MIRREIA

Mitigating Risk and Strengthening Capacity for Rural Electricity Investment in Africa

# PROJECT INVESTOR MANUAL: TANZANIA

**September 2007**

Supported By:

Intelligent Energy Europe

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## TABLE OF CONTENTS

*This report is an output of the European Commission funded project MIRREIA. For further information and details of the project team and authors, please visit: http://mirreia.energyprojects.net*

# A. BACKGROUND

## 1 Introduction

This document is an output of the European Commission[1] funded project 'Mitigating Risk and Strengthening Capacity for Rural Electricity Investment in Africa' (MIRREIA). For further information of the project please visit http://mirreia.energyprojects.net.

The document is a deliverable of the MIRREIA Work Package 5: Policy and Regulation and Work Package 6: Finance. The report combines deliverable D5.4: Project development guidelines with deliverable D6.2: Finance manual, thereby providing a comprehensive tool for investors wishing to develop rural electricity projects in Kenya, Tanzania or Uganda.

This document looks specifically at Tanzania – interested parties are referred to the additional investor manuals on Uganda and Kenya where required.

## 2 Economy and Energy Sector Context

### *2.1 Economy*

In 2006, Tanzania's GDP in real terms grew by 6.2 percent compared to 6.7 percent in 2005. The decline in the growth rate was caused by a severe drought that hit parts of the country during 2005/06 rain season, inadequate power supply, and increase of oil prices in the world market. Sectors that were most affected by drought were: agriculture; manufacturing; and electricity and water. This was offset partly by an increase in the growth rates of the wholesale and retail trade; hotels and restaurants including tourism; transport and communication; mining and quarrying; and financial and business services sectors.

The GDP amounted to TES 14,995,247 million in 2006 at current prices. The population of Tanzania Mainland was estimated at 37.5 million in 2006, which gives per capita GDP of TES 399,873 in 2006. The growth rate of various sectors of the economy in 2006 were as below:

[1] The Intelligent Energy – Europe programme, the COOPENER component (promotion of renewable energy sources and energy efficiency in developing countries).

**Table 1: Tanzania – Economic Sectors**

| Sector | Growth Rate (2006) | Contribution to GDP |
|---|---|---|
| Agriculture | 4.1% | 44.7% |
| Manufacturing | 8.6% | 3.8% |
| Mining | 16.4% | 5.8% |
| Construction | 10.0% | 5.8% |
| Electricity / Water | -1.8% (Electricity –2.5%) | 1.4% |
| Trade, hotels | 8.4% | 17.5% |
| Transport, communications | 7.55 | 5.4% |
| Financial, services | 5.5% | 9.5% |
| Public admin | 5.1% | 6.9% |

The growth rate of electricity and water sector declined to -1.8 percent in 2006, compared to 5.1 percent in 2005. The growth rate of the electricity sub-sector declined to -2.5 percent in 2006, compared to 5.3 percent in 2005. The decline in the growth rate of the electricity sub-sector was due drought experienced in many part of the country, which affected hydropower power generation.

Nonetheless, the water sub-sector grew by 4.5 percent in 2006 compared to 3.4 in 2005. The Increase in the growth of the water sub-sector was attributed to increase in the investment in water projects in some urban areas in the country such as the Dar es Salaam and Mwanza cities water projects; and Shinyanga – Kahama water supply project. The contribution of electricity and water sector to GDP decreased to 1.4 percent, from 1.6 percent in 2005.

## *2.2 Energy Sector*

Tanzania's energy supply is dominated by biomass-based fuels, providing an estimated 90% of the national primary energy requirements. These fuels are mainly used in the informal sector, for household and small industrial use, drawing on the 35.5 million ha of forests and home gardens to provide a cheap and accessible source of energy for the population of 37 million people.

The main commercial forms of energy used are petroleum, gas and electricity. Electricity is mainly produced from hydropower plants, but in recent years, substantial thermal power generation too has been required to meet the growing demand and to improve supply security. Petroleum and hydropower account for about 8% and 1% of the primary energy supply, respectively. The balance 1% of the primary energy requirement is met with coal, solar and wind power.

The estimated primary energy consumption was 22 million tonne of oil equivalent (TOE) in 2003, amounting to a per capita consumption level of about 0.7 TOE. The main indigenous sources of energy are

- Biomass and agricultural waste
- Hydropower
- Natural Gas

- Coal
- Other forms of renewable energy such as wind and solar power

These sources are available in abundance, but so far, large scale developments have been only in the hydropower and natural gas subsectors. While a large hydroelectric potential remains to be developed, exploration is continuing on natural gas and petroleum. Coal use for electricity generation is limited to a small power plant, while there is no significant use of other renewables for electricity generation in a commercial scale.

### 2.2.1 Energy Policy

**Draft Electricity Bill**

The draft Electricity Bill incorporates several features to provide a light-handed approach to lower the regulatory hurdle to the development of rural electrification projects:

a) Exemption from the requirement to obtain a licence (Section 10). Here the Energy and Water Utility Regulatory Authority (EWURA) can issue exemption orders of a general or specific nature. The Bill specifically exempts generators, where capacity is less than 500 kW, and distributors, where maximum demand is less than 500 kW, from the requirement to obtain a licence.
b) Simplified or generic tariff controls for rural areas (Section 24(4)). Here EWURA can provide "light-handed" tariff regulation for rural activities, either through generic price caps, or through simplified tariff formulae.
c) Different standards and grace periods (Sections 39(2) and 39(3)). Here EWURA can provide different (and lower) standards for rural electrification activities, and can give operators in rural areas grace periods for complying with standards.[2]
d) Simplified record keeping and reporting requirements (Section 18(3)). EWURA can specify less onerous reporting requirements on rural electrification operators.
e) Simplified licensee procedures in rural areas (Section 29(1)(d)). Here the Bill mandates licensees to develop simplified application and other procedures for rural customers.
f) Option to delegate monitoring activities to the Rural Energy Agency (REA) (Section 38(2)). EWURA may delegate its information gathering activities to REA, thereby improving the efficiency of data collection, and simplifying reporting requirements for rural operators.

Most of these provisions empower EWURA to develop suitable light-handed approaches for rural electrification, without specifying the detail of these approaches. Hence, it is the responsibility of EWURA to develop the regulatory approach for rural electrification in such a way as to lower the regulatory burden on such operators.

[2] As for the relationship between EWURA and Tanzania Bureau of Standards (TBS) the following applies. TBS may define a technical standard, but it is EWURA who sets it as obligatory or not. EWURA can also set its own standards, e.g. customer service standards where TBS standards may not apply. TBS standards are not mandatory unless in accordance with another piece of legislation or regulation.

**Rural Energy Act, September 2005**
Act establishing the Rural Energy Agency (REA) and Rural Electrification Fund (REF). The Board of Directors has recently been appointed and ongoing measures are being taken in the recruitment of the management team.

**National Energy Policy, February 2003**
This policy addresses various energy issues including private sector involvement, energy pricing and developing a fuller understanding of the country's energy resources.

The National Energy Policy sets a new framework legislation for the electricity sector, which will replace the Electricity Ordinance of 1931.

Art. 2.1 (a) Challenges: " there is a need to promote and enhance private investment in electricity generation, transmission and distribution";

Art. 2.1 (d) Rural Electrification: "Electricity needs to be made available for economic activities in rural areas, rural townships and commercial centres. Rural electrification is, therefore, a case of long-term national interest and a prerequisite for a balanced socio-economic growth for all in Tanzania."

The policy identifies the following challenges:

(a) Increased electricity supply and distribution and estimates that demand for electricity will triple over a period of 20 years, and emphasises the need for accelerated investment in all elements of the electricity industry including private sector participation

(b) Petroleum development to sustain the gas production, and through increased gas and oil exploration, with the objective of reducing foreign currency spent on the import of petroleum products.

(c) Regional interconnection to support growth and to improve reliability of electricity supply through regional and international interconnection for mutual benefits

(d) Rural electrification to make electricity available for economic activities in rural areas, townships and commercial centres, and identifies this to be a pre-requisite for a balanced socio-economic growth.

(e) Reaching rural households to provide energy supply to replace kerosene used for lighting and to improve the efficiency of wood-fuel use, to improve the household environment and to reverse deforestation.

With regard to the supply of electricity, the relevant policy statements declare that:

- Competition as a principle to attain efficiency, will be applied to the electricity market
- Generation of electric power will be fully open to both private and public investors
- There will be open access to the grid

- Regional cooperation and integration will be given priority to ensure reliability and to exploit low cost power
- Priority shall be given to developing domestic power generation capacity
- There shall be strategic partnerships with technically suitable and financially strong partners, to develop a competitive market in generation and distribution
- Tanzania will conduct research and participate in international research on commercially viable large scale technologies for renewable sources for electricity generation
- Support will be given to ownership contracts to ensure competition and a high level of investment.
- A new governance system shall be established, differentiating the roles of policy making, regulatory functions and operational functions.

**National Energy Strategy**
The Strategy is an operational follow-up of the National Energy Policy. Currently a draft Power Sector Reform Strategy Paper has been prepared that embraces broadly all components of the National Energy Policy.

**Rural Electricity Master Plan**
The study was completed in 2006 and will be a good planning guide to lead the operations of REA/REF as well as the Ministry of Energy and Minerals (MEM).

**Power Master Plan for TANESCO, 2001**
Update of plan from 1999.

**Energy and Water Utilities Regulatory Authority Act, Act No. 11, June 2001**
EWURA has been operational since 2006.

**Electricity Ordinance of 1931 - CAP 131**.
The main legislation and regulation relative to electricity sector management and development consists of the Electricity Ordinance of 1931[3]. Amended several times; changed into an Act in 1961. It covers:

- Setting of electricity tariffs;
- Obligation to supply electricity to outlying areas;
- Delivery of subsidies to vulnerable and low income groups;
- Expropriation; and
- Exportation of electricity.

[3] "CAP": Law enacted during Colonial Period, i.e. before 1961. A Law enacted since then is an "Act".

### 2.2.2 Petroleum

Tanzania is continuing with the exploration of petroleum but has not so far has any positive results. Therefore, all petroleum products are imported. The total annual demand for petroleum products exceed 1.5 million tonnes per year, and cost over 300 million USD in 2005. Petroleum products are used in transport (45%), manufacturing (25%), agriculture (10%), households (10%) and commerce (5%).

Petroleum fuels are used for power generation as well. Since 2003, a 100 MW fuel-oil burning power plant has been in operation, and was used heavily to address the power crisis of 2006. A few small diesel-burning power plants are used in the main grid as well as in the mini-grids. The petroleum supply industry is fully liberalised and several players are in the market.

### 2.2.3 Natural Gas

The proven natural gas reserves are located in the Songo Songo island offshore on the Indian Ocean. The important gas discoveries have been in Songo Singo (30 bcm1) and Mnazi Bay (15 bcm). Discovered reserves are limited and the options considered to use this limited quantity of gas are electricity generation, industrial applications and petrochemical industries.

A gas-fired power plant (Songas) has been in operation for several years, and presently has a total capacity of 190 MW. To address the generating system crisis of 2006 and the immediate future, gas fired generation was increased in the system on a short-term basis.

More gas fired generating plants are under construction. As of March 2007, a total of 244 MW of gas-fired power plants were in operation. A pipeline has already been built to deliver gas to Dar es Salaam for use in power generation.

### 2.2.4 Coal

The coal reserves are found in Mchuchuma in south western Tanzania near the northern end of Lake Nyasa. Some studies indicate that Mchuchuma coal deposits can provide fuel for 400 MW generation capacity for up to 35-40 years. There is an existing small coal mine at Songwe-Kiwira which started production in 1988. A small coal-fired power plant with an effective capacity of 1.5 MW is in operation at Kiwira and sells electricity to TANESCO.

Coal reserves in Tanzania are being used for industrial applications, but this major resource is yet to be exploited for its full potential. A small amount of electricity is produced but there are plans to build larger power plants to use coal.

### 2.2.5 Hydropower and other Renewable Energy

Hydropower is the main form of renewable energy used in Tanzania, for the supply of commercial energy ie electricity. The country presently has an installed capacity of 561 MW across six power plants. A few off-grid small hydroelectric power plants are in operation.

Tanzania's total technical hydroelectric energy potential is reported to be in excess of 4700 MW of installed capacity or about 3200 MW of firm capacity. Of this potential installed capacity, only about 12% has actually been developed. The economic potential, when the costs of developing hydroelectric capacity are compared with gas and coal-fired thermal power generation, is yet to be established. Research is being conducted on wind energy potential in various parts of the country.

### 2.2.6 Electricity Supply

The electricity supply industry in Tanzania is structured as follows:

(a) Tanzania Electric Supply Company (TANESCO), a vertically integrated utility in the business of generation, transmission, distribution and supply of electricity, through the main national grid operating at 220 kV, 132 kV, 66 kV, 33 kV, 11kV and 400 V.

(b) Twelve mini-grids, owned and operated by TANESCO

(c) One privately operated mini-grid (TANWAT industry)

(d) Distribution companies in Zanzibar, Resolute (mining area) and Kahama (mining area), purchasing from TANESCO and distributing in their own areas.

Tanzania's electricity generating system has been predominantly hydroelectric, until the recent growth in demand and vagaries of weather required the installation of thermal generating systems. As of March 2007, the generating system has a total installed capacity of 979 MW, and the maximum demand recorded in 2006 was 603 MW (in December).

**Table 2: Tanzania – Grid Connected Power Plants**

| Power Plant (location) | Technology | Fuel Type | Installed Capacity (MW) | Ownership |
|---|---|---|---|---|
| Kidatu | Hydro | Hydro | 204 | TANESCO |
| Kihansi | Hydro | Hydro | 180 | TANESCO |
| Mtera | Hydro | Hydro | 80 | TANESCO |
| New Pangani Falls | Hydro | Hydro | 68 | TANESCO |
| Hale | Hydro | Hydro | 21 | TANESCO |
| Nyumba ya Mungu | Hydro | Hydro | 8 | TANESCO |
| **Subtotal** | | **Hydro** | **561** | **TANESCO** |
| SONGAS (Ubungo) | Gas Turbines | Natural gas | 182 | IPP |
| IPTL (Tegeta) | Diesel | Fuel oil | 100 | IPP |
| Aggreko (Ubungo) | Gas Turbines | Natural gas | 40 | Leased for two years from Oct/Nov 2006 |
| Dowans (Ubungo) | Gas Turbines | Natural gas | 22 | Leased for two years |

| Power Plant (location) | Technology | Fuel Type | Installed Capacity (MW) | Ownership |
|---|---|---|---|---|
| Six locations | Diesel | Diesel | 34 (effective capacity) | Grid connected, TANESCO |
| **Subtotal** | | **Thermal** | **378** | **Various** |
| **Total installed capacity** | | **Hydro and thermal** | **979** | |
| **System Peak Demand in 2006** | | | **603** | |

To meet the growing demand, Tanzania is planning to develop new hydroelectric and thermal generating facilities. The masterplan for the electricity supply shows the requirement of the power plants shown in Table 3 to ensure the lowest possible costs.

**Table 3: Tanzania – New Power Plants**

| Power Plant | Capacity (MW) |
|---|---|
| Conversion of IPTL diesel power plant for gas-fired operation | 100 |
| Zambia– Tanzania interconnection | 200 |
| Ruhudji hydropower | 36 |
| Mchuchuma Coal fired plant Stage 1 | 200 |
| Mchuchuma Coal fired plant Stage 2 | 200 |
| Rumakali hydropower | 222 |

Available and planned generating facilities have not been adequate to meet the growing customer demand, and in 2006 when faced with a major shortfall in hydropower generation, TANESCO had to resort to load shedding. By late 2006, the hydroelectric system recovered to the normal storage levels, but TANESCO is presently building several power plant to ensure that no load shedding would be required in the immediate future, until the planned power plants come into operation.

**Table 4: Tanzania – Power Plants under Construction**

| Power Plant | Technology | Fuel Type | Installed Capacity (MW) | Due by | Ownership |
|---|---|---|---|---|---|
| Dowans (Ubungo) Phase 2 | Gas Turbines | Natural gas | 80 | mid 2007 | Leased for two years |
| Mwanza | Diesel engines | Natural gas | 45 | mid 2007 | Rented |
| Ubungo | Gas Turbines | Natural gas | 100 | mid 2007 | TANESCO, permanent |
| Kiwira | Steam | Coal | 50 | end 2007 | Kiwira, permanent |

### 2.2.7 Distribution Network

The main grid in Tanzania, as well as some of the mini-grids and isolated thermal power plants supplying small communities, is operated by TANESCO. The main grid is supplied by six hydroelectric power plants (two more awaiting rehabilitation), and six main thermal power plants. A detailed description will follow.

The transmission grid covers some parts of the country, and five main hydroelectric power plants feed at 220 kV and 132 kV levels. Smaller power plants are connected at 66 kV and 33 kV levels. The main load centres and the power plants are interconnected at 220 kV voltage level. Tanzania considers 33 kV and 11 kV to be the medium voltage distribution, while there are plans to phase out the 66 kV voltage level. In the medium term, long distance transmission will continue to be at 220 kV and 132 kV. The coastal stretch to the north of Dar es Salaam is supplied at 132 kV.

TANESCO imports between 5 MW and 10 MW of bulk power from Uganda for Kagera region while Sumbawanga town in Rukwa region and Tunduma and Vwawa (Mbozi) township in Mbeya region get their supply from neighbouring Zambia. Tanzania plans to establish a 200 MW interconnection with Zambia.

TANESCO operates twelve isolated networks, and all of them are based on small diesel engines. These are Kigoma, Mtwara, Lindi, Njombe, Mafia, Mpanda, Tunduru, Songea, Liwale, Ikwiriri, Masasi and Kilwa Masoko). These have a combined installed capacity of 31 MW but they effectively contribute about 15 MW due to aged machinery and lack of spare parts.

### 2.2.8 Electricity Demand

Tanzania's electricity demand has been growing at rates exceeding 10% in recent years, and the installed capacity has not been able to keep pace with the demand, particularly in the face of varying hydrological conditions. The main grid presently serves about 550,000 customers, most of whom are household customers. In year 2003, the sales to each customer class was as given in Table 5.

**Table 5: Tanzania – Electricity Sales**

| **Sales to Each Customer Class** | **GWh** | | **Share of sales in 2003** |
|---|---|---|---|
| | **2002** | **2003** | |
| **Households, small commercial** | 1175 | 1223 | 48.8% |
| Industry | 964 | 1133 | 45.2% |
| Public lighting | 3 | 3 | 0.1% |
| Bulk sales | 133 | 145 | 5.8% |
| **Total Sales** | **2275** | **2504** | **100.0%** |
| **Estimated Losses** | | | **Share of generation in 2003** |
| Technical losses | na | 374 | 11.7% |
| Non-technical Losses | na | 312 | 9.8% |
| Total Loss | 520 | 686 | 21.5% |
| **Total Generation** | **2795** | **3190** | **100.0%** |

# B. PROJECT DEVELOPMENT GUIDELINES

## 1 Introduction

This section of the document describes all relevant ministries, other government agencies, local authorities and regulatory authorities required for issuing licenses, permits and approvals for renewable energy electricity generating and distributing projects in Tanzania. It also describes the procedural requirements and incentives to set up a renewable energy electricity generation plant or an electricity distribution company.

## 2 Generic Process Description

Generally, a developer of an independent power producer (IPP) needs to conduct numerous activities to transform the initial idea into an actual generation plant. To benchmark the necessary activities to be carried out in each of the three countries, a typical process is described below. The consecutive order of the steps is not necessarily as presented here. Also, several steps are usually carried out in parallel. The description excludes required activities to develop the IPP as a CDM project.

1. Project identification and promotion: May need support from government or energy regulatory authority.

2. Obtain permit to conduct initial studies. Possibly, support from energy ministry or regulatory authority is required.

3. Feasibility analysis. For a renewable energy IPP this would typically include:
- Obtain external funding for the analysis, if possible
- Resource assessment; e.g. biomass, hydropower or wind energy resources
- Generation plant and grid connection layouts
- Preliminary environmental impact assessment
- Electricity generation estimate
- Potential buyers of electricity
- Full cost accounting; financial analysis of all costs and revenues; possibly also a socio-economic analysis
- Risk assessment (financial, political, regulatory and licensing risks)
- Draft implementation plan; e.g. a Gantt Chart of all following activities

4. Institutional arrangement: Company structure, shareholders agreement, project management, administration, accounting and auditing.

5. Business plan.

6. Obtain business licenses and other business formation approvals, e.g. company registration license and trading license.

This will usually require a due diligence report and business plan.

7. Secure the land through a lease or other agreement with the landowner. Acquire land use permit, including land for the access road.

For hydropower projects, the water right also needs be secured.

8. Fuel purchase agreements, in particular for biomass and fossil fuels (in case fossil fuels are used as complementary fuels or for back-up).

9. Obtain pre-siting permit; local/regional government.

10. Obtain an electricity generation license / IPP license. Energy ministry or energy regulatory authority.

11. Ensure the right of access to the grid; transmission system operator.

12. Grid connection (power transmission and interface):

- Investigate power system capability and future expansion plans and technical barriers regarding grid connection at the site
- Selection of a site for a substation to connect to the grid
- Planning of the system
- Load flow studies, including transient and dynamic stability (if applicable)
- Assessment of power quality - both at consumers and at the system
- Metering scheme
- Co-generation protection and synchronisation schemes (if applicable)
- Establish bounds for the contractual agreements between the generator, the grid operator and the end user (if applicable)
- Design of electrical substructure, including transformers and hand-over station, taking into consideration primary network, protection, control, synchronisation schemes and metering implications.
- Prepare substation drawings and description for tender purposes, including protection, control, monitoring and metering systems.
- Prepare monitoring system for power quality at the customer's site (if applicable) as well as at the point of common coupling
- Enter into a connection agreement with the network service provider.

13. Negotiate and sign a Power Purchase Agreement (PPA):

- Reach a PPA with the buyer of electricity. The energy regulatory authority may have issued a standard format. Major contents: Energy and capacity charges, operation of the generation plant, performance security, interconnection, use of system, metering, indemnities, insurance. The tariffs may be predetermined by the regulatory authority.

- Possibly secure a government guarantee, protecting investors against possible risks on feeding electricity into the national grid.
- The PPA may include negotiations with particular customers, e.g. neighbouring industries or green customers. It may also include power wheeling (the use of the grid as conduit for providing electricity from source of generation to the buyer) and power banking (electricity supplied to the grid can be taken back) – possibly as separate agreements.
- Submit the power purchase agreement to the regulatory authority for approval.

14. If the project is eligible for any subsidies - e.g. investment grant, renewable electricity premium, tax or duty exemption - these shall be acquired.

15. Raise investment capital:
- Investment budget.
- Analysis of availability and accessibility of capital (equity and loans)
- Bilateral financial agreements
- Financial closure

For rural electricity projects, public funding may be available.

16. Tendering to select contractor to build the plant.

Sub-steps:
1. Prepare pre-qualification tender documents.
2. Announcement, pre-qualification.
3. Interested contractors deliver bids for pre-qualification within 3 weeks.
4. Short list, 1 week.
5. Prepare tender documents.
6. Invitation to tender.
7. Preparation of proposals: Minimum 45 days, preferably 60 days.
8. Evaluation and selection, 1-2 weeks.
9. Contract negotiations, 1-2 weeks.
10. Letter of Credit to contractor
11. Mobilisation.

Steps 1-4 may be dropped in a completely open tender. Then step 8 would usually require more time.

17. Employment of consultants and contractors/investors may have to be sanctioned by the energy regulatory authority.

18. A go/no-go decision needs be taken at various stages of the development; e.g. after completed feasibility analysis, after completed tendering and prior to financial closure.

19. Environmental impact assessment (EIA)

The EIA process typically has three main phases: Screening (to determine whether an EIA license is required); scoping (to focus the EIA on the key issues); EIA study.

Outputs:

- EIA ready for approval by authorities; national environmental agency
- Environmental management plan for the construction phase
- Environmental management system for the operational phase, including an impact monitoring guideline.

The EIA process may be very time-consuming, a.o. due to public consultation.

20. Obtain approval of environmental terms and conditions; local/regional government.

21. Obtain construction/installation license; local/regional government.

22. Obtain other permits from regional government and local authorities; e.g. land planning, approval of intervention on public land, building construction, safety and security measures.

23. Employment of consultants and contractors/investors may have to be sanctioned by a public authority.

24. Risk coverage and insurance.

25. Some authorities, e.g. the energy ministry or the energy regulatory authority, may need to appraise the project at various stages of the development, e.g. after completion of feasibility analysis and after completed tendering.

26. Apply for operation license; regulatory authority or regional government.

27. Establish generation plant:

- Set up project management
- Design review: Contractor scrutinizes design layouts and elaborates detailed designs. The Contractor may opt for other designs than those developed earlier.
- Approval of final detailed design.
- Civil works: Access road, internal roads and site preparation, geotechnical investigations, foundations, manpower facilities, supply of electricity and water to construction site, cable trenching, fencing, buildings construction. The civil works is usually the responsibility of the main contractor, but may be sub-contracted to a local company.
- Electrical works: Generation plants own consumption, substation, central monitoring and control facilities.
- Procurement of equipment; may include tailor-made manufacturing. The national bureau of standards may have issued procurement standards. Major equipments may have to be tendered.

Equipment procurement standards may be set by the national bureau of standards or the energy regulatory authority.

- Delivery of equipment: Transport to harbour; shipment; customs clearance; transport to site.
- Installation of equipment.
- Commissioning of plant: Testing of all equipment; performance testing (do components perform as guaranteed?); safety certificates.

28. Operation of generation plant:
    - Operation, monitoring (power generation, EIA etc); maintenance. Al three activities may be contracted to third parties.
    - The regulatory authority may request regular monitoring reports.

29. Arbitration; in case of disputes concerning investments.

# 3 Key Stakeholders in Rural Electrification and Renewable Energy

## *3.1 Public Authorities*

### 3.1.1 Ministry of Energy and Minerals (MEM)

MEM has responsibility for setting and reviewing policies and strategies as set out in the National Energy Policy and the National Energy Strategy through issuance of directives and guidelines.

Previously, MEM exerted regulatory powers over the power sector. However, those powers have recently been transferred to EWURA, cf. below.

| | |
|---|---|
| Address | Sokoine/Mkwepu Street, P.O. Box 2000/9152, Dar es Salaam. |
| Telephone | (255) 22 - 2117153-9, |
| Homepage | www.tanzania.go.tz/energy.htm |

### 3.1.2 Energy and Water Utility Regulatory Authority (EWURA)

EWURA has taken over the function of regulating water and energy utilities (issuance of license to power companies, tariff setting and tariff regulation) effective from year 2006. The Energy and Water Utilities Regulatory Authority Act (Act No. 11) was passed by Parliament in April 2001.

| | |
|---|---|
| Address | Samora Avenue,Harbour View Towers, Box 72173, Dar es Salaam |
| Telephone | (255)22-2123850, 2123854 and 2123856 |
| Homepage | www.ewura.com |

### 3.1.3 Rural Energy Agency (REA)

REA will be established as consequence of the Rural Energy Act of 2005.

The Rural Energy Board (REB) has recently been appointed (2007) having representatives from key stakeholders: Ministries responsible for energy, finance, local government, etc; private sector and financial sector; development partners; NGOs and civil society.

REB's responsibilities are to: Approve all projects funded by the Rural Electrification Fund (REF) and set conditions; oversee the Rural Energy Agency (REA) and REF; approve REA's operational plan REA will: Facilitate modern rural energy projects; Promote modern rural energy services; Provide technical assistance to developers; Recommend projects to Rural Energy Board for financing; monitor and evaluate projects. The management of REA is currently being sought executive selection on a competitive basis.

The Rural Energy Fund (REF) is a financial mechanism that will be confined to eligible rural energy projects. It provides capital subsidies for the initial up-front costs of capital investments in the energy sector (once-off "smart subsidies"/grant) which could significantly reduce risks to project developers and financiers. Sources of funding for the REF are expected to come from Government annual budgetary allocations as well as contributions from development partners.

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| | |
|---|---|
| Address | TAC Associates Building, 3rd Floor, 114 Malik Road, Upanga, Dar es Salaam, |
| Telephone | (255) 22 213 4006/ 4334/6/8 |
| Homepage | www.rea.go.tz |

### 3.1.4 Ministry of Water & Livestock Development

Regulates water resources; e.g. for hydropower.

| | |
|---|---|
| Address | Maji Ubungo, P.O. Box 9153, Dar es Salaam. |
| Telephone | (255) 22 - 2117153 – 9 |
| Homepage | dppmaj@raha.com |

### 3.1.5 National Environment Management Council (NEMC)

NEMC, established in 1986, is under the Vice President's Office. The main role of NEMC is to perform an advisory role to the government on all matters relating to environment management. In particular NEMC sets environmental standards for project investment in conjunction with the Tanzania Bureau of Standards (TBS) which sets and approves technical equipment specifications

| | |
|---|---|
| Address | Mkwepu/Sokoine Street, Box 63154, Dar es Salaam |
| Telephone | (255) 22-2134603, 2127056 |
| Homepage | www.nemctan.org |

### 3.1.6 Ministry of Natural Resources & Tourism

Regulates forest harvest and deforestation.

| | |
|---|---|
| Address | P.O. Box 9372, DAR ES SALAAM |
| Telephone | (255) 22-2111061-4 |
| Homepage | www.mnrt.org |

### 3.1.7 Tanzania Investment Centre (TIC)

TIC is the primary agency of Government to coordinate, encourage, promote and facilitate investment in Tanzania and to advise the Government on investment related matters. All Government departments and agencies are required by law to cooperate fully with TIC in facilitating investors.

For recognition, protection and other investment incentives, registration with TIC is recommended.

| | |
|---|---|
| Address | Ohio Street BOX 938, Dar-es Salaam |
| Telephone | (255) 22 2116328 |
| Homepage | www.tic.co.tz |

TIC's website is an extremely useful and user-friendly investors' guide. Here you can find guidelines and application forms on almost anything needed for private investments, e.g. business registration, income tax registration, VAT registration, residence permit, ownership of land, and labour relations.

### 3.1.8 Business Registration and Licensing Authority (BRELA)

BRELA is part of Ministry of Industries and Trade.
It is a legal tradition for foreign companies to be registered by BRELA for them to open a bank account.

| | |
|---|---|
| Address | |
| Telephone | (255) 22 2180141 |
| Homepage | |

### 3.1.9 Tanzania Revenue Authority (TRA)

TRA is responsible for taxes and duties, e.g. on equipment.

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|---|---|
| Address | Sokoine Drive Dar es Salaam P.O. Box 11491 Dar es Salaam |
| Telephone | (255) 22 211 9591-4 Toll Free number: +255-786-800000 |
| Homepage | http://www.tra.go.tz/index.htm |

## 3.2 Parastatals

### 3.2.1 Tanzania Electricity Supply Company (TANESCO)

TANESCO is the sole vertically integrated electricity supplier in Tanzania. It is a public corporation wholly owned by the Government and regulated by the Ministry of Energy and Minerals. Company Ordinance-CAP 212 sets out TANESCO's obligations with regard to financial and environmental reporting.

TANESCO's core business is to generate, transmit, distribute and sell electricity to customers in Tanzania mainland and bulk supply to the island of Zanzibar.

TANESCO has been the key player in project development in electricity generation, transmission and distribution countrywide for both the urban and rural areas of Tanzania. Under the power sector reforms, TANESCO is being unbundled into three operational entities namely; generation, transmission and distribution.

After unbundling the Multiple Power Generators, which will be operating under full wholesale competition, will sell power on long term PPA arrangement to the transmission unit in TANESCO, acting as the Central Purchasing Agency.

TANESCO was managed by NET Group Solutions (Pty) Ltd (South Africa; management contract); but the contract terminated at the end of 2006. Currently a local management team is managing the company.

| | |
|---|---|
| Address | Ubungo Head Office (Umeme Park Building), P.O. Box 9024 Dar es Salaam |
| Telephone | (255) 22 2451130 - 9 |
| Homepage | www.tanesco.com |

## 3.3 Technical and Other Services

### 3.3.1 SANet Tanzania, National Cleaner Production Centre of Tanzania

SANet is a partnership between the Division of Technology, Industry, and Economics (DTIE) of the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF). With the project's global network of information resources, experts, and financing options, SANet helps businesses innovate with cleaner technologies.

| | |
|---|---|
| Address | Mikocheni TIRDO offices,Box 23235, Dar es Salaam |
| Telephone | (255) 22 260 2338 |
| Homepage | www.sustainablealternatives.net/tz/ |

### 3.3.2 Cogen for Africa

The initiative, running 2007-2013, is implemented by UNEP/GEF and AfDB and executed by AFREPREN/FWD. It supports cogeneration in industries, primarily agro-industries, by pre-feasibility studies, feasibility studies, assistance to PPA negotiation and mobilizing investment finance.

| | |
|---|---|
| Address | P.O. Box 30979, 00100 Nairobi |
| Telephone | (+254-20)-3866032 |
| Homepage | http://cogen.unep.org |

# 4 Procedures for Developing Power Projects

A developer of an independent power producer (IPP) needs to conduct numerous activities to transform the initial idea into an actual generation plant. The major steps are presented below. The numbering does not reflect a necessary sequence – it is merely for reference.

1. Project identification and promotion: Currently needs MEM's support and backup. Later the backing of REA/REF is needed.

2. Business Licenses: These include a Certificate of Incorporation (local company) or Certificate of Compliance (foreign company), Municipal Trading License, income tax registration, VAT registration etc. Information on where and how to apply for such licenses can be obtained at the Tanzania Investment Centre (TIC).

3. Preparation of Feasibility Studies: Investors may fund this or it could be jointly funded by the MEM and Investors and/or support from financial institutions. Aware of the unattractiveness of rural based projects, MEM has been funding studies and projects through TANESCO from annual budgetary allocations. REA using REF and as approved by REB will be scrutinising projects and setting terms and conditions for granting of subsidies

4. Business plan: These are mandatory when financing will be sought by investors from REA/REF and/or financial institutions. Equally TANESCO and EWURA will require business plans, when assessing projects applying for PPAs.

5. Project appraisal: Currently done by MEM, but later REA/REF will take responsibility.

6. Land and Water Rights: Investors have to channel these through the appropriate authorities under the existing Acts. Also, Tanzanian Investment Centre can provide the necessary information and forms.

*7.* Pre-siting permit: For some project types, in particular green-field projects (e.g. a new hydropower plant), it may be useful to obtain a pre-siting permit or a provisional license from EWURA as a prelude during the process of seeking a PPA.

8. Electricity sale.

The potential income from selling electricity need be estimated at an early stage to evaluate whether the investment would be viable.

On-grid generators: Power Purchase Agreement (PPA) with TANESCO Transmission:

- PPA contracts can be negotiated provided that EWURA has been consulted and is satisfied that they have been prudently entered into. The envisaged new Power Legislation has provision for competitive procurement as well as regulatory oversight on negotiated PPAs.

- Determination of tariffs is done by EWURA, based on proposals from TANESCO. The tariff-setting rules have not yet been developed.
- Government has provided guarantees on PPAs with TANESCO under negotiable terms. This protects investors against possible risks on power generated to be fed into the national grid. However, such guarantees may not be issued under the new regime.
- The Ministry of Energy and Minerals issued in April 2007 standardized Small Power Purchase Agreements (SPPA) and associated standardized Small Power Purchase Tariffs (SPPT) for small (0.1 – 10 MW) hydropower, biomass power and wind power plants. However, this is not yet fully operational.

EWURA is considering publishing indicative forecasted tariffs to reduce risk perception among potential investors.

Power wheeling: There are no experiences and no rules for one-to-one power purchase. The forthcoming tariff system will divide the tariff into a generation component and transmission (use-of-system) component. Thus the cost of power wheeling will become apparent.

For off-grid systems the tariff structure shall be approved by EWURA. The tariffs may be cost-reflective end ensure the investor a reasonable return on investment. EWURA has not yet issued any license to of-grid operators.

9. Power generation license:

This is issued by EWURA. Currently, there is one license covering both construction and operation, but EWURA is considering introducing a two-step license, where this may be appropriate.

A final license requires a business plan and an approved environmental impact assessment (EIA). However, it has not been decided, whether the EIA shall be approved before the generation license, or whether the license can be issued on condition that the EIA is approved subsequently.

There is no triviality limit, but EWURA is considering introducing one, possibly 100 kW or 500 kW. Projects below the threshold still need to inform EWURA on location, the technology, its expected capacity and performance.

10. To be connected to the electricity supply system, the following procedures must be followed:
- Investors need to apply TANESCO by completing a "Preliminary Application Form for Power Supply". Two types exist: 1) Form A - Power requirements below 30 kW. 2) Form B - Power requirements above 30 kW. An investor can present himself to the appropriate TANESCO Regional Manager at the respective Regional Office.
- The applicant must pay the cost of installation in full - typically up to 11 kV, but for larger projects it may be up to 33 kV. The installation can be installed and owned by either the generator or TANESCO. The way of ownership will be reflected in the tariff.

- Inspection will then be conducted after the private contractor has filled out the "Installation Completion Card" attached with the drawings of the electrical installation.

There is no grid code, but EWURA and TANESCO have agreed that TANESCO shall develop a draft for EWURA's comment and approval. The code will comply with the guidelines developed by the Southern Africa Power Pool.

11. Application for investment subsidy: Rural Energy Agency (REA).

The amount of grant would depend on the nature of the project and availability of funds as well as the decision of the Rural Agency Board. A levy on electricity generation to finance the Rural Energy Fund is included in the fiscal budget for 2007-2008.

12. Project Financing: Equity and Loan from financial institutions at negotiated interest rates. These currently range from 13% - 16% for TShs. and 6% - 12% on foreign currency. For more details, see the MIRREIA report on finance risk mitigation.

13. Environmental impact assessment (EIA).

Specific project guidelines on EIA have been prepared and are being issued and enforced by NEMC, which all investors are required to adhere. NEMC will issue a list of consultants, among which the project developer shall select one.

NEMC has produced a national framework for EIA Procedures and Guidelines. In 2005 NEMC published an 'EIA and Audit Regulations', and currently NEMC is developing sectoral checklists, procedures and guidelines.

The first stage of the EIA process is to develop a Scoping Report, including Terms of Reference for the actual assessment. The second stage, the assessment report, shall include an Impact Mitigation and Environmental Management Plan (EMP). The project developer shall then communicate the assessment's findings in form of an environmental impact statement (EIS) to all stakeholders.

14. Other permits from local authorities: Most other permits that may be necessary will be facilitated by TIC.

15. Tender project: No requirements for private funded projects, except when there will be public involvement such as REA/REF grants, whereby the Public Procurement Regulatory Agency (PPRA) may be required to supervise the tender process.

16. Labour relations; social security, hospital insurance, residence permits etc: Consult the Tanzanian Investment Centre.

17. Employment of consultants and contractors/investors: Under the REF subsidy REA would need to sanction appointment.

18. Adherence to equipment procurement standards: This has previously been done by the Tanzania Bureau of Standards (TBS). In the future EWURA will initiate standards, TBS will formalise them, and EWURA will ensure compliance.

19. Taxes and duties on equipment. To check whether specific renewable energy equipment is exempted from duties and taxes, contact Tanzania Revenue Authority or Tanzania Investment Centre.

20. Establish generation plant: Needs local government approval and permits.

21. Plant operation: EWURA is in the process of developing a performance monitoring, accounting and reporting system.

# 5 Incentives to Promote Rural Energy and Renewable Energy

Tanzania has introduced attractive financial terms for potential investors in developing solar, wind and micro-hydro projects:

- A 100% depreciation allowance in the first year of operation;
- Exemption from excise duty and sales tax and concessionary customs duty on the first import of materials used in renewable energy projects. Currently solar PV equipment is exempted, although there must be solid evidence that batteries are actually used for PV systems;
- Investment subsidies will be provided by the Rural Energy Agency, when established;
- Extensive guarantees are provided to investors under the investment promotion centres certificate of approval. Such guarantees are ownership of properties, dispensation of assets, and repatriation of income.

Under the Access Expansion Programme (AEP), currently being prepared by MEM, the World Bank is expected to finance Priority Rural Electrification Projects (PREPS). The AEP will equally support start-up projects known as “sub-projects” for the REA.

# C. FINANCE MANUAL

# 1 Introduction

This section of the report addresses the issues which need to be considered by project sponsors in structuring a financeable independent renewable energy and energy efficiency (IRE) project in East Africa. While different technologies and institutional structures give rise to different considerations, this report analyses the issues which arise in most types of projects encountered: the development of a power plant, and selling power to a national utility under a long-term power purchase contract. Again, while different methods of financing can be adopted, this report identifies the issues and concerns of project lenders providing long-term debt finance to the project company on a limited recourse basis, and discusses the options for financing available in East Africa.

# 2 Financeability Issues

## *2.1 Country Issues*

One of the main concerns for the sponsors of, and the lenders to, an IRE project will be its financeability. The availability of finance in itself is not an absolute concept and whether a project will be financed depends upon a number of factors taken together, ranging from: the identity of the participants; the credit risk of the offtaker; the adequacy of the fuel supply; the terms of the PPA; and the political risk of the host country, to issues such as the lenders' appetite, given their own country and sector limits, for projects at a given date. In broad terms, issues can be broken down into two main areas: country issues and project specific issues.

While, by definition, country issues vary depending on the location of a project, there are a number of factors which will require consideration in most countries and which are likely to have a substantial impact upon the viability of a project.

It is important for sponsors and lenders to note that they are likely to face issues not necessarily encountered in the more developed countries. They will often find themselves working in an environment where electricity prices are subsidized, where the offtaker is a questionable credit risk, where the capital markets are weak and where the legal and regulatory framework may not be as independent, well-established and reliable as they might be. At the same time, such legal frameworks often present substantial constraints upon contractual freedom and the developer's ability to structure or finance a deal in the way that it would wish.

### 2.1.1 Credit Strength of Purchaser

A significant issue in limited recourse financing is that the ultimate recourse is effectively to the utility offtaker. All the utilities in East Africa are financially weak and, due to widespread donor support, operate against a background of subsidised electricity prices and widespread electricity theft. Without

donor support, they would not have the financial strength to undertake borrowing at the levels typically required.

### 2.1.2 Government Support

As indicated above, the credit risk of the offtaker is perhaps one of the largest problems encountered in IRE transactions. Occasionally, government support has proven necessary for at least the first few projects in the country's IRE programme. Examples are the subsidies to be provided through the Rural Support Programme in Tanzania.

The East African governments will eventually move away from providing credit support to utility offtakers. While there is a range of possibilities for providing the type of support that is necessary to provide acceptable credit risk, ultimately the movement to well-structured utilities selling power at rates which reflect the economic cost of supply is the only realistic long-term alternative to central government support. This has been one of the most significant driving forces towards the corporatisation and privatisation of state utilities.

### 2.1.3 Political Risk

Political risk can be a major factor and can add significant costs to the project. Given the political sensitivity of many power generation projects and the fact that government agencies are likely to be involved, projects can rarely be treated simply as ordinary commercial developments albeit on a larger scale. Power projects are an area where commercial, legal and political considerations intermingle.

The projects will invariably require government authorization and may need further government co-operation and support during operation. The government or its agencies will often be in a position to revoke authorizations, impose new taxes and even nationalize or expropriate the project.
Political risks can include:

- Nationalisation;
- Confiscation or expropriation, with or without compensation;
- The imposition of, or adverse changes in, exchange control regulations;
- Import restrictions/quotas on fuel or equipment;
- Restrictions on remittances;
- Higher or selective taxes, duty or withholdings;
- Currency devaluation;
- Political instability following changes in government;
- Disputes between central and local governments or between government departments;
- Corruption.

In addition to political risks arising in the country itself, a number of cross-border political risks can occur, for example:

- Restrictions on export licences for equipment or technology; and
- Blockades or embargoes.

Project sponsors and lenders will analyse and seek to mitigate political risks. A number of questions may be relevant:

- Is the institutional structure sufficiently clear, such that the relevant authorities can be identified and a decision or authorization obtained which will bind other state authorities?
- Is the project one which is fully authorised, in tune with policy and likely to be promoted?
- What level of support and assurance will the state give as to the continuation of permits?
- Can assurances given be enforced against the state entities providing them?

There are a number of ways of mitigating against political risk. Political risk insurance cover may be available from multilateral agencies such as the Multilateral Investment Guarantee Agency (MIGA) or Africa Trade Indemnity (ATI), both associated with the World Bank. Export credit agencies also provide political risk cover although this tends to be more expensive. Political risk cover may also be available from private insurers, although the cost is often high and areas of coverage under these guarantees or insurance policies differ widely. A fuller review of some of the aspects of political risk is provided in Section 4.5 below.

### 2.1.4 Currency Stability

The East African currencies have not been generally regarded as stable over the long term, but they are all freely tradable. Payments to IRE projects are likely to be made in the local currency. Even where this is not a mandatory requirement, it is often the only realistic option. The disparity between the currencies of project operating costs (primarily finance costs if foreign currency debt is used) and project revenues means that developers will commonly require that local currency payments under the PPA are indexed to foreign currency, to service and retire foreign currency debt and to provide the developers with a return on investment in the currency in which it was made.

Whenever payments are linked to foreign currency values, this generally has an inflationary effect on the price of power to the extent that the local currency devalues against the US$ or other relevant foreign currencies. The recent weakness of the US$ against other foreign currencies has resulted in the local East African currencies being stable or even appreciating against the US$, but this is not an effect which can be relied on. The general principle for currency management is to match revenues and costs as far as possible. Currency exposure should, if possible, be passed through to the offtaker and ultimately to consumers. However, the effect of additional costs will have an impact on the viability of private power where devaluations are envisaged, and the resulting price increase may create social and political tensions.

### 2.1.5 Strength of Local Financial Markets

A project's foreign currency exposure is reduced to the extent that project costs are financed in the local currency. The long-term objective in all the East African countries is to develop an adequate funding base in the local currency to reduce the requirement to link tariffs to movements in the foreign currency in which funding is made. In Kenya there is an active bond market with government treasury bonds issued up to maturity terms of 15 years. Uganda and Tanzania are also developing bond markets which will make longer term local currency financing more easily available.

Where a large portion of a project's capital costs are foreign currency-denominated, local currency financing will still often be attractive, as the project's foreign exchange exposure is effectively limited to the construction period during which risks can often be offset through appropriate hedging mechanisms.

Local lenders will often see political risk issues in a different perspective to foreign lenders, and may be more willing to accept the credit risk of a government-owned utility which in many cases may be the only purchaser of power.

### 2.1.6 Price of Power

Project lenders and investors expect to achieve reasonable power sale prices, allowing adequate risk-related returns and with a margin for the project company which is sufficiently robust for it to withstand changes in external conditions. A detailed discussion of power tariff structures can be found in Section 3.1.2 below.

Quite often, power has been provided at subsidised price levels. Where subsidies are present, they can have a negative impact on the viability of IRE projects. Unless the government is prepared to accept retail tariffs based on the economic cost of supply, the utility offtaker is adversely affected and this will be of concern to project lenders. Ideally, the retail tariffs should reflect the economic long-run marginal costs and the IRE tariffs charged to the utility should be at, or below, the portion of the utility's retail tariff representing generation costs. As a rule of thumb, this will be in the region of 60% of the total long-run marginal cost of providing power.

Increases in power prices have a substantial effect on inflation in the economy, both because of the direct cost to consumers and the indirect effect through cost increases experienced in the manufacturing and other sectors of the economy. For this and other reasons, the price of electricity will often be a politically sensitive issue. However, most countries have recognised the requirement of project sponsors and lenders that the PPA include adjustments to deal with the effect of inflation and other changes to base costs, and hence protect the project's ability to service and repay debt and provide investors with an adequate return.

### 2.1.7 Avoided Cost of Power

The driving force behind many countries' development of IRE projects is the desire and need to pass the significant financial, technical and administrative burdens of creating generating capacity onto the private sector. Even though a host country will need to permit the project company to sell power on terms which achieve a reasonable return, the savings and benefits to the host country can be considerable. Scarce resources can be allocated to other priorities, more capacity can be created and large capital investments can be avoided. The concept of the avoided cost of power has been developed as a means of quantifying the cost at which the host country's own utility could produce power. The avoided cost of power is used as a yardstick against which power prices can be set. Usually, the independent project company will need to be able to sell power at a discount to the purchaser's avoided cost of power.

### 2.1.8 Maturity of Grid

Ideally, an IRE sponsor would hope to develop a facility which has a clearly defined role over the term of the PPA in a reasonably mature grid and where there is a clear need for the additional capacity. The less mature the grid, the greater the likelihood that future grid developments could dictate that the facility's role within the grid will change, and the project may come under pressure to re-negotiate terms, or at the very least, the potential upside on the investment through excess generation payments may be reduced. The potential effects of changes in government policy should be modelled as part of the financial risk assessment for the project and consideration given to taking political risk cover if it is available at a reasonable cost.

### 2.1.9 IRE Policy

A clear policy and implementation process has obvious advantages: if policies are maintained in a consistent manner, they provide a clear framework for developers to pursue projects and can reduce the perceived level of political risk.

All the East African countries have renewable energy policies in place. However, most of these policies are new and are still evolving. There is little experience with the implementation of the policies and of renewable energy projects, and it can expected that gaps in the policies will only be uncovered as more projects are constructed.

### 2.1.10 Legal Framework

Ideally an IRE project should be implemented under a transparent, certain and enforceable legal framework. Project sponsors and lenders should be in a position where the rights and obligations which have been negotiated and set out in the relevant project documents can, if necessary, be enforced, ultimately through the local courts. While it may be possible for the project participants to agree that certain project documents are governed by laws other than those of the host country, a number of local laws will certainly apply to the project and it is often mandatory for certain documents, in particular the PPA, to be governed by local law. In any event, ultimate recourse to the utility offtaker necessitates

either legal action through arbitration or the courts in the host country, or the enforcement of a foreign judgement or award through the local courts, and local law, and the quality and independence of the local courts, become an issue.

Accordingly, any project will involve an assessment of:

- the substantive effect of local laws;
- the clarity of local laws and interpretation of contracts governed by local law;
- the quality, reliability, independence and impartiality of the local courts; and
- the enforceability of foreign judgements or arbitrary awards through the local courts.

In cases where project financiers are unsure about the factors listed above, this can be a real handicap in obtaining limited recourse financing where the ability to enforce complex contracts against a government-owned entity is the underlying security available to lenders. A number of mitigation mechanisms can be considered, such as foreign dispute resolution or the choice of foreign governing law.

The legal framework sometimes provides a number of restrictions on the ability to take the types of security required to have effective recourse to the project assets and revenues, or presents restrictions on the ability freely to enforce such security. This issue is more fully considered in Section 4.4 below.

### 2.1.11 Power Purchase Agreement

The PPA has three main roles:

- To provide a framework for the dispatch of the plant and the supply of power in accordance with the utility's requirements;
- To provide a mechanism through which the project sponsors will recover a reasonable return on their investment provided the plant operates in accordance with pre-agreed standards; and
- To allocate risks between the parties.

Some PPAs deal with both commercial and technical operational issues in detail. Others deal primarily with the commercial issues while many of the technical operational issues may be addressed in a further document such as an interconnection and dispatch agreement.

The PPA is likely to be the only material agreement between the project company and the government or government-owned entities. This is in contrast to many other types of infrastructure project where the terms under which the facility is operated are dealt with in a government concession or implementation agreement. This is not a hard and fast rule, however, and it may be possible for the project company to enter into a concession or implementation agreement with the government addressing issues such as the ownership of the plant, obligations in relation to construction of the plant

and the provisions of government support, while the PPA addresses issues relating to the operation of the plant and the purchase of electricity.

Even where there is no implementation agreement, there will often be other agreements or documents addressing government support for the project, for example, approvals, letters of support or guarantees of the utility offtaker's obligations. The existence of a separate concession or implementation agreement and the content of this document depends largely on the relevant regulatory structure, the degree of country risk which the utility itself is prepared to take and the level of support which is required from government to ensure the financeability of the project. Other contracts usually entered into are contracts for the construction of the plant, operation and maintenance of the plant, supply of fuel or feedstock (if applicable) and other contracts necessary for the operation and maintenance of the plant.

## *2.2 Project Specific Issues*

In considering the project issues it is important to understand the project structure which may be adopted, as it is likely that the project issues will themselves play a part in the ultimate contractual structure. While every structure has its own special features, most projects exhibit the same basic characteristics.

In addition to the country issues, a number of project specific issues will typically be considered by the project lenders. These are discussed below.

### 2.2.1 Project Sponsors

The identity of the project sponsors is a critical issue. Lenders will be concerned to see that project sponsors have both the expertise and financial strength necessary to implement the project The level of commitment of the sponsors is also an issue, in terms of:

- The amount of their equity committed;
- The period over which they commit themselves to maintain a substantial interest in the project; and
- Their commitment in terms of the provision of technical and managerial resources to the project

The project sponsors' ability to bring expertise or other resources to the project, is an important issue. Clearly, sponsors who have expertise in the power industry, whether as electrical utilities, power producers or plant operators, are attractive. Lenders will consider each sponsor's technical and managerial skills and its track record in similar projects.

Some countries have regulations requiring a certain percentage of local ownership in the project company. In any event, the existence of a strong local partner as one of the project sponsors is usually regarded as desirable.

Some project sponsors may wish to take an interest in the project with a view to participating in some other role, for example as contractors, equipment suppliers or operators. This will clearly raise the potential for conflicts of interest, and lenders will want to see that any such conflicts have been appropriately addressed.

### 2.2.2 Financial Structure

The following are key issues for project lenders:

- A sound project structure which will limit interference with a project's cash flow and provide adequate safety nets in case of project difficulties.
- Adequate capitalisation. Substantial equity ownership provides a strong incentive to keep the project sponsors actively involved in the project and committed to the project's viability.
- The actual level of equity expected by project lenders depends on technology and other risks associated with the project In jurisdictions which present a reasonable risk profile, a project using simple, proven technologies would probably need around 35-40% equity.
- Lenders will not permit the withdrawal of any equity unless certain cashflow coverage ratios are maintained.
- Distributions should be limited until all reserve requirements are fully funded.
- Reserves should be equal to at least, six months' debt service and should be funded up-front or within a short time-frame (not exceeding five years).
- The project company should be a single-purpose vehicle.
- If the technology is complex, an operation and maintenance (O&M) reserve is desirable. This should be fully funded prior to periods of scheduled major maintenance.

**Project Technical Feasibility**

The lenders will review any feasibility study prepared for the project. This will typically involve a technical analysis of the project and the lenders will usually wish to appoint an independent engineer, and sometimes other technical consultants, to evaluate project viability and highlight areas of risk. At the same time the lenders will review the project sponsors' financial model in terms of both methodology and assumptions made.

The lenders will wish to ensure that, in addition to project costs, the project will be able to meet interest and debt repayment obligations and provide an adequate return to sponsors on the equity invested. There will also be a need to ensure that there is an adequate cash surplus or contingency, particularly in respect of any risks identified. This will involve performing a sensitivity analysis to the base case cashflow projection to give best case and worst case projections.

**Offtake Contracts**
Pricing arrangement usually involve two-tier structures with:

- Fixed capacity payments that compensate the project company for operational costs and other commitments that do not vary with reference to levels of generation and the required return. These include debt service and repayment, fixed O&M costs and the return on equity.
- Variable energy payments covering costs that vary with levels of generation, principally fuel or feedstock costs and variable O&M costs.

As projects are financed on the basis of capacity payments, conditions placed on capacity payments are crucial. The less conditional the payment, the more dependable the revenue stream. Debt service and other fixed costs should be adequately covered by capacity payments.

The PPA should specify required performance standards for plant availability. The plant must perform to these standards if full capacity payments are to be received; otherwise payments are usually reduced in proportion to the reduction in the plant's availability. The lenders will consider the reasonableness of availability requirements in light of plant technology and the operator's experience. If availability requirements are considered to be set at a high level, then there is a greater risk of interruption to capacity payments given (i) the required scheduled maintenance outages for the type of technology involved, and (ii) expectations of unscheduled outages.

**Revenue Protection**
Lenders expect the offtaker to continue making capacity payments to the extent that the project company is unable to deliver capacity due to:

- Offtaker default;
- Unjustified government action or inaction;
- Change of law; and
- Force majeure incapacitation of the grid.

Which parties take the risk of disruption due to other political or physical force majeure events will vary depending on the perceived degree of political risk, the potential for mitigation of political risk, and a number of other circumstances. The risk of disruption due to problems with feedstock supply that could not have been avoided by the project company will depend on a number of factors, including feedstock type, government control over supply, etc.

Similarly, project lenders will expect the offtaker to start making capacity payments in the event that the project company is unable to commence the delivery of capacity because commissioning is delayed by reason of the events described above. Under the PPA the project company would normally be expected to take the risk of late commissioning due to contractor default or force majeure. The project lenders will expect these risks to be addressed, so far as practicable, in the Construction Contract through liquidated damages or under the insurance programme through delay in start-up cover.

**Termination**
Termination by either party should be limited to extreme circumstances only. There should be lengthy cure periods and notice periods prior to any termination right arising. Termination events should be limited to events which seriously prejudice the offtaker's planned development and operation of its grid by an addition to the plant's capacity. Events would include winding-up of the project company, abandonment, unremedied material breach and long-term delay in commissioning. Lengthy cure periods should be given to enable the project company or, failing that, the project lenders to remedy the breach.

For late completion, project lenders will often look for a period in the region of 240-360 days beyond the scheduled commissioning date as the earliest date at which a right to termination for delay arises. The scheduled commercial operation date should be subject to extension to the extent that delay is caused by offtaker default or force majeure.

**Lenders Rights**
Project lenders will want the PPA to contain express rights for lenders to stop any breaches on the part of the project company. Such step-in rights are regarded as essential by project lenders.

### 2.2.3 Buy-Out

The PPA should provide that the project company may require the utility offtaker to purchase the power plant in the following events:

- The dissolution, corporate reorganisation or privatisation of the offtaker, (except where in accordance with known and acceptable plans);
- Any government support for the project ceases to be in full force and effect;
- The failure by the offtaker to make payments after a suitable cure period; and
- Any material breach by the offtaker which is not remedied after a suitable cure period.

Project lenders will also consider whether the project company should be able to terminate and require buy-out by the utility if there is a change of law or unjustified government action or other governmental force majeure that has a catastrophic effect on the implementation of the project.
Buy-out prices will depend on a number of factors. Project lenders will want to see that outstanding debt is recovered after necessary termination costs are met, and the project company will require some return of or on its equity.

The position on termination of the PPA for the project company's default is more problematic. It is difficult to justify a purchase obligation by the utility in this case, although the project lenders will probably wish to ensure that, if there is a buy-out, the transfer payment, together with any further equity committed by the sponsors, covers outstanding debt.

### 2.2.4 Power Costs

The electricity sale price under the PPA should be reasonable, allowing adequate risk-adjusted returns and with a margin for the project company which should be sufficient to ensure that it is not significantly reduced in the event of potential changes in external conditions. The sale price should usually be below the avoided cost of the buying utility and should compare favourably with other proposed IPP projects.

### 2.2.5 Technology

Technology risk includes both construction risk and operating risk. The level of risk will generally depend upon three main factors:

- The technology itself: project lenders have a clear preference for tried-and-tested technology, particularly given certain recent problems encountered with new technology;
- The identity of the construction and operation contractors; and
- The terms of the construction and operation and maintenance contracts.

Project lenders will often require a project feasibility review carried out by an independent engineering firm with extensive experience of the technology proposed for the project, in order to fully assess the technology risk.

### 2.2.6 Construction Risk

Construction risk is the risk that the project will not reach acceptance as scheduled and on budget, and depends on three main factors:

- The level of risk involved in the project: projects with simple designs and technical requirements face lower risks. Ideally, the construction schedule should be conservative. The construction budget should include schedule cushions and reserves sufficient to cover reasonable levels of delays and cost overruns.
- The construction capability and financial strength of project contractors: project lenders want to see contractors with a proven track record and experience of building comparable projects at, or ahead of, budget and schedule. Lenders also want strong turnkey Construction Contracts which shift the construction risk to the contractors and equipment suppliers. The major issues for consideration in the Construction Contract are set out later in this section.
- The levels of guarantees provided by contractors/third parties and their capacity to perform: for turnkey contracts, the match between the rate of liquidated damages for delay or accepted sub-performance of the project plant and debt-service obligations is critical.
- Other issues for consideration will include:
    - location of the project;
    - site acquisition issues;

- way-leave acquisition, for example, if the developer is responsible for obtaining rights of way for a transmission line;
- availability of infrastructure and utilities;
- availability of competent local labour; and
- existence of a contingency fund or sponsors' commitments for funding to meet cost overruns.

Any failure to complete the project on time is one of the more serious risks faced by the project. With limited exceptions, the project will not receive revenues until completion. Many project lenders are uncomfortable in taking full completion risk and will often require project sponsors to take this risk, e.g. by providing guarantees of all payments in respect of debt, both principal and interest, prior to completion.

Where the developer is responsible for land or way leave acquisition, particularly if way leave for lengthy transmission lines or other infrastructure is required, this will often be seen by lenders as a major potential area for delay, and they will wish to be satisfied that all site and way leave acquisitions are complete before loans are disbursed.

### 2.2.7 Operation Risk

Key areas are:

- Unavailability and efficiency: the chosen technology should allow the plant to maintain the operational characteristics required to reach projected financial performance levels throughout the term of the PPA. As before, tried-and-tested technology which can demonstrate a reliable operating history is preferred. However, many renewable energy technologies are new and may therefore need proving before lenders will commit financing.
- Performance warranties and guarantees: project lenders will assess the nature of warranties on key equipment to consider their capacity to cover operating problems during start-up and initial operations.
- Operator experience: project lenders want an operator with experience and a performance record in operating comparable facilities.
- The O&M contract: the terms of the O&M contract should control expenses and provide adequate incentives for performance. Lenders may be concerned if the O&M contract has cost pass-through provisions without appropriate controls. Lenders may want the O&M contract to provide for outside review of annual O&M budgets by an independent engineer.
- Long-term O&M expenses - can these be forecast with reasonable certainty?
- Availability of a competent local labour force.

A more detailed consideration of operation risk and major issues for consideration in an O&M contract is set out later in this section.

### 2.2.8 Insurance

The project should be covered by adequate construction all-risks, marine transport, property damage and machinery breakdown insurance, covering the replacement value of all operating equipment in case of the usual insured risks in both the construction and operation phases. Project lenders will usually also require delay in startup/business interruption insurance to cover lost revenues resulting from delayed/interrupted operation arising as a result of damage caused by the insured risks. The extent of cover required will depend on the technology used. Unproved technology could require a policy covering a project in the event of operating difficulties for causes other than damage caused by the usual insured risks. A more detailed consideration of project insurances is set out later in this section.

### 2.2.9 Foreign Exchange Risk

Foreign exchange risk comprises:

- Conversion risk: the willingness of a sovereign government to allow its currency to be converted into foreign currency, and the liquidity of the market for that currency.
- Exchange rate risk: changes in value of one currency relative to another.

Project lenders will consider:

- Controls on access to foreign exchange and borrowing;
- The availability of foreign exchange and supply and demand patterns of the foreign exchange market in the project country;
- The potential for depreciation of the local currency over time. The ability of a project's cashflows to absorb depreciation is important;
- Whether pricing arrangements under the PPA reflect local currency depreciation; and
- The size of the debt-service reserve. The reserve should be based on historical real currency depreciation rates. The size of the reserve required will vary from project to project.

### 2.2.10 Environmental Risk

Environmental risk is an increasingly important issue. Carrying out and reviewing the environmental impact assessment and obtaining necessary approvals can be one of the longest lead-time items during the development phase of the project.

Environmental issues can affect both the siting of the project and the technology used and can have a substantial impact on project costs. Clearly, compliance with local environmental laws is a minimum requirement. If multilateral lending agencies are involved, compliance with their environmental standards is a further requirement.

As further requirements will often be imposed as part of the approval process, following the review by the relevant authorities of any environmental impact assessment, it is important that these requirements are identified as soon as possible.

# 3 Documentation

## *3.1 Power Purchase Agreement*

The PPA is the central document in an IRE transaction. It has three main functions:

- A mechanism through which the utility can dispatch the plant;
- A pricing mechanism for the sale of energy and capacity by the project company to the utility. In addition, there is a possibility that the plant will be acquired by the utility offtaker, either through termination provisions, or at the end of the PPA term (see Section 2.2.3 above).
- A means of allocating risks between parties.

There is an increasing standardisation in the allocation of risks between the parties to IPP transactions. Variations between countries reflect the differences between their levels of country risks.

This section sets out the issues commonly addressed in a PPA for a power plant.

### 3.1.1 Utility Requirements

For any IPP project, the PPA should be designed to satisfy the operational requirements of the offtaker utility in relation to the addition of the plant's generating capacity to the grid. The PPA is likely to make the following requirements of the offtaker:

- An obligation on the project company to build the plant and operate the plant to certain performance specifications, designed to satisfy the offtaker's requirements for the delivery of a stated level of power with characteristics which will not adversely affect the grid.
- The offtaker has a legitimate concern as to the quality of the construction and maintenance of the plant throughout the plant's economic life. As the plant comprises a component of the grid, the utility offtaker is entitled to require that the plant is insured at an appropriate level.

The utility offtaker will require the plant to be commissioned ready for commercial operation within a certain time frame. This is usually reflected in a scheduled commercial operation date and sometimes an earliest commercial operation date.

The plant should be operated:

- At agreed operating characteristics;
- At agreed levels of availability;
- In accordance with agreed operating procedures; and
- In accordance with dispatch instructions.

Downtime for plant maintenance should be scheduled in advance, preferably to avoid periods of peak demand, and should allow for a certain degree of re-scheduling by the utility offtaker, subject to the plant's technical limits.

The PPA must also address the concerns of the project company and those of its lenders, recognising the likely requirements for loan finance, often on a limited recourse basis.

### 3.1.2 Tariff Structure

An area of primary concern for the project company and project lenders will be the adequacy of the provisions for the calculation and payment of tariffs. These payment provisions should:

- Adequately reflect the cost of development and operation of the facility;
- Provide for adjustments in payments to reflect changes in cost or economic conditions, either in the normal course or due to certain unexpected events; and
- Provide for an appropriate allocation of risk in relation to any interruption or reduction in the plant generating capacity.

The key is to ensure that the tariff provisions will result in cashflows consistent with the project's financial model, provided the plant operates within the expected technical parameters. Ideally, where risks affecting the cashflow are allocated to the project company under the PPA, these should be risks which are capable of management by the project company, or the effect of which can be mitigated through the use of insurances or other project contracts.

The tariff structure will normally comprise:

- Fixed capacity charge payments intended to cover the project sponsors' return on investment, operational, and all other project costs which do not vary with reference to the level of generation; and
- Energy charge payments calculated by reference to energy generated and intended to cover fuel and other costs which vary in accordance with the levels of generation.

**Capacity charge**

The fixed tariff or capacity charge is intended to cover all capital costs, including debt service and repayment, fixed operating costs, working capital, taxes and the return to the equity investors.
The capacity charge will normally be payable regardless of the actual dispatch of the plant, provided the plant meets the contracted levels of availability. This is normally expressed as equivalent availability: the product of the capacity of the plant and the time during which the plant is available at these levels. A plant's equivalent availability reflects its outages for planned and unscheduled maintenance, and forced outages or reductions in its generating capacity. If the project plant fails to meet the contractual levels of equivalent availability there will be a pro-rota reduction in capacity payments.

The PPA may have a number of mechanisms relating to the calculation of equivalent availability, including the provision of weighting for periods of high and low demand. The effect is greater reductions in capacity payments if the plant is not available in periods of high demand. Reductions in capacity payments for reduced availability can be combined with penalties, usually intended to compensate the utility offtaker for the estimated additional cost of obtaining replacement power, although such additional costs are very difficult to estimate. In some cases, the reduction in capacity payment itself is regarded as a sufficient incentive for the project company, and no further penalties are applied.

While reduced equivalent availability results in reductions to capacity payments, higher than contracted equivalent availability will generally not give rise to additional payments. On the other hand, some PPAs will provide for additional payments in the event that the plant is operating at higher than contracted levels of availability and excess generation occurs during these periods of additional availability.

**Capacity Charge Adjustments**

The utility offtaker will normally require the level of capacity payments to follow a fixed profile over time. There is usually no indexation of the capacity charge and it will either be level, or varying at pre-agreed points in time, and the financial model adopted by the project company must reflect these amendments.

The portion of the capacity payment which is usually subject to adjustment by reference to inflation is that part of the capacity charge intended to cover operation and maintenance costs. This should be adjusted by the application of appropriate inflation indices of the countries in which the operation and maintenance costs are likely to be incurred. While operational costs are generally incurred locally, certain materials, maintenance or spare parts costs may be foreign.

It is almost invariably the case that payments under the PPA are denominated solely in the local currency. Clearly, to enable the project company to meet its operating costs and maintain the expected level of return, it is necessary for that portion of the capacity payment intended to cover foreign denominated costs to be payable either in foreign currency (normally US$) or to be adjusted by reference to fluctuations in the exchange rate between the relevant local and foreign currencies. There is usually no provision for adjustments to the capacity charge and the project company usually takes risk in respect of higher than budgeted capital costs, operation and maintenance costs, and financing costs. The project company should be in a position to mitigate these risks to a large extent through the other project contracts, through fixed-rate funding or by using appropriate hedging mechanisms to reduce the risk of interest rate fluctuations.

**Energy Charge**

The energy charge is intended to cover fuel costs and those other operation and maintenance costs which vary with the levels of generation. It is usually payable by reference to energy exported by the plant.

An energy charge calculated on a per KWh of electricity delivered basis is, however, often insufficient to cover all variable costs of generation, for example, additional fuel or feedstock consumed during

start-ups, or operation on hot stand-by, and the PPA should provide for appropriate additional payments to cover these costs.

The energy charge itself will be calculated on the basis of the:

- Assumed cost of fuel;
- Heat rate (thermal efficiency) of the plant; and
- Agreed level of variable operation and maintenance costs.

As the plant will operate within a range of efficiencies depending on the level of generation, if the plant is subject to dispatch then the PPA should provide for the contracted charge to be determined by reference to the efficiencies achievable at different power generation levels. The efficiency risk will normally remain with the project company and so the project company will be subject to a shortfall in recovery of costs to the extent that the plant in fact operates at a lower efficiency than required to meet its contractual obligations.

The project company and project lenders will require that the power generation efficiency reflects the likely performance of the plant, not only in its new and clean condition but also taking into account the likely degradation in the efficiency of the plant during operation.

Depending on the technology, the plant may operate on a combination of feedstocks and fuels. Bio-mass plants will often require supplemental firing with fuel oil during dispatch at low levels. Fuel oil or diesel may be used as a support fuel in hybrid systems alongside wind, hydro or biomass, either for limited planned substitutions or as an emergency support fuel where there is an interruption to supply of the primary power generator. Ideally, the energy charge should reflect the additional costs of support fuel if it is required.

**Energy charge adjustments**

The energy charge will normally be adjusted to reflect changes in feedstock or fuel costs. The adjustment mechanism should reflect the plan agreed between the utility offtaker and project company which itself will reflect the often conflicting requirements of the utility offtaker to obtain the lowest input cost available in the market and the project company's requirement for a reliable supply from a creditworthy feedstock supplier.

If the input costs are denominated in foreign currency and the energy charge is denominated in the local currency, then the energy charge should be adjusted by reference to fluctuations in the exchange rate between the local and applicable foreign currencies. The portion of the energy charge covering variable operation and maintenance costs should ideally be adjusted by reference to local and foreign inflation indices and appropriate exchange rate fluctuations.

Depending on the technology and location of the plant and the source of inputs, it may be that the project company is in a position where it has to acquire the inputs under a take or pay contract. In this case, the PPA should contain provisions under which the utility offtaker is required to pay to the project

company minimum payments, regardless of the levels of dispatch, to enable the project company to meet its take or pay obligations.

### 3.1.3 Increased Costs

Ideally, the PPA should provide a costing mechanism to reflect both cost increases and decreases, to provide for adjustments in tariffs to compensate the project company for changes arising from events where the project company and its lenders would normally consider it unreasonable for the project to take risks. The project company and project lenders will normally expect triggering events to include:

- Any new or amended laws, government regulations or other legal requirements imposed upon the project company or sponsors, including amendments to tax or withholding rates or changes to tax holidays or exemptions. Changes to environmental laws or requirements are of particular concern.
- Any unjustifiable government acts or omissions, including the delay, withholding or non-renewal of consents or permits, or the imposition of conditions to such consents or permits, unless caused by any failure of the project company.
- Political force majeure events including embargo, blockade, quota restrictions or expropriation.

The increased cost provisions should provide for a mechanism where payments are adjusted to put the project sponsors in the same position in terms of net, after-tax economic return, after taking into account:

- Increased operating costs;
- Required capital expenditure;
- Cost of funding capital expenditure (whether by debt or equity);
- Reduced operating performance; and
- Reduced return to the sponsors.

Such increased cost provisions should contain a clear mechanism for calculating the adjustments to payments and also provide for any dispute to be referred to arbitration or another appropriate dispute resolution mechanism.

### 3.1.4 Interruptions to Generation

The PPA should reflect the project company's need to receive capacity payments and payments to compensate for minimum operating pass through costs in the event that a plant's generating capability is affected due to the utility's acts or omissions, any fault in the grid or the transmission link, or where generation is affected by certain governmental-type force majeure risks. These will usually include change of law, unjustifiable government acts or omissions or non-receipt of approvals or permits

(unless the fault of the project company). The exact definition of governmental force majeure is very much a country-specific issue.

The same risks could delay the timely commissioning of the plant and the PPA should reflect the project company's need to receive revenues equivalent to capacity payments (and possibly fuel minimum payments) in the event that commissioning is delayed beyond the scheduled commissioning date due to the utility's offtaker's fault, force majeure affecting the grid/transmission link or governmental/once majeure events.

The PPA will usually provide that the risk of interruptions to generation through non-govemmental/orce majeure risk lies with the project company and the project company will not be entitled to receive full capacity payments to the extent that commissioning of the plant is delayed or its operation is affected by non-governmental/force majeure events. In many cases, lost revenues can be mitigated through appropriate delay in start-up/business interruption insurance programmes, or through the project contracts, for example, liquidated damages under the Construction Contract.

### 3.1.5 Payment

Payment should usually be made monthly. Payment terms will vary but should be limited to no more than 30 days from receipt of invoice. The contract should allow for payment to be made to escrow accounts.

Where payments are made hi the local currency, but project costs are incurred in foreign currencies, the PPA will often recognise the need for conversion and potential losses arising on conversion. PPAs in some jurisdictions with less stable currencies have compensated the project company for currency losses arising out of conversion or given support in relation to the conversion process itself.

### 3.1.6 Credit Risk

The credit risk of the utility offtaker is clearly an important issue and is fundamental to the financeability of the project. Credit support through government or central bank guarantees and letters of support, or other mechanisms may be required.

### 3.1.7 Construction

The utility offtaker will wish to ensure that, once built, the project will have the required operating and performance characteristics. For this reason, the minimum functional specifications and design specifications of the project plant should be clearly stated in the PPA.

The project company will wish to minimise the utility's interference in the design of t he plant or the process of construction. As has been noted, the utility has a legitimate interest to ensure that the project plant complies with certain technical design and functional criteria, but these should be pre-defined in the PPA. Unexpected changes in design may have an effect on capital costs and the construction schedule under the Construction Contract, the effect of which will not be fully covered by the PPA.

The area is more complex in relation to the transmission link and protective equipment, and there is usually a greater degree of utility offtaker involvement in the design of any transmission and protective equipment installed by the project company. The project company will, however, usually require that detailed designs are to be approved, provided that they satisfy the stipulated design criteria.

There should be an obligation on the utility offtaker to connect the project plant to the grid. The transmission link and any necessary grid reinforcement is usually the utility's obligation, and the PPA should set out the design specification, construction timetable, responsibility for carrying out the work and responsibility for costs. Often, the cost is passed on to the project company, in which case the project company needs to ensure that its obligation for the cost of the transmission link or grid reinforcement is capped or otherwise reflected in the tariff.

The PPA should clearly define the utility offtaker's requirements in relation to commissioning, required as a condition for the plant being allowed to go into commercial operation. These provisions should include notice and co-ordination provisions for synchronisation to the grid, clearly pre-defined performance tests, the utility offtaker's obligation to provide start-up power to the project and an obligation to dispatch the project plant during the commissioning period in a manner consistent with the requirements of the PPA's commissioning tests and the commissioning tests required under the construction contract prior to acceptance by the project company.

### 3.1.8 Operation

The obligations to operate the project plant should reflect the need for the plant to be wholly or partially shut down during the plant's scheduled maintenance. It should also recognise some degree of various types of unscheduled maintenance, including forced outages. Outages for planned maintenance will usually be scheduled on an annual basis, but should allow the project company some flexibility for rescheduling consistent with the utility offtaker's need to manage the grid and to avoid maintenance at periods of peak demand. The utility offtaker will often require the scheduled maintenance outages to be moved as part of grid management This should be restricted by reference to the project plant's technical limits, as the manufacturer's warranties and operator's obligations will often be adversely affected in the event of the plant not complying with the stipulated maintenance programme.

There should be some recognition of the likely requirement for forced outages and some flexibility for these outages to be taken into account in arriving at the plant's contracted equivalent availability. Usually a floating allowance of forced outages is provided for. In conjunction with the payment provisions, this will mean that the basic level of capacity payments is unaffected, provided forced outages remain within the floating allowance.

### 3.1.9 Term and Termination

The term should be for a fixed duration long enough to provide the required return on investment while providing a reasonable cost of power. The term should run from a pre-defined start date, either the effective date of the PPA or the date of commissioning into commercial operation. The term should exceed the term of the financing by a margin of some two to three years in order to provide a cushion for lenders.

The utility offtaker will wish to have rights to terminate for certain events. Given that the asset is illiquid in nature and its only effective use is likely to be as part of the utility's grid, consideration of termination rights should take into account the substantial loss in value of the asset to the project company on termination of the PP. In all but extreme cases, the effect on the project company may be disproportionate to the impact on the utility of the event giving rise to the right to terminate. Accordingly, termination should only occur in the most extreme circumstances and the PPA should provide for substantial cure periods and lenders' step-in rights.

Termination for delay in completion should usually give the project company a substantial grace period (360 days plus for a substantial plant is not unusual). The delay should not be so great that the plant is unable to fulfil its function in the grid. Termination for extended or catastrophic force majeure should be carefully considered. The project company is often given a right to terminate for extended governmental force majeure or in the event of an uninsured and uninsurable catastrophic force majeure. The utility offtaker is sometimes given the right to terminate for very extended force majeure if the plant effectively loses its function in the grid.

The project company will usually be given rights to terminate for material utility offtaker default, expropriation or nationalisation, or similar political risk-type events.

Given the effective loss in the value of the plant on termination, in the event of termination due to utility or government default and some force majeure-type termination events, the project company should have an option requiring the utility offtaker to purchase the plant. On project company default and certain other occasions, the utility offtaker may have an obligation to purchase the plant, but is more likely merely to have an option to purchase the plant.

The purchase price will depend on a number of factors, including the cause of termination. The project lenders' main concern will be the ability, after discharge of termination costs, to meet outstanding debt including any accrued interest and charges. Termination costs include the costs of early termination of project contracts and relocation of the project company's staff.

The project company itself will expect some compensation for termination in the event arising from the utility offtaker's default or government acts. This will often be bassd on a return on equity, together with interest, if termination occurs prior to commissioning or, if termination occurs after commissioning, the net present value of future profits, on the basis of an agreed discount rate.

The rate of liquidated damages for delay should usually be based on the level of loss suffered as a result of delay, including any penalty payable under the PPA and lost revenues under the PPA. In some cases, the project company may be able to reduce the level of liquidated damages to the extent that some of the plant's operational costs may be avoided or where it is prepared to sacrifice some portion of lost profits arising from delay. As the rate of liquidated damages will usually be fairly substantial, the contractor will expect a cap to be placed on the level of liquidated damages recoverable for delay, usually at the higher end of the range of 10% to 20% of the contract price. In fixing the cap the project lenders will, on the basis of the plant technology and the time required for replacement of equipment, analyse a potential delay and the period of delay for which they expect the contractor to be liable for liquidated damages. The project lenders will want to see that the cap, after applying the rate of liquidated damages, provides them with coverage for this period.

Liquidated damages for sub-performance will also be capped, again usually within the range of 10% to 20% of the contract price. The rate of liquidated damages for sub-performance should be fixed at levels reflecting the net present value of reduced revenues or increased costs arising as a result of the sub-performance. The project lenders will wish to ensure that there is no uncompensated level of sub-performance and, accordingly, the level of the sub-performance at which the project company is obliged to accept the plant, when applied to the rates of liquidated damages, should not exceed the cap on liquidated damages. Given the fact that termination for a failure to meet minimum performance requirements is a remedy of last resort, the project lenders will wish to see that the allowances for minimum performance requirements, and hence the cap on performance liquidated damages, are set at a level which will accommodate the range of sub-performance to be covered for the plant in question.

### 3.1.10 Liability

Any liability for failure to achieve commissioning on time or to operate the project plant in accordance with the PPA should be clearly defined. For the project company, there will preferably be no penalty, but only lost revenues pursuant to the relevant payment provisions. Often, however, liquidated damages are applied for late completion or failure to operate, reflecting the utility offtaker's incremental cost of replacement power. Other than the liability for such liquidated damages, there should be a clear disclaimer of liability for consequential loss as a result of a failure to perform.

The parties will normally give the usual cross-indemnities in respect of third party liability. There will normally be an obligation on the project company to carry appropriate third party liability insurance.

### 3.1.11 Metering

Accurate metering of deliveries is important to both parties. Metering is normally within the plant site, on the high voltage side of the step-up transformer so that the meter records power delivered net of the plant's own usage and transformer losses. In some jurisdictions, the project company is paid for power delivered to the grid at the utility offtaker's end of the transmission link, in which case meters are located at this point.

The PPA should contain provisions for:

- The specifications required for the meters;
- The obligation and cost of installation;
- Initial calibration on commissioning;
- Regular accuracy tests;
- The ability of parties to require re-tests; and
- The responsibility for costs of repair and re-calibration.

The PPA will normally provide for energy delivered to be calculated by reading the main energy meter, or, in the event that it proves to be inaccurate, the check energy meter.

### 3.1.12 Assignment

The PPA should be assignable by the project company as collateral security to the project lenders. It may be necessary to provide for an obligation on the utility offtaker to acknowledge or consent to the assignment. The project lenders will normally require in the PPA the utility offtaker agreement to make payment into charged accounts at the direction of the project lenders.

## *3.2 Construction Contract*

The construction of the plant is perhaps one of the most substantial areas of risk for the project company. If there is any delay in completion of the plant, this may result in the project company incurring penalties under the PPA or, if the delay is long enough, termination of the PPA. At the same time, any delay will result in a corresponding delay in revenues (except in the limited circumstances which may be covered under a PPA). Any uncovered cost overrun which requires additional investment by the project sponsors will normally result in a corresponding reduction in return.

Following completion of construction, the levels of performance of the plant, including its availability and efficiency can be significantly affected by its construction quality. Performance at levels below the target performance levels can result in substantial reduction in revenues or uncovered increased costs during operation.

For these reasons, the construction arrangement will be critical to the viability of the project and will come under intense scrutiny by the project lenders. Project sponsors and project lenders will normally endeavour to enter into a Construction Contract which passes the construction risks through to the contractor. There are, however, limits on the risks which the contractor will take.

In developing and negotiating the Construction Contract itself, the allocation of risks between the project company and the contractor will be important factors. While the starting point for project sponsors and project lenders will often be to attempt to shift all of the construction risks on to the

contractor, it is important to recognise that there are some risks which the contractor will not take, and there are other risks which the contractor may accept but at a substantial cost. It is important for the project sponsors and project lenders to consider which risks should be retained by the project company. This will involve careful consideration as to what risks are effectively passed on to the utility offtaker under the PPA, or to insurers under the insurance policies. As a general rule, however, project lenders are uncomfortable in seeing the project company retaining risk, although there are a limited number of the more remote risks which project lenders are usually prepared to see the project company retain.

Project lenders will normally carry out a full legal and technical review of the construction arrangements and, to the extent that the arrangements are found to be lacking, the project sponsors may be required to provide support, often through limited cost overrun commitments or completion guarantees.

Contracts for the construction of power plants are usually let on a turnkey lump sum basis. The detailed design will often involve proprietary technology, particularly for items such as wind turbines, and will be carried out by the contractor. The contractor is likely to comprise a consortium of construction companies and equipment suppliers, including manufacturers and suppliers of biomass digesters, turbines or other specialist equipment.

Contractor liability will be limited in the following significant areas:

- Liability for delay through liquidated damages will usually be subject to a cap.
- Liability for liquidated damages for sub-performance measured on acceptance of the plant will be limited to an agreed cap.
- Following acceptance, the contractor will not accept any liability for economic loss, for example lost revenues arising from any plant failure or sub-performance.
- The contractor's liability to make good defects becoming apparent after acceptance will be limited to defects arising during an agreed defects liability period, and possibly for latent defects arising during a further agreed period.

For this reason, while the form of Construction Contract is important, it will not in itself provide the protection required by project sponsors and project lenders and the following issues will be regarded as critical:

- Plant technology;
- The operating history of comparable plants;
- The identity, experience and performance record of the construction contractor in building comparable plants;
- The resources made available by the construction contractor for the particular project;
- The terms of the Construction Contract, the performance warranties, acceptance procedures and nature of guarantees or defects liability coverage; and

- The capacity of the Construction Contractor to cover operating problems during start-up and initial operation.

While the construction arrangements present one of the most substantial areas of risk to a project company, at the same time it can provide one of the largest areas of opportunity, particularly in a competitive bid environment. Aside from financing arrangements and the level of return which the project sponsors are prepared to accept, the construction arrangements perhaps provide the best opportunity for one project company, in a competitive bid situation, to differentiate itself from others.

In any bid evaluation, plant technology, plant reliability and performance characteristics are, naturally, important issues to the utility offtaker for whom security of supply is a crucial factor. Perhaps more important, and an issue usually receiving a higher rating in any evaluation process, is the cost of power. The lower the capital cost and the higher the availability and efficiency, the lower the effective cost of power. The identity of the suppliers and sourcing of equipment are also important factors in the ability to provide export credit financing, guarantees or interest support. These in turn may enable the project company to put together a financing package at lower rates or, more significantly, over a longer term, which again may reduce the effective cost of power to the utility offtaker.

### 3.2.1 Tests on Completion

Detailed completion testing requirements should be set out in the Construction Contract, normally in the project company's requirements. For a power plant these will normally include:

- Functional tests, often on a system basis, to check the functional and safe operation of equipment and systems;
- Reliability tests; and
- Performance tests, designed to measure capacity, ouput and compliance with emission standards.

Lenders will be particularly interested in the completion tests. On plant acceptance the contractors obligations are substantially reduced as, although the contractor will be responsible for making good defects occurring during any defects liability period, he will have no liability for lost revenues or increased operating costs occurring as a result of such defects. Additionally, sponsor or other guarantees often fall away on plant acceptance. Where export credit finance is provided, the export credit agency will often not be prepared to take completion risk and, accordingly, will require a guarantee from commercial lenders up to plant acceptance, which is the point at which risk passes from the commercial banks to the export credit agency.

### 3.2.2 Liquidated Damages

It is usual to provide for liquidated damages for both performance and delay. As indicated above, performance liquidated damages are usually applied in respect of defective performance of a plant where performance does not fall outside the specified rejection criteria.

Liquidated damages for delay may be applied to each unit or to the entire plant as appropriate. The period of delay is from the scheduled date for acceptance to the date of actual acceptance and the plant achieving minimum performance requirements. It is usual to allow the contractor a period after acceptance of the plant during which he can carry out works to improve performance of the plant so as to reduce his exposure to performance liquidated damages. Such remedial works should, however, be carried out in such a way so as not to interfere with the operation of the plant.

Ideally, the rate of liquidated damages for delay should be equal to any penalties suffered under the PPA or otherwise in respect of delay, together with the lost revenues resulting from delay. This will usually result in a high level of liquidated damages and contractors will usually endeavour to negotiate a reduction in the level of liquidated damages.

Even if the project company is willing to forego part or all of the portion of revenues representing the return on its investment, it will be constrained in agreeing such reductions to the extent that these are required to be used to fund a debt service reserve. Clearly the project company will not be able to agree reductions in those parts of revenues representing fixed costs or revenues required to fund debt service or scheduled debt repayments in the absence of the project sponsors themselves agreeing to fund these amounts.

The cap on delay liquidated damages should cover a period of delay which the project company's technical advisers (and those of the lenders) are satisfied would cover a reasonable period of potential delay for the plant, taking into account technology, location and the identity of the contractor.

Performance liquidated damages should be calculated based on the projected increased costs, or reduced revenues resulting from the level of sub-performance at which acceptance occurs. The cap on performance liquidated damages should be sufficient to cover the maximum level of sub-performance at which plant acceptance is required. Given the fact that outright rejection of the plant and termination of the contract is very much a last resort, the project company and lenders will wish to set the minimum performance requirements, at which acceptance occurs, at realistic levels. This will involve a review by the project company and lenders' technical advisers as to the range of sub-performance historically experienced for the same type of plant constructed by the same contractor.

For most IRE projects involving experienced contractors and tried and tested technology, it is typical to see delay liquidated damages capped in the region of 20% of the contract price and covering approximately six months' delay, with performance liquidated damages capped at around 10% covering somewhere in the region of 3% to 5% of sub-performance on both net capacity and net heat rate.

### 3.2.3 Warranties

Besides the warranty for guaranteed performance levels, other specific warranties should be included in relation to the plant, including fitness for purpose obligations, specified design life and other technical requirements such as dependable capacity, equipment availability, etc.

### 3.2.4 Security

It is usual to require the contractor to provide a performance bond (which may be on-demand or on-default) as security in addition to, or in place of, the security available through payment retentions. The combined amount of the retention and bond is usually in the region of 10% to 20% of the contract price. Parent company guarantees may also be required from the parent companies of the contractor. Further, the contractor may seek to include a retention bond as an alternative to the project company deducting any amount for retention.

### 3.2.5 Financing

Contractors will often be required to procure export credit financing. While they will take a fairly substantial role in procuring the availability of such finance, ultimately the availability of finance will depend on a range of issues in relation to the project and is clearly not fully within the control of the contractor. The contractor is, however, able to ensure that the appropriate sourcing and other applicable requirements of the export credit agency are complied with to ensure the full availability of export credit finance obtained. The contract will often provide an obligation to provide supplier credits on similar terms to export credit finance obtained by the project company, but which it is unable to draw down as a result of the contractor's failure to comply with its sourcing undertakings.

### 3.2.6 Training / O&M Manuals

The contract should contain clear provisions relating to the provision by the contractor to the owner or operator's personnel of training, and for the provision of operation and maintenance manuals. The requirements for the operation and maintenance manuals should be set out in detail.

## *3.3 Operation & Maintenance Contract*

For any privatised power project, there are a number of key areas of operation risk as follows:

- Unit availability: this is often considered to be the greatest operating risk for a project since revenues are tied in directly to availability. The project company and project lenders must be satisfied that the plant technology is such that it should be able to reach this level of equivalent availability given the planned maintenance outages, unplanned outages and capacity degradation. The project company should also ensure that the operator is capable of operating the plant at these levels.
- Power output efficiency of the plant has a direct impact on input costs. The project company should satisfy itself that the technology of the power plant will allow the unit to maintain the efficiency levels required to reach the projected performance levels assumed in the financial model, and that the operator is capable of maintaining the plant at these performance levels.
- Likely dispatch schedules: a key factor in long-term performance of the project plant is the mode in which it is dispatched, for example the number of start-ups per year.

- Long-term operation and maintenance expenses: the financial model will assume a set portion of revenues under the PPA to cover operation and maintenance costs. These fees will have to cover not only day-to-day operation and maintenance but also the cost of labour and spare parts for major overhauls. As the level of recovery is fixed in the PPA, it is important, so far as commercially possible, to keep operation and maintenance expenses within these levels. So far as possible, operation and maintenance expenses under any operation and maintenance contract ("O&M Contract") should be fixed within the levels of recovery under the PPA and be subject to the same levels of escalation as applied under the PPA.
- Operator's experience: any failure to operate the plant properly can result in substantial lost revenues under the PPA or increased fuel, operating or maintenance costs. Given that the profit margin under an O&M Contract is very low in comparison to plant revenues, although some levels of incentive are usually applied through a bonus mechanism applied by reference to the performance levels achieved, penalties are likely to be set at levels substantially below the revenues lost under the PPA. Accordingly, for both the project company and the project lenders the identity of the operator, the operator's experience and performance record in operating comparable facilities, the staffing and operational structure proposed are all of paramount importance.
- Plant construction: the levels of performance of the plant can be significantly affected by its construction quality. Accordingly, the following issues will be regarded as critical:
    - Plant technology;
    - The operating history of comparable plants;
    - The identity, experience and performance record of the contractor in building comparable plants;
    - The resources made available by the contractor for this particular project;
    - The terms of the Construction Contract, the performance warranties, acceptance procedures and nature of guarantees or defects liability coverage; and
    - The capacity of the contractor to cover operating problems during start-up and initial operation.

### 3.3.1 Operator

Project lenders will require a financially sound operator with a significant level of experience and a verified performance record in operating comparable facilities. Project lenders will want to ensure that the:

- Operator is adequately capitalised; and
- The operator will have suitable resources in terms of management and operational staff and will have sufficient technology made available from any parent company, if a special purpose subsidiary is used, to provide an appropriate level of operational expertise.

### 3.3.2 O&M Contract

Lenders prefer a fixed-price O&M Contract with the level of payments and rate of escalation consistent with both the financial model and the level of recovery of O&M costs under the PPA. It is not, however, always possible to obtain a fixed cost O&M Contract for a long-term contract where the O&M contractor is not linked to the original equipment supplier. It should, however, be possible to agree a fixed level of O&M payments together with a fixed escalation formula to cover all operational services, provisions of consumables, other than fuel, and routine maintenance. Spare parts and labour for plant inspections and overhauls would be treated as reimbursable items. The project company and project lenders normally wish to see an O&M Contract with the following features:

- The term of the O&M Contract should cover the full term of the PPA, or at least the debt-repayment period. The term of the O&M Contract is often linked to a number of complete maintenance cycles.
- The O&M Contract should very clearly define the pre-commissioning services, operation services and maintenance services. The services should be based upon the level of services commonly found in IRE projects but also specifically reflect the operational obligations of the project company under the PPA.
- To ensure the likelihood of meeting operational standards, the O&M Contract should set out in detail:
    - The minimum maintenance to be carried out during scheduled outages;
    - The guaranteed performance levels of the plant;
    - Key staff and restrictions on staffing changes;
    - The spare parts inventory to be maintained;
    - Operating procedures (based on, but potentially more definitive, than those in the PPA);
    - The organisation plan;
    - Reporting requirements;
    - Quality assurance plans.
- A lump sum mobilisation fee payable by instalments by reference to milestones in consideration for the pre-commercial operation services carried out by the operator. The operating fee should be payable monthly. The fee would be escalated by reference to an index consistent with that in the PPA. The operating fee will cover all of the O&M services, except in the case of a contract which is not a full lump sum fixed-price contract, where certain reimbursable items for plant maintenance or repair would be excluded. The fee would normally be payable in a mixture of local currency and US dollars or other hard currencies, but this needs to be considered in the light of what is achieved in the PPA.
- To provide incentives, the O&M Contract should provide for bonus/penalty provisions applicable by reference to the plant's operating performance against target equivalent availability, heat rate and possibly other performance criteria. Bonus payments should be

capped at levels which are consistent with the revenues received at the same levels of performance under the PPA. Penalties will usually be capped somewhere in the region of 10% to 20% of the annual operating fee.

- Where the O&M Contract is not a lump sum fixed-price contract, payment for labour and spare parts for work (i) carried out during scheduled outages and not caused by the operator's failure to comply with the terms of the O&M Contract, or (ii) arising through plant defects, should be reimbursable. Reimbursable expenses for overhauls subcontracted by the operator should be charged at cost. The identity of permitted maintenance subcontractors should be pre defined in the O&M Contract.
- The ability to terminate the O&M Contract if the operator fails to perform at acceptable levels. Termination events will normally include a failure to operate to defined levels of performance over a period of one to two years. On the other hand, the operator's termination events should be limited. In the event of termination, except in the event of non-payment of the operator by the project company, the operator will usually be required to remain operating the plant over a transition period during which a replacement operator is appointed and undergoes plant familiarisation.
- The O&M Contract should contain force majeure provisions largely following the force majeure events under the PPA. To the extent that the plant is not actually generating, but is deemed to be generating or available under the PPA, this is not regarded as sub-performance by the operator.

# 4 Key Project Issues

## *4.1 Project Insurances*

Identifying the insurance requirements of the project and putting in place appropriate insurance arrangements is an area of considerable importance both to the project company and the project lenders. Insurance arrangements provide a means of shifting a risk from the project participants to a party not directly involved in the project. Whether a risk should be offset by insurance or by transfer to a participant in the project or by some other means will depend on a number of factors:

- Insurance may be required by law;
- The availability of insurance at a cost which is economical given the likelihood and possible extent of loss; and
- The financial strength of the project participants and their ability to bear the risks.

Usually expert insurance and risk management consultants will be appointed to develop and implement the project insurance arrangements. The project lenders will typically require that insurance consultants are appointed and that they satisfy the project lenders as to the project insurance arrangements. Project insurances may be taken out separately by different participants in the project. However, for power projects this is unlikely to be the most appropriate or the preferred means of structuring the insurance arrangements. The project company will usually enter into an owner-controlled insurance programme, providing one seamless package of insurance cover extending over both the construction and the operation phases of the project, and providing the majority of the cover required by all the project participants. The reasons for this include:

- Phased completion of power plant: the power plant is usually taken over by the project company in sections of generating units rather than as a whole. One or more generating units and plant common systems will be operated by the project company while the construction contractor completes the construction and connection to common systems of other generating units. To accommodate the phased completion and commencement of operation of the generating units, it is usually appropriate that the project company undertakes to maintain the project insurance, with the exception of those insurances relating to liabilities peculiar or specific to one or other of the project participants.
- Control over insurance arrangements is with the project company. This has the advantage of allowing the project company to ensure that the insurances are of the types and in the terms required and, even more fundamentally, that the insurances are in place and are maintained in place over time.
- Consequential loss policies: it is generally the case that a consequential loss policy, such as a delay in completion policy, can be more easily taken out by a party which holds the primary loss policy. If, for example, the construction contractor were responsible for effecting construction all-risks insurance, this might make it more difficult for the project company to effect insurance covering loss arising from a delay in start-up caused by a risk insured under the construction all-risk policy.

The particular risks against which insurance will be effected and the coverage of such risks will vary from project to project. However, a typical insurance package for a power project may be broadly divided into two phases:

- Pre-completion/construction phase; and
- Post-completion/operation phase.

## *4.2 Project Lenders Requirements*

Project lenders will impose requirements as to the types of insurances, the levels of cover and the identity of the insurers. In addition, and given the importance of insurance as a means of mitigating project risk, project lenders will normally impose requirements as to the terms of the insurances. Provisions and endorsements required by project lenders will probably include:

- The project lenders (or their agent) as joint insured parties;
- A cross-liability clause containing a waiver of rights of subrogation against the project lenders and the project company arising out of any occurrence in respect of which any claim is admitted under the policy;
- Waiver by the insurers of all rights of contribution against any other insurance effected by the project lenders;
- An endorsement that the provisions of the policy shall operate as if they were a separate policy covering each insured party;
- An acknowledgement by the insurers that, in no circumstances, shall the project lenders be liable for the payment of premiums or any other obligations to the insurers;
- An endorsement that the project lenders be advised at least 30 days before any cancellation for any reason or any reduction in limits of coverage or any increase in deductibles, termination before the original expiry date or other change is to take effect, with provision that such cancellation, reduction, increase or other change shall not be effective until 30 days after the issue of a notice to such effect to the project lenders;
- An endorsement allowing the project lenders to step in to maintain the insurances;
- An endorsement that the project lenders will be advised of any act or omission or of any event of which the insurers have knowledge or which might invalidate or render unenforceable in whole or in part any insurance;
- An endorsement that the project lenders shall remain insured up to the limits of the policy, regardless of any misrepresentation, non disclosure, want of due diligence, breach or contravention by the project company of any declaration, condition or warranty contained in the policy except in respect of any deliberate acts or omissions of the project company; and
- A sole loss payee endorsement providing for payment to the lenders.

## 4.3 Tax Issues

Tax issues may have a decisive effect on the final structure of the project. The particular tax considerations which arise will depend to a substantial extent on the country in which the project is being conducted and the home country tax position of the parties. However, there are types of tax considerations which are common to many projects.

## 4.4 Security

### 4.4.1 Role of Security

The financing of IRE projects lends itself to the same security structures as other forms of limited recourse project finance. However, in common with most infrastructure projects, the nature of the assets prevents lenders from availing themselves of the traditional means of enforcement.

In conventional lending structures, the primary purpose of taking security is to put the lenders in a position where, in the circumstances of a default and the failure of the borrower to repay the debt, the lenders are able to realise the security and use the proceeds thereof to satisfy the outstanding debt. However, in an IRE project financing, the nature of the assets render this unrealistic - both due to the practical difficulties e.g. of selling a second-hand power plant, and legal hurdles (such as requirements for governmental consent, etc.). These problems are exacerbated in developing countries where, normally, the power plant will be despatching to the national or a regional grid and where the offtaker will, almost certainly, be a governmental or quasi-governmental entity in a monopolistic position.

Even assuming such obstacles are able to be overcome, the value of the assets associated with an IRE project are likely to be difficult to realise. During the construction phase of the project a purchaser is faced with the prospect of either committing further resources to the project to complete construction or, as an alternative, scrapping the plant and attempting to sell the components in a piecemeal fashion. During the operational phase, any default giving rise to enforcement is likely to be a result of operational difficulties with the plant.

Accordingly, the more appropriate view of security in an IRE financing is that it has a protective function rather than giving the lenders an ability to recover their loans by a realisation. That is, the security acts to protect the assets of the project from a possible disposition and/or from the claims of rival third party creditors.

### 4.4.2 Available Security

The types of security available will, obviously, be dependent upon the laws of the country where the IRE project is to be located. Security breaks down into three distinct categories:

- Sponsor support undertakings;
- Security over physical assets of the project; and
- Security over the legal rights and cashflow of the project.

### 4.4.3 Sponsor Support

While a true limited recourse financing should not require sponsor support - the project being intended to stand on its own - in practice it is common for there to be some level of sponsor support, at least during the construction phase. Such support can take many different forms.

In the strict sense, any security provided by the project sponsors over their equity investment in the project qualifies as sponsor support. The enforcement of share mortgages and assignments of rights under joint venture contracts will, normally in the IRE context, be subject to relevant governmental approvals - often both at the time of the taking of the security and upon a proposed enforcement During the construction phase of the project when lenders feel their exposure is greatest, the sponsors will, on occasions, provide undertakings to the lenders that, in the event the project company is unable to service the interest obligations under the financing due to completion delay, the project sponsors will, during the period from the scheduled completion date until the actual completion date, assume the primary liability for servicing such interest.

Again, during the construction phase of the project, sponsors may be required to provide completion guarantees. Such arrangements appear to provide lenders with a relatively high level of comfort. This comfort greatly exceeds the legal protection actually afforded by such completion guarantees - as the quantification of claims is far from straightforward while the legal analysis of a several completion guarantee is complex.

### 4.4.4 Security over Physical Assets

In most jurisdictions, it will be possible to take some form of mortgage or charge over the project site and the plant itself. However, problems can arise because:

- The project company may not own the project site;
- There may be legal restrictions imposed on the ability of the project company to grant such security – as power plants are often viewed as a nationally strategic asset, the ownership and operation of which is controlled by the relevant governmental authorities;
- Practically, given the location and nature of a power plant's assets, it is unlikely that the lenders would be able to successfully enforce such a security interest and sell the power plant to a third party – and in any event, by the nature of a limited recourse financing, in circumstances where

there has been a default, it is indicative of problems with the project assets and/or their operation.

### 4.4.5 Security over Rights and Cashflows

Project security will also involve the assignment by the project company of the benefit of its contractual rights under the project documents {e.g. Construction Contract, Operation and Maintenance Contract, PPA, etc) which, in turn, should provide the lenders with security and control over the project's cashflow when combined with security assignments over the project companies' bank accounts.

There are a number of problems routinely encountered in most developing countries:

- The contracts themselves will often impose restrictions on the ability of the project company, as a party to that document, to provide a security assignment over such rights – commonly requiring the consent of relevant government entities (especially, in the case of the Power Purchase Agreement).
- The assignment will only be as good as the underlying rights created by the project contracts - which, themselves, will normally be governed by the domestic law of the relevant jurisdiction.

## *4.5 Political Risk*

When approaching power projects, it is it is vital to consider the overall legal environment in which the project is to be executed; in other words the statutory framework and general law existing in the host jurisdiction and the family to which the legal system as a whole belongs. Further, it should be asked how that system is operated in practice; is there an independent judiciary and what is its quality?

Given the size and sensitivity of many power projects and the fact that the host government is likely to be directly involved, it is also important to recognise that the area is one where law and politics intermingle.

### 4.5.1 Changes in Legislation

The value of the project could be fundamentally affected by changes in relevant legislation. The extent to which the project company is protected from adverse changes in the legislative framework is, for legal purposes, not at all. Government is generally free to amend or repeal legislation as it deems fit. These changes may be motivated by purely domestic considerations, such as changes in economic policy, or they may be part of wider constitutional issues.

One factor which may mitigate the risk of legislative changes is the presence of agreements with government which seek to restrict such changes. However, these can be of little use against a government which is determined to change the ground rules. A more complete answer may be that

most governments are interested in encouraging private and foreign support for their power industries and so they would not wish to deter future investment by capricious behaviour. The assumption underlying this is that policy will be stable and consistent over time. While some regions enjoy sustained periods of stability, there may nevertheless be pressures, the effects of which will be felt well within the payback periods contemplated by most investors in, or lenders to, power projects. Pressure arising from the eventual succession of heads of government is a good example, given the personal influence often wielded by them.

### 4.5.2 Agreements with Government Bodies

Agreements with government bodies such as state utility offtakers or other state entities raise issues of validity and enforceability. Of these issues, capacity to enter into agreements and the possibility of the entity being entitled to claim sovereign immunity are crucial.
The individuals with whom negotiations are conducted must have the capacity to bind the government body which employs them and, similarly, the government body with whom agreements are made must have the right under the law of the relevant jurisdiction to enter into the agreement In practice, there is no substitute for checking precisely the applicable law in the relevant jurisdiction and the degree of authorisation of individuals.

Even if the individual or government body in question appears to have the right to commit to agreements in general, it should be ascertained whether there are any limitations on their powers in relation to the particular contract.

Another matter which should be considered when contracting with government bodies is sovereign immunity; in other words, the extent to which, even if the contract is initially valid, the government may later be able to use its sovereign status to defeat actions for breach or efforts to execute any judgements obtained.

# 5 Sources of Finance

## *5.1 Commercial Banks*

There are several common themes running through the commercial banking sector in East Africa. The formation of an effective credit bureau is often cited as important in most markets where significant growth is expected in the retail lending sector. Banks are facing increased levels of competition as aggressive competitors have either just entered or increased their market presence. In Kenya, consolidation and market development have fuelled competition and there has been some consolidation resulting from government imposed minimum capital requirements.

In all markets there is concern about how best to service the unbanked market. For example in all the East African countries, banking penetration is extremely low and the banks are chronically under-represented outside the major urban centres. New products are evident in all the markets. While credit cards are being developed in all the countries, Kenya has seen innovative new offerings such as Mpesa which uses cell phones to transfer cash between individuals. A lack of transparency on pricing is an issue in although the Central Banks are becoming more proactive in emphasizing more openness.

A major problem of dealing with commercial banks is the lack of adequate branch infrastructures, particularly in rural areas. More creative distribution structures are being slowly developed, including the use of ATMs and hub and spoke branch networks. Neglect of the SME sector is quite common, but this situation is improving, particularly in Kenya with the advent of banks such as Equity, K-Rep, and Family Finance which have made the SME sector their core market.
The cash orientation of the East African markets such as has been mentioned as a hindrance to the development of new products. The nature of the property lending environment is also viewed as a major barrier to development.

Most banks in East Africa are small to medium sized and locally owned. The industry is, however dominated by a few large banks, three of which are foreign-owned (Barclays Bank, Standard Chartered, Stanbic). In Kenya seven of the major banks are listed on the Nairobi Stock Exchange, and Stanbic is listed in Kampala. Several of the foreign banks also have partial local ownership.
The commercial banks and non-bank financial institutions offer corporate, commercial and retail banking services, although several large banks also provide investment banking services.
Commercial banks in East Africa are very conservative lenders. Although banks margins (as measured by the difference between deposit and lending rates) are very high, most banks prefer to invest in government bonds rather than lend to private sector companies.

Established businesses, multinationals, and businesses which are able to offer adequate fixed assets as security will be able to meet their financing needs from commercial banks, and it is important to develop a relationship with one or more banks over some time through trading activity, before approaching banks for financing capital investments. New businesses in particular find it very difficult to obtain medium to long term project financing unless the capital gearing (ratio of debt to equity) is low (well below 50%), or if, as noted above, alternative security to the new project being financed can be offered.

A recent development in commercial banking has been the transformation of local development finance banks (DFCU in Uganda, TDFL in Tanzania, DBK in Kenya) lending only for long term investments, to commercial banks which have a broader product range. These banks have experience of medium and long term project based lending, but now operate as commercial banks. Given their experience, they should be more open to renewable energy projects, although they do often run into their own financing constraints which limit their abilities to engage in term lending.

## *5.2 Bonds*

Bonds are a form of debt usually invested by non-bank financial institutions. Bonds are usually unsecured, but can also be backed by a bank or other form of guarantee. The main advantage of bonds is that the pricing is usually lower than bank debt, and the risk profile of the investment can be tailored to the financier's requirements. Bonds are usually issued as tradable instruments (e.g. on the Nairobi Stock Exchange) and will therefore need to comply with trading regulations.
It is unlikely that a bond issue will be feasible at the start of a project. However, once a project is running and generating positive cash flows, issuing a bond may become a viable option.

## *5.3 Development Finance Banks*

Development finance banks (DFB) are a viable alternative to commercial banks for debt finance, but vary considerably in their lending criteria. The sections below provide some guidelines on development finance banks active in East Africa.

All the DFBs have lengthy appraisal processes. It will generally require six months or more after presentation of a detailed financing proposal to run through the appraisal process, obtain approvals for financing, completing documentation, and meeting all the conditions precedent to disbursement.

### 5.3.1 Local Institutions

There are two active locally based development finance banks:

**East African Development Bank**

The East African Development Bank (EADB) was established in 1967 under the treaty of the then East African Cooperation. Following the break up of the community in 1977, the Bank was re-established under its own charter in 1980.

EADB is owned by the three member states of Kenya, Uganda and Tanzania. Other shareholders include the African Development Bank; FMO (Netherlands); DEG (Germany); Consortium of Yugoslav Institutions; SBIC – Africa Holdings; Commercial Bank of Africa, Nairobi; Norbanken AB, Stockholm; Standard Chartered Bank, London; and Barclays Bank International, London.

EADB has offices in Kampala, Nairobi and Dar-es-Salaam. With EADB's core objective being promotion of sustainable development in the Member States, the Bank has developed a range of products that are tailored to meet regional development requirements. Projects should demonstrate technical feasibility, financial and economic viability and management competence, and should take cognisance of environmental and gender issues.

The product range is offered to most productive sectors of the Member States' economies with emphasis on:

- Agriculture and Agro-Processing
- Industry and Mining
- Tourism
- Infrastructure (Including Energy, Information and Communication Technology, Transport and Real Estate and Property Development).
- Services (including education, health, finance)

**PTA Bank**

Based in Nairobi; covers financing for all COMESA countries, PTA finances projects in almost all sectors of the economy. The focus is on agro-industry, energy, infrastructure, transport, communications, manufacturing, mining, service industry and tourism.

Projects which may qualify for PTA facilities are those that are export oriented, foreign exchange earning and/or foreign exchange saving, local resource based and have a regional perspective. In addition the project has to be financially viable, technically feasible, economically sound and environmentally sustainable.

The following finance products are available:

- Loans – direct and sole lending, co-financed lending, and syndicated lending.
- Lines of Credit to local financial institutions for on lending to small enterprises.
- Guarantees to facilities obtained from other lenders or suppliers.
- Technical assistance towards feasibility studies and project preparation where the complexity of the project so demands.

Facilities offered for loans, lines of credit and guarantees range from a minimum of US$ 500,000 to a maximum of US$ 20 million. The normal term of facilities is up to 10 years including a maximum grace period of 2 years. However, actual tenure is determined on the cashflow capacity of the project.

The pricing of facilities is specific to the proposal and is determined on analysis of the project's and borrower's risk profile. Pricing includes interest rate and other fees and charges related to the

mobilisation and implementation of the project. A fee is also payable for the appraisal of projects. All facilities have to be secured or have collateral that is commensurate to the project risk profile.

### 5.3.2 International Institutions

A number of international development finance banks are active in financing renewable energy projects. Some of the major investors in East Africa are listed below:

**DEG**

The German Investment and Development Company, is a specialist in long-term project and corporate financing. It advises private companies, structures and finances their investments in Africa, Asia, and Latin America as well as in Central, Eastern and Southeast Europe.

DEG invests in profitable, ecologically and socially sustainable projects in all sectors of the economy open to private entrepreneurial initiative: in agriculture and in manufacturing, in services and in the infrastructure sector. As one of the largest European development finance institutions, DEG has thus far cooperated with more than 950 companies and by financing € 4.2 billion it has attained an investment volume of € 30 billion.

DEG promotes power generation favoring renewable energy or local resources. For example DEG has contributed to financing the Upper Bhote Koshi hydropower station in Nepal. The 36-megawatt run-of-river hydropower station will increase Nepal's generating capacity by about 10 per cent.

**FMO**

FMO promotes sustainable development of the private sector in developing countries. Realizing sufficient returns on its risk capital is a prerequisite. Only then can FMO continue to act as an effective risk partner and ensure the continuity of the organization. These two aims – sustainable development and financial returns – are therefore inextricably linked.

FMO has an investment portfolio of € 1.79 billion, making it one of the largest bilateral development banks. FMO has excellent access to capital markets, in part attributable to the Triple A status that was conferred in 2000.

FMO's core activity is to provide local businesses and financial institutions in developing countries with long-term financing, ranging from loans to equity investments in enterprises. FMO does this on market terms and only when financing by commercial financiers is either unavailable or inadequate. Its present portfolio covers 78 countries.

**IFC**

IFC's Environment and Social Development Department assists IFC to develop successful and sustainable projects with low environmental and social impacts. Within this department, the Environmental Projects Unit (EPU) contributes to IFC's mission by accelerating market acceptance of technologies, products, and operating practices that benefit the environment. It supports sustainable

energy projects and in recent years, has been actively seeking to finance a greater number of energy efficiency projects and to develop special initiatives to accelerate the market penetration of these technologies. The EPU welcomes proposals seeking IFC financing for private-sector projects with specific environmental benefits. In reviewing such proposals, IFC works closely with the relevant IFC Investment Departments.

The Power Department of the IFC is a team of professionals which provides a wide range of advisory and financial services to IFC's clients. IFC works with investors to refine and improve project structures, alleviate risk, and assure syndication of commercial debt on the best terms. The Power Department structures financial instruments to meet the needs of individual transactions. Beyond IFC's equity, A loan, B loan, mezzanine financing and risk management facilities, IFC and the World Bank collaborate on the deployment of the Bank's partial risk guarantee to underpin additional financing as circumstances require. IFC is also designing new credit enhancement mechanisms, intended to extend loan maturities and reduce costs.

**E+Co**

Provides early stage risk capital, but wll only work with projects that have a clear social and environmental benefit. Projects must also be commercially viable (i.e. competitive with conventional alternatives) and must have potential to be self sufficient in order to attract private investment in the next stages of the development cycle.

E+Co is a US based group focused on the provision of business development services and seed capital. Their interest is in supporting indigenous enterprises that are working to provide those in developing countries with a reliable and affordable source of clean energy. Typically, investment (debt or equity) is limited to US$250,000, but the company is different from other sources of funding because it is willing to take a higher (but measured) investment risk by providing a combination of business services and seed capital during the earliest stages of an enterprise's growth. E+Co believes that the combination of business services, seed capital and commitment to local entrepreneurs is the key to success. E+Co co-manages UNEP's Rural Energy Environment and Development programmes (see www.areed.com) in Africa, Brazil, and China.

## *5.4 Investment Funds*

All of the development finance banks listed above can provide investments in the form of both debt and equity. However, there are also a few investment institutions which specialise in providing investment capital which ranks below senior bank debt. This kind of financing sits in between bank debt and shareholders equity, and is also referred to as 'quasi-equity' or 'mezzanine finance'.

Some examples of finance terms are noted below:

**Table 6: Mezzanine Finance Instruments**

| Financial Instrument | Notes |
|---|---|
| Subordinated debt | All payments are subordinated to senior (usually bank) debt;<br><br>May be secured by a second charge on company assets; Debt type instrument, i.e. fixed repayment schedule;<br><br>Interest rate will be higher than senior debt and may include a profit related 'kicker' i.e. additional interest payment if the company makes a profit above an agreed level. |
| Preference shares | Closer to shareholders equity in form, but usually redeemable to make for an easier exit from the investment; Terms may include repayment of capital over time, but this will be subordinated to all debt repayments;<br><br>Dividends may be set as equivalent to dividends paid out to ordinary shareholders, but may also be structured as a fixed coupon with profit share rights;<br><br>Terms will usually include pre-emption rights for buy-out by ordinary shareholders, but may also include for the investor to force a sale of the company to an outside buyer if the ordinary shareholders are unable or unwilling to effect a buy-out. |

Some of the investment funds which are active in East Africa are described below:

**Table 7: Investment Funds**

| Investment Fund | Description |
|---|---|
| **Grofin** | GroFin is a multi-country business development and finance company focused on providing business support and risk capital to small and medium sized enterprises in emerging markets underserved by traditional sources of capital. GroFin tries to integrate business development assistance, usually with subordinated debt investments to support locally owned start-up and growth enterprises to reach sustainability.<br><br>GroFin invests in South Africa, Kenya, Uganda, Tanzania, Rwanda, Nigeria and Oman. Its funders include several international finance institutions, banks and multi-national companies. Assistance from the Shell Foundation allows for expansion into new markets and replication of the GroFin business model.<br><br>GroFin Funds provide direct financing to locally established enterprises with growth and profit potential in amounts ranging from US$50,000 to approximately US$1 million. Finance facilities are structured using mainly medium-term loans (three to six years) and performance based incentive payments. Interest and/or capital moratoriums are possible depending on the projected cash flow of a particular business. |
| **BPI** | Business Partners Limited is a South African investment company for small and medium enterprises. In Kenya BPI has set up a US$14,1 million quasi-equity risk capital fund to invest in Kenyan small and medium enterprises (SMEs) and also provides post-investment technical assistance funding through an interest free loan.<br><br>BPI uses primarily quasi-equity and debt instruments when structuring its deals, and makes individual investments of between US$50,000 and US$500,000. |
| **Aureos** | Aureos Capital Limited (Aureos) was established in July 2001 as a joint venture between CDC Group plc, a UK government-owned fund of funds, and Norfund, the Norwegian investment fund for Developing Countries.<br><br>Once established, Aureos assumed the management responsibility for 139 portfolio companies with a book value of US$72 million originally invested and managed by CDC between 1989 and 2001. As at the end of April 2007 Aureos had effected 116 exits. The remaining |

| Investment Fund | Description |
|---|---|
| | 23 portfolio companies are valued at around US$26.3 million. The expected realised and unrealised cash multiple will be around 1.7 times book value.<br><br>In parallel over the same period, Aureos sponsored and raised 10 new regional SME funds for the emerging markets with total capital commitments of US$468 million. So, including the Legacy Portfolio, Aureos had raised and managed approximately US$600 million. Aureos typically looks at MBOs, expansions, pre-IPO and acquisition type of transactions in the US$2 million to US$10 million investment range. Most businesses in which Aureo invests have an operating history of between three and seven years. Aureos generally will not invest in new businesses. |
| **Actis** | A leading private equity investor in emerging markets, Actis has US$3.5 billion of funds under management. Since demerging from CDC Group plc in 2004, Acti shas raised US$1.6 billion in new funds from institutional investors in North America, Europe, Africa, the Middle East and Asia.<br><br>Actis has been investing in emerging markets for 60 years. Since 1998 has invested US$2.5 billion in 137 companies and is currently investing c. US$500 million in 15-20 transactions a year. Actis makes minority and majority investments ranging from US$10 million to US$100 million. |

There has been a growth in interest in investing in Africa over the last 1-2 years. As a result, there are a number of other funds in the process of being set up, and there may therefore be additional sources of financing available in the near future.

## 5.5 Political Risk Insurance

Political risk is discussed in Section 2.1.3. The risks covered are usually:

- Currency transfer restrictions - coverage protects against losses arising from an investor's inability to convert local currency (capital, interest, principal, profits, royalties, or other monetary benefits) into foreign exchange for transfer outside the host country. The coverage also insures against excessive delays in acquiring foreign exchange caused by the host government's actions or failure to act. Currency devaluation is not covered.
- Expropriation - coverage offers protection against loss of the insured investment as a result of acts by the host government that may reduce or eliminate ownership of, control over, or rights to the insured investment. This policy also covers partial losses, as well as "creeping expropriation," a series of acts that over time have an expropriatory effect. Bona fide, non-discriminatory measures taken by the host government in the exercise of its legitimate regulatory authority are not considered expropriatory.
- War and civil disturbance - coverage protects against loss due to the destruction, disappearance, or physical damage to tangible assets caused by politically motivated acts of war or civil disturbance, including revolution, insurrection, and coups d'état. Terrorism and sabotage are also covered. War and civil disturbance coverage also extends to events that result in the total inability of the project enterprise to conduct operations essential to its overall financial viability.
- Breach of contract - coverage protects against losses arising from the host government's breach or repudiation of a contractual agreement with the investor. In the event of such an alleged breach or repudiation, the investor must be able to invoke a dispute resolution mechanism (e.g., arbitration) set out in the underlying contract and obtain an award for damages. The investor may file for a claim if, after a specified period of time, payment is not received.

There are two main sources of political risk cover available for projects in East Africa:

- **Africa Trade Indemnity (ATI)** - is a multilateral political risk and credit insurer, established at the initiative of COMESA and owned by African member states supported by the World Bank. ATI partners with Lloyd's of London and other major private insurance companies to facilitate private led trade flows, and investment through the provision of insurance, coinsurance & reinsurance, financial instruments and related services. ATI is based in Nairobi, and is therefore reasonably accessible.
- **Multilateral Investment Guarantee Agency (MIGA)** - As a member of the World Bank Group, MIGA's mission is to promote foreign direct investment (FDI) into developing countries. Types of foreign investments that can be covered include equity, shareholder loans, and shareholder loan guaranties, provided the loans have a minimum maturity of three years. Loans to unrelated borrowers can be insured, provided a shareholder investment in the project is insured concurrently or has already been insured. Other forms of investment, such as technical assistance and management contracts, and franchising and licensing agreements, may also be eligible for coverage.

# 6 Sample Project Profiles

## *6.1 Suma SHPP*

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| Project Name | Suma Small Hydro Power Plant (SHPP) |
| Energy Source | Hydro |
| Project Description | Katumba Tea Factory, the proposed Mwakaleli Tea Factory and the identified Suma hydro site are located in Mbeya region in the South Western Corner of the Southern Highlands of Tanzania, the region lies at an altitude of 475 metres above sea level with high peaks of 2 981 m above sea level at Rungwe higher attitudes. The topography is characterised by large plateaus surrounding high peaks and ridges, bounded on all sides by escarpments or deeply dissected hill. Plateau altitudes range from 1 400m to 2 400m.<br><br>Mbeya region is one of the most important cash crops producer in Tanzania, responsible for 35 % of tea produced in the whole country. About 5,535 ha are under tea production. Population densities are among the highest in Tanzania, reaching 134 people/km2. |
| Power Demand | The basic processing of tealeaves undertaken at the tea factories requires significant amounts of electrical and thermal energy: on average 13,2 kWh (thermal and electrical) are needed to produce one kg of made tea. Currently the electrical energy is sourced from TANESCO national grid or the tea factories' own diesel generators which act as a backup. To meet the thermal needs the tea factory relies on fuelwood.<br><br>For each ton of made tea a mean of 710 kWh are needed. On average Katumba tea factory pays 96 TSh (0,08 USD/kWh) for every unit of TANESCO power drawn, and 215 TSh (0,18 USD) for every unit produced by their diesel generators. On average the factory would be looking into a TANESCO electricity bill amounting to 190,000 USD per year and in addition a diesel bill of about 6,700 USD.<br><br>Katumba tea factory has three diesel generators, the installed capacity amounts to 1 450 KVA but not all three are functioning at the same time. The tea factory has a grid capacity of 1 000 KVA. The tea factory is fully reliant on fuelwood (mostly purchased) for heat applications. On average about 2.4 tonnes of wood are required for every tonne of made tea and the cost to the company amounts to about 5 USD/ tonne of wood. About 12.5 kWh of thermal |

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| | equivalent per kg of made tea are needed. The tea factory has two boilers rated at 10 bars and a steam capacity between 4 tons/steam per hour.<br><br>The annual consumption of wood amounts to 8,000 tons. The thermal energy requirements represent about 20% of the total energy costs incurred by the Tea Factories. Yet in terms of energy content, the thermal power needs represent 95%6 of the total energy requirements of the production process. The power requirements to substitute the overall energy needs (thermal and electrical) of the tea factory would amount to about 45 GWh per year, of which 43 GWh would be for the thermal energy needs. The substitution of the thermal energy needs can therefore not be considered in the SHPP scheme. |
| CDM | Tanzania strongly relies on hydro for power generation. An eventual substitution of utility power will therefore generate negligible CO2 savings in the short term but greater savings can be envisaged in the medium to long-term with the increased role that thermal power is envisaged to take in the overall power mix.<br>CO2 savings will be made in terms of substituting diesel fuel needs to power the backup diesel generators of tea factories. In total about 17 400 litres of fuel are consumed by the two tea factories. This will mean than on annual basis about 52,25tons of CO2 emissions will be avoided.<br><br>In most cases the thermal energy requirements of tea factories are met by wood, a CO2 neutral fuel, if sourced from sustainable forestry plantations. The CO2 savings from an eventual substitution will therefore be zero. |
| Power Purchase Agreement (PPA) | The assumption is that the PPA price will be indexed on the local inflation rate as a pass through mechanism. |
| Investment Summary | **Investment Summary** |
| Return on Investment | 3.46% if power is consumed only by the tea factories. This rate is low because the consumption of power by the tea factories is only 19% of power produced (there is a peak demand for power, but |

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| | power is continuously generated and cannot be stored).<br><br>This rate is unacceptable for commercial financing. A grant will be required from the REF to cover part of the capital cost and to bring the IRR up to a more reasonable level of 15%-20% to enable commercial investment. Reducing the investment cost by 30% would result in an IRR of around 8%.<br><br>Alternatively, if all excess power is sold to the grid, then with a PPA price of US$ 0.06/kwh, the project IRR is 80% which is very profitable. |

## 6.2 Kenya – Nandi Hills

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| Project Name | Kenya – Nandi Hills |
| Energy Source | Hydro |
| Project Description | The Kipkurere, Kipchoria and Yalla hydro sites are in the Nandi Hills located west of the Rift Valley and can be characterized by gentle rolling hills with varying altitudes of 1 800 and 2 200 meters above sea level, close to protected forest areas, whose highest peaks are around 2 500 meters above sea level. The areas climate is influenced positively by Lake Victoria.<br><br>The fourteen tea factories in the study area are in operation throughout the year processing a combined total of about 160 000 tons of green leaf and producing 40 000 tons of made tea, representing about 13 % of the total tea production in Kenya.<br>Yala river is located in the west part of Nandi Hills area, close to Tindinyo village and the Kaimosi Tea Factory. It flows westward, from a hilly plateau culminating at 2700 m asl, partly covered with forest (south Nandi and Northern Tinderet forests). At the proposed intake (1660 m asl), the watershed area is 1577 km². Its mean elevation is above 2000 m asl.<br><br>A scheme designed at 5m3/s discharge and 132 m gross head is the most appropriate. This design flow corresponds to a 4.7 MW output power and is available 79% of the time. Power production will be 32 360 MWh / year. With a development cost at around 271$/MWh yearly and 1867 $/kW it appears to be the most adapted to the power demand and enables the addition of 5MW or two 2,5 MW turbines in order to fully use the river potential. This design flow corresponds to a 4,691 MW output power and is available 79% of the time. Power production will be 32 360 MWh / year. |
| Power Demand | The basic processing of tea leaves undertaken at the tea factories requires significant amounts of electrical and thermal energy: on average 7,7 kWh (thermal and electrical) are needed to produce one kg of made tea. Currently in most factories the electrical energy is sourced from KPLC national grids costly diesel generators. To meet the thermal needs Tea factories rely on fuel wood.<br><br>All tea factories rely on their diesel generators for up to 4 % of their electrical requirements over a year. In reality the reliance on diesel generators varies from one month to the next and is usually relied on more frequently in the peak production season when power outages are more frequent, April and May and then again August to |

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| | October, as is shown in the graph here. The quality of the power supply is closely dependent to the national distribution network layout and the distance between the tea factories and the power plants feeding the network.<br><br>Monthly consumption varies considerably depending on the tea production, which consequently depends on the level of rainfall. Typically, the operation has two clear seasons: high productive seasons from October to January and from April to May. During high productive seasons the factory works over 24 hours, 6 days a week.<br><br>All of the tea factories in the Nandi Hills area are connected to KPLC, and therefore do not rely exclusively on the diesel generators.<br><br>On average energy accounts for 0,08 USD/kg of made tea, electricity alone represents about 70 % of this value. Energy therefore represents about 5 % of the recent market value, 1,54 USD/kg (November 2005), of Kenyan made tea.<br><br>For each ton of made tea a mean of 568 kWh are needed or equally for every electrical kWh used on average 1,79 kg of made tea are produced. On average the tea factories are paying 7,00 Ksh (0,09 USD/kWh) for every unit of KPLC power drawn, out of which 72 % is the actual charge on the power and 28 % is composed of fixed charges, taxes and levies, and 14 Ksh (0,19 USD) for every unit produced by their diesel generators. On average a factory in the area would be looking into an electricity bill amounting to 145 000 USD per year and in addition a diesel bill of about 10 000 USD.<br><br>The tea factories in the area all fully rely on fuelwood (self grown or purchased) for heat applications. It is roughly estimated that for each 4 hectares of tea plantation approximately 1 hectare of woodlot is needed in order to cover the thermal power requirements of the tea processing plant. Most tea estates appear to have sufficient wood plantations to cover their own needs. On average about 1,5 tonnes of wood are required for every tonne of made tea and the cost to the company amounts to about 23 USD/ tonne of wood. About 7,5 kWh of thermal equivalent per kg of made tea are needed. Boilers tend to be rated at 10 bars and a steam capacity between 3 and 5 tons/steam per hour. |

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| | The thermal energy requirements represent about 30% of the total energy costs incurred by the tea factories. Yet in terms of energy content, the thermal power needs represent 90% of the total energy requirements of the production process. The power requirements to substitute the overall energy needs (thermal and electrical) of all the tea factories would amount to about 190 GWh per year, of which 173 GWh would be for the thermal energy needs. The substitution of the thermal energy needs can therefore not be considered in the SHPP scheme. |
| CDM | Kenya strongly relies on hydro for power generation. An eventual substitution of utility power will therefore generate negligible CO2 savings in the short term but greater savings can be envisaged in the medium to long-term with the increased role that thermal power is envisaged to take in the overall power mix.<br><br>CO2 savings will be made in terms of substituting diesel fuel needs to power the backup diesel generators of tea factories.<br>In total about 170 000 litres of fuel are consumed by the 14 tea factories, this will mean than on annual basis about 511 tons of CO2 emissions will be avoided.<br><br>In most cases the thermal energy requirements of tea factories are met by wood, a CO2 neutral fuel, if sourced from sustainable forestry plantations. The CO2 savings from an eventual substitution will therefore be zero.<br><br>CO2 savings can be made on the rural electrification component by substituting kerosene fuels and diesel used for generators. On average every household would be consuming about 10 litres of kerosene fuel per month this would lead to a saving of on average 360 kg of tonnes of CO2 per every household connected per year. |
| Power Purchase Agreement (PPA) | To be agreed |
| Investment Summary | **Investment Summary** |

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| Return on Investment | The project IRR is 49%. This is a very high rate of return, and is based only on power consumption by the tea factories, but could be impacted by capital cost increases.<br>If power is sold to the grid at US$ 0.06/kwh the rate of return is even higher as the load factor increases because power can be sold to the grid when it is not otherwise required by the factories. |

## 6.3 Mtibwa Sugar Estate Limited – Bagasse Cogeneration

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|---|---|
| Project Name | Mtibwa Bagasse Cogeneration |
| Energy Source | Bagasse |
| Project Description | Mtibwa is located 102 km north of Morogoro town and 290 km from Dar-es-Salaam. It is situated at an altitude of 350 m above sea level at the eastern foothills of the Nguru mountain range. To the north west of the estate, there are a few densely populated villages, including Turiani, Madizini and also a number of smaller settlements.<br><br>Until recently the estate occupied an area of more than 6,000 ha of land of which some 1750 ha is under cane cultivation. 1,800 ha are irrigated while the remaining area is rain fed. Mtibwa has also purchased 30,000 ha of land to the south west of the estate. The bulk of its sugar cane supplies comes from outgrowers. Mtibwa plans to increase area under estate cultivation to 5,000 ha by the end of 2006. An additional 5,000 ha is planned to be planted in both 2006 and 2007. The expansion plans will also include additional cane supply from new outgrowers. The sugar production in 2005 was 48,000 tonnes.<br><br>Mtibwa is linked to the national grid through a 120 km 33kV TANESCO line from Morogoro. There is 5MW of on-site power generation and up to 36MW could be generated at Mtibwa with the possibility of supplying 17 MW to the grid provided the transmission line is upgraded by TANESCO.<br><br>Before privatisation the power station comprised two boilers of 30 tons MCR each and two T/A's 2,5MW (20 bar) and 1,5 MW(20 bar). A recent expansion included a new 80 tph boiler and a 9 MW (24bar) back pressure turbo alternator which have been installed but are not fully operational. The total installed generation capacity is 13 MW and 140 ton per hour of steam raising plant.<br><br>To accommodate its expanded cane production from Takawe, Mtibwa plans to expand its current crushing capacity of 150 tcph to 250tcph in 1987 and to 330 tcph in 2006. The front end is currently good for 250 tcph in two milling trains of 150 and 100 tcph respectively. The back end is good for only 150 tcph and is planned to be modified this offcrop to achieve 250 tcph next year. |

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| | The proposals typically include higher pressure boilers (120 ton per hour) of either 45 or 63 bar pressure and a pass out turbine of 25 to 30 MW with 15 to 25 MW planned to be exported. The evaluations shown IRR's of 20 % and above and are based on electricity sales prices of USD 70 to USD 80 per MWh.<br><br>The factory will operate in cogeneration mode during the normal crop season and will be in full condensing mode for about 4-6 weeks to burn the excess bagasse stored during the crop season. The excess 15MW of power will be sold to TANESCO.<br><br>The power station expansion project aims to supply the expanded factory power requirement, replace the imported TANESCO power, and export the surplus. |
| Power Demand | The plant will consume about 392 330 tons of bagasse per year and about 10 000 barrels of fuel oil. Fuel oil will be used only for startup and during emergency situations. A bagasse storage and reclaim house of 4 800m3 capacity will be used to continuously circulate bagasse to the two boilers.<br><br>The existing base load includes 850 connections on the 33 kV line which are handled by Tanesco and the factory and consumer connections (>700 connections) on the plantation. Mtibwa manages electricity supply on the plantation. Over 3000 new connections could be made over a two year program. Demand is expected to be around 2 MW. |
| CDM | No CDM funding has been considered at this stage. |
| Power Purchase Agreement (PPA) | To be agreed |
| Investment Summary | The capital cost for the plant including the modifications to enhance process efficiency for energy saving is USD35 million. |
| Return on Investment | 20% |

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