RENEWABLE ENERGY SUPPORT SCHEMES

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1. General Introduction

Renewable energy technologies (mainly hydropower) make up a large share of total power supply in Africa and there is potential for this to expand as a wider range of technologies is deployed. Many countries are actively developing or considering developing their renewable energy resource potential. Renewables potentially improve energy security by reducing the reliance on imported fuels and help diversify the power mix. They can be implemented in a decentralised manner, which enable a faster deployment than centralised power plants (although small-scale projects can be costly in terms of scarce administrative skills), and can provide local employment for construction and maintenance. Renewables are also critical technologies to help provide energy access to remote communities.

Governments have often struggled to produce policy measures that keep up with the advance of renewable power and its knock-on effect on the rest of the electricity system.

2. General principles

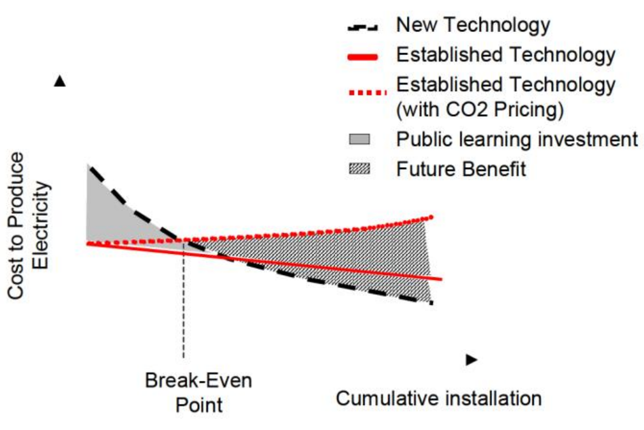
2.1 Basic rationale for policy support to renewable energy

Public intervention in favour of renewable is interpreted as the correction of a market failure to take account of externalities.

On a moral stand-point, this is the non-representation of future generations in the market process. It leads to overconsumption of natural resources (gas, coal, oil, uranium ...), their finite attribute and impact on the global environment not being included in the price formation mechanism.

On the economic stand-point, the public support offset the learning effect of innovative and less mature technologies.

The following graph describes this process. By agreeing to pay a price for electricity generated by a new technology (black dotted curve) that is higher than a conventional technology (red curve), the knowledge to gradually reduce the competitiveness gap is acquired. Beyond a certain quantity of installed capacity, the new technology becomes less costly than the conventional one. The initial incremental costs (solid grey area) is less than the benefit obtained (dotted grey area).



Source: Karsten Neuhoff, Cambridge Working Papers in economics, CWPE 0460 - 2005 - "Large Scale Deployment of Renewables for Electricity Generation", page 15.

Other externalities can be treated differently:

- The climate change consequences are framed by CO2 allowances (ETS market) or by a tax on emissions (in some countries).

- The health consequences (pollutants emitted near the plants) are subject to strict regulations.

This theoretical model is subject to discussion. First, the cost of conventional technologies may fall, or the cost of new technologies may fluctuate, delaying the time when the two curves intersect and minimizing the gain. Secondly, the emergence of a gain is linked to a growing installed capacity for the new technology; but the amount of installed capacity may be limited by the absorption capacity of the grid for renewable energy or by the emergence of a more efficient technology, before the benefit has exceeded the initial cost. At the end, it might result in a higher electricity price for the consumer, than without the policy support.

2.2 Basic rationale for policy support to renewable energy in the African context

Many instruments have been put in place to support the development of renewable energy in Africa (concessional loans, technical assistance, development equity, credit guarantee, policy incentives, etc.). They are either multilateral initiatives from the annual climate conferences of UNFCCC that helped launch carbon trade and the SE4All initiative, either national or regional initiatives (e.g. GEEREF, SEFA) or by bilateral initiatives (e.g., KfW's GET FIT, AFD's SUNREF). The instruments and the most active initiatives on financing RE projects can be segmented according to their nature, namely:

- Feed-in Tariff (including Feed-In Premium);
- Dedicated Low cost credit lines;
- Tools developed by public or private initiatives (support programs, grant and / or technical assistance facilities)
- Specialized investment fund set up as a result of public initiatives or private initiatives
- Public and private guarantee instruments;
- RE asset management financial products (Green bonds, yieldcos)

Type of instrument	Description
Public Policy	
Price driven support schemes	FIT, tax leave, premium, subsidy carbon credit market, tradable permits, compensation mechanisms
Volume driven support schemes	national target for electricity production from renewable
Tender and auctions	sealed-price auction, descending clock auction, bid bonds
Investment support	
Institutional support (Enabling environment)	technical assistance and capacity development
Development finance	Concessional loans, equity, grants, bonds
Seed capital	Refundable pre-finance, junior debt
Guarantee instruments	
Credit enhancement	Credit guarantee; letter of credit
Coverage of policy and off-taker risk	Liquidity guarantee Off taker guarantee; policy guarantee
RE asset management financial products	
Green bonds and yieldco	Financial products to raise money from institutional investors

The most effective public sector intervention tool for the finance community (public and private) are first the establishment of national RE targets and then feed-in tariffs (source UNEP, 2012).

3. Main Renewable Energy Support Schemes

Support schemes can be differentiated according to the following criteria:

- In **price-driven support schemes**, the government sets the price, and the corresponding volume evolves depending on the respective cost-potential curve in a country.

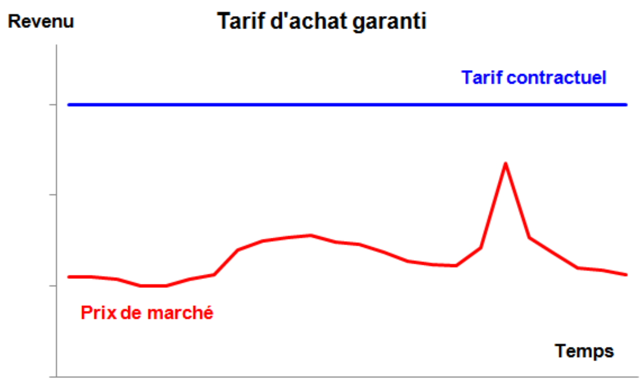
- In **volume-driven support schemes**, the government predetermines the volume and the price develops according to the existing resource conditions and technology costs in the country.

According to the theory of economics, the output of both systems would be the same in a utopical world with perfect information.

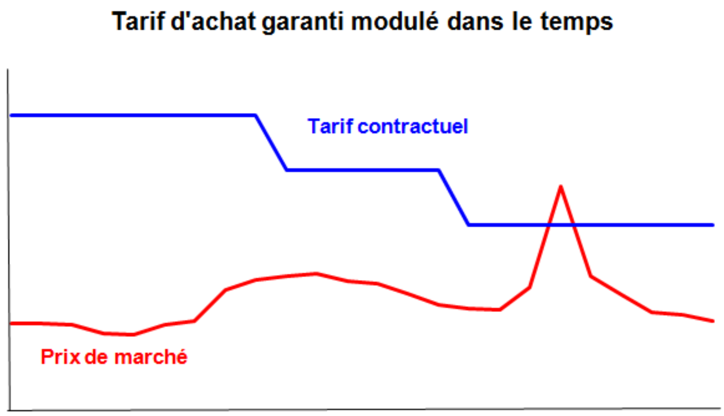
3.1 Price driven support schemes

Feed-in Tariff (FiT)

This support scheme is the most adopted in Africa, and has been the most adopted in the EU until 2012; it grants the producer of renewable electricity a constant price for its production on a contractual period (usually 8-20 years). The producer is completely insensitive to market prices. Usually the FIT is technology specific but in some circumstances the FIT may be technology neutral. In that later case, the FIT is calculated below the long range marginal cost of electricity (LRCE) generation of the system. In some countries, the LRCE is used as a price cap for technology specific Feed-in Tariff (e.g. Kenya).



In a variant of this scheme, the tariff is front loaded and decreases over time.



The guaranteed feed-in tariff provides revenue certainty to the investor. It may generate high profits when the facility is built under highly favourable conditions (well-resourced site, fast implementation, good exposure, high load factor ...) and the tariff is set for average conditions.

In Africa, beyond technical differences of FIT systems (tariffs differentiated by technology or technology neutral tariff differentiated for on grid and off grid, duration of PPA and currency for payment) and prices generally considered too low by developers to allow them to sign PPA truly bankable (i.e. Uganda), some common limits reflect structural problems that governments face to allow their FIT policy to be effective. Examples are the capacity limit of national grid for absorbing intermittent generation, the cost of connection to the grid that still hinder the development of RE projects in Kenya, Tanzania and Rwanda. The low creditworthiness of the national electric utility in Tanzania, Rwanda and Uganda, does not allow developers to sign with them safe and bankable PPA.

Ghana

Ghana established a FIT in 2011, providing 10-year technology differentiated payments, with remuneration levels set to be reviewed every two years. Initial FIT rates were established in 2013, with solar PV receiving the highest level of support at USD 0.15/kWh (GHS 0.43/kWh). Ghana mandates its Public Utilities Regulatory Commission to develop quotas for the purchase of renewable power by electricity distribution companies and bulk consumers.

To balance the mix of renewable power within the grid, Ghana introduced feed-in tariffs for solar PV and wind that depend on the storage capacity within the respective project. The tariff paid to solar PV with storage is higher than the one on offer to projects without storage.

Nigeria

Nigeria's FIT, established in 2012, supports the development of wind, solar, small hydro, biomass, and biodiesel, with payments guaranteed from 2012 to 2016 and subsequently revised every five years.

Nigeria has established a "tax holiday" of five to seven years for any investment in the energy sector, both renewable and non-renewable, as well as a VAT exemption for companies along the biofuel production chain, from the production of feedstock to the generation of electricity.

Senegal

FIT is currently being developed in Senegal that covers solar PV, solar thermal, wind, hydro power, biomass, and biogas installations. Senegal mandates that the national electric utility SENELEC deploy renewables in its concession areas, though no official quota exists.

The Gambia

FIT is currently being developed in the Gambia. Provisions for the Gambia's proposed FIT and net metering policies are included in its proposed Renewable Energy Act 2013, adopted by the National Assembly in December 2013 but still awaiting full ratification.

Cabo verde

In 2011, Cabo Verde became the first and only, as of early 2014, ECOWAS Member State to adopt a net metering policy. The policy was inaugurated with the connection of a 9.9 kilowatt (kW) solar PV system installed on ECREEE headquarters.

Kenya

The Feed-in Tariff Policy in Kenya enacted in 2008 was updated in December 2012. The major change in the application process is reference to a grid connection study (in addition to the feasibility study of the RE power plant). The Feed-in Tariff has been revised upwards although still capped at the calculated long term marginal cost of the grid assessed at 12 USct/kWh. Solar PV is still an eligible technology but tariff is capped at 12 USct/kWh for grid connected (20 USct for off grid application). An indexation of the O&M share of the tariff has been introduced. A bankable, standardized and non-negotiable power purchase agreement has been released.

Tanzania

In Tanzania the feed-in tariff policy determines the level of tariff based on the avoided cost of the electricity system (therefore undifferentiated by renewable technology). The avoided cost of the electricity system is calculated on an annual basis by the regulator EWURA and a formula is applied for off grid system. Therefore there is no guaranteed price over the long term even if a PPA is signed for a 15 years period (aligned on the loan repayment duration from TEDAP).

Up to 2020-2025, the avoided cost of the interconnected system will be driven by thermal plants. However, the planned development of thermal power plants using natural gas priced at extraction cost plus fee and not at international price makes uncertain that the avoided cost of the grid (and therefore the feed-in tariff) will remain above the levelised generation cost of renewable energy technologies such as biomass, wind and Solar PV. However, to mitigate this risk, there is a floor price which limits downwards variation of the tariff. The floor price is stated in the PPA in TSH/kWh and is adjusted every year with inflation (4-7% annual increase over the past years).

Furthermore RE projects which are developed for off-grid schemes and benefit of a higher feed-in tariff may lose this advantage once the area is connected to the grid. This could happen during the next 10 years considering the accelerated electrification programme implemented in Tanzania.

The Feed-In Tariff is paid in Tanzanian Shilling that is not stable; however fluctuation of exchange rate is implicitly captured in the annual revision of the tariff and indexation of the floor price.

The experience of project sponsors shows that TANESCO may occasionally defer payment of the electricity fed into the grid (up to a couple of months) which could potentially trigger a default of repayment of the senior debt by the borrowing SPC, unless this risk is covered by an insurance. Furthermore, there is no take-or-pay clause that provides a compensation to the Small Power Plant, should the grid experience a situation that would prevent off-taking the power generated. Therefore the incoming cash flow of the SPP is at risk. In case of persistent default of the off-taker and termination of the SPPA, there is no buy-out clause. Arbitration must be in Dar Es Salaam. As a result, the bankability of the SPPA is questionable.

The Tanzania Energy Development and Access Project (TEDAP) is a World Bank funded $ 25 million credit line to provide Tanzanian banks with long-term finance in order to facilitate banks' financing of small RE projects. The credit line, which was established early 2010, is administered by the Tanzania Investment Bank (TIB) and provides qualified financial institutions that lend to eligible RE projects funds with the following conditions:

Maturity: up to 15 years

Grace period: up to 5 years

On lend Interest rate to commercial banks: 7.83 % in TSH (effective from 21st July 2012)

Commercial banks interest rate: probably in the range 12-16% in TSH (tbc)

Closing date of the credit facility: 15 March 2015

Technical Assistance: Rural Energy Agency (funding through TEDAP Off-grid Component; SIDA Trust Fund and GVEP-SME)

Commercial banks approved for on lending are: CRDB, NMB, Azania Bank Limited, Twiga Bancorp

Uganda

The Feed-in Tariff Policy in Uganda was updated in November 2012. The major change in the application process is the integration of the GET FIT programme.

As part of this revision, the front loaded structure of Feed-in Tariff was abandoned for a flat tariff structure over 20 years. However the emergence of the GET FIT top up tariff premium managed by KFW enables to recover the advantage of a front loaded tariff structure with higher unit cost revenue during the first five years of the project enabling to improve the Debt Service Coverage Ratio. A bankable, standardized and non-negotiable power purchase agreement was released. However two additional agreements need to be negotiated in parallel: the implementation agreement (with ERA) and the FIT premium financing agreement (with KFW). The latter agreement is optional and refers to IFC performance standards on environmental and social sustainability. It also refers to KfW legal and financial due diligence standards. The burden of KFW standards is on each project owner.

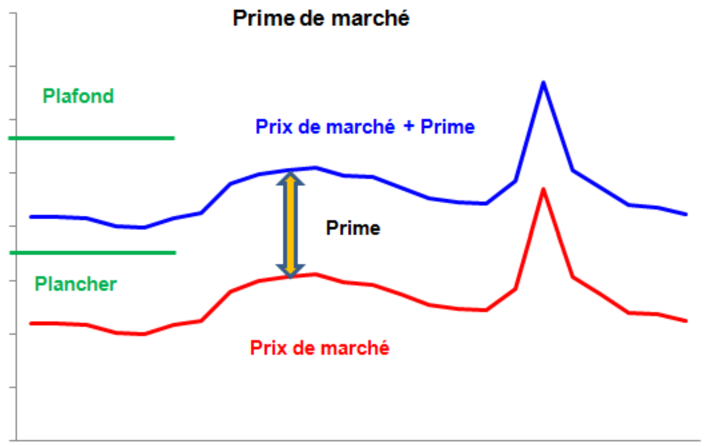
Only grid connected applications are eligible to Feed-in-Tariff. Solar PV is no longer an eligible technology for feed-in Tariff as a result of the perception of high unit cost at the time of the revision.

Mauritius

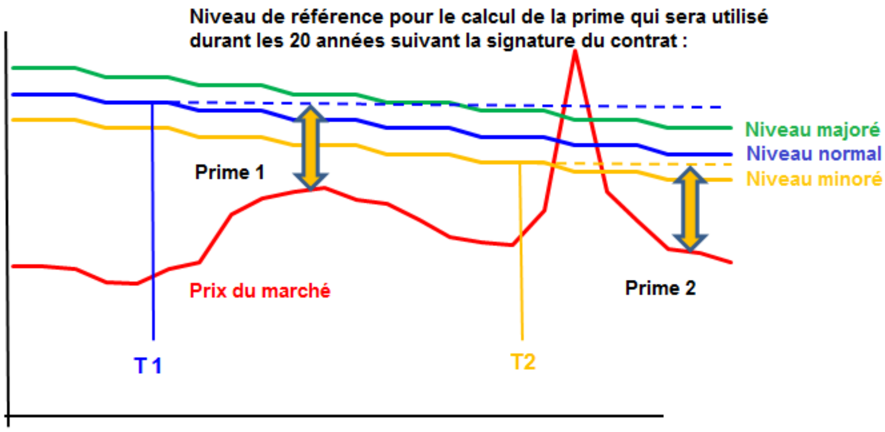
Mauritius has, over a period of nearly two decades, developed a feed-in pricing policy on co-generated power, which has been the key driver for increased production of bagasse co-generated power. The development of a feed-in tariff in Mauritius was a result of close collaboration between policy makers, the sugar industry and other stakeholders. The Government played a key role as the "honest broker" in the negotiation of power purchase agreements and the setting of feed-in tariff levels. This reduced the lengthy and sometimes acrimonious tariff negotiations between investors and the national utility. The development of tariffs and policies were funded by the Government of Mauritius. The Feed-in Tariffs specify the price at which the Central Electricity Board (CEB), the single buyer, should purchase electricity from Independent Power Producers in the sugar industry on various power modes.

Feed-in Premium (FiP)

Recently, EU member states have preferred this scheme against the feed-in tariff. It requires renewable electricity producers to sell electricity on the market, at current prices, and receive a fixed contractual top-up for each MWh sold. In a more elaborate version, the premium may float, so that the total amount received by the producer remains above a floor but below a cap.



With the new law on renewable energy adopted on July 11, 2014, Germany introduced a premium paid ex post, equal to the difference between the average price during the previous month and a target value. This target value changes every quarter within a range defined on the objectives determined for each technology. After commissioning, it applies for 20 years.



When the installed capacity during the quarter remains within the range provided, the premium for additional facilities represents the difference between the market price and the normal price (example 1 in the chart above). When the capacity exceeds the upper bound of the range, the premium will be calculated from the lower price level for all facilities committed later (Example 2). If the capacity has not reached the lower bound of the range, the premium will be calculated from the upper price level. In any case, no premium is paid if the market price exceeds the target prices (normal, higher or lower).

In Uganda, the **GET FIT Premium Payment Mechanism (GFPPM)** consists of paying a premium (per kWh) on top of the FIT for specific technologies (small hydro, bagasse and biomass) over 20 year period. The payment is anticipated in 2 steps:

- 50% up-front at the date of commencement of commercial operation (COD)
- 50% over the first 5 years of operation per kWh generated

This anticipated disbursement of premium improves the debt service and thus reduce the financing costs.

For Solar technology that does not have a FIT in Uganda, the GET FiT Solar Facility (GFSF) aims to bridge the gap between the purchase price of the Electricity Regulatory Authority (ERA) and the rate offered by the developer, using tenders by reverse auctions.

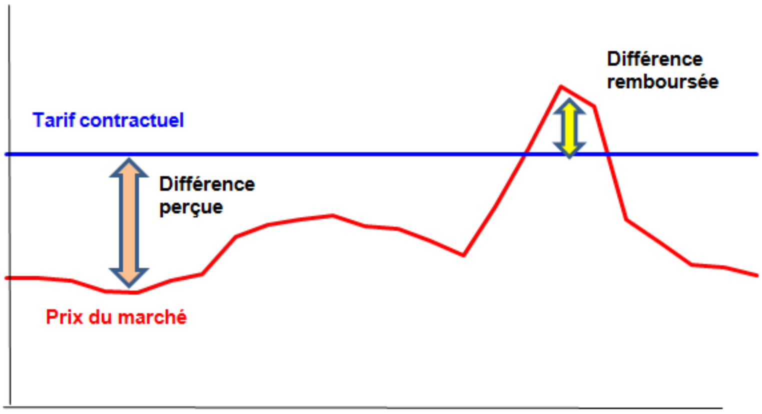
GET FIT also proposes optional coverage of the liquidity risk (as part of a World Bank Partial Risk Guarantee - PRG). This coverage is nevertheless insufficient to attract commercial banks for which the default risk of UETCL (Uganda Electricity Transmission Company Limited) and / or the GoU (Government of Uganda) remains too high. The projects selected during the first call were primarily funded by development banks although some commercial banks were able to show their interest. Therefore, the risk coverage has been completed by a loan guarantee. The PRG covers liquidity risk, commercial debt, and includes compensation in the event of termination resulting from a defect of the GoU or the off-taker under the PPA and Implementation Agreement. The possibility to further extend this coverage to equity in case of termination is under study.

GET FIT helps investors and lenders in conducting due diligence: For investors, Get Fit contributes to the creation of a climate of trust by providing a robust and clear framework (standardized PPA predefined schedule, identified stakeholders). For lenders, Get Fit ensures that only bankable projects emerge and shares the due diligence performed with funders (on request and after agreement of the developers).

The target investment leverage of GET FIT grants is 1:5

Contract for difference (CfD)

In this support scheme, a contract price is negotiated (or awarded after a call for tenders) between the producer and a designated authority. The producer sells the electricity generated on the market. If the market price is lower than the contract price, the difference is paid by the designated authority to the project sponsor. If the market price is higher, the producer shall refund the difference.



Net metering

Net metering allows grid-connected electricity consumers who also generate their own power to "bank" or "store" their electricity in times of over-production (i.e. for solar energy during peak production in the day), and to offset their grid consumption with this banked or stored electricity during other times (i.e. during night, morning and evening hours). Net metering is usually but not exclusively applied to small-scale generators using renewable energy sources.

There are a number of variations to net metering, particularly with respect to whether the utility pays for net exports to the grid. One option is for credits for excess electricity that is exported to the grid to be "banked", such that any surplus is carried forward and used to offset consumption in future periods, but there is never any payment for net exports. Alternatively, net exports by net metering customers can be paid for ("settled") by the utility on a periodic basis, either based on the billing period or less frequently such as quarterly or annually.

Net metering allows electricity consumers equipped with a solar PV system to cash a fair value of the excess power exported to the grid. Doing so, a net metering policy improves the financial attractiveness of a solar PV investment with the following outcome

- It will attract more customers to install PV systems and,
- It will increase the unit capacity of installed system

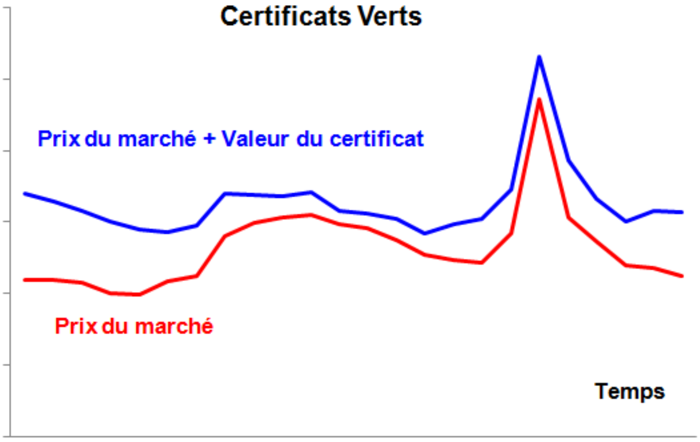
In absence of net metering policy, the excess power exported to the grid by solar PV system installed at customer point bears no value for the customers and provides a free resource to the utility.

Some US Utilities adopt a fighting approach by pushing regulators either to restrict net metering for solar panels, or to allow a fixed fee to (according to them) cover the costs to the grid of providing back-up. Other US utilities adopt an "adapt" approach by building their own PV capacity or investing in solar at arm's length via tax equity or a partnership.

3.2 Volume driven support schemes

Tradable Green Certificates (TGC)

In this support scheme, renewable electricity producers receive a green certificate for each MWh generated. They may sell these certificates on a dedicated trading platform. Suppliers are required to submit at year-end a number of green certificates proportional to their sales. They buy these certificates on the platform. The final customer pays full price (blue line) including the price of electricity on the wholesale market (red line), plus an amount representing the value of green certificates (variable).



Quota obligations

Obligations that require energy suppliers (e.g. distributors) to purchase a quota of renewables are considered to be used in Ghana. This is called Renewables Portfolio Standard (RPS) or Renewables Obligation (RO). Energy suppliers may build their own renewable energy plants or buy green certificate representing the production of such energy. Such instruments create a market between renewables producers and suppliers of energy which can trade energy or certificates at a price determined by them and other possible market players. In particular, such instruments expose the energy producer to market prices, since they must market and sell the energy itself on the relevant market and, if its renewable characteristic is identified separately with a green certificate, also sell and receive a market price for its "greenness". In most countries which have introduced quota obligations, a penalty is applied for non-compliance that effectively sets a ceiling on the price of the certificate. Setting a floor price for the tradable certificates enables to reduce the price risk for investments.

3.3 Tender and auction

Tender or auction schemes do not represent a distinct support category, but are often used in combination with other support schemes. They are usually applied to allocate financial support to different renewable technologies and to determine the support level of other types of support schemes, such as feed-in systems, in a competitive bidding procedure. Tender/auction designs need to ensure there is sufficient competition to incentive lower prices and have low regulatory costs to avoid becoming a barrier to market entry, as well as avoid strategic bidding, and contain penalties for non-delivery. In some cases auctioning is not appropriate, such as for small scale producers or technologies not easily able to participate in spot markets or bear market risk.

The two major reasons why governments use auctions to determine feed-in tariff or PPA prices are that:

1. the process of competitive bidding is expected to lead to lower prices and correspondingly to lower subsidy levels and,

2. they allow for budget as well as volume control and thereby increase the predictability of renewable energy supply.

A plethora of design options are available to tailor the auction to policy goals: the capacity to be auctioned can be determined, or auctions may be technology- or even site-specific:

In a **sealed-price auction**, all bidders submit the price and quantity of MWh they are willing to provide. Governments may then start to award the projects from the lowest electricity prices offered, until the desired capacity is reached. Alternatively, the government might specify other criteria by which to rank the bids (e.g., local content requirement). Here, bids are not disclosed.

In a **descending clock auction**, a price is announced by the auctioneer, then corresponding quantities are offered by the bidders. In the next round, the auctioning authority announces a lower price and will get less quantity offered as a result. This may be repeated until the desired capacity is provided at the lowest price.

In general, it is possible to combine both mechanisms as, for instance, has been done in Brazil. There, an open descending clock auction was used as a first step to implement a more informed stepwise price determination. However, especially in markets with few agents, this method can be subject to collusion among the bidders. So a second step of a sealed-price auction was added to determine the final winners.

The winning bidder must realise the project within a given timeframe or otherwise pay a penalty. Often this is partially implemented through bid-bonds, which have to be provided before participation in an auction and/or after winning the auction. Those bonds would then not (fully) be paid back if a project is won but not implemented.

3.4 Investment support

Upfront investment support generally covers capital costs and is distinct from operating support which covers operating or production-based costs. Investment support takes various forms, the main types being (i) grants, (ii) low interest loans, (iii) concessional equity and (iv) tax exemptions or reductions.

3.4.1 Investment grants

Investment grants for RE are available in African countries funded by multilateral or bilateral development programmes and are often devised to stimulate the take-up of renewable energy technologies. Investment grant may exist beside other measures such as feed-in tariffs or premiums.

3.4.2 Low interest loans

Low-interest loans are loans available at an interest rate below the market rate. Soft loans may also provide other concessional benefits to borrowers, including longer repayment periods or interest holidays.

In Ghana, Mali, Nigeria, and Senegal additional financial support has come from public financing mechanisms such as public investment, project grants or low interest loans.

> The **SUNREF programme of AFD** consists of making available a credit line at regional level (group of developing countries within the same regional economic community). This credit line is tapped in order to provide affordable long term credit to commercial banks of a developing country to be on-lent to investors in the same country in order to finance their renewable and energy efficiency projects at the risk of the commercial bank through its credit review process. In order to trigger the financial feasibility of a renewable energy project, the loan must have an interest rate of less than 7% (in hard currency) and a maturity of around 10 years and a grace

period of 1-2 year. In many SSA countries it is impossible for a local bank to match these criteria without the SUNREF credit line. Projects may be developed either with a corporate finance model, driven by a company that will borrow on its balance sheet to finance the RE project or with a project finance model where a special purpose company is created around the project and will repay debt from the project specific income. The investment amount for a single project under the SUNREF regulation is capped at 10 million EURO. Through its ARIZ guarantee scheme, AFD is proposing to the partner bank a coverage up to 50% of the loss in case of default of the borrower.

The regional credit line is combined with a regional technical assistance programme funded on a grant basis. This TA service is provided without charge to the partner banks and the investors and overcomes three major barriers to the financing of RE in SSA, namely:

- lack of technical capacity of local developers to assess the viability of custom projects at the pre-feasibility stage (validation of project concept and formulation of terms of reference for a bankable detailed study) and to formulate energy efficiency investment programmes using prescriptive technologies;
- lack of financial capacity of the developers of small RE projects to support the development cost of projects prior to financial close; in this regards a revolving fund managed by the TA may provide refundable pre-finance to project developpers
- lack of capacity of local banks in the evaluation and financing of renewable and energy efficiency projects.

The investment leverage of SUNREF grants is 1:20

http://www.afd.fr/home/projets_afd/appui-secteur-prive/finance-environnementale/la-finance-verte-a-lafd

3.4.3 Development and equity partners

Financing facility for the benefit of public sector

Many donors have already formulated development programmes for the energy sector of beneficiary countries (e.g. EU 11th EDF in countries where energy is a focal sector, Power Africa for the US).

Most African states still suffer from a non-enabling legal and regulatory framework to allow scaling-up of Renewable Energy IPP. Apart South Africa, Kenya, Uganda, the development of IPP or PPP remains difficult to envisage, although some cases are under investigation in Gabon, Ghana, Cote d'Ivoire, Tanzania, Rwanda, Nigeria and Mali.

Working upstream with the governments enables to define their needs and policy targets. One priority lies in financing studies that will help to assess the resources and match them to the country needs considering the absorption capacity of the grid for renewable generation.

Funding these early phases may be with refundable pre-payment or direct subsidies, but must necessarily incorporate accompaniment of governments in building their Renewable Energy development strategy, the relevant action agenda and the definition of an investment prospectus (including a financing plan).

It is only once these prerequisites are satisfied that a program to support the definition of a legal and regulatory framework can be put in place. Such a program would aim structuring PPAs and tenders in line with national targets and the capacity constraints of the grid, in order to communicate clear and attractive messages to investors, as it was the case with the REIPPP in South Africa.

The **Global Environment Facility (GEF)** aims to help the development of projects that have a positive impact on the environment. In this context, the GEF provides grants for technical assistance in preliminary project development phase. However, over the EUR 8 billion disbursed since its inception in 1991, RE projects in SSA received only EUR 33 million (less than 0.5%). GEF involves lengthy procedures, sometimes up to 15 months for a grant of 1 or 2 million. http://www.globalenvironmentfund.com/

The $796 million **Scaling-Up Renewable Energy Programme (SREP)** in Low Income Countries is a funding window of the $8.1 billion Climate Investment Fund. It was established to scale up the deployment of renewable energy solutions in the world's poorest countries to increase energy access and economic opportunities. Channelled through five multilateral development banks (of which World Bank, African Development Bank and IFC), SREP finance aims to pilot and demonstrate the economic, social, and environmental viability of low carbon development pathways building off of national policies and existing energy initiatives.

SREP $501 million is allocated to 44 projects and programs that expect $3.3 billion in co-financing and aim to support the installation of 840 MW in renewable energy capacity and improve energy access for 14 million people.

Up to February 2016, SREP $136 million (27% of allocations) was approved for 12 projects with expected co-financing of $1 billion. Technologies supported include solar, wind, bio-energy, geothermal, small hydro power, and cook stoves.

Demand for SREP support is strong. Forty countries have expressed interest in joining the SREP. Fourteen new countries were selected in June 2014—mostly from Africa—expanding SREP pilot countries to 27, and one regional program.

SREP pilot countries in West and Central Africa are **Mali**, Benin, Ghana, Liberia, Rwanda and Sierra Leone. SREP pilot countries in East and Southern Africa are **Kenya**, **Ethiopia**, Lesotho, Malawi, Madagascar, Tanzania, Uganda and Zambia.

In Mali, the SREP program aims to develop a technical assistance project, called Competitive Bidding Process, to support the public sector in the development of a clear regulatory and legal framework to promote RE IPP projects. The aim is to allow the government to retrieve control of the planning of the sector. This initiative targets a budget of USD 4 million (of which USD 1.5 million from SREP). The first solar PV IPP promoted by Scatec (33 MW) benefited in priority from a SREP loan, before focusing in a second time on the development of a regulatory and legal framework for the promotion of RE IPP projects in Mali. http://www.climateinvestmentfunds.org/cif/node/67

Financing facility for private sector's RE projects

Private sector financing facilities are numerous and can take various forms. First come the donor support to the private sector, which are generally in the form of subsidies for study or investment. Then come the investment trust funds (institutional, sovereign or private), which invest directly in equity or quasi equity (refundable pre-finance convertible in grant in case of failure) to finance the costs of feasibility studies and technical, commercial and legal structuring of RE projects.

Access to capital for project initiation remains insufficiently covered even if many actors and tools exist. Developers and project leaders are still struggling to find the institutional and private partners who are willing to engage in the project preparation phase.

Institutional and sovereign initiatives to support the financing of the emerging RE projects of the private sector and funds of funds

The amounts invested in RE projects in SSA are limited in comparison with total capacities of funds.

The Electrification Financing Initiative (ElectriFI) is a EU financing initiative that has received the support of development partners (EDFI, USAID,…). The funds committed to ElectriFI will be managed by FMO. ElectriFI will support renewable energy investments, with a focus on rural electrification, of a total budget above EUR 0.5 million. ElectriFI will provide blended finance to stimulate investment, in the form of early-stage grants that can be converted into long term subordinated debt. These actions will support private investors along the rural power supply chain (including RE generation) with the ultimate goal of expanding access to electricity. ElectriFi has initial funding of €75 million from the European Commission. http://www.electrifi.org/

The **Renewable Energy Performance Platform (REPP)** supports small to medium-sized renewable energy projects (below 25 MW throughout sub-Saharan Africa. A wide range of renewable energy technologies are eligible for support including wind, solar photovoltaic (PV), geothermal, waste to energy (landfill gas and thermal waste to energy), run-of-river power, biomass and biogas. The REPP has initial funding of £48 million from the United Kingdom's Department of Energy and Climate Change through the International Climate Fund. REPP supports both grid connected and off-grid projects. REPP also considers projects being developed by private sector IPPs, as long as REPP eligibility criteria are met. REPP was developed by the United Nations Environment Programme (UNEP) and the European Investment Bank (EIB) to deliver the UN SE4ALL objectives in sub-Saharan Africa by supporting renewable energy projects in countries throughout the region. A consortium comprising Camco Clean Energy and GreenStream has been appointed to manage the REPP. http://www.repp-africa.org/

The **Seed Capital Assistance Facility (SCAF)** is a Joint Programme of the United Nations Environment Programme (UNEP), AfDB and the Frankfurt School of Finance and Management. This programme available since 2007 provides a financial contribution to partner investment funds in order to share the cost of RE projects development in sub-Saharan Africa.

SCAF set up 2 lines of support over a period of 2 to 3 years. The first line of support (identification and initiation of projects) offers partnership agreements on a cost-sharing basis (50/50) with partner funds. The second line of support encourages the partner funds to take a greater equity share by participating around 15 to 20% in the amount invested by the partner fund (up to USD 1 million per fund for SCAF1 and USD 2-3 million par fund for SCAF2). This equity participation will be used to develop the financial model and the legal and technical feasibility studies of projects. It is expected that subsidies are converted into junior debt if the project reaches financial close.

SCAF 2 is also working on the creation of a third line of support to foster the emergence of new investment funds that do not have a sufficient track record.

Over the period 2007-2014, 4 projects had been supported by SCAF. http://www.scaf-energy.org/about/introduction.html

The **Global Energy Efficiency and Renewable Energy Fund (GEEREF)** is a Fund-of-Funds advised by the European Investment Bank Group that invests in private equity funds which focus on renewable energy and energy efficiency projects in emerging markets. GEEREF's funds concentrate on infrastructure projects that generate clean power through proven technologies with low risk. GEEREF has invested in 7 funds across Africa, Asia, Latin America and the Caribbean of which 3 of them in Africa. http://geeref.com/

The **SEFA (Sustainable Energy Fund for Africa)**, a joint initiative of the African Development Bank (ADB) and the Government of Denmark, has been deployed since January 2012 and aims to support the development and implementation of small and medium energy efficiency and renewable energy projects in Africa. SEFA operates through two components to make available grants for venture capital / development capital and technical assistance:

- Making investments through the African Renewable Energy Fund (AREF)
- Project Support Facility in the form of grants. SEFA has awarded several grants for financing feasibility studies either to the Ministry of Finance (Madagascar, Djibouti) or to the project sponsor (Mauritius).

With over 100 funding applications received each year, SEFA is perceived as a success although processing times are fairly long and the non-refundable nature of subsidies remains an issue. http://www.afdb.org/fr/topics-and-sectors/initiatives-partnerships/sustainable-energy-fund-for-africa/

The **African Renewable Energy Fund (AREF)**, dedicated to renewable energy in sub-Saharan Africa, was launched with a capital commitment of USD 100 million on March 12, 2014. Since that time AREF has been investing capital in grid-connected development stage renewable energy projects, including solar, small hydro, wind, geothermal and biomass. In September 2016, committed capital had raised up to USD 200 million.

The African Development Bank (AfDB), the European Investment Bank (EIB) and the Global Energy Efficiency and Renewable Energy Fund (GEEREF) are among AREF's main investors. Other investors that have backed AREF include the West African Development Bank (BOAD), Ecowas Bank for Investment and Development (EBID), FMO, Calvert Investments, CDC Group, BIO, OeEB - the Development Bank of Austria, Wallace Global Fund, Sonen Capital, Berkeley Energy and ABREC in addition to a number of other private investors.

As the Fund's lead sponsor, the AfDB contributed $55 million in an equity investment package as well as climate finance instruments such as Sustainable Energy for Africa (SEFA) and the Global Environment Facility (GEF) to leverage commercial and institutional investment. SEFA has additionally committed a $10 million Project Support Facility (PSF), which will provide resources to be deployed at an early stage to structure bankable deals.

The fund aims to invest between $10 million and $30 million in 10 MW to 50 MW power projects (IPPs) and expects to build a total of 200 MW to 250 MW of capacity in sub-Saharan Africa (not including South Africa). The stake may be in the form of concessional equity (4% return) to attract other investors or grant refundable at the financial closure of the project.

Headquartered in Nairobi, Kenya, AREF is managed by Berkeley Energy Africa Ltd, a fund manager focused on developing and investing in renewable energy projects in emerging markets. http://www.berkeley-energy.com/

The **Finnish Fund for Industrial Cooperation (Finnfund)** has intervened on financing the wind farm Cabeolica project in Cape Verde, taking a EUR 7.8 million stake in the equity of the project company. However, its intervention in RE projects is limited and comes only in the later stages of the financial closing, along with commercial banks. Its strategy is to take minority interests of EUR 1-10m, depending on the project size, on the medium term (7-10 years). Finnfund is aiming a return on investment of 16% on its portfolio. http://www.finnfund.fi/en_GB/etusivu/

Norfund

Norfund promotes clean energy production as a basis for economic growth and enhanced quality of life in developing countries by investing in equity, mobilizing other capital and combining this investment with expertise and insight into the sector. Norfund has a strong focus on commercially proven renewable energy technologies, especially hydropower, solar and wind. Bio-energy investments are also considered selectively. Norfund's strategy is to mobilize sound technical partners while at the same time diversifying its portfolio. http://www.norfund.no/

Private Equity funds enabling access to finance for RE projects

Most of private equity funds invest marginally in project initiation phase. It is less risky to intervene a few months before the financial closing, when all technical documents are known and the early investors and lenders have expressed their interest in the project.

Inspired Evolution One is a USD 90 million fund managed by the South African fund "Inspired Evolution Investment Management", established in 2007 and specialized in clean energy. It intervenes potentially across all SSA but it is only located in South Africa. Evolution One invests on the shorter term with maturities of 3 to 5 years maximum. Out of 9 investments, 6 are dedicated to RE and 8 are located in South Africa. This fund has an envelope of approximately USD 5m seed capital. GEEREF and SCAF are among the investors in Evolution One. http://inspiredevolution.co.za/funds/evolution-one-fund/

DI Frontier Market Energy and Carbon Fund is a fund of USD 60 million managed by the Danish fund "private equity Frontier Investment Management" dedicated to RE in SSA and specifically in Kenya, Rwanda, South Africa, Tanzania and Uganda. The DI Fund has a preference for projects with a total cost of USD 5-50 million, investing USD 3-10 million equity or mezzanine capital (convertible debt) over a period of 5-10 years, with a target return on equity of 25%. This fund has an envelope of approximately USD 5m seed capital. GEEREF and SCAF are among the investors in DI Frontier Market. http://www.frontier.dk/fund

Arborescence Capital, through its funds "**ARB Energy Africa**" of EUR 150 million, intends to support PPP in countries where other investors are not present, as in Chad where the fund has invested in a 100 MW solar PV project developed through a PPA, and perhaps soon in Cameroon on two projects of 50 MW. The Fund intervenes upstream in order to secure the pipeline of projects: advice to government to emerge PPAs and financial structuring of projects. Its strategy is an investment period of 5-7 years, extendable to 10 years and the expected investment returns of around 14%. http://arbcapital.com/arb-infrastructures-eng/arb-energy-africa-eng/

The **Green Africa Power Fund** was launched in Q2 2014 and raised $189 million by year-end from the UK and Norwegian governments. Its goal is to invest in some 270MW of renewable power generating capacity by March 2019, to reduce reliance on fossil fuels. http://www.greenafricapower.com/what.html

Crowd-funding enabling access to finance for RE projects

Crowd-funding has been another eye-catching innovation in the financing of renewable power projects in recent years, albeit involving mostly modest-sized projects such as one or two local wind turbines. This approach gives project developers and investors the opportunity to circumvent potentially costly third parties and 'democratise' energy.

The International Institution ABREC (African Biofuel Renewable Energy Company) formalized on July 22, 2015 in Lome (Togo) the launch of the crowd-funding equity platform, www.abrec.financeutile.com in partnership with "Finance Utile", French platform pioneer in equity crowd-funding. The new platform will be used to finance projects and SMEs operating in Sub-Saharan Africa in the renewable energy and green technologies.

3.4.4 Tax incentives or exemptions

Tax incentives or exemptions for renewable electricity are often complementary to other types of renewable energy incentive programmes. They are powerful and highly flexible policy tools that can be targeted to encourage specific renewable energy technologies and to impact selected renewable energy market participants, especially when used in combination with other policy instruments.

Tax incentives take a number of forms, including investment or production tax credits:

- **Tax incentives related to investments** include income tax deductions, tax credits for some fraction of the capital investment, and accelerated depreciation.

- **Production tax incentives** provide income tax deduction or tax credits at a set rate per unit of produced renewable electricity, thereby reducing operational costs.

Tax incentives also include reduction or elimination of taxes such as import duties, sales, and value-added tax (VAT):

- **Import duties** on renewable energy components have been reduced or removed in Burkina Faso, Ghana, Mali, and Nigeria,

- **Value added tax** reductions for renewable energy projects have been established in Burkina Faso, Ghana, and Mali.

In addition, Benin, Cabo Verde, Côte d’Ivoire, the Gambia, Guinea, Guinea-Bissau, Niger, Senegal, and Togo all offer some form of tax incentive for renewable energy.

3.5 Guarantee instruments

Many guarantee instruments exist among which the following ones can be distinguished by the type of risks covered:

- **sovereign guarantees** may cover part of the political and legal risks related to the project;

- **"extended" Political Risk Insurance (PRI:** e.g. MIGA, OPIC) that are used to hedge the risk of breach of contract and expropriation (in addition to the risk of currency inconvertibility, the currency risk, the risk of armed conflict , terrorism, civil disturbance and breach of sovereign financial obligations). These PRI may cover tariff changes that would jeopardize the viability of the project (case of creeping expropriation). These PRI also cover the risk that a legislative change impacts indirectly the tariff (as long as the beneficiary of the guarantee can prove that the change in the law led to expropriation);

- **Partial risk Guarantees (PRGs** proposed by the World Bank and AfDB) that cover the risk of failure of a State with regard to its contractual obligations. Therefore, PRGs hedge the change of tariff since they have been previously contracted in the PPA;

- **credit insurance** provided by export credit agencies that insure exporters or banks providing financing for an export contract against non-payment of the commercial contract or the repayment of debt;

- **private insurance** which are primarily used in construction contracts and operations and maintenance contracts to cover the technical risks and resource availability.

A few guarantee instruments provided by public development agencies were developed specifically to cover changes in feed-in-tariff.

These instruments are positioned on the coverage of the political and counterpart risk that remain the main concern of investors. Conversely, if a Government commitment is often sought by developers, a sovereign guarantee alone cannot cover all the risks associated to the project and the value of this guarantee is quite limited in SSA project. As for private insurers, they are reluctant to cover alone the political risks in the absence of track record on ENR projects in SSA (hence the difficulty for the insurer to quote the guarantee premium). Their coercive power is fairly limited vis-à-vis the Governments, while it is essential for project developers.

Similarly the other guarantees do not cover political and regulatory risks and / or have shown a limited degree of application (for credit risk guarantees provided by GuarantCo or ECA). Finally, the guarantee AEGF developed by EU/EIB as part of the SE4All initiative is still to be structured.

MIGA insures investors and lenders against breach of contract. The main drawback is that it only covers part of the change in tariff policy (since only the change of rate leading to a breach of contract is covered since it is recognized as a "creeping" expropriation). The procedures and recourse deadline are too long (2 to 3 years after the date of loss and 1 year after the date of claim) and too complex, requiring legal and negotiation skills that all project promoters, particularly small developers do not have. In addition, the guarantee against the risk of expropriation does not apply to local developers. To correct these long recourse deadline, MIGA has developed the SIP program (Small Investment Program) to promote investments in SMEs (guarantee claims lower than USD 10 million, covering up to 90% of invested equity and 95% of the debt with a maximum maturity of 10 years). But this instrument is not suitable for small RE projects of 1-30 MW for which the administrative costs of MIGA remain too high. This program is not profitable enough considering the constraints related to the size of MIGA that make it unsuitable for small projects, and could be abandoned soon.

OPIC FIT covers against any change in FIT, should it be marginal or should it cause the termination of the project, with the objective of improving the compensation deadline. In case of change of FIT, two cases are possible:

- The change of tariff is marginal and does not call into question the viability of the project. The insured party may then submit a claim to OPIC that, if the claim is accepted, will cover the difference between the original and the new FIT rate up to 12 months (versus 6 months for the PRG cited, matching the maximum exposure desired);

- The change of tariff is significant and leads to the termination of the project. OPIC will pay the insured party up to 90% of equity and 100% of the debt, following an arbitration process.

To be eligible for this type of guarantee, the project must display a viable and robust business plan backed on a structured PPA specifying the conditions and buying tariffs by the off-taker. In addition, through its mandate, OPIC only covers US investors.

The **World Bank PRGs** cover the debt holders and thus improve the bankability of projects by reducing financing costs and / or stretching the maturity of loans. They cover lenders against the failure of a Government to fulfill its contractual obligations, in that they therefore cover retroactive changes of FIT (if included explicitly in the terms of the guarantee). They are implemented over a period of three to twelve rolling months. Nevertheless, the PRGs only apply to debt holders while changes of tariff policy can affect all project stakeholders (sponsors, operation and maintenance service providers...). Equity holders must then turn towards other guarantees to ensure the risk of termination (e.g. case of a IDA PRG coupled with a MIGA guarantee on an IPP – 300 MW heavy fuel oil plant – in Kenya), which significantly increases the financial cost of projects. Such a structure is then no longer suitable for small RE projects.

The African Development Bank has been offering since 2011 the **ADF PRG** (African Development Fund) in low-income countries (and since 2004 in middle-income countries). This instrument is quite similar to WB PRGs, with the particularity to cover all debt holders, including development finance institutions.

ADB reported no particular difficulties in deploying the PRG in SSA, especially in countries familiar with this type of instrument, such as Kenya, Nigeria and Uganda. In other countries, the ADB is under discussion with the governments that seem to be very keen on this type of instrument. Deployment times depend primarily on the ability of the Government and the sponsor to provide the necessary documents in the first place a robust PPA but also financing, environmental and social impact analysis, all permits... the internal process of decision can go fairly fast (ADB claims a PRG implementation within 8 months for a 50 MW geothermal project in Kenya). Eventually, the costs and expenses associated with deploying the PRG are similar to those proposed for a concessional loan (i.e. 0.5% + risk premium).

A disadvantage of the World Bank and ADB PRG is related to the need of back to back guarantee from the State. The selection of the bank issuing the letter of credit can also be time consuming because it requires the agreement of all parties (sponsors, lending banks, Government, ADB and WB). On the other hand, the Government's involvement is highly appreciated by all stakeholders because it brings in addition of a guarantee of compensation, a moral commitment which allows an alignment of interests between the different stakeholders. The involvement of the government is a determining factor in the choice of investment as part of the key success factors of the projects. This is notably one of the lessons of the Buseruka project in Uganda where the Government commitment has been paramount in the success of the project. The GoU intervened on several levels in the financing: a) through a direct subsidy to the project, b) by facilitating negotiations (tariffs, land ownership, etc.) between the various stakeholders, and c) by granting a sovereign guarantee against the risk of default of payment of the public off-taker.

3.6 RE asset management financial products

Banks, private equity funds, project developers and utilities hold billions of dollars' worth of mature wind and solar assets that are earning a steady return, and can be sold at some point onto long-term, risk-averse institutions, such as pension and insurance funds and quoted yieldcos. The proceeds can then be redeployed by the original party into the development and construction of new RE projects.

Green bonds provide institutional investors with a liquid, fixed-interest product that channels their money into clean energy. In Europe, access to low costs bank debt is weakening the case for using bonds to finance projects. However, the European largest issuers of green bonds in 2014 were the European Investment Bank and KfW. The rating agency Moody's has indicated that worldwide emissions of green bonds is expected to exceed 50 billion dollars in 2016 thanks to the momentum of the COP21, far exceeding the record 42.4 billion in 2015. The African Development Bank (ADB) successfully issued $ 500 million of green bonds with a maturity of 3 years in London in December 2015.

Yieldcos provide an equivalent instrument for equity-oriented funds. They are separate and often publicly traded companies that own a portfolio of operating assets.

4. Typical benchmarks

In order to evaluate the Renewable Energy support schemes, a methodology has been developed, based on the following points:

- The stated objectives of regulatory agencies with respect to development and scale-up of renewable energy,
- The broader policy framework within which the renewable energy markets develop, including in particular: The AU guidelines for the electricity sector, the sub regional electricity market codes, the national electricity legislation and,
- A more generalised set of evaluation criteria typically associated with evaluations of this type.

The evaluation framework takes the form of:

- Dimensions (or "ends") considered important for the policy instrument, disaggregated into sub-dimensions where appropriate,
- Indicators that allow the regulator to measure whether the desired ends are being met and,
- Analytical tools and techniques used to discover whether the option being evaluated is likely to secure the desired ends (as measured by the indicators).

The dimensions and sub-dimensions are summarised in the table 1 below

Dimension	Sub-dimension	Description
Efficiency	Policy	Policy instrument reaches the policy target objective for which it has been designed
	Static	Policy instrument enable to reach target at the lowest possible overall costs
	Dynamic	The policy instrument helps drive down costs of less mature technologies over the long term
	Transaction costs	The cost of contracting and price fixing is minimised and is a fraction of the expected benefit compared to the situation without policy instrument
	Productive	The policy instrument leads to electricity being produced at least cost
Equity	Distribution	Support allocation of policy instrument are distributed in a fair manner over the actual costs of each targeted technologies
	Affordability	Prices are (or can be) consistent with affordability of electricity services at prevailing low income levels
	Allocative	Policy instrument reaches appropriate customers grid and off grid
Stability	Market	The policy instrument encourages the integration of RES in electricity market
	Predictability	Policy instrument will be stable and predictable over time
	Flexibility	Policy instrument has the ability to continue to evolve as RE technology costs and generation mix and other factors change
	Price levels	The market prices converge towards economic costs enabling full recovery of capital and operating expenses

	Operational	Electricity market codes can accommodate increased levels of renewable energy in the system
	Credibility	Credibility of regulation will attract investment in renewable energy
Practicality	Implementation	Implementation of the policy instrument is well-defined, timely and reasonably priced

Table 1 Assessment criteria for renewable energy support scheme

5. Key questions

Cost for the producer

1. What is the levelised cost for of electricity (LCOE) for renewable technology?

Cost for the consumer

2. What is the cost for strengthening and extending the transmission and distribution grid in order to connect new renewable generation capacities?

3. What is the cost for adapting the management system of networks as a result of injection of renewable electricity in multiple points (transition towards smart grids)?

4. What is the cost for ensuring the stability of the electricity system (frequency and voltage) following injection of renewable electricity?

5. What are the costs associated to the intermittency of renewable generators? Impact on balancing cost? Impact on capacity adequacy cost?

The need in flexible capacity requirements which can be mobilized in a few hours, are equivalent to the intermittent power installed capacity. Thus, assuming a solar PV capacity of 30 GW, around 30 GW of reserve capacity will be needed to cope with variation of power output of the solar PV power plant, either from the national grid, or from interconnectors with neighbouring countries. The reserve capacity will need to have an adequate ramp-up attribute (in % increase or decrease of nominal capacity per minute). For example:

- a pumped storage — 40% per minute
- an open cycle gas turbine /diesel engine — 20% per minute
- a combined cycle power plant — 5-10% per minute
- a coal fired power plant — 1-5% per minute

The balancing and capacity cost increase is in the range of 8-10 Euro/MWh for a wind power plant and 15-18 Euro/MWh for a solar PV power plant (IFRI, 2014)

Wind generation requires having an incremental reserve capacity compared to that required by a dispatchable supply in order to compensate for load forecast errors and network balancing. The additional reserve requirement is approximately 9-10% of the corresponding wind generation capacity, as it is comprised between 7 and 20% of the generation mix. This additional reserve requirement will decrease when forecasting methods are refined.

Cost for the national community

6. What is the cost of the support scheme from public budget?

7. How is this additional cost shared with consumers?

7. Useful references and links

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