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# Energy Stalemate: Independent Power Projects and Power Sector Reform in Ghana

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**Table of Contents**

**Acronyms**

| | |
|---|---|
| BOOT | Build Own Operate Transfer |
| ¢ | Ghanaian cedi |
| CCGT | Combined Cycle Gas Turbine |
| CEO | Chief Executive Officer |
| CFL | Compact Fluorescent Light |
| CMS | Consumer Michigan Services |
| COD | Commercial Operating Date |
| EC | Energy Commission |
| ECG | Electricity Company of Ghana |
| ECOWAS | Economic Community of West African States |
| EDF | Electricité de France |
| EFG | Energy Foundation of Ghana |
| EPC | Engineering Procurement and Construction |
| ESB | Electricity Supply Board |
| GDP | Gross Domestic Product |
| GSE | Ghana Stock Exchange |
| ICB | International Competitive Bid |
| IDA | International Development Association |
| IMF | International Monetary Fund |
| IPP | Independent Power Project / Producer |
| KNUST | Kwame Nkrumah University of Science and Technology |
| kWh | kilowatt hour |
| LRMC | Long Run Marginal Cost |
| m | million |
| MIR | Management Programme in Infrastructure Reform and Regulation |
| MW | Megawatt |
| NED | Northern Electricity Department |
| NES | National Electrification Scheme |
| PESD | Program on Energy and Sustainable Development |
| PPA | Power Purchase Agreement |
| PRGF | Poverty and Growth Reduction Facility |
| PSRC | Power Sector Reform Committee |
| PURC | Public Utilities Regulatory Commission |
| S&P | Standard and Poors |
| SCGT | Single Cycle Gas Turbine |
| SIIF | Société Internationale d'Investissements Financiers |
| TICO | Takoradi International Company |
| US | United States (of America) |
| US$ | United States Dollar |
| VALCO | Volta Aluminium Company |
| VRA | Volta River Authority |
| WAGP | West African Gas Pipeline |

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**Abstract**

This paper narrates the experience of Ghana's first large-scale, long-term independent power project, Takoradi II, in the context of wider power sector reforms. Takoradi II was a response to the emergency power shortages that existed in 1998. The urgent need for power disadvantaged the Energy Ministry and VRA, the off taker, in their initial negotiations with the investor, Consumer Michigan Services (CMS). The all-equity project called for a high rate of return, in part due to the absence of debt in the financing mix. The plant was planned to be converted into a combined cycle unit, but the steam cycle (phase two) was not realised, pushing up the electricity price even further. Besides being the first IPP in a sector that was in the throes of reform, the investment climate in the country was less than favourable at the time, and the power off-taker's financial position was precarious at best. Nevertheless, without private capital to fund the first phase of Takoradi II, load shedding would probably have occurred during subsequent droughts and constraints in hydro-electric production in Ghana in 2001 and 2002, and would have been more prevalent in 2006 and 2007. Despite the recent equity turnover, the project sponsor, CMS, reported satisfaction with its investment, and no disputes have been entered into since the inception of the contracts. Meanwhile, VRA remains squeezed between high generation costs from the IPP and low consumer tariffs. Until this restraint is addressed, the financial credibility of the off-taker will continue to be an issue, and investors will demand securities such as sovereign guarantees to limit their risk exposure or demand higher returns to compensate for assuming increased risk. A decade after power sector reforms were first instituted (in 1998), Ghana still lacks the coherent power sector planning that will enable it to attract investment and create the conditions conducive to the sustainability of IPPs and the power sector.

## 1. Introduction

This paper critically assesses the experience of the only large-scale greenfield independent power project (IPP) that is currently operational in Ghana, Takoradi II. The paper is structured into four main parts. The first section provides a brief description of the energy sector, and in particular the electricity supply industry in Ghana. The next section briefly describes sector reforms. The third section describes the development of Takoradi II and the last section discusses some of the key elements that affected overall outcomes.

The main objective of the paper is to analyse the extent to which expected development and investment outcomes were realised and the extent to which actual outcomes were in balance. In general, countries and off-takers look for affordable, reliable power (development outcome) and investors expect good returns on their investment and to increase their market share (investment outcome). The degree to which expectations were achieved is embedded in this analysis as well as a discussion of what determined the outcomes. These include external factors pertaining to the host country and also factors internal to the project that help explain the project's relative success.

To address these and other questions, the author adopted an inductive research approach, initially conducting structured literature searches, followed by a country visit and detailed interviews with key stakeholders.[1] The result of these efforts is the present study, which, in addition to documenting and analysing the Ghanaian IPP experience, contributes to a wider body of work, which seeks to analyze outcomes of IPP projects across the developing world.[2]

## 2. The Ghanaian Power Sector

This section gives a brief description of the electricity supply industry (ESI) in Ghana and the institutional context which sets the background for power sector reform and the introduction of IPPs.

### 2.1. Generation

As early as 1915, the Volta River was identified as a resource to produce hydroelectricity, which would in turn help spur industrialisation. Development of the resource was made more likely with

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[1] Interviews and written queries were conducted with fifteen stakeholders throughout 2007 in Ghana. Interviews were followed by email correspondence to clarify discussion points. Stakeholder interviews included representatives from the Ministry of Mines and Energy, the Volta River Authority, Energy Company of Ghana, Ghana Energy Foundation, CMS, the Energy Commission, the Public Utilities Regulatory Commission, and the World Bank, as well as a number of unaffiliated industry professionals from non-governmental organisations and academia. Throughout the text, stakeholders have not been identified by name and are only identified by organizational affiliation.

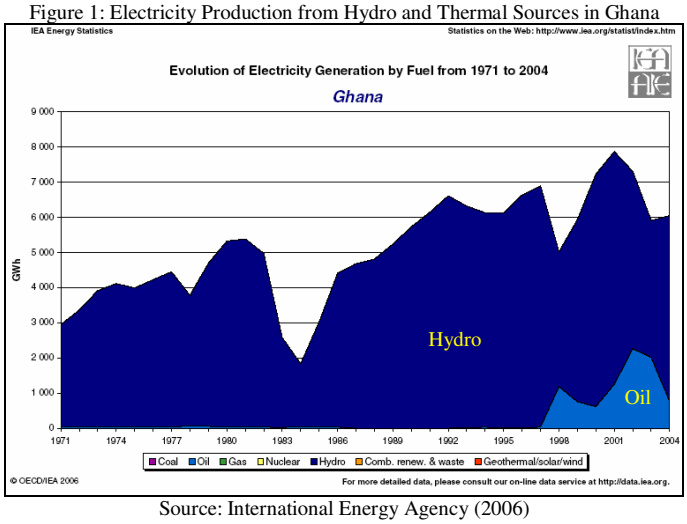
[2] This paper follows a series of investigations that were initially performed by the Program for Energy and Sustainable Development at Stanford University to explore the factors that contribute to the successes and failures of greenfield IPPs globally, and by MIR of the University of Cape Town to consider these factors for IPPs in Africa. Detailed case studies of IPP experiences in Egypt, Kenya, Morocco, Tanzania and Tunisia have been completed to date, and are available at http://www.gsb.uct.ac.za/gsbwebb/default.asp?intpagenr=309.

the discovery of bauxite and the potential for aluminium production which requires large amounts of cheap electricity. Further studies in the 1950s reported favourably on the prospects of the hydro generation facility and an aluminium industry. It would, however, take another decade before work on the Volta River would commence.

The Volta River Authority (VRA) was established following the Volta River Development Act (Act 46 of the Republic of Ghana) in 1961 (VRA, 2006). Work began soon on the Volta River dam and VRA's first hydroelectric station at Akosombo was commissioned in 1965, totalling 912MW, and later upgraded to 1020MW. The Kpong hydroelectric project followed in 1982, adding another 160MW (VRA, 2006).[3]

In 1983/4 drought caused dam levels to decrease to a point where daily load shedding throughout the country was inevitable. The unexpected drought was a sober realisation of the country's overdependence on hydro. The government then took a strategic decision to complement hydro with thermal power, and thereby to mitigate supply risks against the effects of low rainfall. VRA thus commissioned the Takoradi thermal power plant in 1997. This is a 330 MW combined cycle plant fired with light crude oil. Longer terms plans were directed towards the development of the West African Gas Pipeline (WAGP).[4]

Figure 1: Electricity Production from Hydro and Thermal Sources in Ghana




Source: International Energy Agency (2006)

Again in 1998, low rainfall impacted the country, when the Akosombo dam level fell to 237.5 feet compared to a minimum operating level of 240 feet. Frequent load-shedding ensued. Many bulk consumers such as mines as well as other export industries were rotationally supplied with power and certain regions were rationed with only 12 hours of electricity supply per day. As illustrated in Figure 1, the effects of the drought were not as significant as that of 1983 and were in part cushioned by Takoradi I and capacity from the emergency diesel operated generator sets, procured by the Ministry of Mines and Energy, which came on line at the time. The lack of rain was not, however, the only explanation for the 1998 power shortages. Van Edig (1998) suggests

[3] In 2003 and 2004, the VRA completed a retrofit programme on the Akosombo turbines bringing the total hydro capacity to 1180MW.

[4] Ghana, through the VRA, has a 16.3 per cent share in the West African Gas Pipeline (WAGP). Other partners are Chevron Texaco (36.7 per cent), the Nigerian National Petroleum Corporation (25 per cent), Shell (18 per cent), SoBeGaz (2 per cent) and SoToGaz (2 per cent), (Energy Information Administration, 2003).

that low tariffs administered by the government resulted in inadequate resources to fund additional long-term investment and that this was a key reason for the daily load-shedding.

In 2000, the country's first independent power project (IPP), Takoradi International Company (TICO), also referred to as Takoradi II, came online, further bolstering the country's generation potential. This was initially constructed as a simple cycle 220MW plant.

In 2006 and 2007, Ghana again found itself in the midst of another power crisis, partly due to reduced hydro generation, lack of investment, and also an increase in electricity demand, which has been driven by buoyant economic growth.[5] Thus, despite the thermal complementation, hydro still remains dominant in Ghana's capacity mix, as depicted in Table 1 below.

Table 1: Ghana Installed Power Generation, 2007

| Plant | Type | Owner | Installed MW |
|---|---|---|---|
| Akosombo | Hydro | VRA | 1020 |
| Kpong | Hydro | VRA | 160 |
| Tema[6] | Thermal | VRA | 30 |
| Takoradi I | Thermal | VRA | 330 |
| Takoradi II | Thermal | CMS[7] 90%, VRA 10% | 220 |

Finally, it is important to note that a number of other privately financed power projects have been considered over the last decade, which have not come to fruition. These projects include mainly thermal generation plants. The difficulties experienced in getting these projects off the ground gives an indication of how the investment climate strained the development of much needed generation capacity. A detailed discussion of these projects is beyond the scope of this paper; however, Appendix A highlights key facts and figures.

### 2.2. Transmission and Distribution

At the time of Ghana's independence in 1957, the public sector through the Electricity Department operating under the Minister of Public Works assumed responsibility for electricity generation, transmission and distribution. In 1967, the Electricity Corporation of Ghana (ECG) was established to replace the Electricity Department. The ECG was charged with the procurement of bulk electricity and distributing it to all consumers throughout the country.

However, the ECG became weighed down with substandard service levels, a poor financial situation, labour disputes, and disruptions at a senior level in the organisation. Eventually, the government decided that the ECG should focus on resolving its organizational problems and that the VRA should take over the four northern regions. Through its subsidiary, the Northern Electricity Department (NED), established in 1987, the VRA assumed responsibility for power distribution in Brong-Ahafo, Northern, Upper East and Upper West regions. In southern Ghana, viz. Ashanti, Central, Greater Accra, Eastern and Volta regions, ECG remains responsible for

[5] Power cuts to mitigate the imbalance between supply and demand started in August 2006 and continued for about one year.

[6] The VRA has a 30MW diesel station in Tema. The Tema plant was installed between 1961 and 1963, and ran continuously until 1966. Thereafter, it was used on standby until 1979. The station has been operated as a contingency plant since then (Energy Commission, 2005).

[7] CMS sold its share in Takoradi II to TAQA in 2007.

distribution of electricity to consumers.[8] Substantial progress has been achieved in electrification over the years and access rates are now approaching 50 per cent.

To enable power exchange to neighbouring Togo and Benin, a transmission link was completed in December 1972 (VRA, 2006). A transmission link with Côte d'Ivoire was also established in 1984. Power flow was initially from Ghana to Côte d'Ivoire, but following the power crises in Ghana, trade flows are now reversed.

In sum, Ghana's ESI is characterised by a generation mix that is still largely dependent on hydro power. Recurring drought coupled with the pressure to extend electricity access to more Ghanaians has led to a greater focus on developing thermal generation capacity, which is invariably of significance to the development of the country's IPP programme.

## 3. Power Sector Reforms

A review of the electricity supply industry in Ghana suggests that there have been many factors that have shaped the pace as well as institutional aspects of reform in the sector. One such factor is the role that the World Bank has historically played, and will most likely continue to play, in the sector. The World Bank has extended loans to the VRA from the time of its inception. These loans generally have been linked to the economic recovery programme and were tied to conditions, one of which was power sector reform and the introduction of private capital to assist in infrastructure expansion. Conditionalities were formalised in 1993 as part of the World Bank's "commitment lending" policy[9].

The distribution sector has long been a focus of reform, although efforts to improve operations at the ECG have met with limited success. In addition to a management contract with the Electricity Supply Board (ESB) of Ireland in the early 1990s to revamp the organizational structure of the utility, in 1994 the ECG also contracted Electricité de France (EDF) and Société d'Amenagement Urbain et Rural (SAUR-Bouygues) to help improve the performance of its customer service and collections divisions over a four year period (World Bank, 1995). Although short-term improvements were achieved, they were not sustained.

Another factor prompting reform of the sector was severe drought that affected the country between 1982 and 1983 and again between 1993 and 1995. Coupled with sharp annual increases

[8] The four regions were among the main areas earmarked for rural electrification and called for significant extension of the power distribution grid. The VRA, at the time, was in a very good financial position and it was therefore advantageous to offer the management of the electricity distribution in the four regions to the VRA in order to secure the required loans for that portion of the rural electrification project (EFG pers. com., 2007).

[9] As a response to poor power sector performance for many decades in developing countries, mainly due to low institutional capacity, low electricity access and poor quality of supply, the World Bank's commitment lending policy was formulated and adopted. The World Bank attributed the poor performance to a lack of hard budget constraints that would have been present in the private sector and the difficulty governments have politically and economically in adjusting electricity tariffs to at least cover the cost of producing power. The World Bank's commitment lending policy approach promoted regulatory frameworks and unbundling to gear power sectors toward private investment on the premise that the right incentives would produce an improvement in sector performance (World Bank, 1993 and 2006).

in electricity demand of between 10-15 per cent from 1982 to 1995, the need for transformation in the sector was brought into the spotlight (Edjekumhene and Navroz, 2002).

The second drought from 1993 to 1995, together with growing demand, intensified the need for complementing hydro with thermal power. At the time of negotiations between the Government of Ghana and the World Bank over a credit for the development of VRA's first bulk thermal plant, the bank's International Development Association (IDA) laid down conditions of sector reform. Although the bank was content to see the VRA remain a dominant generator, it expressed a desire to supplement generation capacity with independent power producers. The bank approved the loan on the proviso that the Power Sector Reform Committee (PSRC) would be established to deliberate the operational, legal and commercial implications of the reform agenda.

Although the World Bank expressed its desire to see reforms in the sector, the changes that it had envisioned were limited. It therefore came as a surprise to the bank when the government replied with a comprehensive policy framework that was much more extensive than the bank had prescribed. Contracting in a Chilean firm, SYNEX Consulting Engineers, as consultants, the PSRC submitted its recommendations to the Government of Ghana in a report detailing how generation, transmission and distribution sectors should be transformed.[10] Transmission was to be unbundled from the VRA to form a state owned grid company, allowing open and non-discriminatory access to both generators and large wholesale users. On the generation side, although the PSRC had no desire to see a reorganisation in the hydropower business of the VRA, it did recommend relying on private public partnerships to augment capacity while allowing generators to sell wholesale power directly to large consumers in a wholesale market in addition to distributors through the grid company. Five regional distributors were proposed to supply power to consumers with consumption of less than 5MW. Consumers using more than 5MW would be eligible to participate in the wholesale power market. The NED would be unbundled from the VRA and, along with the ECG, be transformed into the five distributors, with concessions for these distributors eventually being privatised.

The PSRC also recommended instituting an independent regulatory body responsible for issuing licences and tariff setting. The cabinet accepted the recommendations of the PSRC and in 1997, through Act 538, the Public Utilities Regulatory Commission (PURC) was created with the authority to set tariffs. This was followed by Act 541, which was passed by Parliament, and led to the establishment of the Energy Commission, an advisory body to the ministry with the mandate of licensing as well as the development of rules for the technical operations of the sector.[11]

Although the VRA in principle agreed with the need to reform, senior officials in the organisation severely criticised the scope, arguing that the unbundling of the VRA would weaken the sector and that the model proposed, which resembles the Chilean electricity market, would not yield similar results due to the small size of the sector in Ghana (Edjekumhene, Bawa Amadu and Brew Hammond, 2002).

[10] Chile was one of the first countries to reform its power sectors in the 1980s and has had more than a decades experience in reformed power markets.

[11] The Energy Commission was modelled on the erstwhile National Energy Board which had a strong policy advisory role and was seen as a specialised, quasi-independent 'department' in the Ministry of Energy.

Despite the initial reform agenda, little has happened since. VRA and the distribution sector have not been unbundled and while a regulator has been established and one IPP investment made, as of early 2008, no new large-scale plant has been commissioned to overcome power scarcities.

### 3.1. Tariffs

Although the VRA was pessimistic about the sweeping reforms, it did welcome the establishment of the PURC, with its mandate to "build a credible regulatory regime that will respond adequately to stakeholder concerns and ensure fairness, transparency, reliability and equity in the provision of utility services" (PURC Act, 1997). Since tariff setting had long been a controversial issue in the sector, it was hoped that the commission's independence would bring greater credibility to the tariff setting process. Historically, the government has been reluctant to raise tariffs close to the long run marginal cost (LRMC) for political reasons. In 1997, the government attempted to raise tariffs by 300 per cent, but the public outcry resulted in a presidential intervention to abate the fears of the general public. The crisis fast tracked the establishment of the PURC in that year (initially only scheduled to be instituted in the following year). The PURC surprisingly managed to pass through a series of staggered increases cumulatively totalling a 300 per cent increase in 1998 through the establishment of a transitional plan for tariff increases (Edjekumhene and Navroz, 2002).[12]

Mindful of the link between electricity tariffs and the socio-economic climate in Ghana as well as its mandate and responsibility toward suppliers and their sponsors, the electricity regulator has steered from both extremes as far as tariff setting is concerned. The PURC defends its low tariff increases, saying that the VRA should look internally to make efficiency gains and reduce losses, as opposed to solely looking for its rate of return (ROR) in the tariff. Upon completion of the West African Gas Pipeline, which has experienced considerable delays, electricity production costs are expected to drop significantly since most of the expenditure for thermal power is due to the fuel costs.

In the meantime, however, tariffs will probably continue to remain a contentious issue, as the VRA wants to see them closer to the LRMC and consumers want 'affordable' rates. The government has intervened on more than one occasion by partially absorbing tariff increases to consumers by subventions to various categories of users. These subsidies have at times been slow in making their way back to the VRA, often hampering the VRA's ability to make timely payments, including purchases from Cote d'Ivoire and Takoradi II.

In September 2006, the government froze residential tariff increases but allowed increases to industry to continue. In August 2007, it appeared that the state was continuing to make the sector more sustainable. The chairman of the PURC disclosed that the government intended to increase tariffs and remove subsidies by the end of that year to facilitate entry of private sector participants and make tariffs more cost-reflective (Gongo News, 2007). It therefore came as a shock to the PURC chairman after it announced a 35 per cent tariff increase in November 2007, when the government subsequently announced that it was increasing the lifeline tariff band to consumers

[12] The drought of 1997 came as a realisation to the public that these increases were in fact necessary to ensure sustainability in the long run. The increases were approved in tandem with a comprehensive communication programme to consumers (Edjekumhene and Navroz, 2002). It should be noted that inflation, largely fuelled by devaluation in currency, gnawed away at the benefits of tariff increases. Raising tariffs to a level whereby at least costs are recovered was one of the World Bank's IDA lending conditions.

threefold (from 0-50 kWh to 0-150 kWh). The review by government of the structure of electricity tariffs resulted in an outcry from the regulator and played a part in the resignation of the PURC chairman, with the government's announcement considered as the breaking point (Ghana Districts, 2007).

### 3.2. The Volta Aluminum Company (VALCO)

Another reason why VRA revenues have been low is due to the agreement that the VRA has historically had with the aluminium company, VALCO, since the start of the Akosombo dam project. The establishment of VALCO was initially the *raison d'être* of the VRA, together with the construction of the Akosombo hydroelectric station.[13] The historic relationship between the two organisations exhibited a strong co-dependence especially during the early years while residential demand was low and VALCO consumed the bulk of the VRA's supply.

In 1968 more than three quarters of the VRA power was consumed by VALCO (Brew-Hammond 1997). The VRA, earning its revenues from VALCO in the form of foreign exchange, was therefore largely insulated from the country's fiscal turmoil and eroding currency, the effects of which were felt by the rest of the Ghanaian economy. It was due primarily to the foreign currency earned from VALCO that the VRA could historically maintain its operational capacity, and to an extent, the capacity of the sector. By 1995, electricity generation supplied to VALCO dropped to below 40 per cent as domestic demand for power increased. By that time Ghana, which traditionally was an exporter of power to its neighbours, became an importer of electricity from Côte d'Ivoire as its energy demand increased, as noted in section 2 (World Bank, 1995). In addition to demand driven by economic expansion, the relatively cheap hydro electricity did not reflect the marginal cost of new power and did not help in sending the right price signals to consumers to encourage energy efficient behaviour.

During the drought years, supply to VALCO was significantly cut. In 1994, a dispute over power cuts eventually led to an out-of-court settlement between VALCO and the VRA. What was clear to the Government of Ghana and to the VRA was that the tariff paid by VALCO was not sustainable, since VALCO was paying much less for its power than other consumers in Ghana. In 2001 Kaiser Aluminum, VALCO's parent company, experienced financial difficulties and filed for bankruptcy.[14] Disputes related to the tariff that VALCO was entitled to in terms of the agreement signed in the 1960s continued. The government's position was that the preferential power purchase contract that was entered into with VALCO was for 30 years and expired in 1997, and that considering the significantly altered conditions of the sector, VALCO should in fact be charged at a rate that is commensurate with that of other large bulk consumers, who were paying two to three times the rate of VALCO.[15] The VRA bulk electricity tariff to VALCO until 2003 was 1.65-1.80 US cents per kWh whilst the approved bulk supply tariff to other customers was about 4.5 cents per kWh (Energy Commission, 2005). This led to the subsidization of

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[13] At that time VALCO was 90 per cent owned by Kaiser Aluminium and Chemical Corporation and 10 per cent by Reynolds Metals.

[14] Reasons for this action, as cited by Kramer (2003), include a slump in the global aluminium market, costly asbestos litigation lawsuits, rising retirement pension and costly medical obligations.

[15] At that time in 2003, the generation mix had swung to 65 per cent thermal and 35 per cent hydro as opposed to virtually all hydropower in 1967 when the power purchase contract was signed (Government of Ghana Press Release, 2003).

VALCO by US$40-60m in 2002 (ibid). In October 2004, after lengthy disputes, the Ghanaian government decided to buy out the shares of VALCO and assume ownership of the company.

The power demand and supply situation grew gradually worse until there was hardly any power left in the system to supply VALCO without inducing large scale blackouts throughout the country. In March 2007, the government shut down VALCO completely. The sector had therefore gradually lost its single largest consumer, and, with a diminishing contribution of hydro to the generation mix, was left with costly obligations to buy thermal power.

## 4. Private Sector Participation in Generation – The Takoradi IPP

During the drought of 1993-1994, Ghana planned to install thermal capacity to complement and moderate against the adverse dependence of hydropower. A plan was passed to develop a thermal plant in the western region of Ghana near Sekondi-Takoradi, the country's third largest city and industrial and commercial center.

The VRA was poised to be the champion of the project on the basis of its past success and involvement in the sector.[16] The project consisted of the construction of 330 MW of combined-cycle generation capacity, made up of two combustion light crude oil fired turbine generator sets of 110 MW each, a heat recovery boiler, a steam turbine generator to produce an additional 110 MW of generation and the associated transmission and sub-station infrastructure. Construction of Takoradi I commenced in 1996 and the first simple cycle unit (110 MW combustion turbine) became operational in December 1997. The commercial operation of the second simple cycle unit began in January 1998 and commissioning activities on the combined cycle, including the steam turbine and generator, commenced in April 1999 (Takoradi II Addendum Environmental Report, 2001). The World Bank issued an IDA loan and was the principle lender to the project on the condition that the next investment into the generation sector would be that of a private investor. Thus, the publicly funded Takoradi I (330MW combined cycle gas plant) was considered the first of a two-phase project, with Takoradi II (a 330 MW extension) expected to be privately financed.

### 4.1. The Takoradi International Company (TICO)

In an effort to raise interest and finance for Takoradi II, the President of Ghana, during a trip to the U.S. State of Michigan, engaged Consumer Michigan Services (CMS) in discussions. At the time, CMS had no investment experience in Ghana, however, it was involved in IPP deals in India and North Africa (including Morocco's Jorf Lasfar IPP).

An international competitive bid (ICB) was passed over for a negotiated deal, with reasons cited that an ICB would have taken too long (CMS, PURC and Energy Commission pers. com., 2007). Given the urgent need for power, time was of the essence.

Although the initial plan was for CMS and the VRA to have an equal shareholding in the private company, at that time shortly after the drought period, the financial situation of the VRA did not lend itself to such a major investment. The lower sales due to the drought and the higher cost of thermal production had strained the resources of the utility. It was therefore agreed that CMS

[16] The World Bank in its 1995 Staff Appraisal Report described the VRA as 'a relatively well-run public utility with few institutional and financial problems'.

would take a 90 per cent stake in the project and that the VRA share would be reduced to 10 per cent with the option of increasing it to 50 per cent should the VRA's financial situation improve to the status where the additional shares could be acquired. It was also agreed that the first phase of the project, i.e. the two single cycle gas turbines, should be undertaken although the debt financing had not been finalised for the second phase of the project which comprised the steam cycle and its associated components.

Shortly after project closure at the end of 1998, the Takoradi International Company (TICO) was registered as the Special Purpose Vehicle (SPV) to assume operations. Construction started the following year with the first turbine coming into operation in March 2000 and the second turbine six months later. This concluded the first phase which saw 220MW of single cycle light crude oil (LCO) fired generation coming on line at a cost of US$110m. The second phase of the Build Own Operate Transfer (BOOT) scheme, which consisted of a heat recovery unit and a steam turbine, was to be debt financed. This, however, did not materialise since the Ghanaian government and project sponsors could not agree on the terms of the deal and, until present, the project has remained entirely financed by the shareholders' equity and without the steam cycle.

### 4.1.1. Project Stakeholders

The VRA's balance sheet never improved to the point where it could exercise its option of increasing its share in the project to 50 per cent.

CMS contracted Black & Veatch (of the U.S.) and Overland Contracting Incorporated (a subsidiary of Black & Veatch) as the Equipment Procurement Contractor (EPC) to supply the main plant hardware for the installation enabling both firms to execute their first major power project in Sub-Saharan Africa. The Operating and Maintenance (O&M) responsibilities remained with the major shareholder through CMS International Operating Company, a subsidiary set up by the CMS parent company.

The design of the original Takoradi site was such to provide for the Takoradi II expansion and to effectively double the plant's output from 330 MW to 660 MW.[17] The fuel arrangement for Takoradi I was also extended to accommodate the expansion, with the VRA assuming responsibility for the fuel supply to the IPP, since it was already supplying fuel to its own plant. The VRA being fuel supplier and power off-taker effectively reduced the arrangement to a tolling agreement with TICO. The fuel is purchased by the VRA on international tender, supplied by tankers and piped to a single point mooring where it is stored in tanks for consumption.

[17]The expansion of the Takoradi site required a Supplementary Environmental Impact Assessment in 1999 from the Environmental Protection Agency (EPA) of the Republic of Ghana before the start of construction.

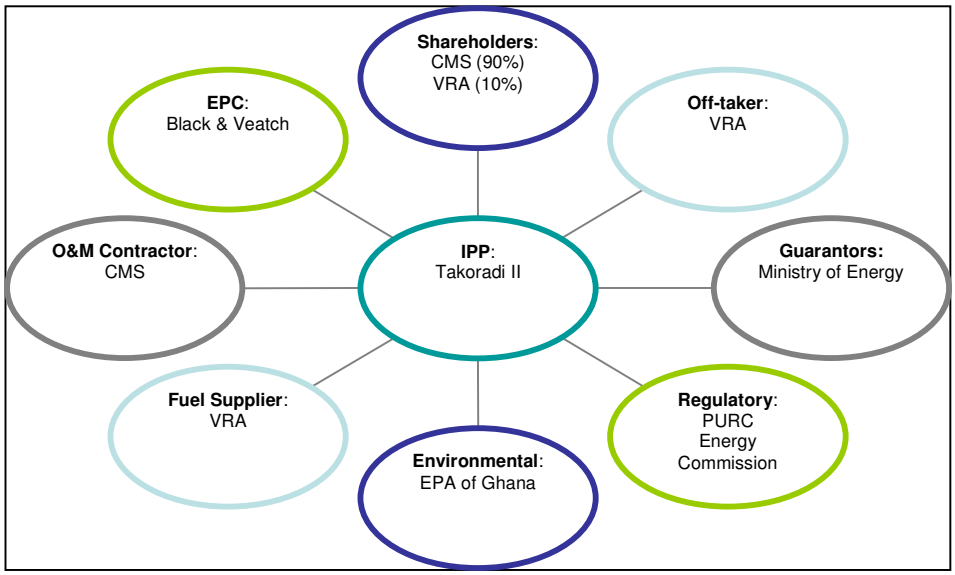



Figure 2: TICO Principal Stakeholders

Figure 2 provides an illustration of the principle project stakeholders. In March 2007, CMS announced that it would sell its share in TICO to TAQA, the Abu Dhabi National Energy Company.[18] The sale formed part of the company's wider divestiture strategy to exit emerging markets and refocus its operations on its domicile market. CMS has been experiencing financial difficulties in its home market, which spurred a retreat from emerging markets.[19]

### 4.1.2. Project Agreements

The absence of debt on the project and the large stake that CMS acquired meant that CMS has shouldered most of the risk. A long-term PPA of 25 years linked to a minimum availability ensured that the investors would be able to recoup their investment and make a return on the transaction. Like most IPPs in developing countries, PPA charges are dollar denominated to protect investors against currency devaluation. The PPA consists of a variable energy charge and fixed capacity charge (to which O&M is added). The project was also backed by a government guarantee.

The fuel agreement is simplified by the fact that the VRA has to acquire fuel for the operation of Takoradi I. Since TICO would have no more control over fuel prices than would the VRA, it was agreed that the VRA procure the fuel for TICO in an attempt to synergize and avoid the duplication of logistics and procurement efforts. The responsibility rests on the VRA to procure

[18] Listed on the Abu Dhabi Stock Exchange, TAQA is a global energy investment company specialising in infrastructure projects in the Middle East, Asia, Europe and Africa. It should be noted that CMS was criticised due to its decision not to involve the Government of Ghana in its plan to sell its stake in TICO. The Ghanaian government was not privy to the negotiations that were ongoing with TAQA and was only informed of the intended sale at the same time as the press.

[19] CMS pers. com. (2007), also see Berenson (2002).

the correct specification fuel to be burned by TICO and the latter for ensuring that the fuel is burned in accordance with the heat rate curves as stipulated in the contract.

As part of the security package, provision is made for arbitration in the event of a dispute that may not be resolved internally between the parties involved. Arbitration is to be held at the London Court of International Arbitration and covers the entire contract duration. In contrast to many other IPP contracts, an escrow account is not a requirement on the part of the off-taker. A letter of credit with a value of US$3m was, however, provided by the government.

## 5. Analysis of Outcomes

At an estimated 20.5 per cent ROR on the project equity, the investor CMS reported that it was happy with the investment and generally with the outcome of the project (CMS pers. com., 2007). There were no delays or major problems during the power station construction and thus far the plant has been operating well. Although there have been some issues with regards to fuel supply arrangements with the VRA in terms of quality and availability, they appear to have been resolved, and to date there have been no major problems with the project or the agreements between stakeholders. Ghana has benefited from the power generated and so has averted more extensive load shedding that would have occurred had the plant not come on line (ECA, 2003: 49).

Ghana's IPP experience is similar to that of many other Sub-Saharan African states, namely seemingly positive outcomes for the investor versus modest outcomes for the developing country. The critical question is to what extent were country-level versus project-level factors responsible for them? And perhaps more importantly, how did causal elements that influence these projects contribute to the broad outcomes of the project and the sector? The following section will explore these questions in more detail.

### Country Factors that Shaped Outcomes

An array of country-level factors impacted on the IPP investment. These include the extent to which investors found the investment climate to be favourable, policy frameworks and planning, bidding practices and governance.

#### 5.1.1. Investment Climate

At the time of project negotiations and closure, although Ghana was well on its way to recovery from its financial and economic crisis, it fell short of being considered an investment destination in general terms and was not rated by major ratings agencies such as S&P, Moody's and Fitch. The country lacked the stable macroeconomic policies which would attract large scale interest and investment in its power sector. Although the Takoradi IPP contracts have held and there has been no contract renegotiation or arbitration, over the past decade legal battles have been entered into in at least two cases where power had been contracted by the government (see Appendix A for details). For investors these long drawn out court cases in the power sector, as well as cases in other infrastructure sectors such as water and telecommunications, have informed the risk associated with investment in Ghana. As a result, investment interest waned or the cost of capital increased to compensate for this increase in perceived risk.

Although Fitch and S&P have started to rate Ghana on its investment competitiveness, the country still falls a couple of notches short of investment grade. In February 2007, Ghana's long-

term foreign and local currency rating of B with positive outlook, which it has held since 2003, was stepped up to B+ with a positive outlook affirmation. According to Adomakoh (2007), the Fitch report observed that "Ghana's growth continues to outperform its rated peers, while macroeconomic stability has been maintained in the face of oil price shocks and single digit inflation is near at hand".

Ghana's economic growth record over the past six years has been among the strongest in Africa, with real GDP growth exceeding 6 per cent in 2006 and poised to exceed that figure in 2007 (C Bonds, 2007). The rate of inflation was trimmed from a high of 40.5 per cent in December 2000 to 12.1 per cent in February 2006, despite upward pressure resulting from petroleum deregulation of prices that started in 2005 (Addison, 2006). The implementation of prudent monetary and fiscal policies has reversed the large budget deficits of between 8 per cent and 10 per cent in the late 1990s to 2.7 per cent in 2005 (ISSER, 2005).

Before 2000, the country's gross international reserves were less than one month's imports. In 2006 it has significantly increased to four months of imports for goods and services (Addison, 2006).[20] Qualifying for the G8 Multilateral Debt Relief Initiative, public and external debt has been reduced to levels that are more sustainable.[21] With the successful conclusion of a three-year Poverty and Growth Reduction Facility (PRGF) in October 2006, the IMF now classifies Ghana as a "mature stabiliser".[22]

Overall, Ghana's economy and investment climate have improved significantly from where they were a decade ago when private capital was introduced into the power sector. The improved economic climate has assisted in the development of certain investments planned for the economy. However, when one hones in on the power sector itself, despite plans for future power projects (future power sector projects are summarised in Appendix B), developments have not nearly progressed at the same rate as they have for the rest of the economy. To understand some of the reasons for the disparity, this analysis further assesses the elements that drive investor sentiment in the sector.

### 5.1.2. IPP Policy and Regulation

Energy and IPP policy is under the purview of the Ministry of Mines and Energy with the Energy Commission providing the tutelage for planning and advising government. The Ghanaian Parliament enacted the Energy Commission Act (Act 541) on 31 December 1997 to:

> Provide for its functions relating to the regulation, management, development and utilisation of energy resources in Ghana; provide for the granting of licences for the transmission, wholesale supply, distribution and sale of electricity and natural gas; refining, storage, bulk

[20] This was largely assisted by attracting higher commodity prices on the country's main exports – gold and cocoa.

[21] Ghana chose to be included in the Heavily Indebted Poor Country (HIPC) programme in 2002, with an estimated US$ 215 million to be written off per year over the 2002-2011 period. The total value of debt relief to be realised over 20+ years was estimated to be in the order of US$ 4.3 billion. Ghana is one of fourteen countries that have qualified for debt cancellation agreed to by the G-8 group in Gleneagles in July 2005. This lifeline is expected to help the country achieve the Millennium Development Goal #1 of halving poverty by 2015 (European Commission, 2007).

[22] The ratings agency Fitch, however, counsels caution on two counts: first, Ghana has yet to demonstrate that it can maintain this record in the absence of high frequency multilateral surveillance, and second, fiscal slippages in 2006 highlight continuing weaknesses in the management of the public finances.

> distribution, marketing and sale of petroleum products and to provide for related matters (Energy Commission Act, 1997).

With the legislation passed on the last day of 1997, the commission only became operational later in 1998, at roughly the same time that negotiations were finalised for Takoradi II and when financial closure was reached for the project. By the time construction was completed and the start of commercial operation was imminent, a provisional licence was issued to TICO in order to assume operations. Thus the Energy Commission had limited control or input into the development of the Takoradi II project.

The Public Utilities Regulatory Commission also had limited input into Takoradi II. Established in 1997, but only operational in 1998, the commission carried out an independent review of the fixed capacity charge the following year (1999), after financial closure was reached. Although the contract remained unchanged, it was concluded by the commission that the capacity charge should not be passed through in its entirety to consumers and thus it became a government contingency. Even if the PURC had had an opportunity to review the PPA during the early phase of the negotiations, it is, however, doubtful whether a nascent regulatory institution would have possessed the necessary capacity to effect any consequential changes. With the energy crisis at its pinnacle, a review of the PPA could potentially have stalled the addition of the necessary capacity, a situation the government probably wanted to avoid at that time (PURC pers. com., 2007).

Avoiding potential delays in the development of the project was also a key reason for the procurement procedure followed in acquiring the much need generation capacity. The time constraint was one of the key reasons that Takoradi II was a negotiated deal as opposed to an international competitive bid. It is, however, the government's intent that future plants are procured in an international competitive bid in order to attract the lowest priced power (Energy Commission pers. com., 2007). Regardless of this intent, Ghana has never developed a power plant through an ICB process. Moreover, there are no concrete plans for competitive bidding for future plants, showing a divergence between the country's future policy intent and implementation, as well as possible weaknesses in planning and implementation within the sector.[23]

The government has also clearly stated its policy of moving away from providing sovereign guarantees for privately contracted power plants, in contrast to TICO. It should be reiterated here, however, that the sovereign guarantee for TICO was crucial in securing the deal. It is unlikely that CMS or any other investor would have entered into an agreement without such an assurance, given the fact that TICO was the first privately owned generator in Ghana, in a virgin regulatory environment.

### 5.1.3. PPA Charges and Generation Costs

In contrast to VRA thermal plant, the performance of TICO is supported by a guaranteed revenue stream due to the power purchase agreement. The absence of project debt meant that the required rate of return on the project was higher than would be the case if the weighted average cost of capital were to include the sizable portions of debt that are almost synonymous with classic project financing. Proportionally higher returns commanded by shareholders impact on charges putting upward pressure on tariffs. The Takoradi II project developed by CMS is reported to have a PPA which allows it an estimated 20.5 per cent return on equity (ECA, 2003:28). This is not

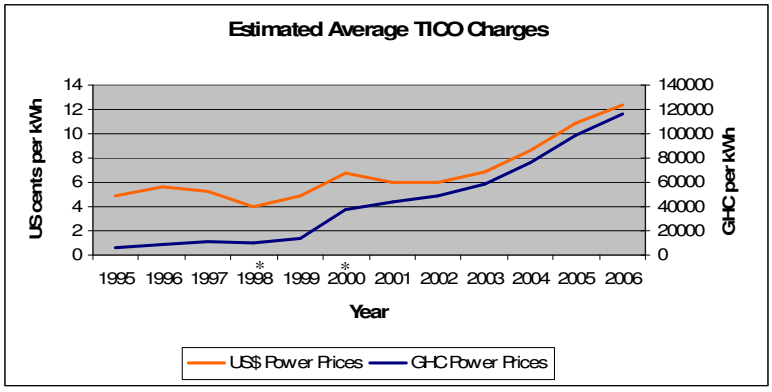
[23] International competitive bidding is traditionally a long process. Planning and effective implementation are therefore critical to ensure that power plants come online before demand outstrips supply.

entirely surprising given the level of risk of the country's first IPP. It has to be borne in mind that the intended project finance developments did not materialise, and had the project been refinanced with debt to expand the plant to incorporate the steam phase, a lower rate of return on the project would have been possible.

Since Takoradi II operates in single cycle mode, fuel costs remain by far the most significant component of generation costs accounting for more than 75 per cent of the charges (ECA, 2003:39). The increasing fuel prices in recent years have therefore had a significant impact on charges to TICO. In 1998 when the project was negotiated, world crude oil prices averaged between US$11-12 per barrel. Today the situation has changed dramatically.

Based on data from a report submitted to the Ministry of Mines and Energy on the Reform of the Ghanaian power sector, with the current international oil prices, it is estimated that charges in 2007 have doubled since COD, and more than trebled when using fuel figures based on the price of crude oil at the time that the project reached financial closure in 1998 (see Figure 3). In comparison to the country's dominant hydro resources, this marks a significant increase in generation costs. More disturbingly, in cedi terms the charges increased at least six fold since COD. In addition to the fuel costs, the country's devaluing currency, which has undermined tariff increases approved by the PURC, is arguably the proximate driver for the runaway costs.

Figure 3: Takoradi II Estimated Tariff Trend Based on Rising Fuel Costs




Sources: ECA (2003), VRA Estimates (2007).
*Project Closure was in 1998 and COD in 2000.

### Project Factors that Shaped Outcomes

As in the case with many Sub-Saharan states, one of the principle reasons why an assurance such as a sovereign guarantee was sought by investors at a governmental level was because the utility was unable to provide sufficient payment security. At the time of project negotiations, Ghana's situation was no exception.

#### 5.1.4. Off-taker Credibility

The finances of the VRA were deteriorating at the time the deal was negotiated. The drought situation (and as a result, lost revenue) as well as a severe currency devaluation were significant threats to the income stream that would recoup investors' outlays. In particular, the slow demise of VALCO, the traditional anchor to the Volta River project that paid in foreign currency, threatened the utility's financial health, thereby putting the PPA, which was dollar denominated,

at risk. The regulator put further pressure on the VRA's cash flows as it tried to find some degree of middle ground between protecting the public while ensuring the financial viability of the utility.

### 5.1.5. Partnering Arrangement and Technology

CMS was prepared to bear a greater portion of the investment risk when the VRA could not finance the initial 50 per cent stake in the project. Nonetheless, Ghana chose a partner who had proven experience in the operation of power plants globally. The technology chosen was guided by Ghana's desire to complement its hydro-dominated generation. Despite the high fuel costs and PPA charges, TICO continues to serve the country with reliable power.

The fuel arrangement was kept to a simple tolling arrangement with the VRA supplying the light crude oil that the plant runs on. VRA buys all the fuel required to run the IPP as well as its own combined cycle plant, which is situated on the same site. It is expected that the plant will run on natural gas when the West African Gas Pipeline becomes operational in 2008.

### 5.1.6. Project Performance

Since COD the plant has had an availability factor of 94 per cent (CMS pers. com., 2007). CMS has also invested in the arena of corporate social responsibility. In addition to refurbishing a nearby secondary school, the company has set up education support and development programmes aimed at providing scholarships for learners at secondary and tertiary level. The company also assists in providing potable water to the residents of Aboadze and Abuesi, two nearby townships adjacent to the plant, and has sponsored some of the medical staff at the local VRA hospital.

In return for the power generated and sold, the company has always had its power charges paid by the VRA as off-taker and no disputes have been entered into between the parties. There have, however, been a few occasions where VRA was unable to meet payment deadlines due to cash shortages within the organisation.[24] In all cases, however, the charges were eventually settled by the VRA. As part of many other developing country IPP agreements, escrow accounts are normally stipulated as part of the security package. In the case of TICO, however, this did not happen. It may be that investors thought that an escrow would delay the inevitable, should problems arise in the off-taker's financial circumstances. Furthermore, the project was bolstered with a state guarantee, and therefore the escrow may not have been deemed necessary.

### 5.1.7. IPP versus VRA Performance

In contrast to the good performance shown from the single cycle Takoradi II, both the financial and the technical performance of Takoradi I, the combined cycle plant operated by the VRA, are causes for concern. Reasons for this appear to be four-fold. First, during the first years after Takoradi I was built, the plant operated only as a single cycle plant, i.e. not combined cycle, which meant that the unit cost was higher than had it operated as a combined cycle. Secondly, availability figures for VRA's thermal plant have been falling over the last few years, which appears to be linked to technical problems experienced by the plant. A third factor relating to poor performance stems from VRA 's cumbersome processes for acquiring spare parts whereby procurement decisions are not allowed to be made at lower levels within the organisation in the

[24] This was mainly due to late payments by the government of subsidies granted to consumers (VRA pers. com., 2007).

event of unplanned maintenance (VRA and KNUST pers. com., 2007).[25] It is believed that without these limitations the VRA's thermal plant would exhibit much better performance than what is currently displayed. Finally, with the company's financial situation, the lack of funds also contributes to the plant's current lacklustre performance.[26]

## 6. Conclusion

In summary, the first phase of Takoradi II was installed rapidly at the request of VRA and the Ministry of Mines and Energy to meet emergency power shortages that existed in 1998. The urgent need for power may have placed the off-taker in a disadvantageous position during negotiations with CMS. The all-equity project called for a high rate of return in part due to the absence of debt in the financing mix, and the fact that the steam cycle was not realised pushed up the price of a kWh even further. Besides being the first IPP in a sector that was in the throes of reform, the investment climate in the country was less than favourable at the time, and the power off-taker's financial position was precarious at best. Nevertheless, without private capital to fund the first phase of Takoradi II, load shedding would probably have been worse in Ghana. Despite its recent exit, the project sponsor, CMS, reports satisfaction with its investment and no disputes have been entered into since the inception of the contracts.

From a development perspective, the country has benefited from the additional power notwithstanding the higher costs of thermal power. However, the real value of tariff increases has been eroded by high inflation. In conjunction with steeply increasing fuel prices, inflation has hampered efforts to contain power prices. The government's need to protect consumers from high tariffs by subsidising them has sent mixed signals in the context of its stated mission to strive toward cost reflective tariffs. The problems experienced in other regulated sectors signalled that the country in general had difficulty in executing reform programmes in public infrastructure sectors and state owned enterprises during the period under review.[27]

In addition to the management problems at the utility (leading to the dismissal of the former CEO) and subsequent leadership uncertainty, the company's poor performance record with Takoradi I supports PURC's belief that the VRA is not as efficient as it needs to be.

The VRA remains squeezed between high generation costs from the IPP and low consumer tariffs approved by the regulator. Until this restraint is addressed, off-taker financial credibility will continue to be an issue for IPPs and the VRA as investors will continue to demand securities such

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[25] Long-term service agreements for VRA's thermal have been proposed to remedy this situation.

[26] The VRA has also suffered the impact of a management crisis. In 2002 and 2003, the company's Chief Executive came under heavy criticism from staff and middle management at the utility for his management style at a time of heightened concerns over the company's ability to supply the country with power. After mounting pressure from VRA staff to investigate, the government set up a committee of inquiry to probe the allegations. Workers demanded his removal from office. At the height of the conflict between management and labour, the discord eventually resulted in the resignation of the CEO and the establishment of an Interim Management Committee to oversee operations until the management situation could be normalised (VRA Annual Report, 2003).

[27] Reform in other industries such as water, telecommunications and the airline industry did not pass without its share of difficulties.

as sovereign guarantees to limit their risk exposure or demand high returns to compensate for the perceived increased risk.[28] The government's unbending stance in this regard coupled with an awkward power sector investment climate may have played a role toward creating an investment quagmire in the electricity sector in the context of a perceived hostile business environment. This stalemate has contributed to the load shedding that has become part of daily life for ordinary Ghanaians.

Despite having a policy of private investment in generation, the challenge to adequately attract investors on equitable terms remains formidable. This is only one of the challenges that arise from dual markets (private and public) for host nations such as Ghana. The symbiosis of private and public generators presents new questions on their relationship and how it will develop over time within the country context. Although private and public plants are both created to generate power, the way that they are treated is different and this treatment may undermine the achievement of their overall objectives. IPPs are more insulated from subsequent tariff reviews after agreements are signed whereas state-owned utilities maintain their exposure. Increasing fuel costs, which are normally fully recovered under PPAs for IPPs, have a significant impact on the financial performance of state utilities that are off-takers of power and effectively face the brunt of volatile energy markets. Development or social objectives, and their associated costs, may be saddled on state utilities whereas IPPs do not share the same load. It is in turn the financial performance of the state utility that in part contributes to the riskiness of IPP projects for private investors. A hybrid market arrangement hence introduces a number of challenges, which if not managed effectively, impairs the sustainability of the power sector.

The number of plants that were negotiated in Ghana (see Appendix A) but never realised at periods when the power was badly needed, further supports the judgment that the enabling environment for IPPs has not been created. Despite a comprehensive reform agenda, there has been little execution.[29] This lack of action contributed to undermining investor confidence in the sector – the fact that no new privately financed large-scale plant has been commissioned and the distribution sub-sector has not been primed for private sector participation as initially intended, supports this view.

In addition to the country's perceived inability to execute its reform programme, currency devaluation and increasing fuel prices appear to be key elements that have put a strain on Ghana's first independent power project. However, with the country's much improved economic fundamentals one would expect that an enhanced investment climate will aid in ensuring that the next ten years of private participation will be more stable than the last. The currency has been much more stable during the last five years (until end-2007), losing only an averaged annual 2.8 per cent of its value against the US$, than during the preceding five years, where it lost an averaged annual 29 per cent of its value. Inflation is also now under control (end-2007), almost touching single digit figures from the more than 40 per cent in 2000. These improvements, along with the commissioning of the West African Gas Pipeline would facilitate creating the economic conditions in the sector that would support a move toward tariffs that reflect the LRMC, a feature that is crucial to the sustainability of IPPs and the power sector.

[28] It must be noted that granting of such guarantees would have been counter to the country's power sector reform policy.

[29] The number of changes in leadership in the Ministry of Mines and Energy may also have contributed to the lacking continuity of the country's power planning and electricity reform programme.

In comparison with the experiences in other Sub-Saharan African countries (most notably Tanzania and Kenya), investment outcomes in Ghana were more positive than overall development outcomes. The investors enjoy a good rate of return on their investment whereas an array of varied factors has left the off-taker in a shaky financial situation. Despite the added generation capacity from TICO, the country still has a shortage of power. Furthermore, although there has been significant amelioration in the country's general investment climate, attracting private investment to the power sector is still not without significant challenges. It appears the political will to make the tough decisions in order to make the sector more sustainable (most notably increasing tariffs to the LRMC and implementing some functional unbundling of VRA) is still lacking. Instead, present macroeconomic conditions should rather be used as a catalyst for attracting the much needed private capital for power generation, and, together with more coherent planning and implementation, put the sector on a new trajectory of privately contracted power. However, government's undermining of the PURC's tariff initiatives, although good for consumers in the short term, will continue to hamper efforts to make the sector more durable.

Included in the Government of Ghana's 2004 new policy framework for reform in the power sector was the objective to become a net power exporter by 2008 (Kusi, 2005). It appears very unlikely that this objective will be met. Furthermore, with the lack of coherent power system planning and timely and competitive procurement practices it also seems unlikely that the power crises will be resolved soon.

A decade after power sector reforms were first instituted (in 1998), Ghana still lacks the enabling environment to attract new IPPs and make the sector more sustainable.

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## Appendix A Revived and Stillborn Power Plants

Takoradi II may be the only functioning large-scale long-term IPP, but at least five other projects have been considered to help quell the blackouts that the country has recently experienced. A brief description is given below.

*Bui*
The Bui hydro project was initiated in 1966 by a Russian consortium. However, the group was forced to leave Ghana as a result of the coup in that same year. The project was reappraised several times in the three decades that followed, but no activity followed. In 2005, motivated by the recent power crisis, the Government of Ghana finally signed a memorandum of understanding with Sino Hydro, a Chinese construction company, to undertake the construction of the Bui dam at a cost of US$500m (which has as of 2007 risen to US$622m). Construction of this 400MW plant commenced in August 2007, with completion scheduled for 2012 (Adda, 2007).

*Osagyefo*
Another project that has been resurrected is the Western Power IPP also known as Osagyefo Barge or Mangyea Project-- two units, supplied by Ansaldo Energia of Italy, with a combined capacity of 138MW. This IPP was planned by the Ghana National Petroleum Company (GNPC) in the 1990s after the discovery of off-shore gas in the western part of the country. The Japan Bank for International Cooperation agreed to finance the barge, but the project stalled when assurances could not be obtained for the development of the infrastructure to exploit the gas fields. It was calculated that the life span of the Tano oil fields (15 years), which was to fire the barge, was too short to make the initiative viable (The Chronicle, 2005).
As part of a larger movement to sell ailing state-owned enterprises starting in 2000, many subsidiaries of the GNPC were closed down (including the Western Power Project). Relocation of the plant on-shore to Tema in order to use gas from the WAGP when this becomes available was considered, but the idea was shelved and the government went back to the original plan to install the plant at Effasu (where there is still no gas infrastructure available (Energy Commission pers. com., 2007)). In July 2007 the Government of Ghana signed an agreement with Balkan Energy of the US to make the barge operational and run it on diesel until gas becomes available (Ministry of Energy, 2007).

*SIIF Accra*
Still another project that did not come to fruition was that of the SIIF Ghana, which was negotiated during the drought of 1998. By the time that the project agreements were signed, dam levels had recovered. Construction of the plant was well underway when weather conditions improved. In the end, the need for the power was negated by the return of favourable dam levels. When the government announced that it would no longer buy the power as agreed, a dispute was entered into and the case went for international arbitration. The plant was eventually removed and sold to Togo.

*AES Sirocco*
AES Sirocco Limited sought to develop a 300MW thermal IPP in Tema. The VRA was to be the off-taker and have a small shareholding in the project. The project was indefinitely stalled when a bill was tabled intending to prohibit the VRA from acquiring equity stakes in more thermal projects. In addition, AES took on a much more cautious approach to financing new power plant investments following the collapse of Enron and the subsequent financial difficulties experienced in the international power trading industry in 2001 and 2002 (ECA, 2003).

*Ashanti/KMR*

In 1998 Ashanti Goldfields also promoted the development of a 300MW thermal plant with KMR.[30] Serving Ashanti's mines as well as a few other mines would be the primary purpose of the plant. The remaining capacity, which could reach up to 50 per cent depending on the mines' load profiles, would then be available for other customers or sold to the grid. In addition to the provision of a 15-year PPA, Ashanti would have carried the risk of selling power onto other mines. KMR who would take on 80 per cent of the project equity (Ashanti would retain the remaining 20 per cent) was reportedly keen to proceed with the project on a 15 per cent rate of return. Ashanti who hoped to achieve 4c/kWh when gas from the West African Gas Pipeline became available needed to achieve this rate inclusive of transmission charges, but at the time the VRA demanded 1.5c/kWh for transmitting the power. The VRA justified these charges through a revaluation methodology of its assets which Ashanti disputed, mainly on the treatment of inflation in this new methodology. When Ashanti was told that it would not be permitted to sell to any existing VRA customer and that the proposed buy-back rate would be 2c/kWh for the surplus energy of the project, the project was halted. Although Ashanti examined the options of developing the plant in - and importing from - Côte d'Ivoire or locating the plant in neighbouring Benin, the firm still faced the bane of wheeling charges from the VRA (ECA, 2003).

*Aggreko and Cummins*

Two other plants were also negotiated through a rental system to plug the immediate power shortages during the drought of 1998. They were that of Aggreko which entered into an 18-month contract with the Government of Ghana to supply 30MW at Tema, and Cummins which entered into a similar 24-month contract with the government. While Aggreko did supply power, it was only after the power crisis that Cummins Power Generation was fully operational. Already having signed the PPA, and despite no longer needing the power, the government was invoiced for the power in accordance with the take-or-pay agreement. By mid 2007, eight years after the drought, a legal battle was still pending in London with the Government of Ghana to settle a mounting debt of approximately US$20m to Cummins which was signed under the previous regime. The Minister of Mines and Energy, Joseph Kofi Adda, in his speech to parliament in June 2007 also mentioned three additional power companies who engaged with the government on private power production, that proceeded and sued for damages despite not having generated any power; Global Aero Design Company, Stone and Webster and Faroe Atlantic Company.[31]

[30] KMR was bought out by AES in 2001.

[31] In the case of Faroe Atlantic Company from the UK, the Ghanaian government entered into a PPA with the firm to provide additional capacity. Although the Ministry of Finance represented the Ghanaian government in the deal, internal parliamentary approval was not sought by the Ministry of Finance, even though this is a requirement for such large-scale projects. On Faroe's court action the High Court first ruled in Faroe's favour the sum of US$6.3m plus interest. The government then appealed, but the case was dismissed by the Appeals Court leaving the government with the bill for damages. The government subsequently appealed to the Supreme Court on the basis of the legality of the transaction, and the Supreme Court ruled in favour of the government based on its obligation to uphold the constitution, viz. the agreement was unenforceable due to lack of mandatory parliamentary approval and that the absence of the parliamentary approval renders the contract null and void (Oxford and Beaumont, 2006).

## Appendix B Future Plants

Looking forward towards 2020, Ghana's Strategic National Energy Plan (2006) estimates that the country would need an additional 2000 MW of generation capacity, based on a moderate economic growth projection. This demand projection increases to well over 2500 MW if VALCO is included in the scenario. It is almost certain that private sector involvement in the sector will continue in line with government and World Bank policy. The need for a favourable investment climate to attract and facilitate private power procurement may not be understated and will remain a challenge for the country at least in the medium term.

According to the Ministry of Energy, in accordance with Ghana's Strategic National Energy Plan (2006), plans are also in place to complete the last phase of Takoradi II to a combined cycle plant in 2009 (also see World Bank, 2006). The plant as it currently stands would have to be taken out of service to complete the steam phase. With the current power crisis, more capacity would first have to come on line before this may be done without resulting in large scale blackouts. Up until the time that CMS announced that it was selling its stake in TICO to TAQA, negotiations were still ongoing to complete the last phase of the project. An EPC request that was put on tender expired without stakeholders reaching agreement on the terms (CMS pers. com., 2007).[32] Despite an EPC which was subject to an open tender bid, the government still believed that the charges asked from CMS were too high and the security arrangements demanded were too stringent. In 2003 it was estimated that the additional steam cycle would cost a further US$140m (ECA, 2003). The additional phase now costs US$215m for an additional 110MW (Adda, 2007). In spite of costs having inflated over the years, the additional efficiency and the debt financing would still reduce charges.

Apart from Ghana's existing thermal plants, much has been riding on the expectation of the long awaited WAGP from Nigeria in terms of future capacity expansions. According to the Ministry of Energy, there are a number of independent power projects that are in the pipeline. Of the half dozen projects mentioned, the soonest to come on line may be the Kpone IPP, a project company made up of a consortium of local and international partners (CenPower, and Infraco and Reltub). The 400MW, gas fired, combined cycle power plant will be located in the municipality of Kpone within the Tema industrial zone and will become one of the main off-takers of the WAGP (Evans, 2007). With a construction time of two years the US$300m project, which is designed for at least 25 years of operation, is scheduled to commence commercial operations in 2009 (InfraCo, 2007).

In April 2008 Sunon Asogli Power Limited (Ghana) was founded by a Chinese company, Shenzhen Energy Investments co. Ltd, and the China-Africa Development Fund (CADF), to develop a combined cycle power plant in the Tema region (China Daily, 2008). The plant is expected to have an installed capacity of 560MW and construction is planned to start in 2008.

[32] The EPC bid process favoured Black and Veatch.