

2030 - 300GW



AREI phase two:
Design a project

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AREI phase two: project preparation

- AREI phase two: prepare a good project is essential for the project developers
- Knowing what is a good project is essential for public officials to assess the benefits to the country, to their communities to SDGs and then provide green lights in short time,
- Recognising a good project is important for project investors including equity holders, loan providers, and for those that should provide guarantees
- A very good design of a project it is half way through itself

AREI phase two: project preparation

- We see in parallel to this presentation how to recognise country and, more importantly for this exercise, project risks
- Here we do not want to re-invent the wheel and therefore we shall extract the best advice and methodologies from what is available on the internet shelves for RE project design
- The question: ? tools for renewable energy project preparation: how to prepare successful renewable energy projects in Africa ?

AREI phase two: project preparation

1. AREI synthesis on the available tools for project preparation.

This synthesis is from the point of view of project developers

2. Tips and lessons learnt

3. Discussion

1. Motivation

1. The first question for any endeavour is WHY ? First, we need to state the fundamental reason(s) the project is necessary or desired. A general rule of thumb would be to define this overall purpose within one or two sentences. This very often is linked to the core essence of the project.

1.1 WHICH economic sector do the projects serve? FOR MINI GRIDS: They serve rural electrification of remote off-grid villages for households, micro-enterprises, and their communities, and thus enables socio-economic development and growth, complementing or better off substituting other energy sources. FOR LARGER RE SUPPLY PLANTS: Rental solar power solutions to decentralized / rural business in remote locations, multipurpose solar-diesel hybrid farms, standalone high-output solar PV systems; These infrastructures can provide cost-effective, convenient and clean rental solar farms to reduce fuel consumption of on-site diesel generators focusing on fast-growing rural economies;

1 Who and what

1.2 WHO ? are the end-beneficiaries of the projects' outcome? MINIGRIDS have a stronger emphasis on the “Base of the Pyramid” (BoP) households village kiosks and agro-processors that are currently dependent on diesel generation sets for electricity supply.

1.3 WHAT are the needs of final beneficiaries that are getting served? For MINIGRIDS :Electricity for lighting, for phone charging, for small appliance, **for micro-enterprise appliances**, such as small fridges, sewing machines, and agro-processing. rural household is far below 1 kWh per day expected to grow over time. FOR LARGE RE SUPPLY: Providing reliable electricity supply to industries: Who are the end-beneficiaries of the projects' outcome?

1.4 gender IMPACTS: How could access to your product improve the livelihoods of women and girls or change observed gender inequalities? Is a Gender Impact assessment GIA to be envisaged?

1.5 Climate change and positive ENVIRONMENTAL IMPACTs are obvious part of the motivation : annual GHG reduction potential for the project in tonnes of CO₂e avoided or annual energy savings in GWh, with attention to the methodology used and assumptions for the calculation.

1.6 Will be such projects part of a national **COUNTRY organized strategy / policy**? And **What are the alternatives** for final beneficiaries if such type of projects would either not exist or would not be preferred by them?

2 fatal flaws killer assumptions

2. The second step, in parallel is a list of KILLER ASSUMPTIONS or fatal flaws and very big risks. They need to be identified and analyzed quickly and accurately to avoid investment of scarce risk capital into "bad projects". They can derive from **policy risks and lack of consensus** within the communities. When they are identified: should the project be stopped, or would an acceptable investment potentially mitigate or eliminate the flaws?

2.1 Expropriation/nationalization risks are obviously part of the killing assumptions for a private driven project.

2.2 Lack of communication and consensus-building among stakeholders of a project can be fatal. To generate buy-in, a common understanding of the project fundamentals, and a unification of purpose is essential; the project development process will involve various stakeholders input, investment, and possibly compromise to avoid that stakeholders can become adversaries at early stages when it is most vulnerable.

2.3 “reverse killing assumption” can always be made: what are the alternatives for households?: not reading, not preserving food, not connecting to the society, for micro-enterprises: loss of revenues, discontinuity and lack of reliability

Project preparation is always back and forward

3. A step backward: the word **MOTIVATION** goes immediately along with key assumptions and the identification of major risks.

3.1 If major risks were identified, how **can these risks be better quantified and mitigated? What will be the costs allocated to mitigate risks, and are they sufficient?**

3.2 **Where are the unknowns**, and how can they be further mitigated?

3.3 Where would investment **in time and/or money be best applied to reduce unknowns, mitigate risks, and develop key information?**

3.4 **What is the level of political support for your project at central and local levels. How is this support demonstrated?** This is linked also to financial and tax incentives that we shall consider later such as state guarantees, grants, subsidies, tax breaks.

If after this rapid check, the project is still considered viable and worth pursuing further **we can proceed.**

An AREI project goes into a complex market

4. **MARKETS.** Commercial-scale projects require an understanding **potential off-takers, regional wholesale electricity rates, access to transmission,** conducting interconnection studies, determining need for grid upgrades, and the potential for material environmental and land-use permitting processes, etc.

4.1 Some market challenges are known similar in almost every market and they generally include:

- an **inefficient governance of the sector** and implementation of policies.
- an **unfriendly business environment**, most notably for foreign investors.
- a **lack of transparent competition** and **project procurement** rules.
- a **weak financial sustainability of public counterparts** to offtake energy
- **risk environment linked to perspective investors' perception** of efficiency and reliability of the project-hosting country on market structure, legal framework, currency issues.
- **coherence and transparency of government policies** and regulations regarding power sector governance and private sector participation.

Regulatory and market environment questions 1

4.2 What is the Required supply chain: What is the legal and regulatory environment applicable to your project? (concession laws, privatisation, mandated energy mix requirements or targets, structure of energy tariffs/independent power production etc, planning and building permission, commercial and business licences, employment licences, emissions/water rights, import and export permits, etc)

Who are the competitors? **Analysis of existing competitors and project competitiveness:** Who are they (private, public, local, int.)? What are your company/project's competitive advantages over other market players? This is especially important for investors to enter in equity partnership

Regulatory environment questions 2

4.3 The markets are affected by the regulatory frameworks. **Policy environments must be examined for barriers and addressed prior to expending significant resources pursuing a project.** The project and steps taken to mitigate, remove, or deal with these policies to create the conditions for success are imperative. On policy issues the project must have strategies and tactics. AREI can make a big positive difference.

The domains are complex spanning from **Land rights to local labour content requirements, from various licensing/permitting issues to technology transfer limitations, from host country law for dispute resolution to hostile investment laws.** Furthermore the legal frameworks impacting financial issues such as **import duties and withholding taxes ending with foreign exchange issues for its availability, convertibility, transferability.**

Involve the project communities

- 4.4 Some areas of policy affect the site of the project as well as the consensus and governance on the project by the local communities.
- **Land rights, local labour content with licensing/permitting are sensitive in function of the site.** The legal details such as **conveyed property rights, legal definition (through legal descriptions and/or accredited surveys), assignability (relating to financing requirements), length of tenure, terms and conditions, default and cure clauses, and other obvious physical constraints of a site, which include but are not limited to: slope, vegetation, soil conditions, infrastructure, access, associated resource impacts, etc.**
- On site planning, look at conflicting or competitive uses for the land necessary for the facility itself. The level of detail is ever increasing starting at a broad level and ending with highly detailed information.
- In case of PV plants. The layout of PV Panels is one of the most important aspects of a solar farm. The panels must be oriented to receive maximum sunlight exposure. The Type of PV Panels Another important factor to consider is the type of photovoltaic panel whether Crystalline silicon or thin-film

Study the impacts

4.5 market considerations are also functions of the technology selected. Straightforward, fundamental technology assessments and analysis are essential part of project motivation. In fact the solar or wind or water energy resource for a specific site might be available from a simple desktop study. Assessing commercial technologies, reliability, and bankability shall not require much more than that.

With permits some studies are necessary for project construction and operation including Environmental Assessment or Environmental Impact Study requirements or gender impact. All sort of permits and local entitlements, electrical contracting permits, and building permits must be followed very carefully also in regard to the quality and speed of public administrations central and local.

These work must not be underestimated and it is done immediately after the identification of site off-takers and other key elements. It is an important elements and **could be a killer assumption:** if a project has a high hurdle for permitting, and therefore includes significant permit or policy risks, it needs to be understood and executed with that knowledge in mind.

5. The off-taker 1

5. Probably the most important crossroads of regulations, risks and sustainability issues is the OFFTAKER.

5.1 The buyer of the energy must be established and ultimately secured by contract, often a power purchase agreement (PPA) if the developer will not play as distributor to the final consumer . Because of the complexities of financing and building renewable projects, we use the general term “off-taker” and not buyer.

The PPA is an executable agreement by the project parties with economic effects. This is a complex area and there are many details to off-take with many financing and technical implications. Embedded in this subject area is also the issues of transmission and interconnection, relating to the direct and ancillary infrastructure and agreements required to “get to market.” Affecting the project design both in terms of technical aspects as well as financial and regulatory we need to know how the investment plugs into the existing energy networks and deals with agencies, further actors and institutions and again regulations that must be mastered.

The off-taker 2

5.2 The creditworthiness of the electricity output purchaser (the off taker), which is often a state-owned enterprise (utility) or authority, is key to ensure the stability of project revenues.

Public utilities in Africa face a multitude of challenges which undermine their financial stability.

One way of addressing this is for governments to provide public counter-guarantees on the off-take payments. These ensure the reliability and predictability of project revenue streams to developers and lenders, over the life of the project to both repay debt and provide an appropriate return.

Some governments may have problems on that so we look at guarantees on the “market” like the EIP investment plan guarantees of the EFSD (EU) those issued within the blended finance approach of the EU, or the IFC’s Private Sector Window for guarantees and WB guarantees can replace the sovereign guarantees.

Furthermore, the guarantees can only work if the other problems listed are also properly understood and proactively managed

Offtaker 3: PPA tips and tricks

- **The PPA structure, must deal with some other important risks, such as curtailment compensation, force majeure (typically exempting both parties from their obligations for a limited period) and termination (covering the default risk from either the off-taker or the generator side).**
- Negotiation of bankable legal documents (starting with PPAs) can be a lengthy, complex, and cumbersome process even in countries that have extensive experience with project finance. The project risks held by off-takers are: Revenue flow, off-taker creditworthiness and payment risk, termination payment risk
- **A good quality PPA contract to define and secure project revenue streams, typically requiring the off taker to buy all or most of the electricity produced at a pre-determined price reduce uncertainties.**
- **Some forms of indexation, either to a hard currency and/or to inflation, to ensure the adequacy of revenue streams defined by the PPA may reduce the currency risk further.**

6 Procurement and support

- Design a good project means to foresee and devise execution, procurement and financial issues connected with operations management in a wise manner.
- Procurement questions whether inside or not the PPA are fundamental: How many MWs are to be installed? By when? What is the process to procure them? In procurement the value chain of energy needs to be defined. How the MW will be evacuated?
- During execution and management of operations the communities around the project can be an asset and a problem solver. Or not. Community concerns: The involvement of civil society is an extremely important driver of success also covering reputational risks on promoters. Obviously the solution is consulting and incorporating concerns from the communities into the project design. Civil society organisations must therefore be appropriately involved at early stage so as to avoid approaches that could backfire and also damage the reputation of public and private promoters.
- During the executions and operations attention must be paid to expropriation and nationalization (considered fatal risks) and, with the probability of occurring : strikes, riots, war, sabotage & terrorism.

7 Finance

- **7. FINANCE.** The financing of RE projects can be very complex and must proceed in steps. The difference between early stage and project maturity is also coupled with different types of financing. Project financing is a discipline on its own merit therefore here we will touch on the essential elements only.
- Key national regulatory frameworks are those related to the money transferring convertibility and exports. The analysis of project finance can get truly complex. The sourcing of the capital for the project is an iterative process starting with development grants and going later for equity loans and other more sophisticated forms of financing. With all elements in place, the project can attract the financial resources necessary for final development, construction, commissioning, and initial operations. Capital requirements do not begin at construction and do not end with its completion.

7. Finance : key questions

What is the breakdown of the total amount in the different types of investment envisaged (debt, equity, grants)

- **What is the target debt-to-equity ratio ?**
- **What rights and benefits would be attached to investors' obligations and commitments?**
- **What is the detailed plan for the use of cash inflows including CAPEX, OPEX, financing costs, soft costs?**
- **Who are the target type of investors?** (philanthropic, impact, development funds, institutional, private equity, venture capital, strategic, industrial, carbon, development finance institutions and banks,)
- **For equity investors, what would be potential exit strategies** (industry sale, buy back by developer, IPO, etc)
- **For debt investors, what would be the pay back strategy**
- **Existing and future financing structure committed** (disbursed/invested), **Equity Shareholder structure, Grants providers, Debt Investors already involved with some details for local international and currencies**
- **Developers "Skin in the game"** Do developers put significant "sweat equity", in kind contributions into the project – most investors would like to understand developer's commitment and enthusiasm for the project.
- **Overview of projected cash flow challenge the main assumptions, especially revenue and estimated capital expenditures and operating expenses** (scope of work/bill of quantities/technical specification), time frame used.

7 Finance indicators: exit strategy

- The typical financial indicators are: Internal rate of return (IRR), return on capital invested (ROC) Payback period, point of break even Annual debt service coverage ratio (DSCR) and interest coverage ratio (ICR) using earnings before interest, taxes, depreciation and amortisation
- Finally and essential for the financial sustainability is the **growth and exit Strategy** : information on growth strategy and expansion plans should be provided, and the financial analysis should reflect this . What is the planned project lifetime? What will happen at the end of this lifetime? What is the exit strategy? This is always of interest to evaluators and potential investors.

8 Teams and partnership

8. Teams and partnerships are essential. Concerning the labour force before during and after construction we will need to assess

- The team that will manage the project development and implementation, with their previous background, experience and right roles and responsibilities in the project are essential.
- The local work force need to be scrutinised for availability of technicians, availability of managers and in function of that, the laws to get expats must be checked.
- Beyond the management team we see useful partnerships. One emerged during/after procurement with the EPC contractor is important. Further partnerships can emerge also in function of which ownership options is allowed by the law. And can be sought in function of the envisaged PPA.
- PPA has advantages such as: No/low up-front outlay of capital, fixed electricity price for 15–25 years, operating and maintenance responsibilities as well as governance must be cleared.

9. Tips and lessons learnt 1

From the literature survey and subject to the panel discussions we produce here some tips and recommendations from lesson learnt. They can serve as a recap and a message for project developers.

- The **increased focus on productive use and local capacity** spurs economic activity and supports small businesses. Thus the development impact goes well beyond rural electrification
- **Tariff frameworks often do not account for the additional costs that mini-grid developers incur.** In order to provide 24 hour service, solar PV mini-grids must include a battery or a back-up generator (usually diesel or biomass) for night-time use. the high costs of night-time power from the battery or back-up generator are leading developers to invest more in demand side management technology and policies.
- Many developers also ensure their **systems are compatible with the national grid** so there is an option to move on-grid
- Integrated **IT systems that enable data collection on usage and remote monitoring of the grid** ensure that project developers can track operational capacity and maintenance needs.
- **Nearly all projects start off with a grant, subsidy or other type of infrastructure financing to reduce capital costs.**

9. Tips and lessons learnt 2

- In most cases a onetime connection fee is charged prior to delivery of any power.
- The most successful method for payments is pay-as-you-go (PAYG), where customers pre-pay for energy.
- nearly all mini-grid developers in the EEP portfolio are moving towards targeting customers with productive use of energy (PUE)
- The most financially sustainable mini-grids in the EEP portfolio employ some form of the ABC strategy of
- A more stable and affordable electricity supply increases the anchor client's revenues and feeds them back into the community.
- there is a need to sufficiently sensitise and inform local residents and businesses,
- A rapidly increasing number of project developers are involved in selling appliances and machinery to the customer base.
- A key success factor in the business model is to recruit and train a skilled and dedicated local team and to build strong relationships with the community.
- A good quality PPA contract to define and secure project revenue streams, typically requiring the off taker to buy all or most of the electricity produced at a pre-determined price reduce uncertainties.
- Some forms of indexation, either to a hard currency and/or to inflation, to ensure the adequacy of revenue streams defined by the PPA may reduce the currency risk further.
- There is a limit to standardization for IPP PPA documents. Even though it is understood that standard documents would need to be adjusted to reflect country specific conditions (procurement laws, land ownership, grid connections regimes), the extent of the adjustments and need for customization is always underestimated.
- In practice, the documents must be adjusted: underlying legal system (common law vs. civil law), language grid stability, number of competing renewable energy projects and land availability, condition and title.
- The peer to peer approach in policy is useful as Countries with significant prior IPP experience may seek to have that experience reflected in the standard documents (e.g. Senegal, where various public sector stakeholders provided more than 100 comments on the template PPA), while countries with very weak grids may not be able to accommodate Scaling Solar without significant amendment of the standard documents (Madagascar, where the need to incorporate a storage component to help stabilize the grid suggests that a detailed grid study should be carried out on grids known to be weak before starting work on the transaction itself). Furthermore lenders, sponsors and even governments have requested changes to standard documentation to address unforeseen situations.

10 Critical elements of successful IPP projects

A. Regulatory regime and permitting

- Project siting and Environmental considerations
- Revenue contract (PPA or Feed-in-Tariff)
- Transmission and Interconnection
- Construction agreements and equipment procurement
- Operations over project life

B. Financing & Equity Investment Considerations

- Construction & development risks
- The tariff and collection structure under the PPA or Feed-in-Tariff
- Land rights issues: right of way, satisfactory site control
- License and permit validity & tenures
- Bankability of the PPA or Feed-in-Tariff and Payment guarantees
- Environmental liabilities

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Thank you

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