China-Ghana Renewable Energy Technology Transfer Cooperation

Consultancy on China-Ghana Renewable Energy Technology Transfer Financing

Task 1

DRAFT REPORT

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1. Financing Experiences of Past Renewable Energy Technology Transfer Projects

1.1 Overview of Renewable Energy Technologies

Renewable energy sources can meet many times the present world energy demand, so their potential is enormous. They can enhance diversity in energy supply markets, secure long-term sustainable energy supplies, and reduce local and global atmospheric emissions. They can also provide commercially attractive options to meet specific needs for energy services (particularly in developing countries and rural areas), create new employment opportunities, and offer possibilities for local manufacturing of equipment.

For the long term and under very favorable conditions, the lowest cost to produce electricity might be $0.01–0.02 a kilowatt-hour for geothermal, $0.03 a kilowatt-hour for wind and hydro, $0.04 a kilowatt-hour for solar thermal and biomass, and $0.05–0.06 a kilowatt-hour for photovoltaic and marine currents. The lowest cost to produce heat might be $0.005 a kilowatt-hour for geothermal, $0.01 a kilowatt-hour for biomass, and $0.02–0.03 a kilowatt-hour for solar thermal. The lowest cost to produce fuels might be $1.5 a gigajoule for biomass, $6–7 a gigajoule for ethanol, $7–10 a gigajoule for methanol, and $6–8 a gigajoule for hydrogen.

TABLE 1.1 Categories of Renewable Energy Conversion Technologies

Technology	Energy product	Application
Biomass energy		
Combustion(domestic scale)	Heat(cooking, space heating)	Widely applied; improved technologies available
Combustion (industrial scale)	Process heat, steam, electricity	Widely applied; potential for improvement
Gasification/power production	Electricity, heat (CHP).	Demonstration phase
Gasification/fuel production	Hydrocarbons, methanol, H2	Development phase
Hydrolysis and fermentation	Ethanol	Commercially applied for sugar/ starch crops; production from wood under development
Pyrolysis /production of liquid fuels	Bio-oils	Pilot phase; some technical barriers
Pyrolysis /production of solid fuels		
Extraction	Charcoal	Widely applied; wide range of efficiencies
Digestion		
	Biodiesel	Applied; relatively expensive
	Biogas	Commercially applied
Wind energy		
Water pumping and battery charging	Movement, power	Small wind machines, widely applied
Onshore wind turbines		
Offshore wind turbines	Electricity	Widely applied commercially
	Electricity	Development and demonstration phase
Solar energy		
Photovoltaic solar energy conversion	Electricity	Widely applied; rather expensive

Solar thermal electricity		
Low-temperature solar energy use	Heat, steam, electricity	Demonstrated; further development needed
Passive solar energy use	Heat (water and space heating, cooking, drying) and cold	Solar collectors commercially applied; solar cookers widely applied in some regions; solar drying demonstrated and applied
Artificial photosynthesis	Heat, cold, light, ventilation	Demonstrations and applications; no active parts
	H2or hydrogen rich fuels	Fundamental and applied research
Hydropower	Power, electricity	Commercially applied; small and large scale applications
Geothermal energy	Heat, steam, electricity	Commercially applied
Marine energy		
Tidal energy	Electricity	Applied; relatively expensive
Wave energy	Electricity	Research, development, and demonstration phase
Current energy	Electricity	Research and development phase
Ocean thermal energy conversion	Heat, electricity	Research, development, and demonstration phase
Salinity gradient / osmotic energy	Electricity	Theoretical option
Marine biomass production	Fuels	Research and development phase

Following are sketches of four principal clean energy technologies.

1.1.1 Biomass energy

- **Demand and supply**

Biomass can make a large contribution to the future world's energy supply. Land for biomass production should not be a bottleneck, if the modernization of conventional agricultural production continues. Recent evaluations indicate that if land surfaces of 400–700 million hectares were used for biomass energy production halfway into the 21st century, there could be no conflicts with other land-use functions and the preservation of nature.

Bio-energy's current contribution of 45±10 exajoules a year—of which probably 16±6 exajoules a year is commercial—could increase to 100–300 exajoules a year in the 21st century. The primary use of biomass for modern production of energy carriers accounts for about 7 exajoules a year. Modern biomass energy production can play an important role in rural development.

Although developing countries are the main consumers of biomass, the potential, production, and use of biomass in these countries are often poorly quantified and documented.

- **Application**

Biomass can be used for energy production in many forms. The resource use, the technologies applied, and the set-up of systems will depend on local conditions, both physical and socioeconomic. Perennial crops offer cheap and productive biomass production, with low or even positive environmental impacts.

A key issue for bio-energy is modernizing it to fit sustainable development. Conversion of biomass to modern energy carriers (electricity, fuels) gives biomass commercial value that can provide income and development for local (rural) economies

Modernized biomass use can be a full-scale player in the portfolio of energy options for the longer term. The production of electricity and fuels from biomass are promising options. But they require the development of markets, infrastructure, key conversion technologies (BIG/CC), and advanced fuel production systems. Flexible energy systems combining biomass and fossil fuels

are likely to become the backbone for low-risk, low-cost energy supply systems.

- **Cost**

Production costs of biomass can be $1.5–2 a gigajoule in many regions. Genetic improvement and production systems—and multi-output production systems, cascading biomass, and multifunctional land use—could bring bio-mass close to the (expected) costs of coal.

1.1.2 Wind energy

- **Demand and supply**

The potential of wind energy is large, with the technical potential of generating electricity onshore estimated at 20,000–50,000 terawatt-hours a year. When investigating the potential, special attention should go to possibilities offshore. Studies for Europe indicate that the offshore wind resources that can be tapped are bigger than the total electricity demand in Europe.

Wind turbines are becoming larger, with the average size installed in 1998 at 600 kilowatts, up from about 30 kilowatts in the mid-1970s. Turbines of megawatt size are being developed and should soon be commercially available.

- **Application**

Although wind-generated electricity is an intermittent resource, it can be transformed to base load power supply if combined with energy storage. The environmental impacts of wind turbines are limited, with noise and visibility causing the most problems, increasing public resistance against the installation of new turbines in densely populated countries. Interest in small turbines is being revived for standalone and autonomous systems in rural areas.

- **Cost**

Costs have to come down further, requiring development of advanced flexible concepts and dedicated offshore wind energy systems. Cost reductions up to 45 percent are feasible within 15 years. Ultimately wind electricity costs might come down to about $0.03 a kilowatt-hour. For compressed air energy storage the additional costs may be limited to about $0.01 a kilowatt-hour, opening the possibility of exploiting good wind resources remote from markets.

1.1.3 Photovoltaic solar energy

- **Application**

Some large-scale commercial and industrial PV systems are producing electricity at rates below 20 cents per kWh and as low as 10 cents per kWh, after government buy-downs and incentives in places like California, making it competitive with traditional grid-connected electricity. The worldwide market for solar PV modules, components, and installations is expected to grow nearly sevenfold from $4.7 billion in 2003 to $30.8 billion in 2013. Solar buzz, Inc. reports that last year, worldwide PV installations increased to 574 MW, which is 34 percent more than in 2002.

Spurring that growth are dozens of publicly backed solar installations in the U.S., Japan, Germany, and elsewhere. From San Francisco's Convention Center to the Jacksonville, Fla. International Airport, PV panels are sprouting on rooftops at consistent growth rates in many parts of the U.S. In 2004, the city of Austin, Tex., approved a 100 MW solar initiative, which would generate 20 percent of the city's electricity by 2020. The California State Senate has even recently passed a bill that would make it mandatory for a certain percentage of new single-family homes to include a solar power system in their construction.

- **Cost**

Solar-powered electricity has been steadily bringing costs down while ramping up production and installations. Solar PV is expected to reach cost parity for many regions in the next decade, spurred by a host of technological improvements in PV cell composition and manufacturing processes, in addition to the market momentum. This will occur both at the local level in many U.S. cities and states, and in large developing economies such as China and India.

1.1.4 Small-Scale Hydropower

- **Demand and Supply**

Hydropower contributes about 20 percent to the electricity supply, about a third of its potential. The supply of hydroelectricity may grow from 2,600 terawatt-hours a year in 1997 (of which about 3.5 percent from small-scale hydropower) to 3,000 terawatt-hours in the first years of the 21st century and to 6,000 terawatt-hours a year in 2050.

- **Application**

Hydropower is a clean energy source with many technical advantages over thermal and nuclear plants: operating reserves, spinning reserves, load following services, voltage control, and cold

start capability. Some of these characteristics help in aggregating intermittent sources of electricity to the existing system.

Large-scale hydroelectric power remains by far the largest source of clean energy, accounting for 90 percent of renewable energy worldwide. However, increasing attention is turning to more nascent small-scale hydro technology, generally defined as turbines powered by water flows already present in the environment—sometimes known as “run-of-river”—often aided by low, small impact dams for seasonal water storage. Small-scale hydro ranges from 30 MW at the high end down to “micro-scale” installations of 100 kW or less, enough to power one or two homes. Due to its ability to serve rural villages at a fraction of the investment cost of large, centralized power plants, small-scale hydro will see most of its growth in the developing world.

- **Cost**

The electricity production cost of large hydroelectricity plants is $0.02–0.08 a kilowatt-hour, with new reductions from technology development offset by the need to mitigate social and environmental effects. For small hydroelectricity plants, the electricity production cost may come down from $0.03–0.10 a kilowatt-hour to $0.04–0.10 a kilowatts-hour in the long term.

1.2 Analysis of Global and Regional Renewable Energy Projects

According to the statistics from Global Environment Facility (GEF), there are around 200 projects about renewable energy that launched successfully. Specifically, GEF have published 182 projects since 1991, supported by agencies such as UNDP, Word Bank, UNIDO, UNEP, etc.

There are 52 projects for countries in Africa, which accounts for the majority (28.57%), including Ghana, Zambia, Nigeria, Suriname and so on. The number of projects for countries in Latin America and Caribbean takes is 38, taking up 20.88%, including countries like Mexico, Fiji, Ecuador, Jamaica and so on. Besides, there are projects for countries in Southeast Asia(20), East Asia and Pacific(16), South Asia(14), East Europe(8), West Asia(8) and North Asia(6). The number of regional and global projects, is respectively 8 and 12, taking up respectively 4.4% and 6.6%. According to the pie chart below, it reveals that most of the projects about renewable energy or renewable energy technologies are for developing countries, especially rural areas.

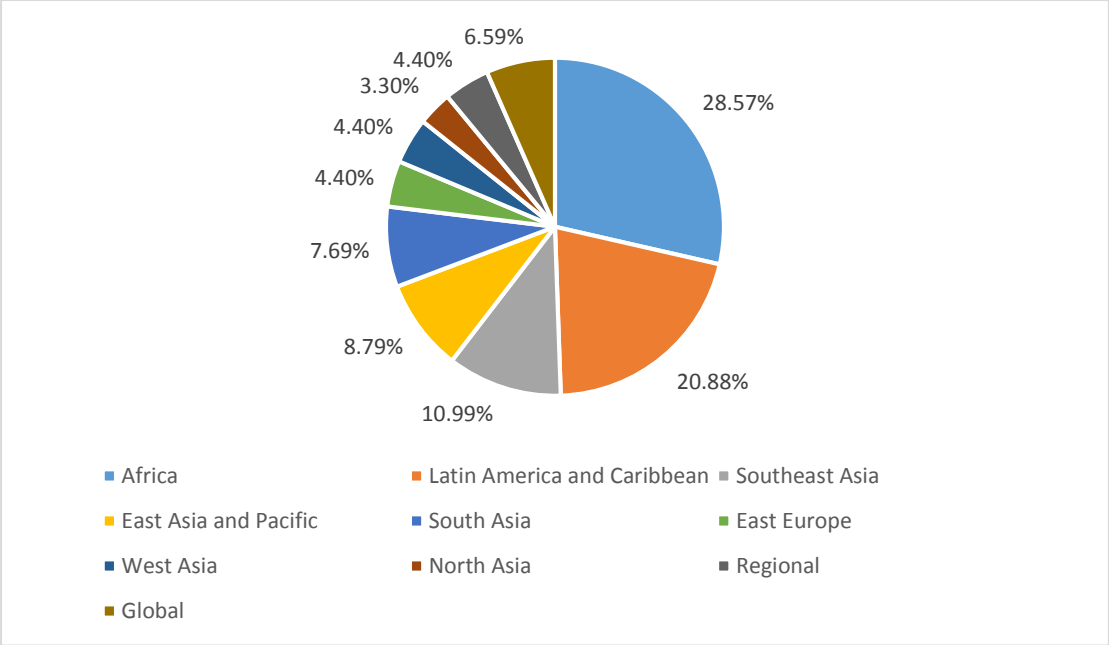

FIGURE 1.1 Renewable Energy Projects (by Region)

Data Sources: Global Environment Facility Project

In terms of the technologies, there are divided into six categories, biomass energy, wind energy, solar energy, large or mini-hydropower, geothermal energy and marine energy. According to the statistics in GEF, most of the renewable energy projects are related to more than one kind of technologies, which means there are solar-biomass, hydropower-geothermal, or wind-solar technologies need to be developed in a certain project. Besides, there are 43 projects aimed to develop biomass energy (23.63%), 20 projects to wind energy (10.99%), 12 projects to marine energy (6.59%), 10 projects to geothermal energy (5.49%), 9 projects to hydropower (4.95%), and 5 projects to biomass energy (2.75%).

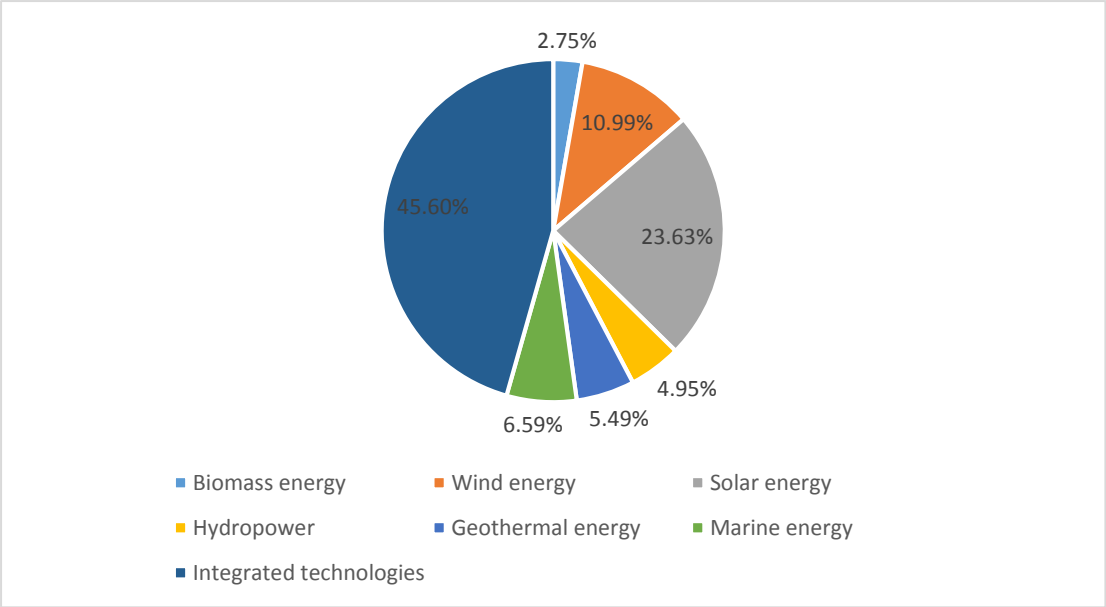

FIGURE 1.2 Renewable Energy Projects (by Technology)

Data Sources: Global Environment Facility Project

1.3 Experiences from the Advanced Countries and International Financial Institutions

Usually, technology, assets and capital are transferred from developed or developing countries to less developed countries in RETT projects. First, transnational transaction would increase the risk of renewable energy projects. Besides, considering that the recipient countries are relatively less developed, their financial market and business environment may could not entirely meet the demand of market operation. These conditions have made it difficult for private sectors to operate RETT projects alone. However, it's necessary to introduce private sector participate in RETT projects' operation to ensure high efficiency and sustainability of the projects. Therefore, international organizations and governments of exporting countries always provide financial support for those projects while let private sectors share responsibility for the operation of those projects.

1.3.1 Multiple Financing Channels of RETT

As most renewable energy systems are capital intensive, availability of suitable financing is essential to the development of renewable energy technologies. Through the analysis of past renewable energy projects we can see that financing mechanisms of RETs mainly include public finance and private finance. Generally, public finance can be divided into international assistance, grants, loans, loan guarantees and tax incentives. While private finance can be divided into equity

and debt on supply side and consumer finance on demand side. Following are the descriptions of these principal potential financing mechanisms.

- **Public Finance**

Public finance alone will never be sufficient to ensure that renewable energy is developed on the mass scale required to significantly reduce dependence on fossil fuels. However, if used properly, public funds can leverage considerable private investment, sometimes up to twenty times the value of the initial public investment. Generally public finance can be provided in the following formats.

International assistance: In addition to any funding provided by a government, a plethora of grants and low-cost loans is available from bilateral donors1, multilateral organizations2 and development banks3. Such funding can be used to build small-scale projects, to provide technical assistance to governments or can be a component of a larger project in conjunction with private financing, leveraging private finance in the same manner as government spending. The provision of such funding can help provide some assurance to private investors as they consider investing in such projects.

Grants: Governments can choose to directly fund renewable energy projects. This is particularly beneficial where a specific source of renewable energy has not yet been developed in a country and the costs of its development may otherwise be prohibitive. Grants allow private investors to see commitment from the government while at the same time have data upon which to measure their potential costs with regard to an investment.

Loans: Where private investment is hard to find at a cost that makes a project viable, a government can provide a loan to a renewable energy developer. Such a loan would most likely be at a much lower interest rate than those from commercial lenders, as the government can set the rate at which it loans funds. If necessary, it can borrow funds from the private bond market at significantly less cost than those incurred by a private company.

Loan guarantees: Rather than directly lending money to a developer, a government can agree to act as a guarantor on a loan made by a private institution, such as a bank. If the borrower defaults, the government will then repay the debt to the bank. A loan guarantee does not leave the government out of pocket, unless the developer defaults on the private sector loan, but the guarantee does allow the developer to borrow required funds at a much lower rate of interest.
Tax incentives: Government can also use its tax laws to waive certain levies for parts and services

[1] Such as USAID, SIDA and JICA.
[2] Such as UNDP and GEF.
[3] Such as the World Bank, Asia Development Bank and the African Development Bank.

that are used to develop the infrastructure required. For example, the government may lower or waive construction tax for large-scale renewable energy projects, thereby significantly reducing the upfront costs of the developers.

- **Private Finance**

In the past two decades, the private sector worldwide has invested in the development and manufacture of a broad menu of renewable energy equipment and in services for the distribution, sale, operation, maintenance and repair of that equipment on a large and growing scale. The principal classes of commercially available systems include wind electric power, solar PV systems, solar thermal units for solar water and air heating, solar thermal electric power, hydropower and biofuels production from a variety of biomass forms. In this sector, financing generally falls into three categories: equity and debt financing on the project or business finance side, and consumer financing to increase affordability on the demand side.

Equity: Equity is the direct investment in a project or company that is developing a renewable energy project with the anticipation that investment will be returned in full with, in addition, a share of any profit or excess return made from the project or company. While, most institutions and persons lack the experience, staff and specific mechanisms to finance renewable energy ventures, both on the production and application sides.

Debt: Debt includes two types: loan and bond. Loans are offered in various forms. The simplest one takes the form of a structured loan from a financial institution. Alternatively, a company can also raise funds through bonds. In recent years, in response to demand, special climate bonds[4] have been developed specifically for investment in renewable energy projects. These are investor-grade bonds that provide a sense of security to investors while ensuring the funds are directed to renewable projects.

Consumer finance: Consumer finance must also be considered with regard to funding the development of renewable energy. Availability of microfinance is necessary for many rural consumers to purchase renewable energy systems, which is significant for the sustainable development of renewable energy projects. Although financing cannot make RETs affordable for the very poor who consider them expensive, it can substantially increase the market for those products among households which can afford them with payments spread out over two or three years.

[4] more details for climate bonds: http://climatebonds.net/wp-content/uploads/2009/12/ClimateBonds_4pp_Sept2012.pdf

1.3.2 Public-Private Partnerships (PPPs): A Popular Mode of RETT Projects

- **The Introduction of PPPs**

In order to mobilize private sectors to invest in public needs and increase the efficiency and effectiveness of public goods and services supply, public-private partnership (PPP) has been developed. PPP is a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance. PPP allocates the tasks, obligations, and risks among the public and private partners. The public partners are government entities, including ministries, departments, municipalities, and state-owned enterprises. The private partners can be local or international and may include businesses or investors with technical or financial expertise relevant to the project. Increasingly, PPPs may also include nongovernment organizations (NGOs) and/or community-based organizations (CBOs) who represent stakeholders directly affected by the project.

The government's contribution to a PPP may take the form of capital for investment, a transfer of assets, or other commitments or in-kind contributions that support the partnership. The government also provides social responsibility, environmental awareness, local knowledge, and an ability to mobilize political support. The private sector's role in the partnership is to make use of its expertise in commerce, management, operations, and innovation to run the business efficiently. Besides, the private partner may also contribute investment capital depending on the form of contract. In general, PPPs can be summarized into five basic forms, which is shown in Table 1.2.

TABLE 2.2 Key Features of the Basic Forms of PPPs

	SERVICE CONTRACTS	MANAGEMENT CONTRACTS	LEASE CONTRACTS	CONCESSIONS	BOT
Scope	Multiple contracts for a variety of support services such as meter reading, billing, etc.	Management of entire operation or a major component	Responsibility for management, operations, and specific renewals	Responsibility for all operations and for financing and execution of specific investments	Investment in and operation of a specific major component, such as a treatment plant
Asset Ownership	Public	Public	Public	Public/Private	Public/Private
Duration	1–3 years	2–5 years	10–15 years	25–30 years	Varies
O&M Responsibility	Public	Private	Private	Private	Private
Capital Investment	Public	Public	Public	Private	Private
Commercial Risk	Public	Public	Shared	Private	Private
Overall Level of Risk Assumed by Private Sector	Minimal	Minimal/moderate	Moderate	High	High
Compensation Terms	Unit prices	Fixed fee, preferably with performance incentives	Portion of tariff revenues	All or part of tariff revenues	Mostly fixed, part variable related to production parameters

Competition	Intense and ongoing	One time only; contracts not usually renewed	Initial contract only; subsequent contracts usually negotiated	Initial contract only; subsequent contracts usually negotiated	One time only; often negotiated without direct competition
Special Features	Useful as part of strategy for improving efficiency of public company; Promotes local private sector development	Interim solution during preparation for more intense private participation	Improves operational and commercial efficiency; Develops local staff	Improves operational and commercial efficiency; Mobilizes investment finance; Develops local staff	Mobilizes investment finance; Develops local staff
Problems and Challenges	Requires ability to administer multiple contracts and strong enforcement of contract laws	Management may not have adequate control over key elements, such as budgetary resources, staff policy, etc.	Potential conflicts between public body which is responsible for investments and the private operator	How to compensate investments and ensure good maintenance during last 5–10 years of contract	Does not necessarily improve efficiency of ongoing operations; May require guarantees

Note: BOT = build–operate–transfer, O&M = operation and maintenance.

Source: Heather Skilling and Kathleen Booth. 2007.

- **How PPPs Are Financed**

Usually, both private partners and public partners would participate in PPP financing process.

(1) Private Finance in PPPs

The private party to most PPP contracts is a specific project company formed for that purpose—often called a Special Purpose Vehicle (SPV). This project company raises finance through a combination of equity provided by shareholders and debt provided by banks or through bonds or other financial instruments. The finance structure of the SPV is the combination of equity and debt, and contractual relationships between the equity holders and lenders. Thus the investors can be classified into two types: equity investors and lenders. Usually, equity investors include the initial ones may be project developers, engineering or construction companies, infrastructure management companies, and private equity funds. Lenders to PPP projects in developing countries may be commercial banks, multilateral and bilateral development banks and finance institutions, and institutional investors such as pension funds.

Large, highly leveraged projects usually use non-recourse project finance mode which would transfer more responsibilities and benefits to lenders. Under this finance mode, lenders can be paid only from the project company's revenues, without recourse to the equity investors. For equity investors, this helps manage risk, by limiting exposure to a project, and makes it possible to undertake much larger projects than would otherwise be the case. For lenders, it means undertaking rigorous due diligence, focusing on the project cash flow and contractual structure.

While, for smaller projects which borrow not much from lenders, the transaction cost such as setting up the contractual structure and carrying out adequate due diligence would be too much compare with the amount that those projects borrows, making is unattractive for lenders. Therefore, non-recourse project finance is usually not suitable for smaller projects. There are two frequently-used options to deal with this problem. One is for project shareholders to back up the project company by providing a corporate guarantee to the lender, for repayment for all or part of the project debt. Another option is for the government to provide finance as a lender to the project company, or to provide a guarantee to some or all of the project debt.

(2) The Role of Public Partners in PPP Finance

Though the private investors typically have primary responsibility for developing the finance structure when a PPP involves private finance, governments still need to influence the financing structure in order to ensure the project is bankable and to limit the financial leverage of the project in case it may undermine risk-transfer. Besides, in order to reduce risk premiums and increase the bankability of projects, governments may also participate in the finance structure through providing debt, equity or guarantees directly or through government-owned financial institutions such as banks and pension funds.

Influencing the Financing Structure: First, governments should ensure the project's bankability by ensure technical and financial viability of the project and appropriate risk allocation while resisting pressure to accept more risk than necessary. Second, to ensure a sustainable level of leverage which has large enough equity stake in the project, governments may need to introduce a minimum equity ratio for PPPs. Besides, structuring any guarantees or termination payment clauses to avoid creating incentives for high levels of debt and leverage are also important. Third, governments may need to introduce stapled financing or require bidders provide a bond which may be called if the preferred bidder fails to achieve financial close within a certain period, in case that the project could be delayed or even fall through if the winning bidders are unable to raise finance on the expected terms. Fourth, governments need to consider upfront how to refinance the project and how benefits of refinancing will be treated as the project may be delayed or more favorable than expected.

Help with Project Finance: First, governments may provide loan or grant finance directly to the project company, especially when revenue projections show that the project is not likely to be financially viable without government funding. Second, governments may provide a minority share of equity in order to get better access to project information, be more involved in strategic decision making and improve value for money by sharing the investment returns. Third, instead of providing money directly, governments may guarantee repayment of debt provided by commercial sources to make debt finance easier and cheaper. Fourth, Government-owned development banks or other finance institutions can also be involved, either providing finance to PPPs as part of a broader portfolio, or established specifically to support the PPP program. Fifth, governments may simply not transfer the financing function of the PPP project to private sectors, retaining on-going responsibility for capital expenditures.

- **Successful Case：Eolo Wind Farm Project in Nicaragua**

Nicaragua's electrification rate is among the lowest in Central America. However, now almost half its energy demand is covered through renewable sources. Additionally, reliance on thermal (oil-fired) generating plants has made the long-term marginal costs the highest in the region. To solve this problem, Eolo Wind Farm is being implemented by Eolo de Nicaragua through a 25-year engineering, procurement, and construction (EPC) contract and a 10-year operation and maintenance contract with Gamesa Eolica (Gamesa). The Eolo project consists of 22 Gamesa G90 2 MW wind turbine generators (WTGs) for a total installed capacity of 44 MW, a 60 MVA transformer and corresponding substation and a 200 meter 230 kV transmission line to connect to the regional high-voltage transmission line, which is part of the national grid.

In August 2012, Multilateral Investment Guarantee Agency (MIGA) issued guarantees of $16.3 million to GME, the parent company of Eolo de Nicaragua, covering its equity investment in the project. MIGA's coverage is for a period of up to 20 years against the risks of transfer restriction, expropriation, and war and civil disturbance. By providing this investment guarantee, MIGA has helped assure commercial lenders of the bankability of the project. The MIGA guarantee helps promote stable regulatory frameworks and enhances the equity investors' confidence investing in a relatively high risk sector.

By providing additional generation capacity that is renewable and clean, Eolo helps reduce the average marginal cost of generation, resulting in an overall reduced cost of electricity to users. Electricity generated by the Eolo Wind Farm is estimated around 170 GWh per year, which is equivalent to approximately 7 percent of all of Nicaragua's annual electricity needs, and is expected to displace approximately 110,054 tons of carbon emissions per year.

1.3.3 Project Matchmaking System: SS-Gate

- **The Introduction of SS-Gate**

Launched in 2006 by the Special Unit for South-South Cooperation (SU/SSC) in the United Nations Development Programme, the South-South Global Assets and Technology Exchange (SS-GATE) started full-fledged operation in November 2008 following a successful pilot. Its aim is to establish a transparent, fair, transactional, and sustainable matchmaking system where public and private sectors and civil society in developing countries can interact and obtain needed technology, assets, services and finance in a secure environment. The current platform is co-sponsored by China International Center for Economic and Technical Exchanges (CICETE) and the OPEC Fund. It is based in Shanghai, China, and operated in partnership with the Shanghai Unites Asset and Equity Exchange (SUAEE).

This system currently has 4 service and transactional tracks. Track I is the creation of a Technology and Asset Exchange Platform for exchanges of assets, equity, technology, and financial resources among SMEs in developing countries, including tools for project bidding, partner matching, financing options, and acquiring project development services. Track II is the creation of a Southern Development Investment Exchange Platform for contribution and partnership opportunities serving a screened list of under-funded development projects. Track III is the creation of an Exchange Platform for creative projects in the South. Track IV is the creation of an Exchange Platform for technology transfer in energy and environment related fields with particular focus on Clean Development Mechanism (CDM) in developing countries. By now, track I and track II has been developed based on the experience of SUAEE and the Social Investment Exchange (SIE) respectively. Track III and track IV are still in the initialization stage.

Through 2014, SS-GATE has listed 7,087 new projects, matched 2,304, and successfully facilitated the transfer of 1,023 technology solutions along a South-South corridor. The SS-GATE system also leverages partnerships on the ground with its country centers which are physical institutional entities that feed the system with locally sourced projects. Currently, SS-GATE is in partnership with 50 country centers in 40 countries.

- **How Does SS-Gate Work**

SS-Gate has two components, a virtual platform and a physical one. Its virtual platform is the website where Southern governments, institutions and companies can list specific needs for goods, services, information and resources while private sector companies in other Southern

countries can offer services, products and/or financing to meet those needs. Its physical platform is comprised of local facilitation and transactional support provided by SS-GATE country centers, regional hubs and the SS-GATE secretariat in Shanghai, China. Through these components, SS-Gate facilitates realization of actual business transaction through a market mechanism and offers end-to-end supporting services.

SS-Gate promotes market-based transactions mainly through three steps. First is offering a platform for programs listing and searching. Through that online platform seekers can upload development needs and providers can share solutions. Besides, by filtering options, users can search for programs and practitioners of interest. The second step is matching. In this step, SS-Gate will match needs and solutions through the online platform or facilitate matches through its offline support and service platform via country centers, regional hubs or its global secretariat. The third step is transfer. When a need and solution are matched, the SS-Gate offline support and service platform facilitates transfers from one country to another.

SS-Gate would analyze a project's situation including project status, industry attributes, national policy and so on at first. Then SS-Gate would select an appropriate source of funding, combined use of various financial instruments, rely on banks, investment institutions, government funding and other financing methods in order to provide a comprehensive financing services solution. If the money demander is a project which has a stable cash flow, a good state of operation and an ideal expectation, SS-Gate would help the sponsor do project financing. If the money demander is an enterprise that has good qualification and high-growth potential, SS-Gate would help the sponsor do equity financing, introducing risk investment, industrial investment or strategic investment for it. Besides, SS-Gate can also provide mergers and acquisitions financing plans and investment risk solutions for demanders.

In general, SS-Gate would identify the needs of the demander and identify potential partners for the demander. Then it would facilitate the agreement between the solution provider and the solution seeker. In project financing mode, the loans or mortgage usually come from the project's assets, the expected revenue or interest as collateral. The repayment guarantee is based on the project itself in a good business situation and sales revenue in service, income or other income when the project is completed. Usually, infrastructure projects, industrial park construction projects and resource-type projects would be considered first.

1.3.4 Seed Fund: IFC Infra-Ventures

- **The Introduction of IFC Infra-Ventures**

The International Finance Corporation Global Infrastructure Project Development Fund (IFC Infra-Ventures) is a $150 million global infrastructure project development fund that has been created as part of World Bank Group's efforts to increase the pipeline of bankable projects in developing countries. Its unique offering, combining early stage risk capital and experienced project development support, is designed to address the key constraints to private investment in infrastructure projects in frontier markets. The sectors targeted by IFC Infra-Ventures, including

energy, water, transport and telecommunications, typically have high returns to society, particularly in frontier markets, and are crucial to the overall developmental process.

IFC Infra-Ventures can fund up to $8 million of a project's expenses at an early stage of development. This can represent a significant part of the funding necessary to bring an infrastructure project from idea to financial close. In addition, IFC Infra-Ventures' experienced staff get actively involved in and support the project development activities, including project and prototype feasibility studies, financing modeling, selecting and supervising project participants, sourcing project equity and debt financing, etc.

IFC Infra-Ventures usually seeks to invest in infrastructure projects that could reach financial close within 2-3 years. To qualify for IFC Infra-Ventures funding, projects must further meet the following criteria: (1) Must be a Private Public Partnership (PPP) or private infrastructure project in a developing country or region, or selected middle income countries;(2) Must be at early stages of development; (3) Must have high development impact/powerful demonstration effect; (4) Must be related to core infrastructure such as power, water, roads, ports, airports, fiber connectivity, etc.; (5) Project size is usually more than $200 million. Smaller projects with outstanding development impact could also be considered.

IFC Infra-Ventures have successfully co-developed: (1) the $420 million, 181 MW Shuakhevi hydropower scheme in Georgia with Clean Energy Invest of Norway and Tata Power of India between 2011 and 2014; (2) the $140 million, 96 MW Tobene Power HFO high-efficiency combined cycle power plant in Taiba Ndiaye, Senegal with Melec PowerGen of Lebanon between 2013 and 2014; (3) the $320 million, 100 MW Kipeto Wind power project in Kipeto, Kenya with GE, Craftskills and Kipeto Energy between 2013 and 2015; (4) the 216 MW Upper Trishuli-1 hydropower scheme in Nepal with Korea South-East Power Co. between 2012 and 2015; and so on. There are other successful projects in Indonesia, Fiji, Nepal, Bangladesh, Kenya, Mali, Mali and Moldova.

- **How Does IFC Infra-Ventures Work**

IFC Infra-Ventures gets involved once a sponsor has a reasonable idea of the project, has secured preliminary support and authorization for the project from the government or other clients and has obtained indications that the project is economically viable. It mostly comes in as minority partners to existing sponsors (up to 50% of the project development funding). In selected cases it may work with governments and act as sole sponsor of a project until an experienced majority sponsor has been identified to complete the development.

Besides, by getting involved early, IFC Infra-Ventures staff can help structure the project so that the risk is reduced and it is made bankable. IFC Infra-Ventures' participation at an early stage increases the likelihood that banks (including IFC) and equity investors will later invest in the project and thus reduces the time needed to reach financial close. By getting involved early, IFC Infra-Ventures staff can help structure the project so that the risk is reduced and it is made bankable. IFC Infra-Ventures' participation at an early stage increases the likelihood that banks

(including IFC) and equity investors will later invest in the project and thus reduces the time needed to reach financial close. Its team is distributed globally, with hubs in Washington, Nairobi, Dakar, Johannesburg, Istanbul and New Delhi.

IFC Infra-Ventures' internal process has been streamlined to meet the requirements of project development. The detailed process is as followed: (1) Sponsor starts project development; (2) Sponsor and IFC Infra-Ventures agree development roles and responsibilities and enter into JDA ; (3) Joint development of the project by Sponsor and IFC Infra-Ventures; (4) Long-term financing discussions between Sponsor, IFC Infra-Ventures, IFC (as debt arranger and provider) and other lenders; (5) Equity investment by Sponsor and IFC; (6) Construction and Operation. If the project failed to set up, then IFC Infra-Ventures would exist at the same time.

- **Case Study: Clean Energy Investment in Georgia**

In April 2011, IFC Infra-Ventures signed a Joint Development Agreement with Clean Energy Invest ("CEI"), a small, experienced Norwegian power developer to develop a series of three hydropower projects for a total of 400 Megawatt ("MW") in Adjaristsqali River valley in Georgia with a total project cost estimated at $700 million. The first project is 185 MW with total capital expenditure of US$370 million.

Georgia has the 3rd largest undeveloped hydro potential in Europe. The Project will increase Georgia's electricity production by 11 percent, export a portion of its output to Turkey, and reduce dependence on thermal generation in Georgia in the winter. IFC has leveraged its global relationships to bring in strategic investor (Tata Power of India) as a sponsor in the project, catalyzing a major south-south investment. The sponsor has provided equity for construction, balance sheet support, technical and operational capabilities, and completed project development.

IFC Infra-Ventures played an active role as co-developer by: (1) helping to create bankable project agreements; (2) providing input on key technical studies and the offtake agreement; (3) helping to negotiate key project agreements such as the Build-Own-Operate ("BOO") and Engineering, Procurement and Construction ("EPC") agreements; (4) helping to register carbon credits; and (5) guiding CEI on services and equipment, outreach to communities and NGOs.

Besides, IFC Infra-Ventures was able to leverage IFC's global relationships to bring in a first class strategic investor (Tata Power of India) to join CEI and IFC Infra-Ventures to finalize the project development, raise the financing and start construction. IFC has already been mandated as Lead Arranger for the project's debt financing estimated at $250 million. IFC also has the right to subscribe up to 20 percent of the project's equity. Both IFC's equity and debt financing for the project was subject to Board approval. The project reached financial close in May 2014.

1.3.5 Market Development Initiative: The Case of Lighting Africa

- **The Introduction of Lighting Africa**

Lighting Africa, an initiative of International Finance Corporation (IFC) and the World Bank (WB), catalyzes commercial markets for the delivery of clean, affordable, reliable energy services to about 600 million people not connected to grid electricity in Sub-Saharan Africa. The program has already enabled more than 35 million people in Africa to access clean, affordable and safer lighting. Its vision is to create a commercially sustainable industry and market that will reach 250 million more by 2030.

The program undertakes a number of market development activities, including: (1) Market Intelligence - In order to help product marketers understand the brand new off-grid lighting market segment, and accordingly plan their sales and marketing activities, Lighting Africa undertakes and publishes a wide range of insightful market research studies; (2) Quality Assurance - A key market threat identified at the outset of the program was the influx of poor quality lighting products into Africa; (3) Access to finance - Adequate financing along the entire supply chain has been identified as being critical for the growth of the off-grid lighting market, both at distributor level and consumer lever. Lighting Africa facilitates and leverages financial products for manufacturers, importers and distributors to help them surmount this barrier; (4) Consumer Education - Lighting Africa designs and implements Consumer Education Campaigns in partnership with product manufacturers and distributors to create awareness for modern off-grid solar lighting products; (5) Business Development Support - Lighting Africa provides advice to players in innovation or novelty sectors on best business practices, corporate governance and risk management; (6) the program also works with governments towards removing policy and regulatory market entry barriers in order to increase access to clean energy, and to foster a vibrant competitive market for off-grid lighting products.

- **How does Lighting Africa Help With Financing**

At distributor level, lack of working capital undermines the ability to secure adequate product stocks and build adequate distributorships in remote rural markets. At consumer level, lack of access to credit limits uptake of modern solar lights.
Lighting Africa facilitates and leverages financial products for manufacturers, importers and distributors to help them surmount these barriers.

(1) Help Launch Energy Fund

Energy Fund is one of the financial mechanisms for renewable energy development both regionally and worldly, which can invest in renewable energy companies with equity or debt across all the supply chain, from manufacturing and distribution to end-user finance. Lighting Africa encourages organizations to launch or co-launch energy fund in order to offer access to finance for enterprises and consumers and catalyze commercial markets for the delivery of clean, affordable, reliable energy services.

In 2011, three of the world's leading organizations supporting social enterprise for development - Ashoka, Bamboo Finance, and the Canopus Foundation, formed a partnership to launch the Oasis

Energy - Solar for All Fund which would invest in companies bringing affordable solar power to markets that are without access to electricity.

The Fund will be a global fund investing in solar energy companies in sub-Saharan Africa, India, South East Asia, and Central & Latin America. Investments will be made as equity or debt in companies across the solar PV supply chain, from manufacturing and distribution to end-user finance. Investments will be in the range of $0.5 - $4 million, and the Fund will be looking to co-invest alongside other partners. In addition to equipment manufacturers, companies with a proven business model in bringing solar PV applications to an off-grid market, such as solar panel distributors or micro-finance institutions providing loans for solar customers, will also be eligible for investment.

(2) Work with National Banks and Micro-Finance Institutions

As part of its business support and market development activities, Lighting Africa explores and negotiates trade finance facilities to enable importers and distributors stock up better in order to effectively service the needs of customers across the continent. The Orb Energy's project in Kenya and Azuri's project in rural Africa are two typical successful examples.

Orb Energy, manufacturer and distributor of solar energy systems, received two million dollars from the Dutch development finance institution（FMO），to replicate its India business model in Kenya in 2015. The company sells off-grid solar lighting products for low-income households such as the Solectric 15 and Solectric 30, both of which meet the Lighting Global Quality Standards published by Lighting Africa. With the capital injection it has received, Orb has a target of selling 100,000 units of product over the next two years. Besides, Orb also works with national banks and micro-finance institutions in India to ensure that its customers receive credit to purchase its products.

Besides, Azuri, developer of the Indigo pay-as-you-go solar power system for off-grid markets, secured a £1m working capital loan from Barclays last month to accelerate deployment of its indigo home solar lighting and charging system in rural Africa with the help of Lighting Africa. Azuri is one of an increasing number of companies, most of whom are for-profit social enterprises, supplying consumers in un-electrified areas of Africa with clean, affordable and quality lighting products.

(3) "Fund-a-Project" Competition

Micro-finance institutions acknowledged that their products and credit systems for energy products were not as flexible as they could be. They committed to develop special financial products to enable low-income client purchase of solar lights, with a special focus on products for women's groups and solar business start-ups.

Lighting Africa launched a "Fund-a-Project" competition, which would provide up to $10,000 in matching funds per project idea to applicants with the best business plan for promoting the

financing, sales and distribution of solar lights to and by women in off-grid areas.

2. Financing Challenges in China-Ghana Renewable Energy Technology Transfer Project

2.1 Project Rationale

2.1.1 Background of the Project

- **Politic Environment in Ghana**

The South-South Cooperation has been promoted to enable coherent cooperation between China and countries in Africa, in particular around the promotion of the UN's Sustainable Energy for All (SE4ALL) initiative, UNDP China has been funded to develop a projects with Ghana, which aims to ensure a more holistic transfer of renewable energy technologies from China to Africa. The planned support will not transfer hardware per se, but focus on the institutional framework and capacity required to make the local absorption of renewable energy technologies effective.

In the past few years, the Government of Ghana has put in place a number of policies, strategies and legislative instruments to regulate the energy sector and promote the development of renewable energy sources. The main legislative and policy instrument is the *Renewable Energy Act 2011 (Act 832)*, which provides for the development, management, utilization, sustainability and adequate supply of renewable energy for generation of heat and power. Besides, Ghana has several institutions directly or indirectly linked to managing energy resources, addressing energy challenges, and implementing the Renewable Energy Act. As in most countries, the Ministry leads policymaking while commissions/agencies serve as regulatory and/or implementing bodies.

- **Economic Environment in Ghana**

The Republic of Ghana, with a population of just over 24 million, is one of the best performing economies of West Africa. Ghana is classified as a low-middle income country with a per capita GDP of $2,500. Situated on the coast, bordering Cote d'Ivoire and Togo, the country has averaged economic growth 6.4% annually since 2000. The growth rate has accelerated in recent years, and now exceeds 7%. However, the country still suffers from high unemployment especially for youth, and poverty is still widespread with huge disparities between the northern and southern sectors of the country.

In recent years, Ghana has performed well in terms of increasing the share of electricity generation going to households from less than 40% in 2000 to 60% in 2010, and currently more than 70% of households nationwide have access to electricity. However, this national average masks striking urban-rural disparity with only 40% of rural households having access to electricity,

with significant impact on productive activities and local economic development. Extension of the grid to some of the remaining remote not electrified (such as islands and isolated) communities is difficult due to geographical and financing constraints. 70% of the population in urban areas and 90% in rural areas depend on wood fuel for meeting their domestic energy requirements which has adverse impacts on health, particularly for women and children.

Ghana has an installed capacity of 2,578MW (as of 15 May 2013) mostly made up of hydro and thermal facilities. Electricity peak demand in 2013 is 2,016MW and is growing at 8% per annum. The existing power plants are unable to attain full generation capacity as a result of limitations of fuel supply, limitation of water inflows into the hydroelectric power facilities and challenges with maintenance of generation facilities.

2.1.2 Purpose of Project

The present project is collaboration between the Energy Commission in Ghana, the Ministry of Science and Technology in China and the UNDP Country Offices in Accra and Beijing. The project will facilitate exchange of expertise and technology between China and Ghana, thereby building on China's unique renewable energy transfer experience.

The project addresses Ghana's need to increase universal energy access. The project aims to effect off-grid community-based electrification, increase the share of renewable energy and promote the productive uses of energy. At the same time, the project supports broader socio-economic and environmental objectives, most notably poverty reduction through employment generation as well as action on climate change mitigation. The project will create an enabling environment in Ghana for absorbing new technology and in China for providing it appropriately. The project also promotes the production of renewable energy technologies in Ghana with a strong focus on private sector development and inclusion. In China, the project will support the review and updating of South-South Cooperation policies and guidelines. Moreover, the project contributes to solid capacity building, enabling China to engage more systematically in South-South Cooperation. This is conducive to Ghana's national development goals and priorities for poverty reduction and provision of energy.

2.1.3 Renewable Energy potentials in Ghana

Ghana is well endowed with renewable energy resources particularly biomass, solar, wind energy and hydro resources. The development and use of renewable energy resources have the potential to support Ghana's energy security. Using renewable energy can also mitigate the negative climate change impact of energy production and use, as well as solve urban and peri-urban sanitation problems through biomass and waste-to-energy technologies. Hydropower is still the most important renewable energy source accounting for about 55% of electricity

generation capacity in Ghana. Additional hydropower plant with 400MW generation capacity has been completed and commissioned, however none of the small and medium hydro power resources (below 100MW) has been developed. The key objective of the Energy Policy is therefore to increase the proportion of renewable energy, particularly solar, wind, mini-hydro and biomass in the national energy supply mix.

- **Biogas (for cooking and power generation)**

Ghana has a large potential for biogas production, deriving both from agro-fuels and from waste-fuels. Agriculture is a major industry in Ghana, and consequently, large amounts of by-products/residues that can be used for energy production are generated. For example, it has been estimated that there is 553,000 tons of maize cob and stalk produced with a potential energy of 17.65 - 18.77 MJ/kg and 19 tons of paddy rice husks with a potential energy of 16.14 MJ/kg. For animal waste, the estimated energy for cattle dung in 1996 was 203,651 GJ/day, sheep 39,474 GJ/day, goats 51,667 GJ/day, pigs 17,365 GJ/day and poultry 3,968 GJ/day. Municipal waste is generated in large quantities. For example, Kumasi and its suburbs generate up to 1,600 tons daily while Accra and its environs generate up to 2,500 tons. In general, municipal waste generation in the metropolitan centers varies from 600-800 tons per day. Additionally, Accra generates over 800m3 of liquid waste per month. This could be a good feedstock for biogas production for cooking and electricity generation. A number of biogas plants have been installed in institutional and commercial premises but its widespread dissemination also faces challenges.

- **Mini-hydro (for agriculture activity and small households)**

There are 22 exploitable mini-hydro sites (below 1MW capacity) in the country with a combined potential generation capacity of between 5.6MW and 24.5MW. These sites are mainly waterfalls to take advantage of their high heads in run-of-the-river schemes. In most of these areas, tourism has become an important source of livelihood; therefore disrupting the attractive waterfalls for the purpose of power generation could become a source of conflict for the majority of communities that rely on the tourist and religious activities. The possibility of combining power generation with the existing tourism industries is therefore found to be necessary. This notwithstanding, the river downstream of some of these potential sites has good heads and embankments such that power can be conveniently harnessed through the construction of weirs to improve plant operation.

- **Solar and Wind (pumps for irrigation)**

Ghana is endowed with enormous solar energy resource spread across the entire country. Over 11,500 solar systems have been installed in more than 120 communities throughout the country for off-grid application. The government through the Volta River Authority (VRA), the main power producer in the country, has just added to the national grid a 2MW solar power to complement

the power deficit in the country. Using locally produced materials in development of small off-grid solar PV systems presents an opportunity to generate employment but this needs technology transfer along with a package of capacity building support. Ghana has about 2,000MW of raw potential for wind energy. It is currently reliably projected that over 300MW installed capacity of wind farm could be established at the coastal part to generate over 500GWh to supplement the nation's energy supply. The Government has indicated (see SE4ALL Action Plan) that solar and wind pumps could substantively contribute to the further development of the irrigation system in the country.

2.2 Challenges Assessment of China-Ghana RETT Project

The challenges of China-Ghana RETT projects can mainly be classified into three types: political risk, market risk and financial risk.

2.2.1 Political Risks

The challenges of China-Ghana RETT projects on political aspects mainly include government changes, inconsistent regulation, lack of experience and insufficient local investment.

- **Government Changes**

The general elections are held once every four years by Ghana government. The next one would be held in 2016. Compared with common trade, a RETT project often suffer greater impact as a far-reaching long-term infrastructure construction. In addition, considering that RETT projects have a large proportion of upfront investment and a long fund recovery period, variation of policies have to be taken into consideration. First, relevant policies, laws and rules of RETT may vary with government succession. Besides, new government's attitude toward China and renewable energy projects may also change. All of these changes could have great influence on the operation and fund recovery of the project.

- **Inconsistent Regulation**

RETT in Ghana is mainly supervised by the Department of Energy and the Energy Commission, which has caused overlapping and inconsistent regulation. Thus, how to meet the supervision requirement of the two supervisors at the same time and how to communicate and coordinate well with both of them are also problems that need to be solved in the long term.

- **Lack of Experience**

Though Ghana government has strong planning capability on PPP projects, their relevant experiences is relatively limited. So the implementation of RETT projects lead by governments may result with lower operation efficiency and excessive or insufficient regulation, which has negative effects on the recovery of project investment, sustainable operation and the realization of sufficient power supply.

- **Insufficient Local Investment**

Insufficient local investment is a great challenge for the China-Ghana RETT project. Financial support provided by Ghana government is limited. There is no special fund which has invested in any RETT project. Though the Renewable Energy Law has proposed the establishment of a Renewable Energy Development Special Fund, which offers additional financial support for activities such as science and technology research for renewable energy technologies, standard setting, pilot projects, rural utilization of renewable energy, and the renewable resource assessments, the Fund is not operational yet.

2.2.2 Market Risks

The challenges of China-Ghana RETT projects in the market aspect mainly includes insufficient development of power grid, difficulty in fee collection and easily replaceable.

- **Insufficient Development of Power Grid**

Currently, the coverage rate of power grid is relatively low in Ghana, some remote areas even having no power grid at all. In the areas with no power grid, power generation enterprises have to construct power grid transmission by themselves, which will improve the upfront investment and operating cost greatly. Even in the areas with power grid, because of the insufficient charge capacity of some power grid, still exist the possibility of power grid can not carry electricity requirements of power enterprises in Ghana. Besides, due to the low centralization degree of the grid market of Ghana, the required grid of power generation enterprises may be operated by more than one company, which may cause many problems, such as high transaction cost, more complicated negotiation and greater differences of power supply among different areas.

- **Difficulty in Fee Collection**

Even the power supply is successfully implemented, the difficulty of terminal fee collection is still a huge problem. Enterprises and households often delay or refuse to pay their electric fees

because of their poor business performance, limited income and so on. Though many power generation enterprises has partly solved this problem through prepayment, theft of electricity is still very serious in Ghana, intensifying the difficulty in fee collection.

- **Easily Replaceable**

Commercial tariff of electricity is 0.22 cents per kilowatt hour in Ghana, while renewable energy electricity price is 0.4 cents per kilowatt hour, which is much higher than the former one. Recently, Ghana is actively considering introducing natural gas resources. If Ghana can get abundant supply of natural gas, it's very likely that the local electricity price would be further reduced. In the meantime, Ghana government and private sector's demand of renewable energy generation would also be reduced. These results would have significant negative impact on RETT projects' sustainability and profitability.

2.2.3 Financial Risks

The barriers of China-Ghana RETT projects in financial aspect mainly contain two aspects, exchange rate risk and high financial cost.

- **Exchange Rate Risk**

The exchange rate of GHC against U.S. dollar is extremely unstable, and has depreciated about 20% in 2014, with the exchange rate reaching 2.16:1 in the last trading day of 2014. What's more, the exchange rate has reached 4.36：1 by the last trading day in the first half of 2015 (June 30, 2015), and still continues to depreciate. While, according to the foreign exchange restrictions imposed by the Bank of Ghana, the Ghana cedi remains the sole legal tender in Ghana, which means the investment in Ghana and capital recovery will be carried with cedi. Therefore, investment absorbed in U.S. dollar from overseas may has a severe exchange rate risk.

- **High Financial Cost**

It's necessary to finance through Ghana local sectors, considering that the exchange rate risk and the independence and sustainability of Ghana RET development. However, the benchmark rate of Ghana ranges from 22% to 23%, which is much higher than China. Besides, due to the unique high risks of RETT projects such as longer payback period, less successful cases and higher degree of specialization, the cost of financing in RETT projects is increased further.