thank other African multilateral and private entities who supported the coordination of this initiative.

The preparation of the APV package to the NEPAD Heads of State Government and Orientation Committee (HSGOC) was jointly developed and finalised by the NEPAD Agency Team and the USAID Power Africa team. Finally, we take this opportunity to thank all other stakeholders who participated in one way or another in the development of the APV Package.



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# FOREWORD

In January 2014 at the World Economic Forum meeting in Davos, Switzerland, just a few months after the launch of U.S. President Barack Obama's Power Africa initiative, several African leaders gathered to discuss how they themselves could work together to drive energy development on the continent with a common vision. They liked the Power Africa model of concentrating on key energy transactions and working with partners to get them across the finish line as quickly as possible. And they wanted to do the same; but the African leaders themselves wanted to choose those priority transactions.

So, these leaders committed to a focused vision for developing key energy infrastructure across Africa -- now called the "Africa Power Vision" (APV). To support the APV and to ensure that Power Africa's efforts aligned with those of our African partners, Power Africa signed a memorandum of understanding with the African Union's NEPAD Agency to collaborate on and accelerate energy projects throughout the continent.

APV is a framework that reflects African-driven priorities for the power sector and represents an opportunity for African leaders to elevate energy infrastructure projects that have a broad, regional impact on the sector. Power Africa is excited to have the opportunity to support APV going forward, which will help us achieve President Obama's goal of working with partners to double access to electricity in sub-Saharan Africa.

APV sets out to provide access to modern energy and expand the regional impact of the energy sector in Africa.

In helping develop this document, the Power Africa team was clear that this process and the selection of these projects must be African-led. Power Africa entered into this partnership with the NEPAD Agency to not just support the shaping of the vision, but to also support the implementation of the vision.

Starting in 2015, Power Africa's on-the-ground Transaction Advisors will use the Power Africa model by working with the NEPAD Agency to identify impediments and obstacles to these energy projects and to offer solutions to move the projects forward. Power Africa's Transaction Advisors, to the extent there is overlap between Power Africa's priorities and the APV projects, will become dual-hatted as both Power Africa and APV Transaction Advisors.

Power Africa and all of its partners truly look forward to this important collaboration and the opportunity to leverage our collective expertise, relationships and resources to build African capacity to control Africa's own energy destiny. We look forward to working together to transform the energy sector in Africa so that energy will no longer be a constraint to Africa's rapid rise to political and economic leadership in the 21st century.

**Ambassador Reuben E. Brigety, II**

Representative of the United States of America to the African Union and
Permanent Representative of the United States to the UN Economic Commission of Africa

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## Exhibits



## References

## Annex

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **AC** | Alternating Current |
| **ADEPI** | Agence pour le Développement et la Promotion d'Inga |
| **AFC** | African Finance Corporation |
| **AfDB** | African Development Bank |
| **APV** | Africa Power Vision |
| **AU** | African Union |
| **AUC** | African Union Commission |
| **BOT** | Build Operate Transfer |
| **CEB** | Communaute Electrique Du Benin |
| **CTB** | Coastal Transmission Backbone |
| **DBSA** | Development Bank of Southern Africa |
| **DRC** | Democratic Republic of the Congo |
| **DSCR** | Debt Service Coverage Ratio |
| **EAPP** | Eastern Africa Power Pool |
| **ECCAS** | Economic Community of Central African States |
| **ECG** | The Electricity Company of Ghana |
| **ECOWAS** | Economic Community of West African States |
| **EDM-SA** | Energie du Mali–SA |
| **EIB** | European Investment Bank |
| **EOI** | Expression of Interest |
| **EPC** | Engineering, Procurement, Construction |
| **ESIA** | Environmental and Social Impact Assessment |
| **FSRU** | Floating Storage Regasification Unit |
| **GDC** | Geothermal Development Company (Kenya) |
| **GDP** | Gross Domestic Product |
| **GE** | General Electric |
| **HSGOC** | Heads of State and Governments Orientation Committee |
| **HVDC** | High-Voltage Direct Current |
| **ICRC** | Infrastructure Concession and Regulatory Commission (Nigeria) |
| **IDA** | International Development Agency |
| **IPP** | Independent Power Producer |
| **IRR** | Internal Rate of Return |
| **JV** | Joint Venture |
| **KfW** | German development agency |
| **LCP** | Least Cost Plan |
| **LNG** | Liquefied Natural Gas |
| **MASEN** | Moroccan Agency for Solar Energy |
| **MIGA** | Multilateral Investment Guarantee Agency |
| **MOU** | Memorandum of Understanding |
| **NEPAD** | New Partnership for Africa's Development |
| **NNPC** | Nigerian National Petroleum Corporation |
| **O&M** | Operation and Maintenance |
| **OMVG** | Gambia River Basin Development Organization |
| **OMVS** | Senegal River Development Organization |
| **OPPI** | Office for Promoting Private Power Investment |
| **PIB** | Petroleum Industry Bill |
| **PIDA** | Program for Infrastructure Development |
| **PIDA PAP** | Program for Infrastructure Development: Priority Action Plan |
| **PMU** | Project Management Unit |
| **PPA** | Power Purchase Agreement |
| **PPCT** | NEPAD Project Prioritisation Considerations Tool |
| **PPP** | Public Private Partnership |
| **PRG** | Partial Risk Guarantee |
| **SADC** | Southern African Development Community |
| **SAPP** | Southern African Power Pool |
| **SE4ALL** | Sustainable Energy for All |
| **SNEL** | Societe Nationale d'Electricite (DRC) |
| **SONABEL** | Société Nationale d'Electricité du Burkina |
| **SONATRACH** | Algeria's largest oil and gas company |
| **SONIDEP** | Niger's petroleum parastatal |
| **SSA** | Sub-Saharan Africa |
| **TNGP** | Trans-Nigerian Gas Pipeline |
| **TSGP** | Trans-Saharan Gas Pipeline |
| **UN** | United Nations |
| **UNECA** | United Nations Economic Commission for Africa |
| **US** | United States |
| **USAID** | United States Agency for International Development |
| **VRA** | Volta River Authority (Ghana) |
| **WAPP** | West African Power Pool |
| **WEF** | World Economic Forum |
| **ZRA** | Zambezi River Authority |

# EXECUTIVE SUMMARY

## 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."

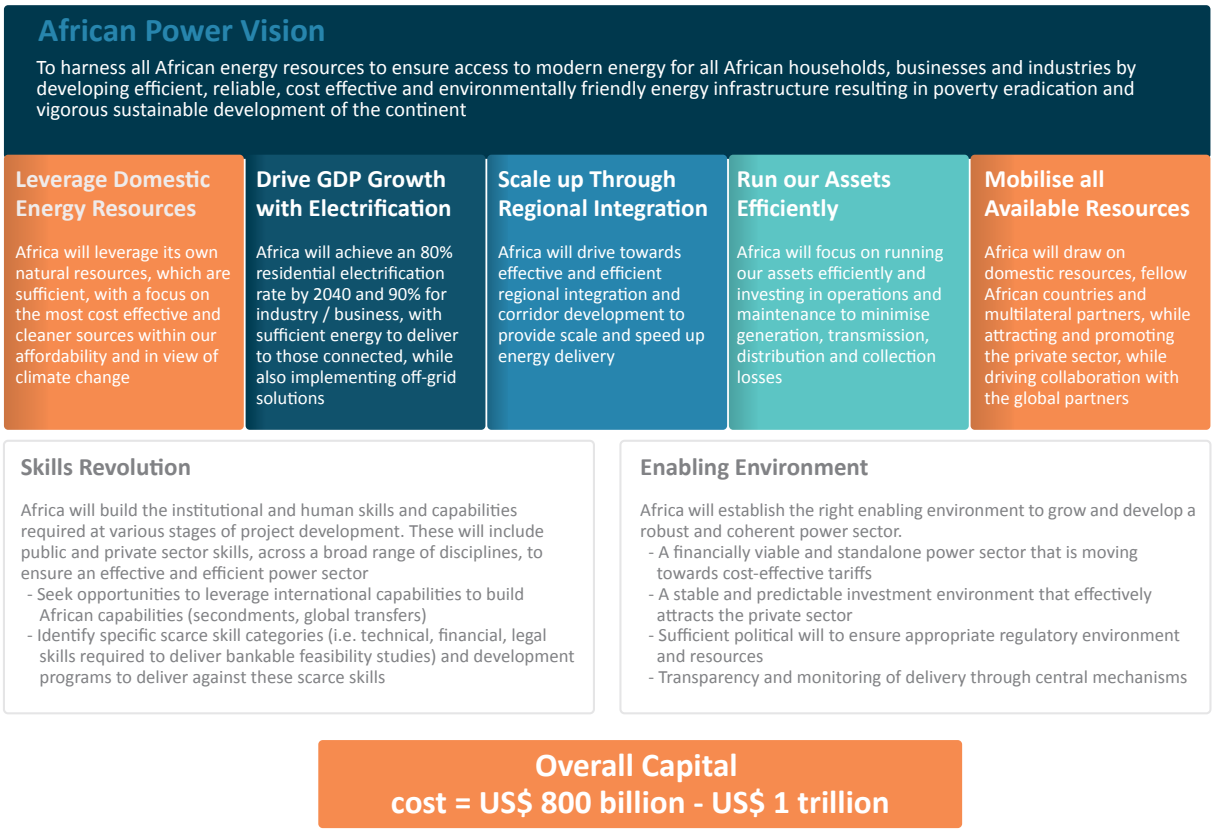
## AFRICA POWER VISION – THE FIVE PILLARS

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.

# 1 INTRODUCTION

At the World Economic Forum's 2014 meeting in Davos, Switzerland, African leaders (in particular, ministers of power and finance) recognised the importance of energy as a driver of socio-economic development and committed to prioritise the implementation of energy infrastructure projects on the continent.

The initiative, called the Africa Power Vision (APV), builds on the objectives of the Program for Infrastructure Development in Africa (PIDA). PIDA was developed by the African Union Commission (AUC), New Partnership for Africa's Development (NEPAD), and the African Development Bank (AfDB) to promote regional economic integration in order to close Africa's massive infrastructure gap. PIDA has 51 programs and projects across 4 sectors: energy, transport, trans-boundary water, and information and communications technology. Endorsed by African heads of state in January 2012, PIDA strives to improve Africa's global competitiveness, with the ultimate goal of improving the daily lives of Africa's people.[2]

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

**The APV's leadership includes:**

- Dr. Nkosazana Dlamini-Zuma, Chairperson, African Union (AU)
- Dr. Ngozi Okonjo-Iweala, Coordinating Minister for the Economy and Minister of Finance, Nigeria
- Mr. Erastus Mwencha, Deputy Chairperson of the AUC
- Dr. Ibrahim H. Mayaki, CEO, NEPAD Agency
- Dr. Carlos Lopes, Executive Secretary of the United Nations Economic Commission for Africa (UNECA)

**Over and above key annual gatherings of Africa's leadership, various additional meetings have firmed up the APV's objectives and implementation:**

- AU African Finance Ministers Meeting (28 March 2014, Abuja, Nigeria)
- WEF Africa (8 May 2014, Abuja, Nigeria)
- Annual AfDB Group Meeting (19-23 May 2014, Kigali, Rwanda)
- Dakar Financing Summit (14-15 June 2014, Dakar, Senegal) – two meetings: informal APV working group meeting and private high-level principals meeting

The key participants at these meetings included the ministers of energy and finance from Nigeria, South Africa, Liberia, Togo, Rwanda, Egypt, Cameroon and Ghana as well as such African, multilateral and private sector entities as the AUC, NEPAD Agency, UNECA, AfDB and the Development Bank of Southern Africa (DBSA).

The Dakar Financing Summit in June 2014 agreed to the following:

- APV will include a draft list of 10 priority projects, including 5 PIDA projects and 5 additional projects that include renewable energy technologies and gas-to-power projects, and have adequate regional diversity.
- The NEPAD Agency will continue to drive the APV process with active support from the working group to be established including the Nigerian Ministry of Finance, AfDB, and the U.S. Agency for International Development (USAID).
- The APV initiative and list of priority projects will be presented at the NEPAD HSGOC and AU Summit in Malabo, Equatorial Guinea to secure buy-in from African heads of state.[3]

The purpose of this package is to present the APV concept note and implementation plan for endorsement at the HSGOC meeting in January 2015, as it was not possible in Malabo. The package contains an implementation plan for operationalising the APV concept note, which proposes a methodology (rationale and process) for prioritising energy projects for acceleration via the NEPAD Project Prioritisation Considerations Tool (PPCT). The PPCT filters potential projects and allows decision makers to identify high-priority, transformative, replicable energy projects with broad-ranging regional impact for rapid implementation. An important success factor for this initiative will be developing projects to bankability, financial closure, and commercial operation.

The PPCT was applied to each of the thirteen (13) potential projects. Project profile briefs describing each potential project can be found in the Annex.

[2]NEPAD brochure, "NEPAD in Brief", undated.
[3]NEPAD "APV Briefing Note", undated.

# 2 AFRICA POWER VISION: CONCEPT NOTE[4]

## 2.1 RATIONALE

In the last decade, Africa has demonstrated resilient economic performance, raising aspirations that joining the family of middle-income countries, combating poverty and unemployment, and attaining structural and economic transformation are within sight. Much of the current development agenda in the continent has thus focused on how to sustain and deepen such positive development momentum, including industrialisation, commodity value addition, and generally broadening the benefits and inclusiveness of development to more people. The pace of growth and emerging policy aspirations have, however, brought the recognition that, among others, Africa faces a major infrastructure gap that could hamper its growth.

The energy sector is particularly recognised as requiring reform, investment, and development to move it from a development bottleneck to a sector with opportunities for alleviating power constraints while contributing to growth itself. However, the variation in energy resource potential across the continent, the near absence of localisation of energy technologies, the benefits of scaling some projects regionally, the diversity of policy innovations globally and across Africa, and demands at the country level that policy, institutional, technical, and other support be given now have led to the realisation that articulating a continental position on key emerging energy issues is indeed timely, along with the consideration of a continental vision on energy.

A broad set of activities and initiatives are driving a common vision of advancing Africa's energy sector. In West Africa, the Economic Community of West Africa States (ECOWAS) has developed a white paper on a regional energy strategy, which was adopted by the heads of state of its 15 member countries. In Central Africa, the Central African Economic and Monetary Community has developed an Energy Action Plan that was presented to its heads of state in 2006. In Eastern Africa, a regional energy access enhancement strategy was adopted in 2006, including an energy access vision. In North Africa, the Mediterranean Solar Plan and the Desertec Industrial Initiative are notable. In Southern Africa, the Southern African Development Community's (SADC) position is reflected in the Energy Ministers Roadmap to, among others, strengthen the Regional Energy Planning Network. These regional initiatives can best inform on regional priorities and the realisation of a continental position and vision.

At the continental level, NEPAD has put forth and advocated for a vision that calls for increasing access to reliable and affordable energy for 35% of the population by 2015, and access to modern energy for cooking to 50% of the population. It also calls for reducing the cost of energy to enable at least 6% economic growth, integrating infrastructure, and policy and institutional reform. The AfDB is the African hub of the Sustainable Energy for All (SE4ALL) initiative of the United Nations (UN). It has created a financing window for sustainable energy development.

**The energy vision articulated in PIDA** is 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. The PIDA energy infrastructure plan calls for the development of major hydropower projects to generate the electricity needed to meet forecasted power demand increases resulting from rising household, industrial, and agricultural consumption, as well as access to electricity. PIDA's plans also include transmission lines to connect the continent's power pools and permit a large increase in inter-regional energy trade, as well as regional petroleum and gas pipelines.

**Power Africa, a partnership led by the Government of the United States of America, along with partners such as the World Bank, the African Development Bank, the African Union Commission, the Government of Sweden, the United Nation's SE4ALL initiative, other donors and African governments, and more than 80 private sector companies** presents another opportunity to transform the electricity sector in sub-Saharan Africa. In 2013, U.S. President Obama launched Power Africa with the aim of working with others to double electricity access in sub-Saharan Africa. In August 2014, during the African Leaders Summit in Washington, DC, President Obama announced a renewed commitment to Power Africa, pledging US$ 300 million per year in assistance to increase the Power Africa's impact across the continent, while also tripling the capacity and access goals to 30,000 MW of additional capacity and 60 million household and business connections. President Obama also announced US$6 billion in new private sector commitments, bringing the total private commitments under Power Africa to date to more than US$20 billion. Adopting a transaction-centric approach, the Power Africa partners work closely together to prioritise and address key legal, regulatory, and policy constraints to investment, and to implement measures that will sustain growth and enable successful governance of a growing power sector throughout sub-Saharan Africa.

In September 2014, **Power Africa signed an MOU with the NEPAD Agency** to collaborate on and accelerate the development of energy projects throughout the continent. This new collaboration will build on Power Africa's transactions model and the NEPAD Agency's regional integration and infrastructure development agenda. The NEPAD Agency and Power Africa share a common purpose to foster the development of energy infrastructure throughout Africa.[5]

[4]Sourced from Draft Africa Power Vision document, by the NEPAD Agency, May 2014

[5]"Fact Sheet: Powering Africa: Increasing Access to Power in Sub-Saharan Africa", the Office of the Press Secretary, The White House (United States) website, available at http://www.whitehouse.gov/the-press-office/2014/08/05/fact-sheet-powering-africa-increasing-access-power-sub-saharan-africa

At the global level, the **UN's SE4ALL initiative** focuses on one aspect of the energy challenge – energy access. It seeks to promote universal energy access in all countries by 2030, along with a doubling of energy efficiency and a doubling of the share of energy coming from renewable energy sources. Since Africa is where the largest share of the global energy access challenge prevails, SE4ALL requires an African position and wider consultation, along with its harmonisation with regional- and country-level energy access targets and strategies.

All of these initiatives link to the goal of powering Africa for development, but require an African position, consensus, and long-term vision.

APV seeks 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.

**The key issues APV aims to address include:**

- Recognising the importance of addressing the energy challenge for Africa's transformation agenda, how can stock be taken of the existing good practices at the country, regional, and continental levels, and what can be learned from them?
- How can stock be taken of the prevailing country, regional, and continental energy targets and visions vis-à-vis emerging global initiatives (such as SE4ALL and Power Africa), and how can a common energy sector vision and position be reached?
- How responsive are current legal, regulatory, and policy frameworks in Africa to facilitating and leveraging private sector investments and finance in the energy sector, and what more innovative policies can be pursued to power Africa's development?
- What lessons can be learned from the Africa Water Vision 2025 and Africa Mining Vision in terms of focusing policy attention in the energy sector?
- What are the lessons learned from private sector-led initiatives such as the WEF on accelerating the implementation of strategic infrastructure through applied business principles? Early-stage project financing is a key challenge in Africa, which must be addressed, especially for mega infrastructure projects, and particularly, energy projects.

## 2.2 STRATEGY: THE FIVE PILLARS TO ACHIEVE THE VISION[6]

The five pillars, the skills revolution and the enabling environment are fully described below:

**Pillar 1 – Leverage Domestic Energy Resources:** *Africa will leverage its own natural resources, which are sufficient, with a focus on the most cost-effective and cleaner sources that are affordable and in view of climate change.*

Africa will work towards building capacity sources that are least-cost and renewable, and that take cognisance of climate change. This will require long-term planning, effective least-cost national development plans, short-term global support to drive the development of renewables, and systematic processes to move projects from development to commercial operation. As a starting point, governments must be collectively aligned on the priority set of projects identified by PIDA.

**Pillar 2 – Drive GDP Growth with Electrification:** *Africa will achieve an 80% residential electrification rate by 2040, and 90% for industry/business, with sufficient energy to deliver to those connected, while also implementing off-grid solutions.*

Africa aspires to achieve universal electrification as soon as possible. However, achievable targets must be set for each individual country. Indonesia, South Africa, and Tunisia have advanced from 20% to 80% electrification in 20 years. If Africa is to replicate this journey, it must reach a goal of an average of 80% residential electrification across the continent by 2040. It should also aspire to a higher electrification rate for industry and business, driven by the fact that they are more urbanised, where the electrification rate is generally higher. In addition, it should actively push and support off-grid solutions as they are particularly targeted towards the poor.

**Pillar 3 – Scale up Through Regional Integration:** *Africa will drive towards effective and efficient regional integration and corridor development to provide scale and speed up energy delivery.*

The solutions required are not always national solutions, but in many cases, are regional in nature, or represent logistics and infrastructure corridors. Regional integration will drastically reduce the capital cost of power expansion, increase the scale of new generating assets, and strengthen other types of cooperation. Each regional power pool must strive to increase cooperation and improve planning and execution.

**Pillar 4 – Run Assets Efficiently:** *Africa will focus on running its assets efficiently and investing in operations and maintenance to minimise generation, transmission, distribution, and collection losses.*

To get the most out of the continent's assets and reduce their overall costs, Africa will strive to operate its existing assets as efficiently and effectively as possible. Governments will help their utilities to improve their asset functioning and collection rates to lower costs for the end consumer.

[6]Op. cit., Note 4

**Pillar 5 – Mobilise all available resources:** *Africa will draw on domestic resources, fellow African countries, and multilateral partners, while attracting and promoting the private sector, and driving collaboration with the global partners.*

Africa must effectively mobilise and leverage all possible resources, from domestic capabilities all the way through to its multilateral partners. All of these partners will have a critical role in delivering the APV, in particular through technical support, financing for feasibility studies, and catalysing additional investment. Furthermore, it will be impossible to deliver on the scale of capacity expansion envisioned without the private sector. Africa will involve the private sector through a selective combination of independent power producers (IPPs), targeted privatisations, and management contracts. Countries will incentivise the right behaviour and allocate the risks associated with power expansion appropriately. Individual countries will be able to contribute to each other (and rely on each other) through a combination of technical capabilities, in some cases, financial resources, and overall best practice sharing.

Each of the pillars of the APV is achievable. However, the right skills and capabilities, and the right enabling environment are also required to develop a robust and coherent power sector.

**Skills Revolution –** *Africa will build the institutional and human skills and capabilities required at various stages of project development. These will include public and private sector skills, across a broad range of disciplines, to ensure an effective and efficient power sector.*

- There are a large set of specific skills that are in scarce supply across the continent. These include technical, financial, and legal skills, which are required in both the public and private sectors, to deliver bankable feasibility studies and projects to completion. Governments must identify the specific gaps that exist, and then focus on building capabilities and broader development programs in order to close the gap on these scarce skills.
- In addition, Africa's governments will take full advantage of international companies and governments that seek to offer aid and support, and will seek opportunities to build on their offer in areas such as classroom-based capability building, secondments of global personnel into Africa, building training centres, and opportunities to temporarily export African personnel to improve their capabilities in international environments.

**Enabling Environment –** *Africa will establish the right enabling environment to grow and develop a robust and coherent power sector.*

There are a number of key elements within the enabling environment; those described below are critical for delivering significant power sector improvements.

- In each African country, the power sector needs to be financially viable and stand-alone. Achieving this requires a commitment to moving towards a cost-reflective tariff across the value chain, making cost highly transparent, improving the efficiency of existing and new assets as they are built, and pursuing the cheapest options for new capacity and electrification.
- The power sector also must create a stable and predictable investment environment that attracts a broad range of funding mechanisms, in particular the private sector through public private partnerships (PPPs), independent power projects, and corporatisation of existing assets. This will require long-term certainty for investors, credible off-takers for investors, and appropriate risk allocation to those parties most able to address them. By providing this long-term certainty and predictability, Africa's aim is to access concessionary financing, in the situations where the government needs to take equity in projects. Ultimately, however, African governments to be the funders of last resort.
- There must be sufficient political will to ensure that realistic plans are made, the right regulatory environment is established, and the right resources are in place to deliver. This will require ruthless prioritisation of projects that matter, and a strong focus on building capabilities within both the government and private sector.
- Significant effort will be needed to increase the transparency and monitoring of delivery and enable real-time inter-ministerial problem-solving through the establishment of central government monitoring capabilities, delivery units, or similar implementation mechanisms. This will enable faster delivery of outcomes. Multilateral and bilateral partners should be held to the same delivery scrutiny as that of African nations to ensure all barriers are swiftly removed as they arise.

Finally, Africa recognises and welcomes the support of the private sector, multilateral and bilateral institutions, a broad range of donors, and – most importantly – its citizens to support, develop, grow, and champion the APV. Each and every country must make continued efforts and all actions should directly support the Vision, which was developed by Africans.

# 3 AFRICA POWER VISION: IMPLEMENTATION PLAN

The implementation plan aims to move the APV from vision to action. 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, since not every proposed power project is equally viable. 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 developing economies where the lack of an optimal enabling environment and developed infrastructure are often crucial factors inhibiting potentially robust economic growth.

Identifying power projects for acceleration means analysing a large number of diverse projects, which can be difficult and time consuming 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 may be thought of as a series of increasingly detailed filters to first sort and then analyse these 13 projects for possible acceleration. They have been designed to reduce the amount of complexity in the selection process by making key project factors easily visible. While these tools provide a disciplined structure for analysis, the criteria they employ can be calibrated to meet the specific requirements of any individual project stakeholder.

**Note that the first three steps are the primary focus of this package, but the additional three steps also are included to provide further guidance on how these 13 projects could be further shortlisted.**

- Step One: APV's 5 Pillars
- Step Two: Group Projects by Technology
- Step Three: NEPAD Project Prioritisation Considerations Tool (PPCT)
- Step Four: Project Readiness Thresholds
- Step Five: Project Readiness vs. Value
- Step Six: Selecting and Fine Tuning the Project Shortlist

## 3.1 THE SIX STEP PROJECT PRIORITISATION FOR ACCELERATION METHODOLOGY

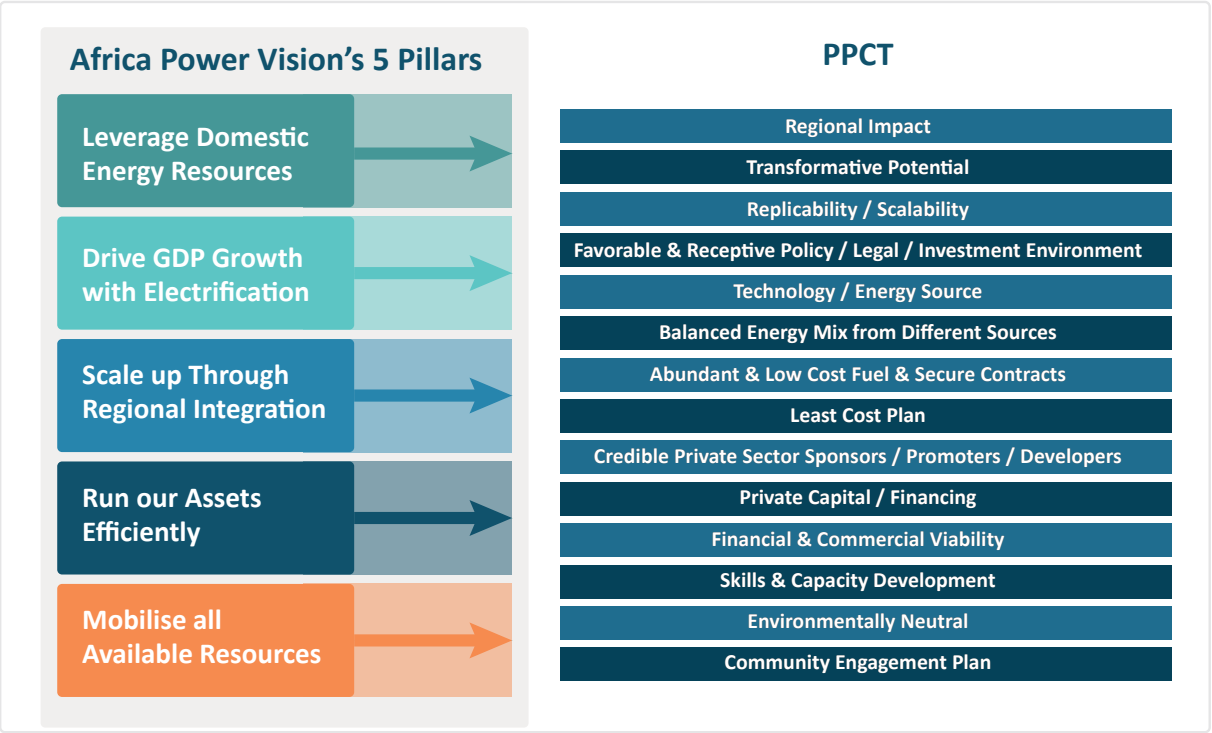
**Step One: APV's 5 Pillars –** Identify and group projects in accordance with the APV five Pillars strategy.

**Step Two: Group Projects by Technology –** Identify and group projects by technology so as to be able to compare like projects. Below are the 13 projects under consideration grouped by technology:

| | |
|---|---|
| **Wind Projects** | Boulenouar Wind Power Project |
| **Solar Projects** | Desertec Sahara Solar Project |
| **Geothermal Projects** | Baringo-Silali Geothermal Field |
| **Hydro Projects** | Batoka Gorge Hydropower Project<br>Inga III Basse Chute (BC) Hydropower Project<br>Sambangalou Hydropower Project |
| **Gas Projects** | West Africa Power Pool: Domunli Regional Power Project<br>West Africa Power Pool: Maria Gleta Regional Power Project<br>Ghana 1000 LNG to Power Project |
| **Gas Pipelines** | Nigeria-Algeria Gas Pipeline |
| **Transmission Lines** | Central African Interconnection Transmission Line Project<br>North South Transmission Line Project<br>Zambia-Tanzania-Kenya Transmission Line Project |

**Step Three: NEPAD Project Prioritisation Considerations Tool (PPCT) –** Analyse projects using the PPCT. The PPCT contains 14 criteria against which each potential project will be assessed. The APV 5 Pillar filters and the PPCT are shown in Exhibit 1.

EXHIBIT 1




***1. Regional Impact***

Projects that strengthen power generation, transmission, and distribution at a regional level and facilitate cross-border electricity flows will connect lower-cost producers with surplus power to sell to higher-cost markets with deficits. This will help make such projects advantageous for regional partner countries. In particular, projects supported and/or promoted by the East, West and/or Southern Africa Power Pools should receive strong consideration.

***2. Transformative Potential***

Projects that are ambitious in scope and size (while still being manageable and achievable from technical and cost perspectives), and have the potential to provide energy access to millions of households and businesses, will boost local and regional economies. These large and transformative projects will require transnational and international support, and would benefit from the high-level support of APV.

***3. Replicability/Scalability***

Projects that are easily replicable – particularly those with credible private sponsors/developers and, as a result, can be "packaged" for financing thus also making them scalable – should be given priority consideration under APV. Examples of replicable and scalable projects include: 1) projects that could lead to establishing best practices, frameworks, and reforms to help realise additional projects in a country or region, 2) the first or key phase of a larger project, 3) projects that have significant potential to create replicable models that can proliferate across the market or multiple markets, 4) projects with the possibility of split off-takers and cross-border trade and transmission, and 5) projects that can pave the way for future similar projects via new policies and/or processes.

***4. Favourable & Receptive Policy/Legal/Investment Environment***

Priority should be given to projects located in countries with a favourable and receptive energy and investment policy environment. This includes countries that accept/encourage and have the legal framework that accommodates private investment in the power sector. As a result, 1) projects can be properly structured (i.e., legal, regulatory, and tax enabling environment is/can be investor-friendly), and 2) risks can be properly mitigated (e.g., sovereign guarantees can be issued, multilateral development banks or international financial institutions are willing to finance projects and/or to provide partial risk guarantees). This category also includes countries that 1) respect/uphold the rights of private investors in the courts of law, 2) maintain stable macroeconomic policies, 3) demonstrate good repayment records and creditworthy off-takers, and 4) use transparent and predictable licensing and tariff frameworks and procurement processes. In addition, countries should be able and willing to make foreign exchange available to service the project's debt.

***5. Technology/Energy Source***

Priority should be given to projects that provide clean, renewable forms of energy, including wind, solar, geothermal, hydro, and biomass. That said, there is a clear recognition of the need to develop and utilise responsibly other forms of energy that are being discovered and exploited, in particular "gas-to-power" (associated gas, non-associated gas and liquefied natural gas in combined cycle configuration, or fuel cells). APV will support transactions that will replace dirty and/or high-cost sources, such as diesel, kerosene, and other forms of heavy fuel oil. If the technology is innovative, project scale-up and its readiness for commercial application have to be reasonable. For example, care must be taken to ensure that what works in a laboratory setting will also work in a pilot plant, a larger demonstration unit, and finally at full commercial scale. With respect to a project's construction and operations, 1) the development plan has to be reasonable, 2) a fixed-price, date certain, full-wrap turnkey EPC contract with liquidated damages should be obtainable, and 3) an O&M contract with efficiency bonus provisions should be obtainable.

***6. Balanced Energy Mix from Different Sources***

Projects that contribute to a balanced renewable energy mix include wind, solar, geothermal, hydro, biomass, and natural gas. In recognition of the intermittent nature of wind and solar, energy projects with storage – notably, pumped storage schemes – should also be encouraged. Supporting these transactions will ensure that countries and regions have energy availability from a wide spectrum of sources, reducing the risks associated with fluctuations in seasonality, hydrology, and changes in consumption patterns.

***7. Abundant & Low-Cost Fuel & Secure Contracts***

The proposed fuel source must be abundant and cost competitive with other fuels, taking into consideration environmental externalities. Contract safeguards must be in place to ensure an affordable and reliable fuel supply for the duration of the project – i.e., the term of the PPA. Therefore, the adequacy of the fuel source needs to be determined, including the 1) adequacy of the resource (natural gas, geothermal, wind, solar, biomass, hydro), and 2) the availability of a long-term supply agreement (quantity and price), if applicable (natural gas, steam, biomass, etc.).

***8. Least-Cost Plan***

Generation, transmission, and distribution projects that fit into regional or national least-cost plans (LCPs) should be priorities. The LCP should include generation, transmission, and distribution assets and can take the form of a long-term (5, 10, 20 years) investment program, broken down into annual spend plans. The LCP should take into account public and private stakeholders and their respective real costs of capital, and fairly allocate new project opportunities among stakeholders.

***9. Credible Private Sector Sponsors/Promoters/Developers***

Projects that are led by credible and experienced private sponsors and/or developers that have taken the lead role in promoting, designing, developing, and investing in such projects – be they on-grid, off-grid and/or mini-grid – will generally have high prospects for being technically, financially, and commercially viable. Such developers must demonstrate their technical, operational, managerial, and financial capacity. They should have a track record of implementing similar projects in the country/region. And they must have the financial strength and motivation to see the project through to completion, including having a substantial amount of equity at risk.

***10. Private Capital/Financing***

Similar to projects led by credible and experienced private sponsors/developers, transactions that will have (or be in the process of securing) private or public sources of capital will also generally have high prospects for commercial success and should be given priority by APV. Such capital may be provided from a variety of funding sources, including, for example, 1) private equity/investment funds, 2) developers, 3) private commercial lenders, and 4) bilateral and/or multilateral lending institutions. In this regard, project developers who are able to introduce innovative financing schemes/structures that unlock additional sources of capital and/or reduce the cost of capital should be seriously considered.

***11. Financial & Commercial Viability***

A number of conditions must be met for a project to demonstrate financial and commercial viability. One such condition is whether there is demand and market for the electricity, including the adequacy of 1) the current and future local/regional demand and market, and 2) the current and future transmission and distribution infrastructure to ensure that there are no overarching system constraints (that is, the existing or proposed distribution network must ensure that the local network has the capacity to accept new power generation for distribution to end users or for regional export). Others include the 1) availability of a long-term PPA (and a take-or-pay structure), 2) a creditworthy off-taker and credit enhancements if necessary, 3) a cost-reflective and competitive tariff, 4) strong cash flow to repay project debt and maintain an adequate debt service coverage ratio (DSCR), and 5) a reasonable rate of return (IRR) to the project developers when combined with equity.

***12. Skills & Capacity Development***

Projects should be supported that create opportunities for skills and capacity development. This is especially needed in areas where there is a lack of the technical, financial, and legal skills needed to deliver bankable feasibility studies and bring projects to completion. Projects can access the expertise of international companies and governments to provide skills and capacity development programs, including classroom-based capability building, secondments of personnel to Africa, and twinning partnerships. The introduction of new skills, know-how, technologies, and capital into the power industry will help enable the benchmarking of performance and pricing via the financial, administrative, and operational experience and accountability of private sector-sponsored projects. In addition, access to new technology and skills adds competition in the service value chain and facilitates innovations to reduce costs and/or enhance efficiencies.

***13. Environmentally Neutral***

Projects that could cause environmental damage must have and execute plans to mitigate and reverse any such short-term adverse impacts. Project social and environmental impacts must be manageable, taking account of their impacts on the local community, cost and ease of expropriation, and job creation.

***14. Community Engagement Plan***

To the extent a capital project will affect local communities (such as in the form of displacement), actions must be taken and investments made to address the impacts through a well designed and implemented community engagement plan that is negotiated with and agreed upon by the affected community(ies). This plan will detail the corporate entity's involvement with and provision of benefits to the local community(ies) in the area of the project site while also delineating the responsibilities/ obligations of local residents.

For the purposes of this package, the 13 proposed APV projects were assessed against the PPCT as explained above. The assessment summaries are contained in the Executive Summary.

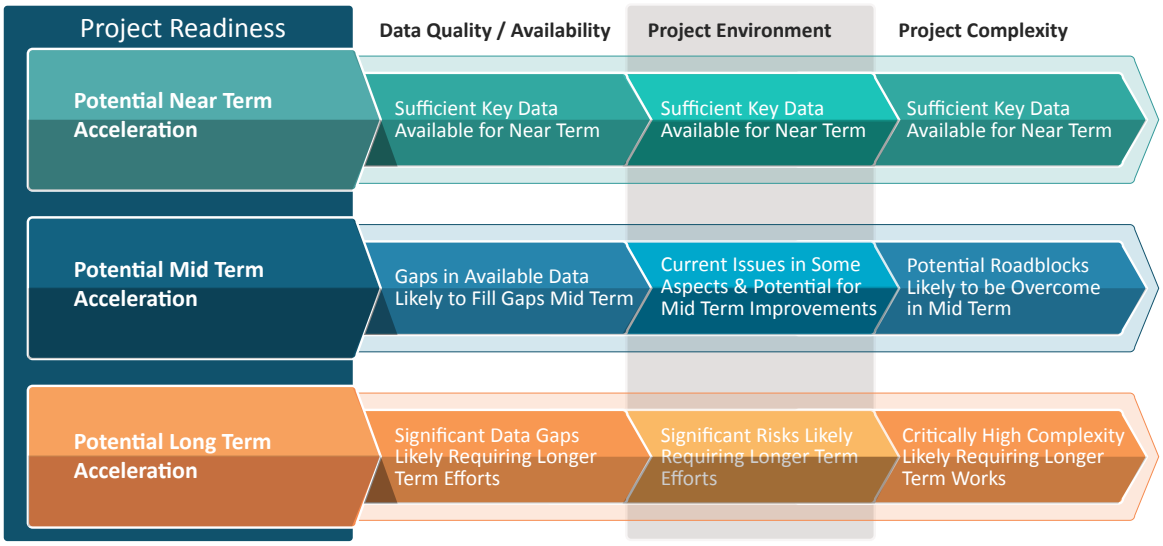
**Note that while the first three steps are the primary focus of this package, the following three additional steps also are included to provide further guidance on how these 13 projects could be further shortlisted via the following methodology:**

**Step Four: Project Readiness Thresholds**

This fourth step acts as an initial gate, allowing projects that meet three primary thresholds to pass through to subsequent gates for further analysis and acceleration; it also serves to slow projects that fall below the thresholds from moving to subsequent gates. In this step, projects are assessed and graded on three primary thresholds: 1) data quality/availability, 2) project environment, and 3) project complexity. Only projects that score well on all three thresholds should be permitted to pass on for further consideration for short-term acceleration. Other projects, whatever their merits, will require additional effort in order to be accelerated in the medium and long terms. The fourth filter is shown in Exhibit 2.

## EXHIBIT 2

### Project Readiness Thresholds



Ideally, when applying this three-step methodology, all relevant data will be available and there will be abundant time in which to analyse them. In practice, of course, data may be lacking and time will inevitably be limited. The following shortcuts can be used to streamline the methodology and to compensate for the absence of some data. As a rule, however, better data means better analysis and one should be careful when using estimates or informed opinion in place of hard information.

- **Apply Expert Judgment when Hard Data are Lacking –** Particularly for early-stage projects, it may be difficult to obtain reliable data on project deliverables, boundaries, and schedules. The opinions of experts can provide useful estimates and that may be employed to gauge, for example, a project's readiness or the readiness or capacity of the country/region where the project is set.
- **Extrapolate Based on Historical Projects within the Same Country/Region or Sector Type –** Projects of the same or similar type that have been completed can be used to create estimates of key financial metrics (e.g., likely net present value and margins). Similarly, completed projects in the same country/region can provide valuable information about the challenges facing a proposed project.
- **Omit Criteria with Low Decision Relevance –** This will vary between projects. In a low-risk project, for instance, the availability of certain risk-mitigation tools will not be an important consideration.

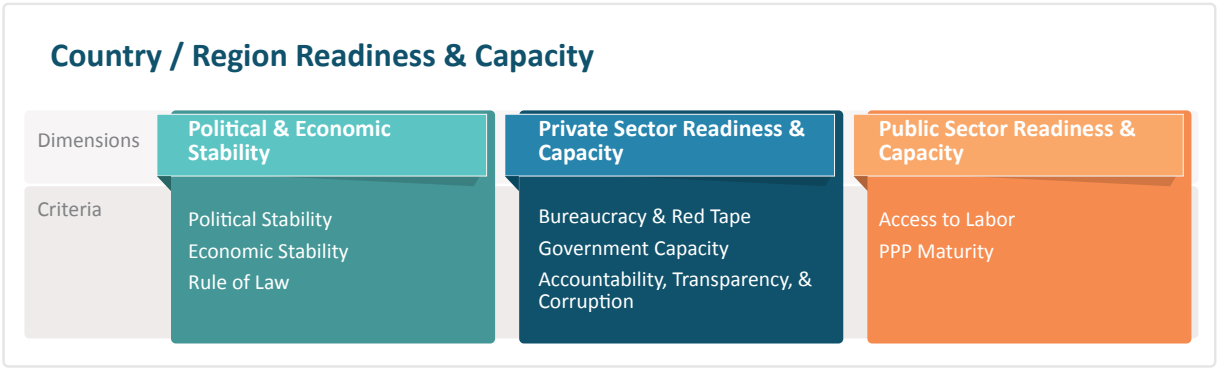
**Step Five: Project Readiness vs. Value**

The fifth step in identifying which projects are possible candidates for acceleration is to analyse them in terms of their project readiness vs. their value. This step weighs the trade-offs between the costs of undertaking a project and the value the completed project is likely to produce. For example, a project yielding modest benefits may be very attractive if it can be undertaken quickly and cheaply, while a high-impact project may come with difficulties far in excess of its ultimate value. Identifying the trade-offs between cost and value, and comparing them between competing projects can be very difficult and time consuming, requiring the analysis of large amounts of disparate data. The goal here is to compare large amounts of data about the relative value and cost of multiple projects, organised from the broadest to the most specific.

***1. Country / Region Readiness & Capacity***

Country / region readiness and capacity is the degree to which the local leaders, people, and businesses of the area where the project is set are able and willing to facilitate its completion. For this analysis, a project is analysed based on three main readiness and capacity criteria: 1) political and economic stability, 2) public sector readiness and capacity, and 3) private sector readiness and capacity. The country/region readiness and capacity filter is shown in Exhibit 3.

**EXHIBIT 3**




***2. Project Readiness***

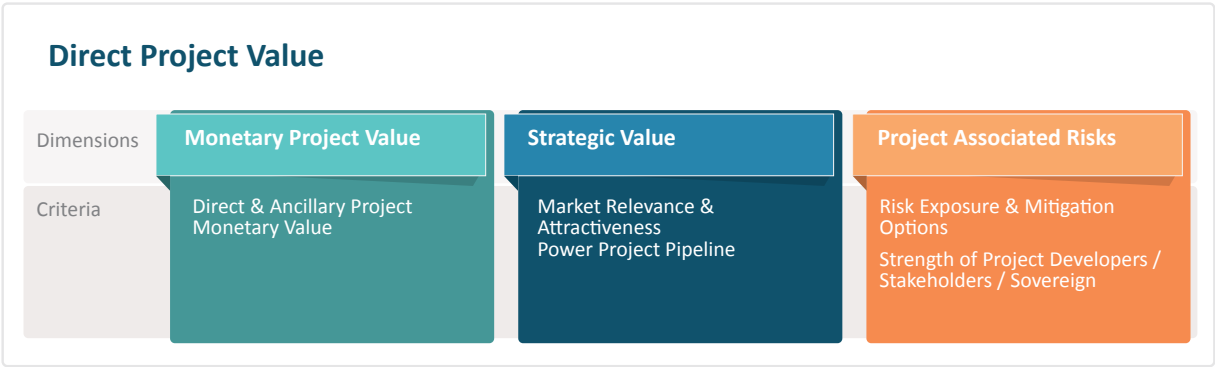
Project readiness is the degree to which it is (or is not) ready for actual construction to begin. Project readiness is assessed along eight criteria covering all key internal influences on a project's do-ability. These criteria are grouped according to project environment, project preparedness, and project complexity. The project readiness filter is shown in the graphic below as Exhibit 4.

**EXHIBIT 4**


***3. Direct Project Value***

Direct project value is a measure of the intrinsic (financial) value of a project on completion, also taking into account the project's likely effect on its country's and region's power project pipeline and its exposure to risk. Here, a project is analysed based on six main criteria, which are grouped according to a project's monetary value, strategic value, and associated risks. The direct project value filter is shown in Exhibit 5.

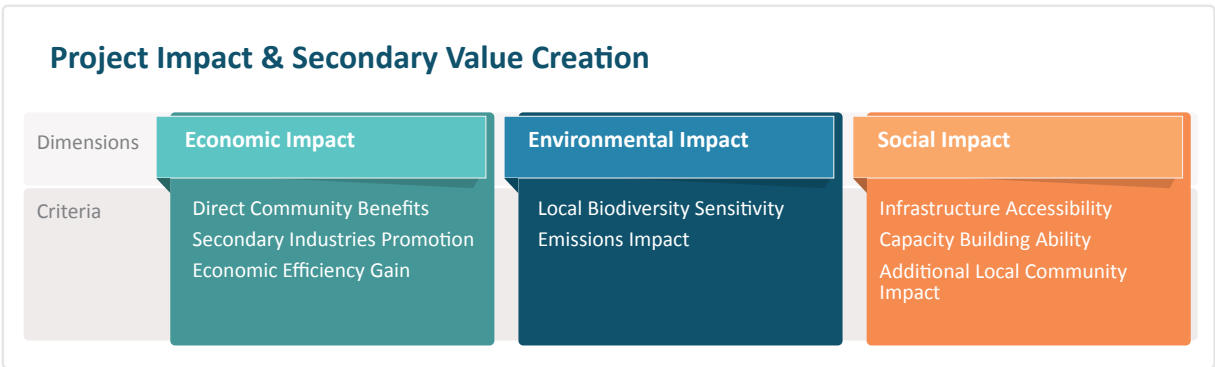
**EXHIBIT 5**




***4. Project Impact & Secondary Value Creation***

Project impact and secondary value creation is assessed along three main lines covering all key influences on a project's impact on its country/region. These are economic impact, environmental impact, and social impact. The project impact and secondary value creation filter is shown in Exhibit 6.

**EXHIBIT 6**



**Step Six: Selecting & Fine Tuning the Project Shortlist**

The purpose is to identify projects that are possible candidates for acceleration from among those that are well-positioned after applying the above-mentioned criteria. At this step, the potential trade-offs based on the results of the assessments are identified and weighed.

A good candidate for possible acceleration is a project that is at a stage where it has generated sufficient achievements to inspire confidence (or soon can), but is not so advanced as to seem "low-hanging fruit". In general, projects that are easy to accomplish or very close to completion will be the least in need of acceleration. Rather, candidates for acceleration must show a good balance between the difficulty of completing the project and its likely benefits. It is not unusual for there to be tension between the public- and private-sector views of this balance, with public sector actors most interested in accelerating projects that are difficult to complete and the private sector actors more focused on projects likely to generate quick results. Private companies will be most attracted to high-visibility, high-impact projects whose potential reputational benefits outweigh their perceived risks.

The public and private sectors should be closely engaged in any project that is a candidate for acceleration. That means the project's requirements – especially what is needed to accelerate it – should be clearly understood by all stakeholders. Those needs should match closely with a potential private partner's abilities. The expectations of all stakeholders about a project's risks and rewards should be closely aligned.

## 3.2 PROJECT DEVELOPMENT PHASES

Once these projects have been shortlisted, it is important to understand the maturity of each project.

Power projects typically have several key development phases before the actual operation and maintenance (O&M) phase commences. It often can take several years to develop a typical full-size power project with, for example, a 50 MW turbine as a first step. However, the project development time may vary, depending on the project developers' experience, information available about the technical resource, institutional and regulatory climate, access to suitable financing, and other factors.

Each phase of power project development consists of several tasks. After each milestone, the project developer – either a project company or a country's institution – will have to decide whether to continue developing the project or not.

PIDA's PAP defines four project stages in a typical infrastructure project as follows:

S1-Early Concept Proposal

S2-Feasibility/Needs Assessment

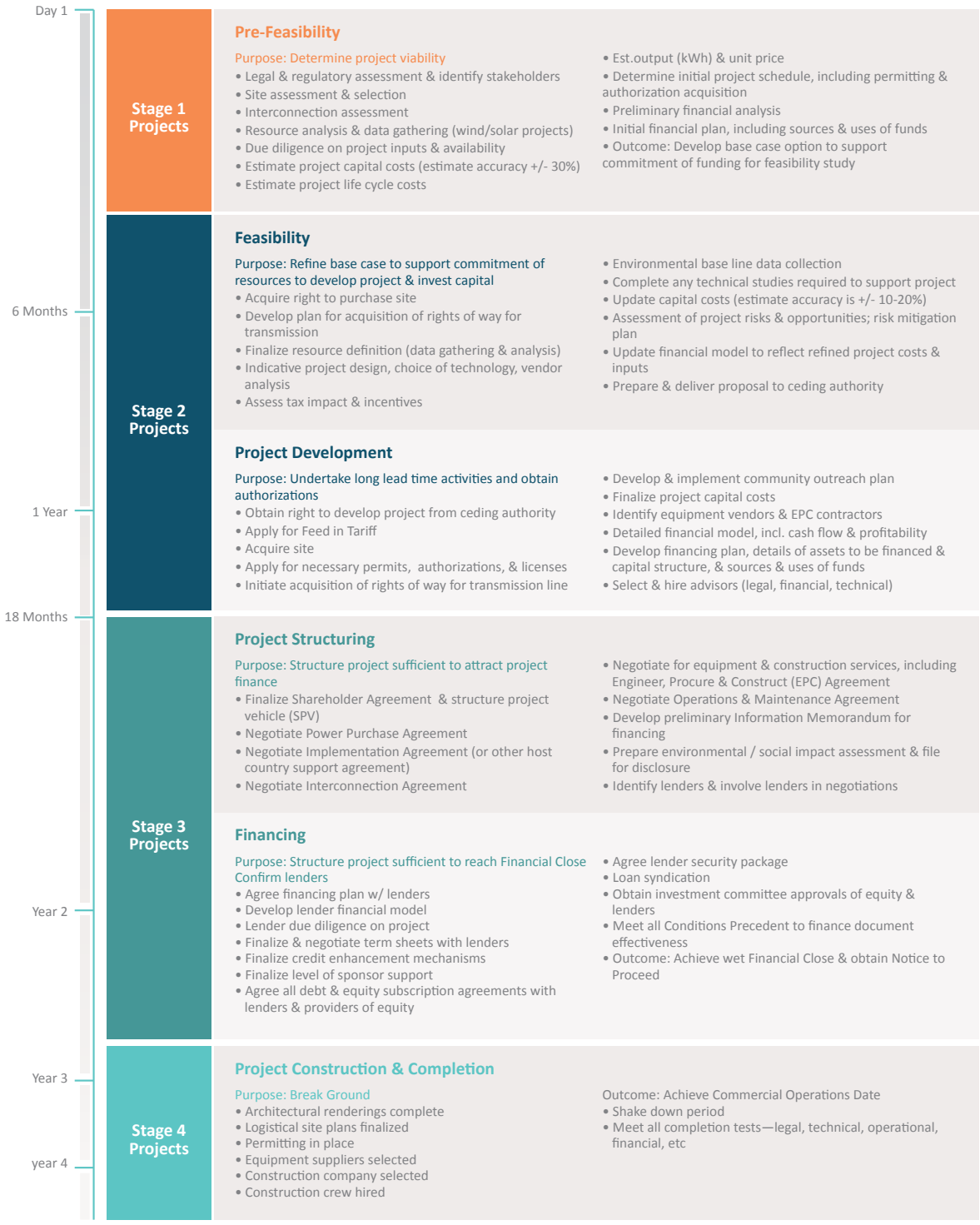
S3-Programme/Project Structuring & Promotion to Obtain Financing

S4-Implementation & Operation

Similarly, Power Africa defines four project stages in a typical power project as described in Exhibit 7:

**EXHIBIT 7**

## Classifying Power Projects by Stage of Development



### 3.3 MITIGATING PROJECT RISK

The risks inherent in power projects also must be mitigated.

The key to financing a successful power project is to craft the right allocation of risks among the project stakeholders. This is done by recommending contractual arrangements that are fair to all three stakeholders: the project developers, the banks, and the host government. The arrangements should allocate the risks to the parties best suited to absorb them and ensure that any residual risks that inevitably will remain can be properly managed.

#### Public Private Partnerships

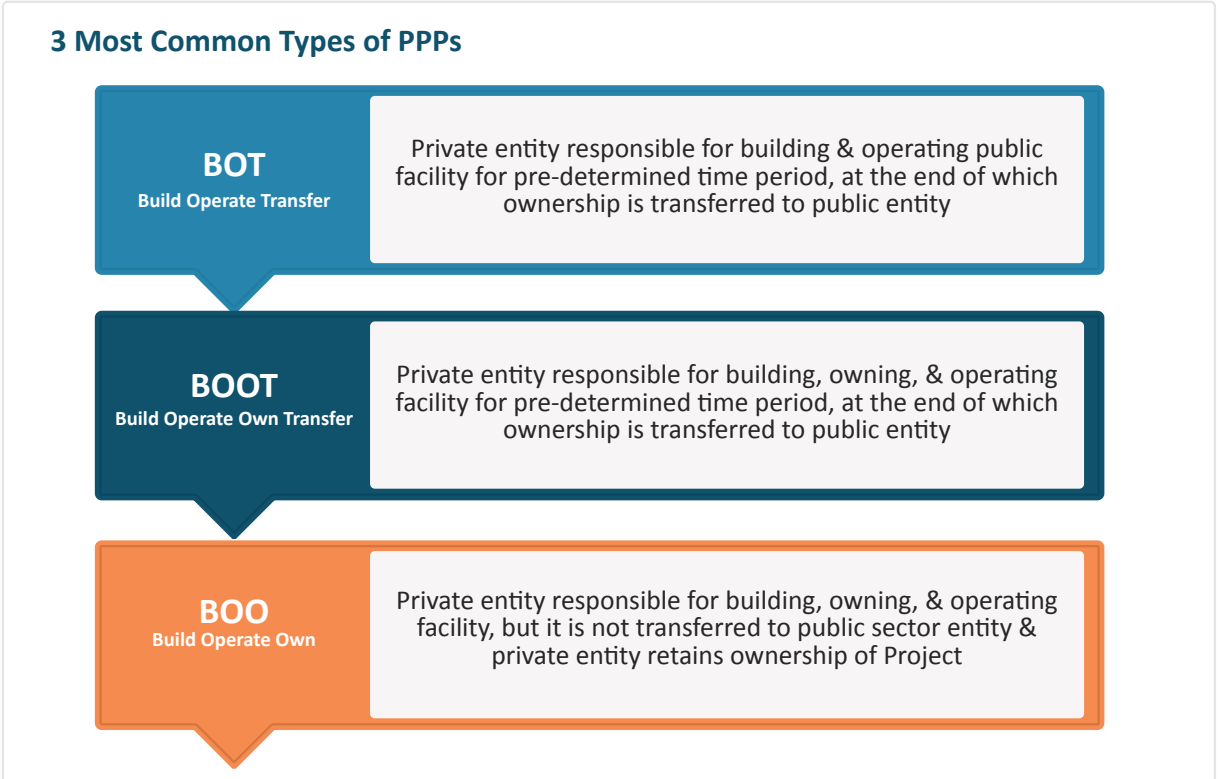
A common way to attract finance for large-scale power projects is to form a public private partnership (PPP) – a contractual arrangement between the public sector agency sponsoring the project and the private sector entity wishing to build the project. It is a way to provide an opportunity for both the public and private sectors to share each other's skills and assets to deliver a power project for use by the public sector.

The PPP contract is legally-binding, long-term output-based agreement between the host government and private partners for the provision of assets and delivery of services. It is used to allocate responsibilities and risks to the private sector partners who have expertise in project construction and operations, which helps in minimising the government's costs along with improvements in performance. In turn, the public sector typically assumes the social, environmental, political, and payment risks of the project, while the private sector assumes the project's financing, construction, and commercial risks.

A PPP contractual arrangement can take a variety of forms, with varying degrees of public and private sector involvement, and sharing of risks, rewards, and responsibilities. Ultimately the arrangement aims to combine the best capabilities of the public and private sectors for mutual benefits. Governments like PPPs because they provide an opportunity to improve services: having access to private capital can speed up the delivery of infrastructure, particularly when governmental financial resources are strained to meet demand for investment in public services. Governments also gain access to new technology and skills provided by the private sector, and often increased competition for ancillary services follows through on the value chain as a whole. Project developers and banks like PPPs because the structure helps make the project attractive for long-term financing, particularly because the project can be evaluated on a stand-alone basis based on its perceived risks and expected future cash flows.

The three most common types of PPPs are depicted in Exhibit 8.

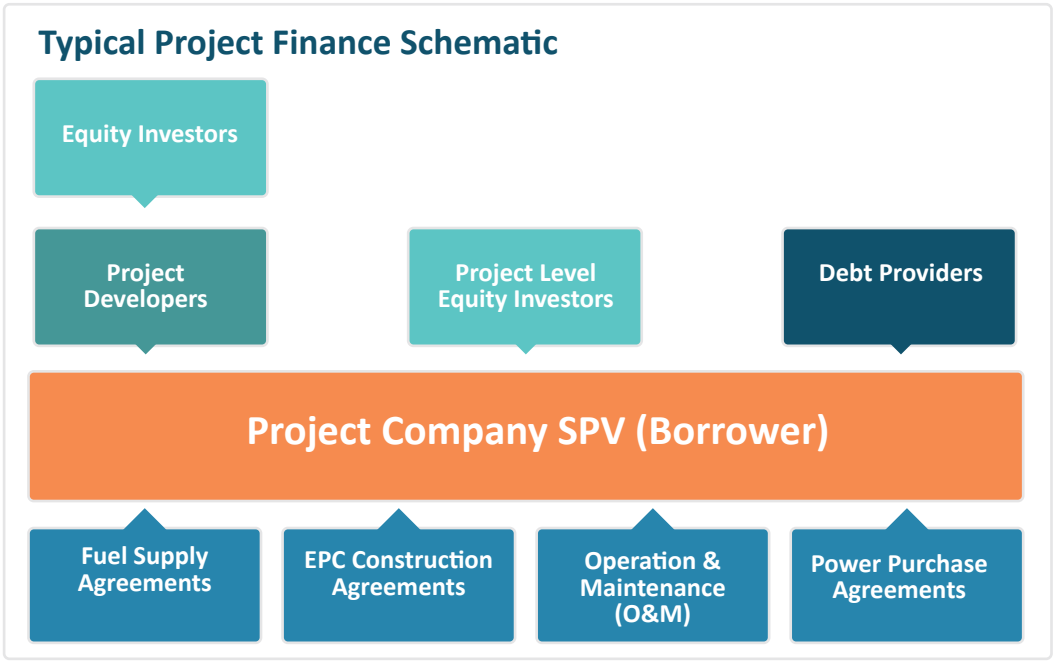
**EXHIBIT 8**



A typical way to mitigate project risk is to form a special-purpose vehicle (SPV) to own and hold all of the project's assets. Finance is then provided to develop a project solely based on the project's perceived risks and expected future cash flows via negotiated contractual arrangements with the three stakeholders. The finance raised for the project is therefore held at the project company level in this newly-created SPV (instead of on the balance sheet of project developers) so that the banks either have no claims (recourse) or only limited recourse to the project developers. Forming a project SPV is a very clean and transparent structure.

Exhibit 9 illustrates a typical project finance structure.

**EXHIBIT 9**




Generally, a rigorous methodology also must be followed in order to craft the right allocation of risks among the project stakeholders. It would include 1) risk identification, 2) risk evaluation, 3) risk mitigation, 4) risk allocation, and 5) contractual documentation.

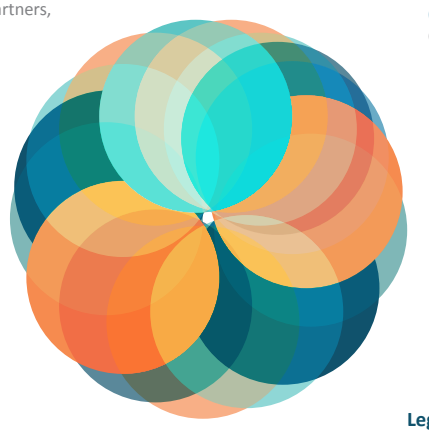
Exhibit 10 illustrates this methodology.

**EXHIBIT 10**

The two graphics in Exhibit 11 illustrate most of the key risks and mitigants for power projects.

**EXHIBIT 11**

## Risks & Mitigants



**Regulatory Risk**
Pass-throughs, Change-of-law clauses

**Fuel Supply Risk**
Put-or-pay

**Political Risk**
MDB, ECA, PRI, Local Partners, Offshore Escrow

**Operating Risk**
O&M Contract, Clawbacks, Limited Recourse, Ratios, Reserves, Security

**Offtaker Risk**
Credit Enhancement, Liquidity Escrow

**Developer Risk**
Joint & Several Obligations

**Market Risk**
Take-or-Pay

**Environmental Risk**
EIA, RAP

**Currency Risk**
Payments in Hard Currency, Convert./Transfer. Undertaking

**Technology Risk**
Warranties, Service Contract, Limited Recourse (if Developer)

**Macroeconomic Risk**
Take-or-Pay

**Force Majeure**
Insurance

**Legal Risk**
Legal opinion

**Cost Overrun Risk**
Contingencies, Developer Guaranties, Capex Reserve

**Project Completion Risk**
Turnkey Contracts, Bonds, Retentions, Completion Tests, Developer Guaranties

## Project Structure Must Address Risks to Achieve Financing

Project Sponsors
- Experienced & financialy strong strtegic investors with demostrated track record of investing & operating geothermal projects
- Ability to porvide financial support to Project

Construction Risks
- Fixed price, date certain, turnkey EPC contract with liquidated damages
- Completion guarantee by Project Sponsors

Economic Performance
- Generates good debt service coverage under stress scenarios
- Stable project returns with potential for aditional upside
- Adequate Debt Service Reserve Account

Fuel Supply
- Adequacy of resource
- Long-term quanitity supply agreement
- Long-term fixed price supply agreement (or at least a price ceiling)

**Sound Project Economics**

Management
- String managarial, financial, operational & technical capabilities with demonstrated track record of implementing similar projects
- Continuity of senior management

Technical Feasibility
- Reviewed by independent engineer

Technology Risks
- Perpetual technology licenses & performance warrantees

Operations Risk
- O&M contract with efficiency bonus provisions
- Adequate Maintenance Reserve Account

Offtake
- Long term quantity offtake agreement
- Long term fixed price offtake agrrment ( or at least a price floor )
- Adequate storage & transportation infrustructure

In addition, specific examples of particular key risks and mitigants for power projects are shown in the tables below.

### Capital Costs

| Risk | Mitigation |
|---|---|
| • capital cost overrun<br>• change orders in development plan/facility design<br>• completion delays and associated higher interest during construction<br>• increase in financing costs<br>• unforeseen environmental liabilities and other construction problems | • fixed-price, date certain turnkey EPC contract<br>• liquidated damages from the EPC contractor for cost overruns and schedule delays<br>• independent review by engineering consultants<br>• financial hedging |

### Operating Costs

| Risk | Mitigation |
|---|---|
| • higher fixed and variable costs<br>• excessive maintenance<br>• labour/union problems<br>• environmental clean-up<br>• changes in standard operating practices | • select operator with proven experience<br>• establish a system of incentives/disincentives for the operator<br>• maintain adequate insurance |

### Market

| Risk | Mitigation |
|---|---|
| • market demand for the product<br>• impact of supply on the market<br>• multiple markets competing for supply<br>• rival sources of supply (existing and planned) | • execution of long-term take-or-pay contracts with buyers<br>• sponsor undertakings to buy pre-agreed volumes at pre-agreed prices or market prices<br>• government undertakings not to curtail production or restrict export of production, and ensure that the national company can meet all obligations |

### Price

| Risk | Mitigation |
|---|---|
| • commodity price volatility<br>• prices of competing commodities<br>• other markets competing for product<br>• cartel pricing<br>• reserves dedicated to single buyer<br>• recognition of crude quality differentials<br>• limited transportation capacity<br>• foreign exchange fluctuations | • floor price with sponsors or third-party buyer<br>• contracted price with sponsors or third-party buyer<br>• commodity price and forex hedging techniques<br>• guaranteed transportation arrangements |

### Credit

| Risk | Mitigation |
|---|---|
| • default of contractor<br>• default of fuel supplier<br>• default of off-taker | • careful selection of creditworthy counterparties<br>• letter of credit or bank guarantees<br>• government guarantees for obligations of state-controlled entities |

### Political

| Risk | Mitigation |
|---|---|
| • change in government<br>• change in legal/tax systems<br>• expropriation<br>• dividend repatriation<br>• currency fluctuation<br>• transparency<br>• energy security | • off-shore escrow accounts<br>• government assurance to abide by provisions<br>• government investment in the project<br>• local sponsorship<br>• political risk insurance |

### Force Majeure

| Risk | Mitigation |
|---|---|
| • war<br>• flood<br>• fire, explosion<br>• earthquake<br>• strike<br>• insurrection | • commercial insurance (construction, business interruption)<br>• political risk insurance (expropriation, currency inconvertibility) |

## 3.4 FINANCING POWER PROJECTS

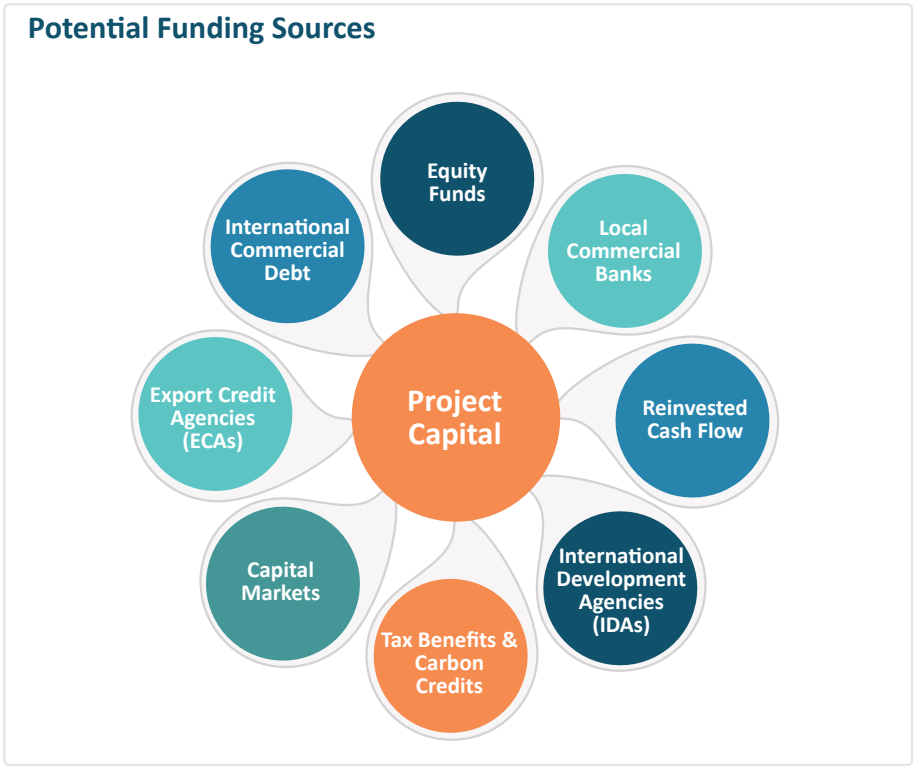
### Financing Objectives of Project Stakeholders

Typically a project's three stakeholders – the project developers, banks, and the host government – wish to achieve the same project financing goals: to finance the project in the shortest possible timeframe, at the lowest cost, and under the best acceptable terms and conditions. If these goals can be met, all parties will feel they have achieved a win-win-win outcome in conformity with their own objectives.

### Sources of Finance

Project developers of power projects need to have adequate equity and debt finance available to ensure the project can be constructed and commissioned. Exhibit 12 illustrates the typical sources of equity and debt for power projects.

**EXHIBIT 12**




**Equity.** Banks and host governments generally require project developers to contribute a significant amount of equity to the project, often in the form of cash. Amounts can vary from as little as 20% of the project cost to 40% or more. Equity also can be sourced from potential strategic partners that are selected based on timing, size, financial strength, and their perceived skill set. It might also be possible to attract equity from potential portfolio investors, including local venture capital funds, or by listing the project on a local stock exchange. Once the project has met its completion tests, its cash flow (cash generated by and reinvested in the project) also can be used for this purpose.

**Debt.** Project debt can be raised from one or more of five sources:

Export Credit Agencies (ECAs)

Finance from ECAs couples the sourcing of services and equipment with the finance-raising effort, i.e., political risk mitigation is tied to the export of services or goods from a specific country (the maximum value is 85%). The sourcing of services and equipment, the timing of approach, and understanding the concerns of ECAs are key to maximising their participation. Usually a balance is needed between attracting external sources of finance with the desire to maximise local sourcing and expenditures.

International Development Agencies (IDAs)

These institutions often are more capable than most commercial banks in evaluating the political risks of a project due to their direct government-to-government relationships. One of the attractive features of IDA finance is that it decouples the sourcing of services and equipment from the finance-raising effort, i.e., political risk mitigation is not tied to the export of services or goods from a specific country as required by ECAs. Also, projects funded by IDAs are entitled to "preferred creditor status", meaning that they are not subject to a country's rescheduling mechanism due to lack of foreign currency.

International Commercial Banks

Depending on the project, most banks are likely to assume only the residual risks associated with ECA and/or IDA financing, by financing the project under the umbrella of these organisations through an A/B loan structure or the like. However, they are more likely to accept commercial risks if the project is sound.

Local Banks

Attracting finance from local banks helps finance the project's local costs. Unfortunately most loans from local banks are usually short term (5 years) and at high interest rates (17-20%).

Capital Markets

For the right projects, the capital markets have the capacity to finance very large transactions via their access to incremental investor pools: fund managers, mutual funds, insurance companies, and pension funds, among others. Public investors are particularly interested in "story" credits, i.e., those that have an appealing project background or sponsorship. Increasingly, the capital markets have a rapidly advancing ability to invest in complex transactions and to assume political risk. In particular, they are hungry for yield for the right projects; in this case, the quality of the project developers and sound project economics are important. Investors in capital market instruments typically focus on the project's cash flow; investors often agree to less restrictive covenants designed to avoid default unless there are substantive issues that have the potential to lead to payment default.

In particular, the capital markets can offer an excellent refinancing opportunity of ECA, IDA, or commercial bank debt after the project's completion tests have been met. Passing the completion tests signals the transition of the project from pre- to post- completion risks. These are tests of the project's ability to produce 1) at planned levels, 2) within expected costs, and 3) for a reasonable period of time. Completion tests signify that the project's construction risk has passed – as the project now is in its operations phase – where market and price risk often occur. With respect to natural gas or geothermal projects, passing the completion tests means that reserve risk has practically ceased, although the final recovery factor of the gas or steam will not be known until the end of the project.

## Finance Raising Approach

Generally five phases must be undertaken in order to achieve the financial close of a project with banks. Usually project developers enlist the assistance of experienced financial advisors to help them achieve financial close.

Phase I: Gather Project Information

***Project Evaluation***

- Identify the objectives of the project developers, including their specific strategies, operating experience, and access to financial resources.
- Advise them on how to manage their aims for the project by offering objective advice that is intended to be in their best interests. Generally, these objectives will include, among others, to 1) achieve the project's financing needs in the shortest possible timeframe, and to 2) set the appropriate environment and framework for additional financings for the project, if desired.
- Undertake a detailed review and evaluation of the project's commercial, technical, and legal aspects.
- Develop an initial funding plan for the project, including identifying potential funding sources along with key requirements that will need to be satisfied.

***Review Technology and Project Agreements***

- Review and evaluate the technical aspects of the project and any risks inherent in the technology it will employ (integration, scale-up, etc.).
- Review the project's permitting and licensing status (tax, tariff, customs, duties, fiscal, and regulatory framework) that could potentially cause delays in construction.
- Review and evaluate draft project agreements and counterparties. All project agreements must be financeable; this is necessarily dependent on reviewing a complete set of financing agreements. Among other things, the creditworthiness of the off-takers/power purchasers needs to be examined, and whether a guarantee of the host government and/or other credit enhancement features are contained in the project agreements.

***Review Financial Model and Apply Stress Tests and Sensitivity Analysis***

- Advise and assist in the preparation and review of financial forecasts and a model for the project showing projected revenues and cash flows under a range of business and financial assumptions. These would include building a lender's base case and sensitivity cases, which will then also be stressed tested under a variety of financial assumptions (different changes in capital expenditures (CAPEX), operating expenditures (OPEX), price, volume, operating efficiency scenarios, etc.). The financial model is a spreadsheet used to evaluate the project's economics by analysing cash inflows and outflows during the construction and operations phases from the perspective of each of the project's stakeholders: project developers, the host government, and banks.
  - The project developers need to determine their investment/funding requirements and expected economic returns.
  - The host government needs to determine its "government take" (i.e., revenues received by the project) and any associated regulatory costs for monitoring the project. Any tax incentives the host government is prepared to give the project developers need to be examined, such as lower tax rates (income, dividends, interest, royalties, etc.), tax holidays, value added tax (VAT) exemptions, import duty exemptions on services and/or equipment, production and investment tax credits, accelerated depreciation, etc.
  - The banks need comfort that the debt will be serviced with a margin of safety in compliance with the covenants contained in the project agreements, i.e., the debt service coverage ratio (DSCR).

  To do this, a "base case" (a forecast of future cash flows) must be developed. Then stress tests and a sensitivity analysis must be performed on the financial aspects of the project. These tests and analyses are used to evaluate different economic cases/scenarios and their impacts on the project's financial performance and ultimately, on the tariff. They show the impact on the project's financial performance and tariff by changing one or more assumptions if they differ from what was previously assumed: CAPEX, OPEX, fuel prices, inflation, construction period, loan term, interest rate, etc. The debt capacity of the project can then be determined against minimum DSCRs under down-side scenarios. Then the project's IRR is calculated and a comparison made with the equity returns that are available on alternative investments whose "riskiness" is similar to that of the project. This analysis also helps the host government in pricing concessions to private contractors.

***Develop Optimal Capital Structure***

- Develop an optimal target capital structure based on the project's strengths, on bankable terms most favourable to the project developers (yet still acceptable to qualified lenders and the host government). This structure would include appropriate equity support, guarantees, capital structure, cash flow waterfall, security interests, and other appropriate credit support from the project developers, and the project's contracts and equipment suppliers, as may be necessary or desirable by the lenders until all completion tests are met to the satisfaction of the lenders to enable the project to revert to limited recourse or non-recourse operational status going forward.

Phase II: Prepare Offering Materials

***Review Availability, Type, and Cost of Finance***

- Review potential external funding markets for the project and recommend selected sources of finance, with a comparison of their relative advantages and disadvantages, including factors such as cost, ease of execution, likely covenants and other restrictions, size and appetite for the different types of risks, etc.

***Prepare Comprehensive Offering Memorandum***

- Assist the project developers in preparing marketing materials (including an offering memorandum) describing the project and the financing opportunity to be used in discussions with lenders in order to establish their interest to participate in financing the project.

Phase III: Market the Project

***Organise Road Shows***

- Identify and bring the project to the attention to the widest possible realistic range of potential lenders (generally about 6 to 12).
- Visit, together with the project developers, selected qualified finance providers acceptable to them.

***Arrange Due Diligence Visits***

- Arrange for potential lenders to conduct business and due diligence investigations, including virtual and on-site data rooms.
- Serious lenders will want to review of all projects contracts, assisted by technical and legal advisors.

Phase IV: Negotiate Term Sheets

- It is expected that several (about three to five) term sheets will be received proposing various forms and terms for financing the project.
- Assist the project developers in flushing out the specific terms and conditions of each financing proposal, and then recommend the strongest lenders with the most attractive terms and conditions to move forward together to close the deal on a syndicated or club basis.

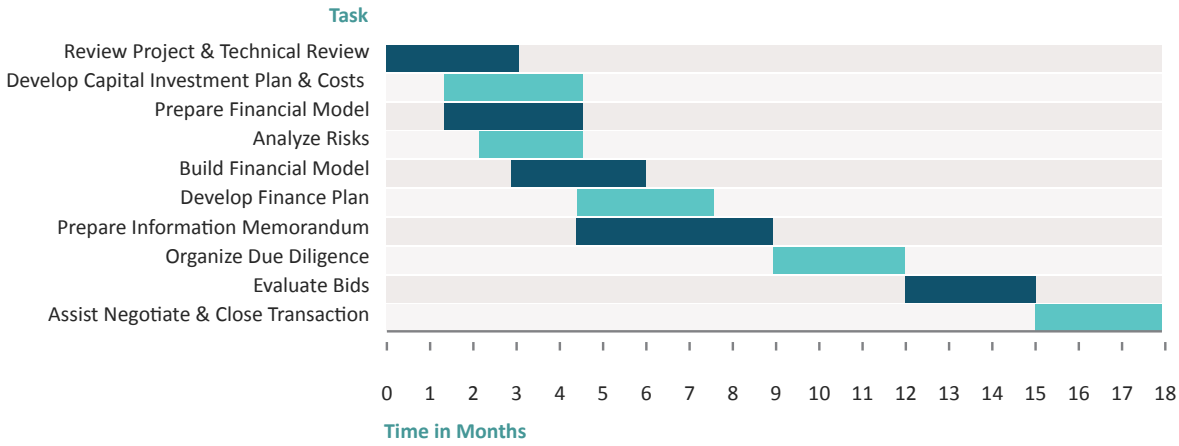
Phase V: Close the Financing

- Assist the project developers to negotiate and close the financing, including all material agreements (assisted by legal advisors), under their guidance. Sovereign immunity should be waived and the host government should agree to international arbitration.

A typical finance raising schedule under optimal conditions is illustrated in Exhibit 13.

**EXHIBIT 13**

## Optimal Finance Raising Schedule



***Conditions Precedent to Financial Close***

Before the project developers are entitled to drawn down on their project loans, they must satisfy various conditions precedent. Examples of typical conditions precedent are illustrated in Exhibit 14.

**EXHIBIT 14**


There are two kinds of financial close:

- A **"dry" financial close** suggests that the project developers and project lenders have concluded a complete package of permanent financing arrangements, but one or more conditions precedent to the initial drawdown of funds must still be satisfied by the project developers or waived by the banks.
- A **"wet" financial close** suggests that each condition precedent to the initial drawdown of funds has either been satisfied by the project developers or waived by the banks. After a "wet" financial close, the project must be constructed and commissioned via a "notice to proceed".

Finally for a project to be fully operational, it must achieve its Commercial Operations Date (COD) – the point when all required project "completion tests" have been met (technical, legal, financial, etc.) – and electricity is actually flowing.

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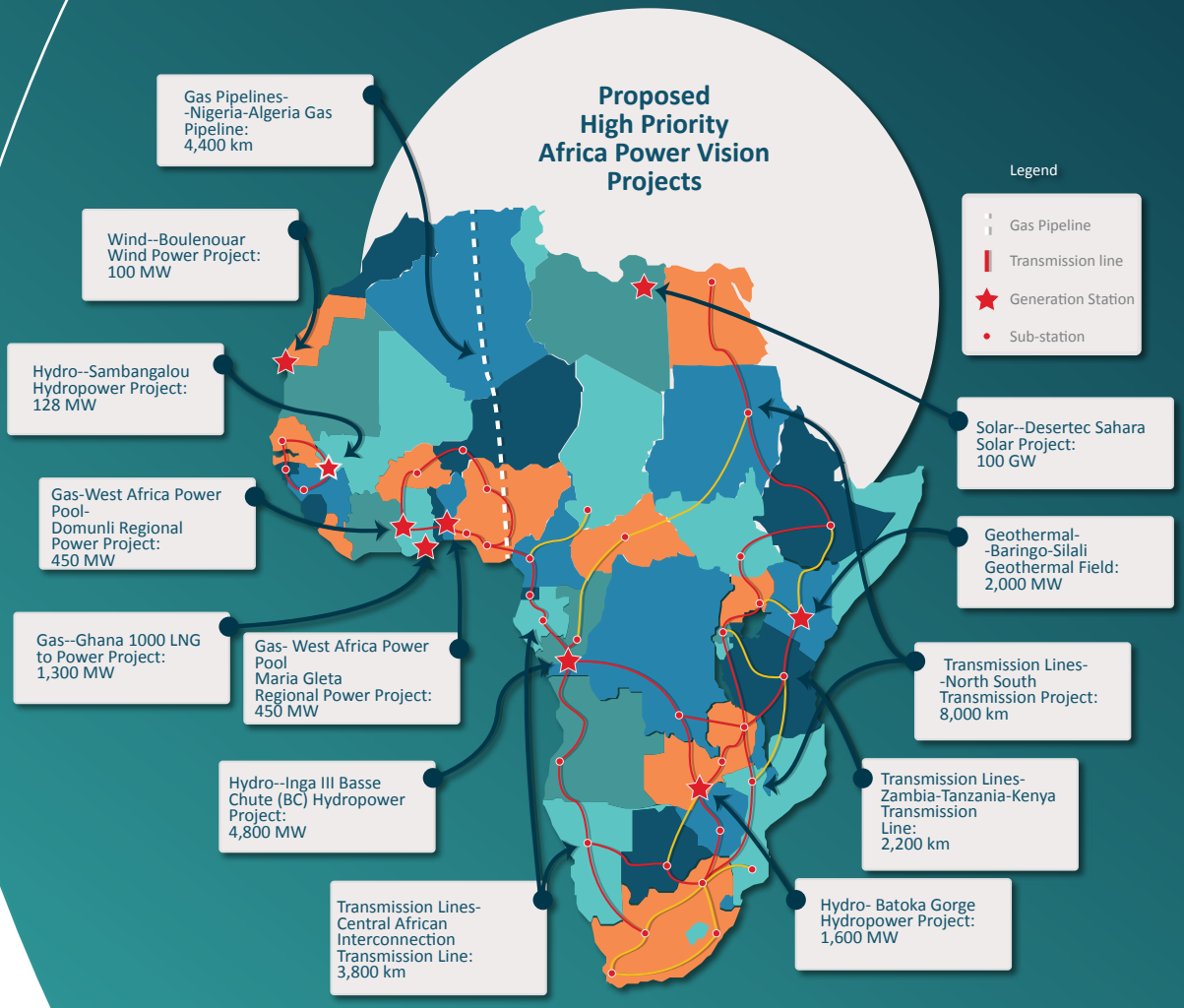
15. Presentation "Geothermal Development in Kenya: Status, Planned Activities and Required Support", by Dr. Peter Omenda, GDC, at Geothermal Donors Coordination Meeting, Reykjavik, Iceland, May 2014
16. "Batoka Gorge Hydropower Project", Project Number: E.11.1.2, Iranian Embassy based in Addis Ababa, available at www.en.addisababa.mfa.ir
17. "The Inga 3 Hydropower Project", by International Rivers, available at www.internationalrivers.org
18. "DRC's Controversial Inga 3 Hydropower Project receives IDA technical assistance grant", by Michael Harris, available at www.hydroworld.com
19. "Sambangalou Dam", Project Number: E.07.1, Iranian Embassy based in Addis Ababa, available at www.en.addisababa.mfa.ir
20. West Africa Power Pool website, www.ecowapp.org
21. "Ghana 1000 MW gas to power Project", ESI Africa Online, May 2014, available at www.esi-africa.com
22. "Ghana 1000 gets under way as consortium inks agreement", by Natasha Odendaal, May 2014, Engineering News Online, available at www.engineeringnews.co.za
23. "General Electric to add 1000 MW to national grid", by Sebastian Syme, October 2014, Graphic Online, available at (http://graphic.com.gh/news/general-news/32843-general-electric-to-add-1000mw-to-national-grid.html)
24. "The Trans-Saharan Gas Pipeline: An Overview of the threats to its success and the means to prevent its failure", by Loic Conan, Utah Environmental Law, Volume 31, No.1 of 2011
25. Presentation "The TSGP Project", by Dr Ghaji Bello, Acting Director-General of the ICRC, in Hamburg and Hanover, April 2013
26. "Nigeria-Algeria Pipeline", Project Number: E.15.1.1/E.15.1.2/E.15.1.3, Iranian Embassy based in Addis Ababa, available at www.en.addisababa.mfa.ir
27. "North-South Power Transmission Corridor, East and Southern Africa", by Sheila Barradas, Engineering News, March 2014, available at www.engineeringnews.co.za
28. "Zambia-Tanzania-Kenya Transmission Line", Project Number: E.02.1.6.1.1/E.02.1.6.4/E.02.1.6.2.1/E.02.1.6.2.3, Iranian Embassy based in Addis Ababa, available at www.en.addisababa.mfa.ir
29. Zambia Tanzania Kenya Power Interconnector, Preliminary Project Information Memorandum, Office for Promoting Private Power Investment, Zambia, May 2013, available at www.invest-tripartite.org
30. Dakar Financing Summit Project Briefs, June 2014

# ANNEX

## PROPOSED HIGH PRIORITY APV PROJECT PROFILE BRIEFS



## Wind – Boulenouar Wind Power Project

| Countries/Region | Mauritania |
|---|---|
| **Project Location** | Boulenouar, Mauritania |
| **Sector/Subsector** | Energy/Generation |
| **Project Description** | Construction of a large-scale wind farm of 100 MW installed capacity located in Boulenouar, 80 km north of Nouadhibou, the second-largest city in the northern part of the coastal region of Mauritania. Set to create a demonstration effect as the first major wind project in the Sahel. It will supply energy to the north-south high voltage transmission backbone that connects the economic capital Nouadhibou to the Senegalese border, through the Tasiast mining area and the capital Nouakchott. Will feed its energy to the high-voltage backbone, enabling the country to export the energy surplus to neighbouring countries and Morocco. In addition, the project falls within the framework of Mauritania's energy mix diversification program. |
| **Project Size/Capacity** | 100 MW |
| **Project Objectives** | Will contribute towards meeting Mauritania's growing domestic and industrial demand. Significantly, it will increase the supply of energy in the interconnected transmission network, enabling the country to export surplus energy to the neighbouring OMVS (Senegal River Development Organisation) countries and Morocco. Aligned with Mauritania's energy mix diversification program, the project will contribute towards reducing production costs, which are currently very high due to their dependence on imported hydrocarbons. |
| **Project Structure/Type** | BOT or PPP structure where both government and private sector are involved from the start |
| **Project Sponsors** | Government of Mauritania |


| Countries/Region | Mauritania |
|---|---|
| **Project Stage** | Feasibility studies currently underway |
| **Project Energy Source** | Wind |
| **Potential Market** | Mauritania, Morocco, Senegal and other neighbouring countries |
| **Regional Context** | Increased cross-border energy trading in the region |
| **REC** | CEN-SAD, AMU |
| **Economic Sustainability & Expected Benefits** | Will provide much needed domestic and industrial (mining) capacity for supply-constrained Mauritania and contribute towards energy trading in the region, thereby leading to socio-economic development. |
| **Implementing Authorities** | Government of Mauritania |
| **Project Status** | Wind speeds were monitored and measured over a period of one year in the region of Nouadhibou and Boulenouar in 2001, together with an evaluation study and analysis of wind energy potential. A consultant has been appointed to review the available studies and determine an optimal plant configuration and preliminary design study by the end of 2014. |
| **Total Estimated Project Cost** | US$ 200 million |
| **Financing Gap** | US$ 200 million |
| **Key Challenges** | Securing financing |
| **Way Forward** | Completion of feasibility studies, plant configuration, and design study.<br>Secure financing for the project. |

## Solar – Desertec Sahara Solar Project

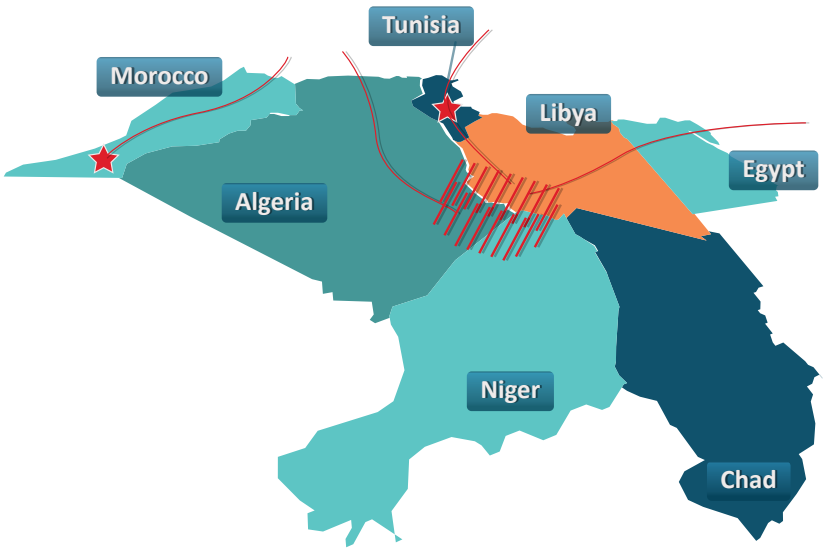
| Countries/Region | Algeria, Niger, Libya, Tunisia, Morocco, Egypt, Chad \| Northern Africa |
|---|---|
| **Project Location** | North-Western Sahara |
| **Sector/Subsector** | Energy/Generation and Transmission |
| **Project Description** | The Desertec organisations promote the generation of electricity in North Africa, the Middle East and Europe using renewable sources, such as solar power plants and wind parks. In addition, they are developing a Euro-Mediterranean electricity network, primarily made up of high-voltage direct current (HVDC) transmission cables.[1] Most of the power plants would be located outside of the Sahara Desert itself, in the surrounding areas in the more accessible north and south steppes and woodlands, as well as the relatively moist Atlantic Coastal Desert. Under the Desertec proposal, concentrated solar power systems, photovoltaic systems, and wind parks would be spread over the wide desert regions in North Africa like the Sahara Desert and all the subdivisions.[2] The generated electricity would be transmitted to European and African countries by a super grid of HVDC cables.[3] |
| **Project Size/Capacity** | The project would be developed over decades and staged over many project sites throughout the Sahara region. The project aims to produce over 100 GW of output by 2050. |
| **Project Objectives** | Aims to utilise the vast untapped solar potential of the Sahara Desert, which receives over 3,000 sunshine hours per year. While the project will aim to develop energy generation for the northern African region, the large demand of Europe could make it a major off-taker of power produced. |
| **Project Structure/Type** | TBD |
| **Project Sponsors** | Government of Morocco (current) with a view to incorporating many more Saharan governments over the coming decades. |
| **Project Stage** | A Tunisian project with STEG Énergies Renouvelables, a subsidiary of the Tunisian state utility company STEG, is in the pre-feasibility stage focusing on solar and wind projects. Desertec is in discussions with a few governments over potential projects. Many of the longer-term projects planned for the future are still conceptual.[4] |
| **Project Energy Source** | Solar and wind power farms throughout the northern Saharan desert. |
| **Potential Market** | Northern African host countries as well as southern Europe. |

[1] Sourced from "Our Global Mission", Desertec Foundation, December 2010, available at www.desertec.org

[2] Sourced from "World's Most Daring Solar Energy Project Coming to Fruition", by Ilya Rzhevskiy, The Epoch Times, June 2009, available at (http://www.theepochtimes.com/n2/technology/solar-energy-desertec-Project-electric-18824.html) and "How Africa's desert sun can bring Europe power", by Robin McKie, The Observer(London), December 2007, available at (http://www.theguardian.com/environment/2007/dec/02/renewableenergy.solarpower)

[3] Sourced from "European Solar Power from African Deserts?", by James Kanter, The New York Times, June 2009, available at (http://green.blogs.nytimes.com)

[4] Sourced from "Tunisia: Nation and Desertec Sign MOU", November 2010, available at (http://allafrica.com/stories/201011081266.html)




| Countries/Region | Algeria, Niger, Libya, Tunisia, Morocco, Egypt, Chad \| Northern Africa |
|---|---|
| **Regional Context** | The nature and scale of the project will incorporate the entire north African and Mediterranean regions. As such, power trade will form an integral part of the Sahara Solar Vision. Transmission lines will cross many countries and even continental borders. The opportunity for power import and export is large and integrated regional solar and wind plants as well as the transmission infrastructure in support of these will have positive regional impacts. |
| **REC** | TBD |
| **Economic Sustainability & Expected Benefits** | Desertec studies have concluded that the extremely high solar radiation in the deserts of North Africa and the Middle East outweighs the 10-15% transmission losses between the desert regions and Europe. This means that solar thermal power plants in the desert regions are more economical than the same kinds of plants in southern Europe. The desert is also extremely vast and sparsely populated, making it possible to set up large solar farms without a negative impact on inhabitants of the region. |
| **Implementing Authorities** | Governments of host countries |
| **Project Status** | In 2011, the Desertec consortium signed an MOU with the Moroccan Agency for Solar Energy (MASEN)[5] to develop a reference project with a total capacity of 500 MW, which will be a combination of concentrated solar power plants (400 MW) and photovoltaics (100 MW). The first available power from this project could be fed into the Moroccan and Spanish grids between 2014 and 2016, depending on the selected technology and market conditions.[6] |
| **Total Estimated Project Cost** | Based on the current estimate, the total costs of the Moroccan solar power/ photovoltaic plant are approximately US$ 1.7 billion. Costs for the other planned projects are TBD. |
| **Financing Gap** | TBD |
| **Key Challenges** | Scale – political and financial support required is vast. Even private investment has proved difficult to maintain as the proposed immense scale of the project is an issue for bankability. |
| **Way Forward** | • Complete pre-feasibility studies<br>• Conclude MOUs with host countries<br>• Plan, structure and secure financing |

[5] Sourced from "Morocco is key testing ground for Desertec solar-farm Project", by April Yee, June 2011, The National, available at (http://www.thenational.ae/business/energy/morocco-is-key-testing-ground-for-desertec-solar-farm-Project)

[6] Sourced from "Sahara wind and sun to power EU homes", by Philip Ebels, February 2012, available at (http://euobserver.com/wind-energy/115033) and "Could the desert sun power the world?", by Leo Hickman, December 2012, The Guardian, available at (http://www.theguardian.com/environment/2011/dec/11/sahara-solar-panels-green-electricity)

## Geothermal – Baringo-Silali Geothermal Field Project

| Countries/Region | Kenya, Uganda, Rwanda \| East Africa |
|---|---|
| **Project Location** | Kenyan part of the East African Rift (extending from Baringo to Silali up to the border with Ethiopia) |
| **Sector/Subsector** | Energy/Generation |
| **Project Description** | Development of geothermal energy in the Baringo-Silali Block, which comprises the Bogoria, Baringo, Arus, Korosi, Chepchuk, Paka, and Silali prospects. Detailed surface studies estimate the Block's potential to be about 3,000 MW. The current plan is to develop 2,000 MW within this Block in four phases:<br>• Phase I-800 MW by 2017<br>• Phase II-400 MW by 2019<br>• Phase III-400 MW by 2021<br>• Phase IV-400 MW by 2023<br>Kenya's Geothermal Development Company (GDC) was mandated to be the lead agency in developing the geothermal field. Kenya has an aggressive electricity capacity enhancement program to add 5,000+ MW by the end of 2016, out of which geothermal will account for approximately 1,600 MW. In addition, Kenya, Uganda, and Rwanda signed an agreement in February 2014 to develop key infrastructure projects with regional impact - the Baringo-Silali development was identified as one of the regional priorities. |
| **Project Size/Capacity** | Potentially 3,000 MW, 200 MW to be developed by December 2016.[7] |
| **Project Objectives** | Supply low-cost, clean, base-load electricity to support the fast growing economies of Kenya, Uganda, and Rwanda with possible spin-off to South Sudan and Burundi once the interconnections are completed. |
| **Project Structure/Type** | A PPP, IPP envisaged. |

[7] Sourced from Presentation "GDC's Geothermal Development Strategy for Kenya: Progress and Opportunities", by Ruth Musembi, GDC, Head of Corporate Communication and Marketing, at Power Africa-AUC Geothermal Roadshow, September-October 2014


| Countries/Region | Kenya, Uganda, Rwanda \| East Africa |
|---|---|
| **Project Sponsors** | Governments of Kenya, Uganda and Rwanda |
| **Project Stage** | Approvals, permits, and licenses currently being obtained (e.g. environmental license, land approval).[8] |
| **Project Energy Source** | Geothermal, East African Rift |
| **Potential Market** | Kenya, Uganda, Rwanda, East Africa region |
| **Regional Context** | Beyond supply to Kenya, Uganda, and Rwanda, possible supply also to South Sudan and Burundi, once interconnections are in place. The generation capacity will likely lead to the development of other key infrastructure projects in the region, as envisaged by the agreement entered into between Kenya, Uganda, and Rwanda. |
| **REC** | COMESA, EAC, EAPP |
| **Economic Sustainability & Expected Benefits** | The project presents opportunities for providing low-cost, clean power for industrial, commercial, and social transformation in the region. |
| **Implementing Authorities** | GDC |
| **Project Status** | Community engagement framework established. GDC advertised for equity investors to jointly develop the steam field.[9] |
| **Total Estimated Project Cost** | US$ 2 billion for the first 400 MW |
| **Financing Gap** | US$ 1.9 billion[10] |
| **Key Challenges** | Environmental and social approvals/licenses. Securing financing. |
| **Way Forward** | Finalise PPP structure, including IPP participation (as necessary) and secure outstanding financing |

[8] Op. cit., Note 7

[9] Op. cit., Note 7

[10] KfW has funded approximately US$ 100 million for steam field development. The Geothermal Risk Mitigation Fund has funded approximately US$ 6 million for infrastructure exploration drilling. Sourced from Presentation "Geothermal Development in Kenya: Status, Planned Activities and Required Support" by Dr. Peter Omenda, GDC, at Geothermal Donors Coordination Meeting, Reykjavik, Iceland, May 2014

## Hydro – Batoka Gorge Hydropower Project

| Countries/Region | Zimbabwe, Zambia \| Southern Africa region |
|---|---|
| **Project Location** | Zambezi River Basin, between Victoria Falls and the Kariba Dam |
| **Sector/Subsector** | Energy/Generation |
| **Project Description** | A hydropower plant based in the Zambezi River Basin, with an installed capacity of 1,600 MW, to enable export of electricity. A 181 m gravity dam will be constructed together with the installation of 8 x 200 MW units with the power shared equally between Zimbabwe and Zambia. Transmission lines, access roads and other facilities are also included in the project design. |
| **Project Size/Capacity** | 1,600 MW |
| **Project Objectives** | • Utilisation of renewable energy and concomitant reduced reliance on fossil fuels<br>• Reduction of power shortages and load shedding<br>• Enable both Zambia and Zimbabwe to increase their electricity generation capacity, while reducing reliance on electricity imports, hence improving energy security<br>• Allow for export of power to the region and associated regional infrastructure development<br>• Job creation: 6,000 permanent jobs per annum during construction and 1,200 during operation phase (split equally between both countries) |
| **Project Structure/Type** | Potential contract type: BOT or PPP structure where both government and private sector are involved from the start - SPV |
| **Project Sponsors** | Governments of Zimbabwe and Zambia |
| **Project Stage** | Technical, legal and environmental studies conducted in 1993 were due for review in 2013. Feasibility studies and the economic impact assessment were reviewed and updated in 2009.<br>Expressions of Interest (EOI) were called for by the Implementing Authority (the Zambezi River Authority) (ZRA) in February 2013 for response by interested companies/consortia with experience in developing large-scale hydropower projects on a BOT basis.<br>Construction planned to commence in 2015. |
| **Project Energy Source** | Zambezi River |
| **Potential Market** | Zimbabwe and Zambia, with potential export opportunities to the region |
| **Regional Context** | Allow for export of power to the region<br>SAPP energy generation mix, which currently comprises mostly fossil fuel plants, will be significantly improved through this green hydropower project<br>Enable better coordination among the existing and future dams on the Zambezi River, in order to ensure the availability of appropriate water levels. |

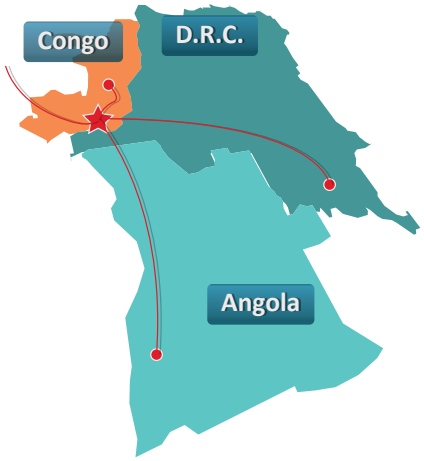

| Countries/Region | Zimbabwe, Zambia \| Southern Africa region |
|---|---|
| **REC** | SADC, COMESA, ECCAS/CEEAC |
| **Economic Sustainability & Expected Benefits** | Potential to create 6,000 permanent jobs per annum during construction and 1,200 during the operational phase (split equally between both countries). Will improve power availability in both Zambia and Zimbabwe and reduce load shedding and spur additional investment and result in increased industrial development and performance. Opportunities for improved water and sanitation service delivery. Will stimulate other downstream economic activities. Power exports to the region will boost inflows of foreign currency. Rural electrification, the development of residential areas, infrastructure and social amenities are all potential spin-offs. Will also benefit activities related to tourism, irrigation and fisheries.[11] Capacity from the project will facilitate the opening of new, and expansion of existing mines as Zambia pursues its goal of increasing copper production. |
| **Implementing Authorities** | Governments of Zimbabwe and Zambia<br>ZRA |
| **Project Status** | Reviewing engineering feasibility, environmental, and social impact assessment studies.<br>Securing of finance for implementation.<br>Planned commencement year for construction is 2015 with an expected construction duration of 6 years. |
| **Total Estimated Project Cost** | US$ 6 billion |
| **Financing Gap** | US$ 6 billion |
| **Key Challenges** | Environmental and social approvals. The environmental issues related to hydro schemes continue to present major obstacles to the development of these projects.<br>Securing financing. |
| **Way Forward** | Project finance is based on a PPP. However, project preparation needs to reach bankability in order to secure project finance.<br>Project stakeholders need to decide on whether they will create a SPV, or whether ZRA should be mandated to fulfil this role.<br>Feasibility Study (1993, updated 2009) and Economic Impact Assessment (1993, updated in 2009) need to be updated. |

[11] Sourced from "Batoka Gorge Hydropower Project", Project Number: E.11.1.2, Iranian Embassy based in Addis Ababa, available at www.en.addisababa.mfa.ir

## Hydro – Inga III Basse Chute (BC) Hydropower Project

| Countries/Region | DRC\| Central and Southern Africa |
|---|---|
| **Project Location** | Inga Falls on the Congo River, Bas-Congo Province, DRC |
| **Sector/Subsector** | Energy/Generation |
| **Project Description** | Construction of a 4,800 MW hydropower plant and associated high-voltage transmission lines. An intake of part of the water of the Congo River into the neighbouring Bundi Valley will be built as well as a dam across the Bundi Valley to allow impoundment of the diverted water. The project will not require construction of a dam on the Congo River itself. The Inga III hydropower scheme is the first phase in the construction of the Grand Inga hydropower project, located 225 km from Kinshasa, and 60 km upstream of the mouth of the Congo into the Atlantic Ocean. The Grand Inga scheme is intended to have a generation capacity of 40,000 MW and will be developed in 7 phases beginning with Inga III, which itself would have 2 phases. The project has been selected by the African Caucus as one of the hydropower projects in Africa demanding particular attention from the World Bank.<br><br>1,000 MW of power generated by Inga III will be sold to DRC's utility Societe Nationale d'Electricite (SNEL), which would in turn on-sell to households and small businesses in the Kinshasa region. 1,300 MW of power will be sold to mining companies in DRC's Katanga Province. The project also includes a commitment from South Africa to purchase 2,500 MW of electricity. This arrangement is designed to increase the bankability of the project and establish its financial viability. |
| **Project Size/Capacity** | 4,800 MW |
| **Project Objectives** | • Utilisation of renewable energy<br>• Reduction of power shortages and load shedding<br>• Export of power to the region<br>• Stimulate the development of industrial sectors, e.g. mining<br>• Job creation<br>• Cost-effective power source |
| **Project Structure/Type** | Developed as a PPP. It is intended that a private concessionaire, selected through a competitive process, will develop, construct and operate the intake, canal, power station and transmission lines. The canal and the dam on the Bundi River will be publicly financed, while the remainder of the project is expected to be privately financed. The PPP structuring may be adjusted based on market tests. The AfDB, World Bank, French Development Agency, European Investment Bank (EIB) and the DBSA have all shown interest in financing the project.[12] |
| **Project Sponsors** | Government of DRC |
| **Project Stage** | The project is under technical preparation. Feasibility studies have been undertaken, but are being augmented by supplemental studies. |
| **Project Energy Source** | Congo and Bundi Rivers |

[12] Sourced from "The Inga 3 Hydropower Project" by International Rivers, available at www.internationalrivers.org



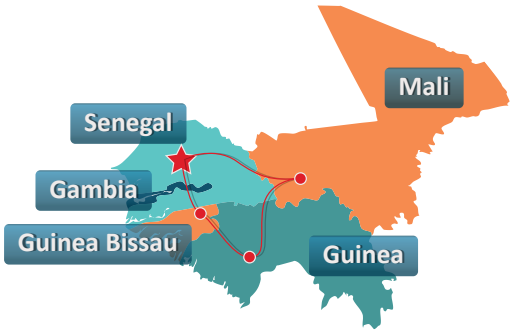

| Countries/Region | DRC\| Central and Southern Africa |
|---|---|
| **Potential Market** | DRC and the countries of the SAPP (e.g. South Africa), since DRC is already interconnected with the SAPP grid. |
| **Regional Context** | The project will be phase one of the broader Grand Inga Project (envisioned 7 phases in total), which has the potential capacity of 40,000 MW. Due to the scale of the Grand Inga project, it potentially has vast socio-economic benefits for the entire sub-Saharan region. Inga III would be the first hydropower project on the Inga Falls in the last three decades and will contribute significantly towards meeting both the historical and future economic growth and demand. |
| **REC** | ECCAS |
| **Economic Sustainability & Expected Benefits** | DRC and the other countries that purchase power from the project will have enhanced economic growth as a result of the supply of economic, reliable, renewable energy. The long-term PPA with South Africa will guarantee a stable, secure revenue stream. Industrial growth, in particular in the mining sector, will be supported and consequently create and sustain large-scale, long-term employment. DRC will receive operating assets at the conclusion of the concession contract. DRC will receive tax revenue from the SPV established. |
| **Implementing Authorities** | Government of DRC, and the proposed ring-fenced implementing agent, the Agence pour le Développement et la Promotion d'Inga (ADEPI) to manage and monitor the Inga development. |
| **Project Status** | Finalisation of the supplemental feasibility studies.<br>Finalisation of the financing and key project agreements e.g. concession contract, engineering procurement construction (EPC) contract, PPAs, insurance, operation and maintenance (O&M) agreement.<br>Establishment of the implementing agent (ADEPI) to be addressed.<br>The project will then be tendered out and an investor selected to complete development and bring the project into the construction phase.<br>Three offtake agreements will be required.<br>It is forecasted that power will be generated by 2020.<br>DRC's institutional arrangements progressing well (Inga Law to be promulgated in June 2015). |
| **Total Estimated Project Cost** | US$ 12-14 billion |
| **Financing Gap** | US$ 7-8 billion |
| **Key Challenges** | Scale – political and financial support required is vast. Also, the environmental issues of hydro schemes continue to present major obstacles to the development of these projects. |
| **Way Forward** | Finalise supplemental feasibility studies and financing and key project agreements (concession contract, EPC contract, PPAs, insurance, O&M agreement, etc.)<br>Secure financing<br>Establish implementing agent (ADEPI) |

[13] Sourced from "DRC's Controversial Inga 3 Hydropower Project receives IDA technical assistance grant" by Michael Harris, available atwww.hydroworld.com

## Hydro – Sambangalou Hydropower Project[14]

| Countries/Region | Gambia, Guinea Conakry, Guinea Bissau and Senegal \| West Africa region |
|---|---|
| **Project Location** | Located 930 km upstream from the mouth of the Gambia River. The dam will be located in Senegal with part of the reservoir in Guinea. |
| **Sector/Subsector** | Energy/Generation |
| **Project Description** | A hydropower plant with a 128 MW capacity, as well as a 185 square kilometre reservoir (4 turbines of 32 MW each).<br>Originally formed part of a larger Gambia River Basin Development Organisation (OMVG) Project, which entailed an interconnecting power grid with the Kaleta Dam in Guinea. |
| **Project Size/Capacity** | Installed capacity of 128 MW, with a mean energy production of 402 GWh per year. |
| **Project Objectives** | • Supply of sustainable electricity to the participating countries.<br>• Control of the water level in the river basin.<br>• Promotion of peace and stability in the region. |
| **Project Structure/Type** | Developed as a public sector project. Project sponsors will decide on PPA, operating contract with private operator and other legal documents. Possible option for a PPP for the operation and maintenance of the dam and hydro system. |
| **Project Sponsors** | Governments of Gambia, Guinea, Guinea Bissau and Senegal. |
| **Project Stage** | Detailed design study was completed in 2008<br>Feasibility study was completed in 2011<br>Two detailed social and environmental impact assessments and a resettlement action plan have been completed<br>All policies, studies and the legal framework have been completed |
| **Project Energy Source** | Gambia River |
| **Potential Market** | Gambia, Guinea, Senegal, Guinea Bissau and the region |

[14] Sourced from "Sambangalou Dam", Project Number: E.07.1, Iranian Embassy based in Addis Ababa, available at www.en.addisababa.mfa.ir




| Countries/Region | Gambia, Guinea Conakry, Guinea Bissau and Senegal \| West Africa region |
|---|---|
| **Regional Context** | The availability of low-cost electricity will lead to increased regional power trade and will also increase the region's energy security<br>Will contribute to a multi-sector (water and power) approach to regional integration |
| **REC** | ECOWAS and CEN-SAD |
| **Economic Sustainability & Expected Benefits** | Gambia, Guinea, Guinea Bissau and Senegal will enjoy low-cost, renewable energy. The availability of low-cost electricity will lead to increased regional power trade and enable regional integration. The additional electricity made available through this project will also increase the region's energy security. |
| **Implementing Authorities** | The coordinating agency on behalf of the three countries is the OMVG. Other implementing partners include the West African Power Pool (WAPP) and the ECOWAS. |
| **Project Status** | Detailed design study completed in 2008 and cost updated in April 2013. Following 2 detailed social and environmental impact assessments, an environment plan and resettlement action plan were established. All documents, policies, studies and legal framework have been completed; will be updated by new transaction advisor once the financing has been mobilised. |
| **Total Estimated Project Cost** | US$ 1.108 million |
| **Financing Gap** | US$ 324-524 million |
| **Key Challenges** | Social impacts – the scale of the planned reservoir spans multiple countries and will require significant community planning and restructuring. |
| **Way Forward** | Dedicated co-ordination unit to be formed to manage the implementation process.<br>Updated inter-governmental agreement to be drafted.<br>Construction is expected to begin in 2014 and be completed by 2018. |

## Gas – West African Power Pool: Domunli Regional Power Project

| Countries/Region | Ghana, Benin, Togo, Nigeria \| West Africa |
|---|---|
| **Project Location** | Located in the Western Region of Ghana, near the Ghana Gas processing plant facility |
| **Sector/Subsector** | Energy/Generation |
| **Project Description** | Construction of a 450 MW combined cycle thermal power plant, which seeks to make use of the Jubilee gas fields. This is a Government of Ghana/Volta River Authority (VRA) (Ghana's national utility for generation and supply) sponsored project located in Domunli in the western region of Ghana. Based on a set of combined cycle power plants: one is set to comprise 2 gas turbines with a rated output of about 150 MW each, and the other a steam turbine with a rated output of about 150 MW. The site selected is located in the western region of Ghana where the Ghana Gas processing plant is built in order to reduce incremental transmission losses. The project was 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),[15] allowing for increased trade, regional integration, and grid stability. |
| **Project Size/Capacity** | 450 MW |
| **Project Objectives** | Supply of sustainable 450 MW of electricity to five ECOWAS countries – Ghana, Togo, Benin, Burkina Faso and Nigeria – through the WAPP 330 kV and 161 kV interconnected transmission lines. The project will address increasing demand and the high cost of power generation by using associated gas. |
| **Project Structure/Type** | Developed as a PPP. The project will be structured as a BOT concession awarded to an IPP. |
| **Project Sponsors** | Government of Ghana |
| **Project Stage** | Site preparatory work is on-going. The VRA is currently seeking funds to develop the project as a joint venture partnership. |
| **Project Energy Source** | Gas from Jubilee fields in Ghana |
| **Potential Market** | Ghana, Benin, Togo, Nigeria, Mali, Burkina Faso, Cote d'Ivoire and West Africa region |

[15] The CTB is the partly completed and partly operational 330 kV transmission line from Cote d'Ivoire to Nigeria (passing through Ghana, Togo and Benin)


| Countries/Region | Ghana, Benin, Togo, Nigeria \| West Africa |
|---|---|
| **Regional Context** | The project is intended to connect into the regional grid, thereby allowing for regional integration, increased trade in the region and grid stability. |
| **REC** | WAPP and ECOWAS |
| **Economic Sustainability & Expected Benefits** | Increased capacity to meet growing demand in the region.<br>Reduced gas flaring.<br>Job creation. |
| **Implementing Authorities** | Government of Ghana/VRA |
| **Project Status** | The VRA is currently seeking funding for the project.<br>A 40 hectare site has been identified and efforts are underway to secure title to the land from the Government of Ghana. The project implementation schedule was developed and adopted in February 2013. The Electricity Company of Ghana (ECG, Ghana), Energie du Mali–SA (EDM-SA, Mali), and Société Nationale d'Electricité du Burkina (SONABEL, Burkina) have already confirmed their participation as off-takers in the project. Studies are also underway to ensure reliable gas supply to the plant upon its commissioning by 2017-2018.[16] |
| **Total Estimated Project Cost** | US$ 600 million (to be updated by AFC) |
| **Financing Gap** | US$ 300 million (to be updated by AFC) |
| **Key Challenges** | Filling funding gap as well as securing reliable gas supply. |
| **Way Forward** | Secure outstanding funding<br>Finalise project implementation |

[16] Sourced from West African Power Pool website, www.ecowapp.org

## Gas – West African Power Pool: Maria Gleta Regional Power Project

| Countries/Region | Ghana, Benin, Togo, Nigeria \| West Africa |
|---|---|
| **Project Location** | Near the border between Porto Novo and Cotonou cities, Benin |
| **Sector/Subsector** | Energy/Generation/Transmission |
| **Project Description** | Construction of a 450 MW combined cycle power plant: one is set to comprise two gas turbines with a rated output of about 150 MW each, and the other a steam turbine with a rated output of about 150 MW, bringing the total output to 450 MW. The site selected is located about 2.5 km west of the planned Maria Gleta substation in order to reduce incremental transmission losses, since the plant will be close to the major load centre in Benin as well as proximate to gas supply. Will be an important consumer of gas from Nigeria and Ghana. The project was meant to utilise the coastal transmission backbone (CTB), allowing for increased trade, regional integration, and grid stability.<br><br>There are three options for integrating the plant to the CTB -<br><br>Base case - 161 kV transmission line to the plant substation (2.5 km) and 330 kV transmission line to the Mome Hagou substation (100 km)<br><br>Alternative 1-330 kV transmission line to Mome Hagou substation (100 km)<br><br>Alternative 2-61 kV transmission line to the plant substation (2.5 km)<br><br>WAPP is responsible for the coordination of the project and the AFC is responsible for its preparation and development. The project company (Maria Gleta Company) which comprises VRA (Ghana) and Communaute Electrique Du Benin (CEB) (Benin-Togo), will sign a shareholders agreement, PPA, fuel supply agreement, implementation agreement, and other relevant project and financing agreements. The main off-takers for the power plant will be Ghana and Benin. |
| **Project Size/Capacity** | 450 MW |
| **Project Objectives** | Supply of sustainable 450 MW of electricity to five ECOWAS countries – Ghana, Togo, Benin, Burkina Faso, and Nigeria – through the WAPP 330 kV and 161 kV interconnected transmission lines. The project will address increasing demand and utilise a more cost-effective fuel (gas) than crude oil. |


| Countries/Region | Ghana, Benin, Togo, Nigeria \| West Africa |
|---|---|
| **Project Structure/Type** | Developed as a PPP, the project will be structured as a BOT concession awarded to an IPP |
| **Project Sponsors** | Government of Benin |
| **Project Stage** | AFC to commence pre-feasibility studies |
| **Project Energy Source** | Gas from Nigeria, West African Gas Pipeline (WAGP) and Ghana (Jubilee fields) |
| **Potential Market** | Ghana, Benin, Togo, Nigeria and the West Africa region |
| **Regional Context** | The project will augment the energy supply in the West Africa region, allowing for increased trade, regional integration and grid stability |
| **REC** | WAPP and ECOWAS |
| **Economic Sustainability & Expected Benefits** | Increased capacity to meet growing demand in the region, leading also to increased trade in the region. Gas flaring will be reduced. |
| **Implementing Authorities** | Government of Benin |
| **Project Status** | AFC to commence pre-feasibility studies |
| **Total Estimated Project Cost** | US$ 781 million (to be updated by AFC) |
| **Financing Gap** | US$ 500 million (to be updated by AFC) |
| **Key Challenges** | Filling funding gap as well as securing reliable gas supply. |
| **Way Forward** | Subject to the approval of private partner selection by the WAPP Board, AFC and WAPP will commence negotiation on project implementation schedule and milestones. |

## Gas – Ghana 1000 LNG to Power Project

| Countries/Region | Ghana \| West Africa |
|---|---|
| **Project Location** | Western Ghana |
| **Sector/Subsector** | Energy/Generation |
| **Project Description** | Construction of an integrated liquefied natural gas (LNG) to power plant, generating in excess of 1,300 MW of electricity to Ghana's national power grid. It will combine the importation of LNG, a dedicated floating storage and regasification unit (FSRU) to receive, store and regas, while associated infrastructure will transport natural gas on-shore to General Electric (GE) turbines to generate power.[17] The project is a greenfield power development project in two phases of 750 MW and 550 MW respectively and will be fuelled by a long-term supply contract for LNG.<br><br>The first phase of the project is expected to begin delivering power by early 2017, initially producing 360 MW in simple-cycle mode. The second and final phase of the project is expected to be implemented before 2019, doubling the first-phase power output.[18] |
| **Project Size/Capacity** | 1,300 MW |
| **Project Objectives** | 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.[19] |
| **Project Structure/Type** | Developed as a purely private sector IPP Project, requiring no direct financial contribution from the Government of Ghana. |
| **Project Sponsors** | The Government of Ghana'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. The Government will also facilitate a long-term agreement with ECG and potentially, other power off-takers for the purchase of power from the project.[20] |
| **Project Stage** | Project sponsors and developers are in final stages of negotiations to secure a VRA-owned site near Aboadze for the project. The PPA negotiations are currently in process and the target deadline for completion was the end of 2014. The Government of Ghana's Ministry of Finance is to initiate a process for a World Bank partial risk guarantee (PRG). Ghana's Ministry of Energy and Petroleum has formed a Steering Committee (delivery unit) to accelerate the project's development. |

[17] Sourced from "Ghana 1000 MW gas to power Project", ESI Africa Online, May 2014, available at www.esi-africa.com

[18] Sourced from "Ghana 1000 gets under way as consortium inks agreement", by Natasha Odendaal, May 2014, Engineering News Online, available at www.engineeringnews.co.za

[19] Op. cit., Note 18

[20] Op. cit., Note 18


| Countries/Region | Ghana \| West Africa |
|---|---|
| **Project Energy Source** | LNG |
| **Potential Market** | Ghana. In addition, the Ghanaian Government will facilitate potential agreements for the sale of surplus power to other buyers in the West Africa region. |
| **Regional Context** | This will be the single-largest power generation project in SSA outside of South Africa, and as such will greatly reduce Ghana's dependence on power imports and assist in stabilising the region's power grid. |
| **REC** | WAPP and ECOWAS |
| **Economic Sustainability & Expected Benefits** | The generation of over 1,000 MW on a single site is expected to yield significant savings as the power generation units could leverage the same balance of plant parts. Due to gas shortages, Ghana is currently spending more than US$ 1 million a day to buy light crude oil for power generation. Current LNG prices are approximately 35% less than light crude oil, so the impact of the project on the economy cannot be understated. |
| **Implementing Authorities** | Government of Ghana |
| **Project Status** | PPA negotiations are ongoing. PRG and MIGA insurance process is ongoing. The Government of Ghana is working towards resolving issues surrounding the supply of natural gas as well as liquidity and default risks of ECG. GE is in discussions with ECG to supply the first batch of 250 MW. The project is on course for stage 1 implementation in May 2016.[21] |
| **Total Estimated Project Cost** | US$ 1,916 billion for Phase 1 power + LNG |
| **Financing Gap** | 100% of equity committed - debt arranging mandate to be awarded |
| **Key Challenges** | Securing reliable gas supply. |
| **Way Forward** | Finalise PPA<br>Finalise PRG and MIGA insurance. Secure and finalise the appropriate gas supply contracts |

[21] Sourced from "General Electric to add 1000 MW to national grid", by Sebastian Syme, October 2014, Graphic Online, available at (http://graphic.com.gh/news/general-news/32843-general-electric-to-add-1000mw-to-national-grid.html)

## Gas Pipeline – Nigeria-Algeria Gas Pipeline Project

| Countries/Region | Nigeria, Niger and Algeria \| West and North Africa regions |
|---|---|
| **Project Location** | 4,400 km pipeline from Qua Ibom Terminal (Calabar, Nigeria), through Niger to Hassi R'Mel (Algeria) |
| **Sector/Subsector** | Energy/Transmission of Gas |
| **Project Description** | Construction of a natural gas pipeline designed to connect with the existing Trans-Mediterranean, Maghreb-Europe, Medgaz, and Galsi pipelines across the Mediterranean sea. Also referred to as the Trans-Sahara Gas Pipeline (TSGP). The length is estimated at roughly 4,400 km, with over 1,037 km in Nigeria, 853 km in Niger, 2,310 km in Algeria, and 220 km connecting Algeria to Spain.[22] Would initiate in the Niger Delta basin, cross vast spans of the Sahel region and the Sahara desert before reaching Hassi R'Mel, a hub for natural gas and oil pipelines running to the Algerian coast. Given the length of 4,400 km, the pipeline is considered cost-competitive when compared to the LNG option taking into account gas wastage, estimated at 15-18%, during the process of liquefaction. There are two options for the size of the pipeline, 48 or 56 inches in diameter. With the 48 inch option, the TSGP will reach a capacity of 30 billion cubic meters of natural gas per year. |
| **Project Size/Capacity** | Approximately 4,400 km and once functioning, the TSGP is expected to reach a capacity of 1,059 billion cubic feet or 30 billion cubic meters of natural gas per year. |
| **Project Objectives** | • Diversification of export route for marketing Nigerian natural gas<br>• Creation of wealth by opening up economic growth opportunities in the sub-region<br>• Boosting the GDP and improving the living standards of the people within the sub-region<br>• Boosting domestic gas supply within the region<br>• Assisting in the fight against desertification through sustainable and reliable gas supply [23] |
| **Project Structure/Type** | PPP model |
| **Project Sponsors** | Governments of Nigeria, Niger and Algeria |
| **Project Stage** | Feasibility studies concluded and accepted by sponsors in September 2006 with the internal rate of return ranging between 15.5 and 25%. Inter-governmental agreement (IGA) between sponsor governments executed and ratified by Niger Republic and Algeria. NNPC progressing with the Trans-Nigerian segment of the Pipeline to kick-start and fast track the initiative. |
| **Project Energy Source** | Nigerian gas reserves |
| **Potential Market** | Nigeria, Niger, Algeria, West and North Africa regions and Europe/European Union. |

[22] Sourced from Utah Environmental Law, Volume 31, No.1 of 2011, "The Trans-Saharan Gas Pipeline: An Overview of the threats to its success and the means to prevent its failure", by Loic Conan

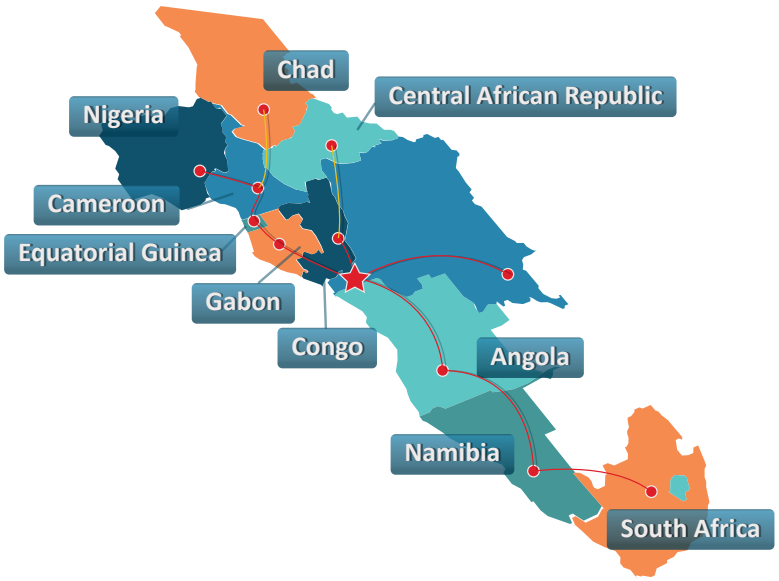
[23] Sourced from Presentation "The TSGP Project", by Dr Ghaji Bello, Acting Director-General of the ICRC, in Hamburg and Hanover, April 2013


| Countries/Region | Nigeria, Niger and Algeria \| West and North Africa regions |
|---|---|
| **Regional Context** | The TSGP has the critical advantage of supplying gas to Northern Nigeria, Niger, Southern Algeria, as well as Burkina Faso, and Southern Mali which are currently affected by high energy prices and desertification. Also intended to help integrate the economies of the sub-region in line with objectives of NEPAD, promote growth and poverty alleviation by opening up economic growth opportunities in the sub-region, and assist in the fight against deforestation and desertification by preventing the widespread use of wood for energy |
| **REC** | AMU, ECOWAS and CEN-SAD |
| **Economic Sustainability & Expected Benefits** | Due to the depletion of European gas fields and the need for alternative supply sources, the demand from Europe is likely to remain high. The TSGP will also contribute to eliminating natural gas flaring in Nigeria. |
| **Implementing Authorities** | NNPC, SONATRACH (Algeria's largest oil and gas company), SONIDEP (Niger's Petroleum parastatal), Nigeria's ICRC, as well as the ECOWAS. |
| **Project Status** | Feasibility studies concluded and accepted by sponsors in September 2006 with the internal rate of return ranging between 15.5 and 25%. IGA between sponsor governments executed and ratified by Niger Republic and Algeria. NNPC progressing with the Trans-Nigerian segment of the Pipeline to kick-start and fast track the initiative. Linking up the supply sources and delivery to Kano, the take-off for the TSGP through the Trans-Nigerian Gas Pipeline (TNGP). |
| **Total Estimated Project Cost** | US$ 10 billion (48 inch option) (2006)<br>US$ 13.7 billion (56 inch option) (2006) |
| **Financing Gap** | US$ 10 billion - 13.7 billion |
| **Key Challenges** | Scale – political and financial support required is vast. Line security from theft and other security issues is a challenge. |
| **Way Forward** | Project feasibility study revalidated (1st quarter 2014) reassessing (1) gas supply options and (2) the Trans-Nigerian optimisation study. Identify critical areas of synergy with the TSGP from a construction point of view. Revalidation of 2006 feasibility study concluded. Ratification of the IGA by Algeria needs to be executed. Reach an agreement regarding Algeria request for participation in Nigeria up stream petroleum. Update the 3 country IGA in line with an alternative SONATRACH participating arrangement and secure internal NASS ratification. Engagement of private investors and financial institutions for project funding. Planned project construction in 2015 for a duration of 4 years. |

## Transmission – Central African Interconnection Transmission Line Project

| Countries/Region | Nigeria, Cameroon, DRC, Angola, Gabon (for first four segments of the transmission line), Equatorial Guinea, Chad, (if the Project is extended) \| West, Central, Southern Africa |
|---|---|
| **Project Location** | Transmission line spanning West, Central and Southern Africa |
| **Sector/Subsector** | Energy/Transmission |
| **Project Description** | Construction of a 3,800 km transmission line system made up of four segments:<br>330 kV Interconnection between Lagos (Nigeria) and Douala (Cameroon)<br>330 kV Interconnection between Inga (DRC) and Luanda (Angola)<br>330 kV Interconnection between Inga (DRC) and Libreville (Gabon)<br>330 kV Interconnection between Libreville (Gabon) and Douala (Cameroon)<br>The system will transfer the future power to be generated by the Inga III and Grand Inga stations and feed it to the SAPP and the WAPP via the interconnection between Cameroon and Nigeria.<br>It is expected to have a 4,000 MW capacity by 2020 and 12-17 GW by 2040 (depending on the segment). The project includes an option to extend the line to Equatorial Guinea and Chad. There is also an option to reinforce the existing 1,800 km transmission link between the DRC and Zambia.<br>The Economic Community of Central African States (ECCAS), the Central African Power Pool, the WAPP and SAPP will be involved in the implementation of the project. |
| **Project Size/Capacity** | 3,800 km transmission line with 4,000 MW capacity |
| **Project Objectives** | Will allow for the supply of low-cost power from the proposed Inga III hydropower plant and other proposed generation projects in the region, to the above-mentioned regional power pools and various utilities. |
| **Project Structure/Type** | Developed as a PPP.[24] |
| **Project Sponsors** | Regional power pools and member utilities. |
| **Project Stage** | At conceptual and pre-feasibility stage |
| **Project Energy Source** | Transmission line, with capacity to transport power from various generation sources, including hydropower. |

[24] Traditionally, transmission line projects are public sector projects, however the recent trend is for the private sector to also play a role through various PPP structures. Notable examples of such PPP structures can among others, be found in the Indian energy sector




| Countries/Region | Nigeria, Cameroon, DRC, Angola, Gabon (for first four segments of the transmission line), Equatorial Guinea, Chad, (if the Project is extended) \| West, Central, Southern Africa |
|---|---|
| **Potential Market** | West, Central and Southern Africa region |
| **Regional Context** | The project will allow for expanded regional power trade and optimisation of existing and new generation sources, improved balance of generation, and improved quality and reliability of supply load across the regions. |
| **REC** | ECCAS |
| **Economic Sustainability & Expected Benefits** | The interconnection line will allow for increased electricity trading in the regions and expansion of generation. Stimulation of job creation during the construction and post-construction/operational stages. The transmission system will be paid for by the collection of transmission charges from users. |
| **Implementing Authorities** | Governments of Nigeria, Cameroon, DRC, Angola and Gabon. The establishment of a single regional entity responsible for development, construction and operation of the transmission system is envisioned. |
| **Project Status** | Pre-feasibility studies together with the environmental and social impact assessments (ESIA) to be completed. |
| **Total Estimated Project Cost** | US$ 5 billion |
| **Financing Gap** | US$ 5 billion |
| **Key Challenges** | Scale – political and financial support required is vast. Securing financing (both for development and the project itself). |
| **Way Forward** | Implementation of the project is scheduled to take place over a period of seven years. While the financing plan is being finalised, a PPP structure is also being prepared. It is important to establish a single regional entity responsible for the development, construction and operation of the transmission line to ensure a single point of responsibility. A regional transmission entity, separate from Inga, needs to be established. The Governments of Nigeria, Cameroon, Gabon, Angola, and DRC should take the lead in establishing the entity.<br><br>There is a need for close coordination between the regional entity of the line and the Inga project SPV to achieve a well synchronised implementation schedule of the two projects since the transmission line will partly rely upon Inga for power generation and its transmission to regional utilities. |

## Transmission-- North South Transmission Line Project

| Countries/Region | Egypt, Sudan, South Sudan, Ethiopia, Kenya, Uganda, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe, South Africa, \| East and Southern Africa |
|---|---|
| **Project Location** | Regional Interconnector-East and Southern Africa |
| **Sector/Subsector** | Energy/Transmission |
| **Project Description** | 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 Eastern Africa Power Pool (EAPP)[25] and the SAPP.[26] [27] 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. In this plan, Dedessa will have a 500 kV substation. To deliver power to the south-western areas of Ethiopia and to South Sudan and countries beyond, a substation called Tepi will be constructed. The same substation will evacuate power from Gibe IV and Gibe V plants, which are additional hydro plants planned to be constructed on the Omo Basin. A 500 kV AC transmission line will be constructed from Dedessa to Juba through Tepi substation.[28] A clear objective of the project (among others) is to create an alternate transmission corridor for East African countries in addition to the Ethiopia-Kenya 500 kV HVDC line. |
| **Project Size/Capacity** | 8,000 km, 3,000 - 17,000 MW capacity transmission line system. |
| **Project Objectives** | Creation of a high-voltage cross-border transmission system to transport power from generation sources to high-demand countries/regions. Provides an alternate transmission corridor for East African countries in addition to the Ethiopia-Kenya 500 kV HVDC line, thereby increasing access and stimulating socio-economic development. |
| **Project Structure/Type** | Developed as a PPP - BOT or EPC.[29] |

[25] EAPP member countries are: Burundi, DRC, Egypt, Ethiopia, Kenya, Libya, Rwanda, Sudan, Tanzania, and Uganda

[26] SAPP member countries are: Angola, Botswana, DRC, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe

[27] Sourced from "North-South Power Transmission Corridor, East and Southern Africa", by Sheila Barradas, Engineering News, March 2014, available at www.engineeringnews.co.za

[28] The Ethiopia-South Sudan segment of the Project appears to be advanced in its conceptual development, hence the detail provided

[29] Subject to country and regional resources and structuring. Since the project is still in conceptual stage, it could possibly be developed as a PPP, with the private sector possibly building the transmission line, but with ownership remaining with the Government/s. Traditionally, transmission line projects are public sector projects, however the recent trend is for the private sector to also play a role through various PPP structures. Notable examples of such PPP structures can among others be found in the Indian energy sector


| Countries/Region | Egypt, Sudan, South Sudan, Ethiopia, Kenya, Uganda, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe, South Africa, \| East and Southern Africa |
|---|---|
| **Project Stage** | Requires feasibility studies. |
| **Project Energy Source** | Transmission line, with capacity to transport power from various generation sources including hydropower and geothermal. |
| **Potential Market** | EAPP and SAPP |
| **Regional Context** | Increased cross-border energy trading within and between EAPP and SAPP. |
| **REC** | EAPP and SAPP |
| **Economic Sustainability & Expected Benefits** | Intended to provide cheap and reliable power to East and Southern African countries where demand is expected to multiply from industrial and commercial customers many fold in the next decade. The project will bring economic opportunity to the region's young population and will help create stable power sector growth. |
| **Implementing Authorities** | Governments of participating countries |
| **Project Status** | Pre-feasibility studies to be undertaken |
| **Total Estimated Project Cost** | TBD |
| **Financing Gap** | TBD |
| **Key Challenges** | Scale – political and financial support required is vast. Requires extensive political co-operation between the countries and regions (SAPP and EAPP). |
| **Way Forward** | The successful negotiations between the Governments of Ethiopia, South Sudan and Uganda and commitment in implementing the project will play a big role in the project going forward. |

## Transmission – Zambia-Tanzania-Kenya Transmission Line Project

| Countries/Region | Zambia, Tanzania and Kenya \| East and Southern Africa regions |
|---|---|
| **Project Location** | Kabwe (Zambia) through Mbeya (Tanzania) to Isinya (Kenya) via Iringa, Singida and Arusha (all in Tanzania) |
| **Sector/Subsector** | Energy/Transmission |
| **Project Description** | Construction of a transmission line that will connect the Zambian grid to Kenya, via Tanzania, covering a distance of 2,200 km. The transmission line (interconnector) will be constructed as a bi-directional 400 MW double circuit 400 kV power transmission line in sections from Kabwe in Zambia to Isinya in Kenya. On Tanzania's side, a 400 kV line from Mbeya to Iringa will provide the strong path for power to be delivered to the northern load centres. On Kenya's side, another 400 kV line from Singida onwards to Arusha will be required to deliver power to the Arusha load centre as well as transmit power to Isinya. |
| **Project Size/Capacity** | Bi-directional 2,200+ km, 400 MW 400 kV power transmission line. |
| **Project Objectives** | • Promote power interconnection across the continent and facilitate the creation of a Pan African power market.<br>• Promote and stimulate the development of new power generation projects and electricity export potential.<br>• Improve the quality of power to Northern Zambia (via Kasama) and Western Tanzania (Sumbawanga).<br>• Reinforce the national grid in Tanzania and make Tanzania an operating/trading member of the SAPP.<br>• Assist Kenya in diversifying fuel sources for generation. |
| **Project Structure/Type** | Although the project was originally planned as a PPP, it is now being developed by the public sector as a unitary system covering the three countries. Driven by the need to keep the average cost of financing low, the project is a suitable candidate for concessionary funding. |
| **Project Sponsors** | Governments of Zambia, Tanzania and Kenya |
| **Project Stage** | Securing financing |
| **Project Energy Source** | Transmission line, transmitting energy from various hydro/coal sources |
| **Potential Market** | Zambia, Tanzania, Kenya, and the region |
| **Regional Context** | The development of the project has been prompted by the increasing demand for power in East Africa. Due to phenomenal growth of the economies in the East and Southern African regions (e.g. Kenya, Rwanda, Tanzania, Uganda etc.), the demand for power has increased substantially. Some of these countries (e.g. Kenya, Uganda) have had to resort to very expensive emergency power suppliers. Hence, the need to explore the possibility of drawing power from Southern Africa, Zambia in particular. |


| Countries/Region | Zambia, Tanzania and Kenya \| East and Southern Africa regions |
|---|---|
| **REC** | EAC, COMESA and SADC |
| **Economic Sustainability & Expected Benefits** | Promoting power interconnection across the continent and facilitating the creation of a Pan African power market.<br>Promote and stimulate the development of new power generation projects and electricity export potential, e.g. enable Kenya to diversify fuel sources for generation: hydro, geothermal, etc. Improve the quality of power to Northern Zambia (via Kasama) and Western Tanzania (Sumbawanga).<br>Reinforce the national grid in Tanzania and make Tanzania an operating/trading member of SAPP. |
| **Implementing Authorities** | Government of Zambia, Tanzania and Kenya. Zambia through its Office for Promoting Private Power Investment (OPPI). Project Management Unit (PMU) to be established by the participating governments to manage the project until the formation of the transmission company, Transco, which will be a special purpose vehicle (SPV). |
| **Project Status** | Commencement of preliminary discussions on PPAs and technical review of the project (routing, configuration, capacity).<br>Finalisation of technical aspects, installation of the PMU in Lusaka. Signing of the Heads of Agreements and, mobilisation of resources by Zambia and Tanzania.<br>Funding for establishment of the PMU from European Union obtained.<br>Commencement of the PMU recruitment. |
| **Total Estimated Project Cost** | US$ 1,1 billion |
| **Financing Gap** | US$ 1,1 billion |
| **Key Challenges** | Securing financing |
| **Way Forward** | Secure financing for the project.<br>The sponsoring governments have agreed to provide the necessary counterpart funding and sovereign guarantees. A combination of multilateral, bilateral and commercial funding sources is to be considered. The funding is expected to come principally in the form of concessionary funding (grants and low cost/long tenor), semi-commercial (medium costs, long-term funding, subordinated to commercial funding) and commercial (market priced, long term funding).[30] |

[30] Information provided in this Annex has been sourced primarily from the Dakar Financing Summit Project Briefs, June 2014

AFRICA POWER VISION CONCEPT NOTE & IMPLEMENTATION PLAN

NEPAD
TRANSFORMING AFRICA