De-risking Renewable Energy Investments
Addressing risks for a better market design

This paper has been prepared by

In collaboration with

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Abstract

In order to boost the renewable energy potential in Sub-Saharan Countries, an attractive and reliable market design shall be realised. As well as good renewable resource availability and suitable macroeconomic and financial conditions, a clear policy and regulatory framework is needed to prepare the ground for investment seeding, Political, policy, economic and social (variable) conditions result in different sets of risks across these Countries, significantly affecting investment making decisions. This paper identifies thirty-six potential risk-issues grouping them in five main areas and elaborating them on practical examples (both outside and inside SSA region), according to the RES4MED's model developed in 2016 and provides a quick assessment of the investment risk in Ethiopia. Furthermore, the paper deal with the policy instruments many Countries all over the world have been implementing to mitigate risks and encourage investments in renewable energies.

Background

Renewable energy (RE) technologies have experienced a rapid development over the past few years, mainly driven by the need to meet an increasing energy demand while mitigating climate change impacts, and to secure energy provision in the long term enhancing energy access.

Many countries are exploring ways to stimulate social and economic growth through stimulating the RE sector, in particular in developing regions such as Sub-Saharan African (SSA) area. Investment in RE can generate new growth opportunities, increase income, improve trade balance, and contribute to industrial development and jobs creation. However, investments in RE sources require large up-front investments.

With scarce public funds, governments rarely can afford the entire cost of RE deployment. Thus, RE strategies shall take into account private sector needs in order to fully benefit from the socio-economic impacts of investment in this field. Such strategies shall aim to provide a reliable framework, both in regulatory and economic terms, ensuring investors the proper viability for their initiatives.

Objectives

This position paper intends to highlight pros and cons of known renewable energy investments-related policies in African countries and, in general, all over the countries where successful policies have been implemented so far.

The objective is to provide examples derived from good and bad practices to learn by when developing RE enabling policies, avoiding experienced mistakes.

Furthermore, the paper identifies all relevant risks faced by investors and aims to explain how they affect policy success.

Main Issues

RE technologies have been publicly supported for several decades but rationale has been changing over time.

Support policies to the development of bio-fuels and RE generation were part of the public effort aimed at ensuring and diversifying energy supplies and providing technical solutions during wars and oil crises, or to mitigate air pollution and climate change effects. Those policies stimulated sound programmes for R&D in photovoltaic cells and wind turbines in Europe and the US, as an effective tool to reduce dependence, for instance, from high and volatile oil prices.

However, RE support policies are only part of a wider concept of *market design*, where also wholesale/retail market design and essential system services contribute to define regulatory and policy frameworks for the power sector.

Market design therefore, requires a set of rules governing the interaction of all the economic agents involved in electricity generation, transmission, distribution, retailing, and trading to reach the ultimate goal of the ***economic welfare***.

The achievement of final goal is indeed an optimisation problem with three major constraints to be taken into account, necessarily:

- Policy objectives;
- Operational constraints;
- Wider energy system

IEA[1] for instance has recently structured a logical scheme to describe this framework by using five criteria to define a good *market design* and policy framework for the whole electricity sector. Each of these criteria would bring **potential pros and cons** to be analysed when designing regulatory solutions.

1. **Short-term efficient operation** and dispatch of existing assets. This means a given service should be provided, once defined the level of quality, at the lowest economic cost.

	Pros	*Cons*
Demand	Enjoys a good standard at a reasonable price	Suffers a quality service lower than the price charged
Offer	Avoiding extra operational profits	Inability to create margins and market depression

2. **Long-term efficient investments** in new assets where the market design should incentivise the right (cost-efficient) amount, the right type and the right location of assets. In this case social welfare should be optimised.

	Pros	*Cons*
Demand	Enjoys externalities as security of supply and low carbon emission	Side effects by system constraints and no cost effective service
Offer	Fair profitability of investments	Difficulty to find financial resources

3. **Appropriate allocation of market, project and political risks** between generators investing in conventional and renewable generators, customers, other market players, and the government. Regulatory risk shall be used as a threshold to ensure the correct level of investments and to avoid market entrance barriers or free lunch.

	Pros	*Cons*
Demand	Sound contribution to the development of RE	Uncertainty in tariff and price to be paid
Offer	Willingness to invest and to operate	Uncertainty in cash flow and business plan

4. **Efficient long-term rent allocation** between different market players that are unsustainable in the long term. *Market design* should be proof of potential arbitrage or strategic behaviour.

	Pros	*Cons*
Demand	Fair payment maintaining the business profitable	Cross subsidisation from customers to generators
Offer	Avoiding distortion among players and ensuring equity in the market	Potential creation of stranded assets

5. **Pricing externalities** including for instance carbon emissions or more general power system externalities such as security of supply.

	Pros	*Cons*
Demand	Pays and enjoys externalities as security of supply and low carbon emission	Suffers the negative externalities or over pays the service
Offer	Receives fair incentive to investment and operation	Creates negative externalities

All these criteria are required from the several parties (both public and private) in the power and RE market: consumers, producers, investors, financers, technological suppliers, market operators, public authorities and external stakeholders.

[1] IEA-RETD, Electricity Market Design and RE Deployment (RES-E-MARKETS), *September 2016*

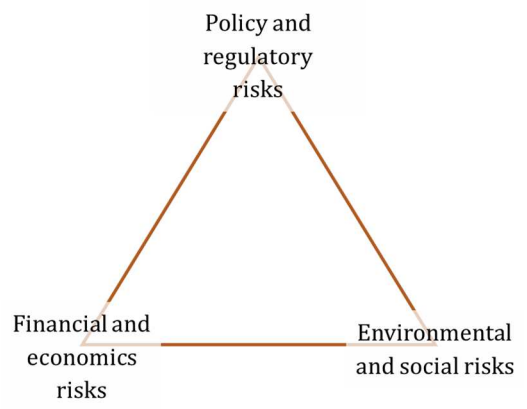
Since public funding in renewables is unlikely to increase above its current level of 15%, as foreseen by IRENA, private finance will have a crucial role for new investments. In particular, institutional investors will be able to scale up renewable energy investment.

The OECD estimates that around USD 2.80 trillion per annum is potentially available from pension funds and insurance companies for new clean energy investment in developed countries. However, this amount of money needs to encounter favourable regulatory frameworks to be employed; otherwise, it will find new paths of use.

Risks

Given the different political or social characteristics and specific technicalities of the power sector in each country, it is often impossible to reconcile the several constraints and to find an optimal regulatory design solution.

This may **enhance the business risks** to be taken into account when taking new RE investment decisions in a given country. Risk perception of a country is a "*three-headed monster*".



Five main risk areas may precisely give shape to the perception, namely:

1. **Risks related to the legal framework** enabling generic and RE investments;
2. **Risks affecting the revenues** side of RE investment;
3. **Risks affecting the costs** side of RE investment, both during construction and operation;
4. **Risks affecting financial structuring** of RE investment; and finally
5. **Risks related to environmental and social issues**.

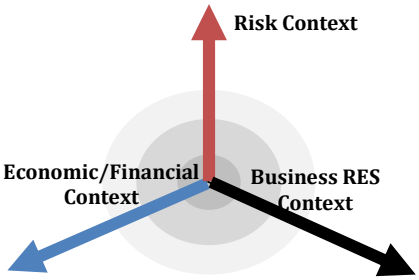
Area		#	Issue
1 Legal framework enabling	Business Environment Framework	1	Starting a business
		2	Property/concession rights
		3	Labour issues
		4	Dispute resolution issues
		5	Business travel rules
	RE Investment framework	6	RE regulatory framework reliability
		7	Rules favouring market opening to IPP
		8	Grid capacity and reliability
		9	Grid access rules
		10	PPA/FiT schemes
		11	Competing policies
		12	Institutional actors' roles and responsibilities
2 Risks affecting Revenues		13	Revenue stability
		14	Availability studies covering resource assessment
		15	Risk of curtailment
		16	Ease of profits repatriation
3 Risks affecting Costs	Construction	17	Permitting
		18	Availability of local skilled workforce (construction phase)
		19	Availability of experienced local manufacturers (construction phase)
		20	Logistics (construction phase)
		21	Security (construction phase)
	Operation	22	O&M weight due to local conditions
		23	Spare parts availability
		24	Availability of local skilled workforce (Operational phase)
		25	Availability of experienced local manufacturers (operational phase)
		26	Logistics (operational phase)
		27	Security (operational phase)
4 Risks affecting financial structuring		28	Long term financing availability
		29	Short term credit availability
		30	Interest rate risks
		31	Exchange rate risks
		32	Currency convertibility
		33	Inflation risk
		34	Tax regime
5 Environmental and social issues		35	Environmental impact assessment procedures clarity
		36	Social acceptance

These areas can be then decomposed in **36 relevant issues** in order to get a more complete and detailed view of the risk perception of each one.

It is interesting to notice how the risk perception of a certain issue can influence the perception of risk on the other issues and overall of the country, either in positive or negative way. Correlation among the risk perception is often strong when considering issues in the same area, however risk perception may also affect other areas. This is especially true when two issues have a common direct object.

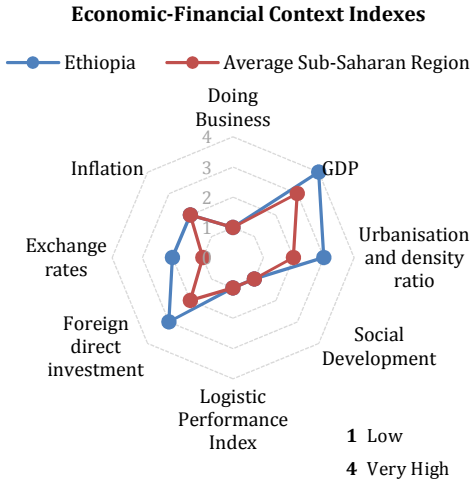
Risk assessment models applied to Ethiopia: a practical example

Based on the risk assessment logical framework developed by RES4MED in 2016, a risk assessment model has been developed by PwC taking into account many dimension affecting investment profitability. This tool allows, by means of a set of indicators, to assign an Attractiveness score, considering the size of Risk in delivering out RES investments in the analysed Country. In detail, 3 domain of analysis are considered:



1. E**conomic/financial,** reporting macroeconomic conditions (growth and stability of the country), financial issues (e.g. currency convertibility, interest rates conditions), together with considerations on social conditions and logistics.
2. **RES Business,** assessing aspects specifically related to renewable energy production and the availability of resources.
3. **Risk context**, its potential impact on profitability of investment generated by natural critical events internal or external to the Country. Thus defining the risks regarding the country's ability to ensure the "promise" made to investors.

Below, results obtained from the risk assessment model applied to **Ethiopia** are presented and analysed in detail. The three set of indicators/sub-indicators are presented per the 3 contexts of analysis and compared to the average results obtained for the **Africa Sub-Saharan Region**.



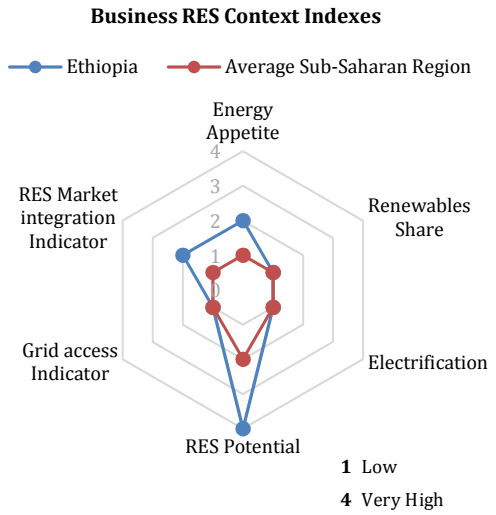
Ethiopia experienced impressive **GDP growth** in recent years and its economy is expected to be one of the fastest growing in Sub-Saharan region over next 10 years. In the last years, the GDP of Ethiopia has maintained a significant average annual growth rate of around 8%, while **Net inflows of foreign investment** in 2015 was 3.5% of GDP, according to World Bank.

While still relatively elevated, **inflation** has been stabilized during 2012 and 2013. The Government has taken various measures including strict monetary and fiscal policies to overcome inflation issue.

The **Urbanisation and density ratio** helps to estimate where and how energy demand must be satisfied. A Country is considered more attractive if the population is concentrated in urban areas as it is easier to serve its demand.

Despite these positive factors, Ethiopia remains one of the poorest countries in the world with a third of the population still living below the poverty line, as can be seen by **Social Development Index**.

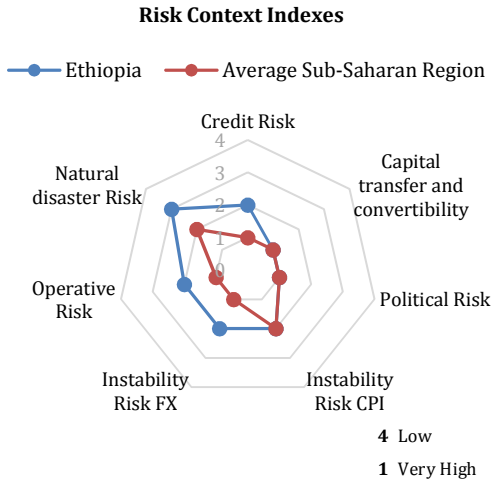
The **Logistics Performance Index** shows the Country still needs to implement the construction of the infrastructure network and the quality of transport.



About the Business context, Ethiopia has a **high potential of resources** in the field of RES. In this regard, the Ministry of Water Irrigation and Electricity Federal Democratic Republic of Ethiopia highlighted that the geothermal potential is around 5000-10000 MW, the average daily number of irradiation to produce electricity from the Sun is around 5.5 kW/m2/day and that the wind potential, with wind speeds greater than 7 m/s, hovers around 1000 GW.

Ethiopia does also have a significant **"Energy Appetite".** BMI forecasts the average electricity consumption growth rate will be around 9% from 2017 to 2021. Nevertheless in 2017, according to IEA and WEF, the per capita consumption is still below the standards base for human needs (about 87 kWh/per capita).

The factors described above suggest a high potential Business Development RES in Ethiopia, but an implementation of mains is still needed (only 25% of the population has access to the network) to enable deployment and integration of the RES. Despite some initial steps toward liberalisation and greater presence of IPPs have been taken, the Country shall move quicker steps to facilitate private investments in the RE sector.



Finally, Risk context indexes have been added to this quick assessment, namely:

- **Political Risk**: associated to political decisions, events or conditions that could affect the profitability of a business
- **Credit Risk**: the risk that a borrower may not repay a loan and that the lender may lose the principal of the loan or the interest associated with it. It is calculated as an average of sovereign risk, banking risk, corporate risk
- **Capital transfer and convertibility Risk**: Restrictions on movements of capital and on repatriation of dividends and profits
- **Instability Risk** (Exchange rates and Inflation): measures the inflation volatility (CPI) and the exchange rate (FX) variance in the Country based on history data
- **Operative Risk**: measures the capability to manage and solve problems linked to the renewable plant operation
- **Natural disaster Risk**: defines the exposure of an entity (population, built-up area, infrastructure component,

environmental area) to one or more natural hazards (earthquakes, cyclones, droughts, floods, and sea level rise).

In Ethiopia, as in all the geographical Area analyzed, there is a considerable high risk regarding the transfer and convertibility of the Capital and of Country Politics, according to SACE.

The current low presence of renewable resources (apart from hydro), contributes to the high operative risk of the country.

Nonetheless, in a final comparison between **Ethiopia** and the Sub-Saharan African area, the Country shows better performances.

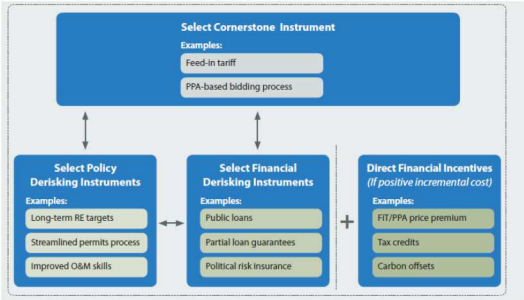
Policy and regulatory measures mitigating risk

In the previous chapters, risks that developers may face during an investment process and their influence on policy outcome have been identified. Policy and regulatory instruments have been built by Governments and Regulatory Authorities, aiming at reducing investments risks and stimulating investments, as, for example:

- Feed-in Tariff schemes (FiT);
- Auctions;
- Third Party Access (TPA);
- Quota Systems, etc.

In most Countries, FiT and auctions have been implemented as solutions to attract private sector requiring sustainable, profitable and bankable investments.

Over the past decade **FiT** has been characterized as one of the most successful support mechanisms to incentivise deployment of RE and its application has been rapidly spreading, especially in combination with other public instruments to address the high financing costs for renewable energy in developing countries and mitigate financial risks . In this context, the best outcomes occur when policymakers address the renewable energy investment risk in a systematic and integrated way by putting in place other instruments together with FiT/Auctions, as outlined in the following graph to mitigate the residual risks which can block the investment.



It is important to note that the above approach has generally been applied to large scale investments and should be reshaped to support distributed renewable energy, small scale and energy efficiency investments through aggregative models.

Although it is important to keep in mind the extensive experience in policy design already acquired, there is also a crucial need to keep up with innovation and actual technology cost trend.

Renewable energy sector is particularly prone to often changes and technology advances. Lately, there has been a notable shift of factors that have influence on RE policy, such as lower costs of RE technologies.

Consequently, determination of right level of support (right level of tariff in FiT case) is becoming more and more challenging.

In several markets, **auctions** substituted FiTs as the main procurement policy of choice. According to REN 21 over 30 countries in the

world held RES auction in 2016, from just 14 Countries in 2014. Such data show how successful the auction mechanism is becoming without both geography and technological boundaries. 2017 is expected to confirm the trend of the recent years, with additional countries, like Ethiopia, issuing RES auctions.

Auctions provide the downward pressure on costs and add transparency benefits. On the other side, there are valid issues about auctions and the different mechanism through which they shall be implemented.

Policy learning between countries across continents is an important driver for improving policy design, especially in developing countries when it comes to plan and implement the most effective measures also under the socio-economic growth point of view.

It is worth to mention an emerging route to market through which RES developments is currently pursued in an increasing number of countries, in addition to national Government auctions: Corporate Power Purchase Agreement.

Corporate PPAs are long-term agreements according to which medium-large business companies – rather than State-owned utilities – buy power directly from renewable IPPs. Such agreement allows corporate off-takers to purchase power at a fixed price, providing a hedge against the volatility of electricity prices, as well as enhancing their environmental credentials.

Creating a market environment which also allows IPPs and Corporates to set up such kind of energy supply contracts, provides an additional RES deployment opportunity.

From a risk mitigation point of view, PPAs relies on the accountability of the contracting parties and therefore i) avoid Governments to directly provide guarantees and ii) have the IPPs allocating the revenue stream risk on (large) Corporates with proven track records and financial stability, enabling project finance opportunities.

For buyers, such deals offer various advantages such as pursuing a sustainability strategy, locking in a certain price to avoid exposure to inflation and price volatility, or ensuring security of supply.

Competitive Auctions and beyond: Regulation as key market enabler

With RE subsidies mostly phasing out, Corporate PPAs become relevant as they ensure stable revenues through long-term contracts with creditworthy off-takers such as large corporates and provide robust credit security, which helps developers to secure financing.

About Corporate PPAs, we refer mainly to 2 different options: option a) “Private-wire” deal in which renewable developer builds a plant nearby the consumer’s premises and physically supplies energy through a wire; option b) is an “ off-site PPA” in which buyers agrees to buy a certain amount of MWh from a plant located elsewhere. The latter, that is the most commonly used, is also known by the term of “Wheeling” that is the delivery of electricity generated by a private operator in one location to a buyer or off-taker in another location via a third party network.

Wheeling is a natural diversification for the local renewable industry as it was for more mature markets. It enables power producers to harvest prime natural wind or solar resources where they are located and supply

clients in other areas even very far away from the generating point, thereby enabling them to benefit directly from clean and low-cost energy.

Both options provides advantages and disadvantages

In Option a) the agreement is generally quite simple but customer will still be dependent on the grid when the RES plant is not generating enough and, at the same time, regulations should allow for possibility to inject excess of energy into the grid at remunerated price.

Option b) solve those issues but creates others since the agreement would be more complex, involving the main utility to allow third party access into the network, clearly defining the costs to be incurred by the developer and the customers, and balancing the supply of renewable projects and demand from the buyer.

Unfortunately market regulations are still holding back on corporate PPAs in some Countries and opposition is faced by incumbent utilities fearing customers leaking and, consequently, revenues losses. But, in developing countries, where 24/7 supply is not assured and power prices are volatile and expected to increase in the future, this option should be encouraged also by the Government in order to foster countries economic development, ensure security of supply and in some case mitigate the misperceived over-exposure of public sector finance.

Recommendations

Optimisation of market design can be carried out carefully assessing both the Country and specific projects risk profile and this paper suggests an approach that Governments/Authorities can apply as if they were in investors' shoes. When risks are identified, tailored supporting mechanisms can be developed and international experiences show solutions are there to pursue private investments attraction with public interests to get electricity at a fair price. At the outset of many RES policies, public incentives strongly helped to overcome barriers to investments and remunerate risks. Then, instruments, fully integrating renewables into the energy system, can be provided to let RES IPPs operating in the market (e.g. Corporate PPAs).

Especially in the era in which skills and expertise can be transferred at low cost, it is necessary for SSA countries, extremely rich in renewable potential, to build on lessons learned by the other countries and make decisions accordingly.

As a **first point**, internationalisation and market openness are essential to create the correct investment environment and to better receive foreign investors.

SSA countries often suffer from a lack of bankable projects that are large enough to justify commercial loan syndication and remain non-investable without comprehensive risk coverage. The main financial risks to slow down the investment are:

Currency. Tariffs in local currency cannot go unhedged. To manage this risk Nigeria, for example, had signed a currency swap with China.

Sovereign. The continent is a hub of sovereign risk for wars, civil unrest and exposure to commodity prices volatility. To manage this risks Angola used the MIGA

(Multilateral Investment Guarantee Agency) political risk insurance for a hydro project.

OFF-taker. Off-takers in Africa are often not bankable. To manage this risk Kenya offers the World Bank PRG guarantee.

As a **second point**, technical assets and dispatching potential shall be adequate to RE targets. Governments that want to rapidly address infrastructure shortfalls in the region should remove regulatory barriers to customer-sited generation (both on and off grid), and encourage greater grid development.

The **third point** refers to incentive mechanism. On this issue, it is essential to dynamically optimise the use of the mechanisms currently available and also *under development* (FiT, auctions and Corporate PPAs respectively) in perspective of an evolutionary regulation to avoid poor results, or even worse, the unjustified extra costs for the systems.

Experiences in fact, suggest considering FiT incentives as a "*transition mechanism"* acting as an essential tool behind the creation of the main requirements for a sustainable RE market, efficient and fair. Indeed a FiT mechanism, whose **strength and duration** is able to properly stimulate those players, might also allow an easier and rapid transition from a nascent to a launched and mature RE market.

If market signals show need for a secure stimulus to find the optimal allocations and to achieve the appropriate competition levels, it is then the case for a structured FiT mechanism. Otherwise, in case signals push to open the market, after a deep evaluation of the status of learning curves and of the real costs for the several RE technologies, auction system will be more appropriate to ensure the correct development of RE in SSA countries.

It is not even excluded that those *well-advised* auctions will not link additional capacity to a specific technology, but rather make technologies competing with each other, in order to ensure the greatest levelling of costs. This would be particularly effective in case of utility scale projects.

Drawing successful case histories from international practices, then, helps Governments/Authorities to accelerate learning processes and to adapt their own schemes to minimise energy supply costs while investors' risks perception cools down.