Construction models for renewable plants in Africa: a flywheel for sustainable development

This paper has been prepared by:

in collaboration with:

Antonella Santilli, *EGP* – Francesco Belfiore, *ERM* – Nicky Crawford, *ERM* – Deon Wessels, *ERM* - Mark Grundy, *RINA*

Abstract

Renewable energy can play a pivotal role in providing competitive and clean electricity, which Africa needs in order to fully realise its growth potential. Moreover, today the opportunity to overcome the development divide strongly depends on the availability of and access to energy. Thus, renewable energy projects can be key for the sustainable growth of the economies where they are deployed, and this can be supported by policies, taking into account the environmental and social impacts, also at local level. Moreover, the private sector can further unlock renewable potential for inclusive development, in particular by implementing sustainable construction and operation models.

Africa needs energy

Africa's energy sources are many and diverse and the continent experiences the kind of economic growth that G7 nations such as France and Germany, let alone Italy, can only dream of. To fully realise its growth potential

Africa needs a lot of energy as well as the infrastructure to ensure that it is delivered affordably, safely, and consistently to households, as well as industry, businesses, and the public services sector. Although energy is not an end in itself, today the opportunity to overcome the development divide strongly depends on the availability and access to energy. Access to affordable energy can help reduce poverty; it can be instrumental for people living below the poverty line to reach a better quality of life. Researchers argue that access to electricity has a

positive impact on development through its effect on the three components of the Human Development Index: these are income, education and health.

Income generation is by far the most studied impact indicator and there is evidence of a significant increase in both the consumption of electricity and income levels of households. In some cases, such as in South Africa, income generation is linked to an increase in female labour supply. As far as education is concerned, the positive effects are to be found in the enrolment rates and the number of years of completed schooling, as well as facilitating the use of computers and in the general operation of schools. Health indicators derive from the reduction of kerosene, and the availability of electricity for health equipment (refrigerators for medication, sterilizers etc.) and for infrastructure (hospitals, emergency camps, etc.). The availability of electricity can also benefit other public services, as well as provide the energy needed for mobile communication systems, water pumping, etc.

Renewable energies can be a solution

Electricity consumption in Africa is constrained by limited supply and by poor transmission and distribution infrastructure. Renewable Energy (RE) deployment, along with grid enhancement, energy storage and micro-grids, has the potential to accelerate Africa's socioeconomic transformation, linking prosperity with quality of life and facilitating the path towards sustainable growth. Bringing energy to those without access, means opening local communities up to new possibilities in education, healthcare, gender equality, and employment. Bringing clean energy can achieve this while respecting the environment and territory. Bringing clean and competitive energy means building a winning model where all aspects of sustainability can be integrated: renewable plants on an industrial scale can benefit the local communities, the environment, and market operators.

In terms of the energy divide and growth of renewables, Africa has long been the subject of reports and market analysis that repeat the same mantra: the continent has a unique potential and human resource capabilities, abundant resources, competitive technologies, and business models that are increasingly refined. African countries just need stable regulatory frameworks to unlock investments and thus give rise to a new era.

Benefits and risks of renewable energies

Besides the obvious positive impacts on the environment and the economy, renewable energy offers three main key advantages.

Firstly, renewable generation is typically less concentrated and more decentralized. Moreover, the time required to build a power plant is shorter than for other conventional technologies. RE projects are inherently more scalable than conventional projects, and can be sized for current demand, and if required expanded as demand grows. Furthermore, it does not need the same infrastructure requirements of conventional power projects, offering additional flexibility for locating projects.

Secondly, renewables can be easily installed and maintained, and their deployment offers opportunities in terms of job creation and inclusive economic development. Finally, an abundance of resources alongside technological improvements, the subsequent reduction in costs and improvements in performance now make renewables competitive with fossil fuel generation. The IRENA report "The Socio-economic Benefits of Solar and Wind Energy" (2014) emphasises the importance of value creation in the renewable energy sector. A central question to the assessment of value creation in the RE sector is to what extent the value creation is being generated locally. This

depends on the maturity of the RE sector in the country where the project is being realised, as well as the presence of an electricity distribution network. The planning, construction, grid connection and operation phases are identified as the main aspects that are able to bring domestic value. As for the manufacturing process and supply-chain, this depends on the presence of such industries in country, and requires at least a certain degree of industrial capability in the country in order to generate local value creation.

The IRENA report further elaborates on value creation in supporting the processes included in the value chain of RE project development, such as policy-making, financial services, education, research and development, and consulting. Strengthening these processes may enable further value creation in the RE value chain, as well as other sectors. A focus on policy-making is key to creating an enabling environment for RE investments in a country. Hence, setting the right policies is considered a first step to facilitate RE investments and can therefore boost value creation at an early stage.

Increasingly, environmental and social performance influences the bankability and viability of renewable energy projects.

Although renewable energy delivers better performance in terms of environmental and social standards, their development may involve some negative impacts that need to be mitigated, whilst several of the benefits can be enhanced. These impacts are experienced locally on both ecological and social aspects through the construction and operations phases of RE projects.

The key factor in reducing the potential negative environmental and social impacts and maximizing the potential benefits associated with RE projects, as well as ensuring technical and economic viability lies in considering from the start, the entire lifecycle of RE projects, from initial business development to their operation and maintenance.

Moreover, as large-scale renewable projects can occupy large areas of land, thereby restricting or limiting land access and use, consideration of land use and its ownership is essential when initially selecting sites. Furthermore, site selection can also determine the availability of local workforce, the ability for the project to bring direct benefits to local communities, may influence impact to local ecology, increase risk of natural hazards etc.

Policy can lower the risks

In some African countries, environmental and social impacts have been taken into account at policy level, in order to enhance the intrinsic potential of renewable energy to support sustainable development.

This is the case of South Africa, where renewable energy projects are obliged to make a real contribution to local economic development in the immediate area of operation. The South African Government developed a clear policy on sustainable economic development within the renewable energy sector. This policy, although cumbersome to those that are less environmentally and socially inclined, has lured a number of investors who have integrated sustainability and shared value into their business. The obligations imposed by Government comprise of seven pillars, which include amongst others:

- Local equity ownership;
- Preferential procurement;
- Local job creation;
- Socio-economic Development (SED); and
- Enterprise Development (EnD).

These components, if appropriately imple-

mented in partnership with local actors, not only reduce environmental and social risks to the company, but also set the foundation for **Creating Shared Value** (CSV) within the local community.

What the private sector can do

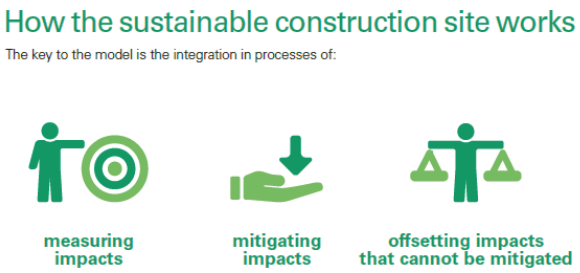
Over the last years, a number of business formula have arisen, starting to take into account the social and environmental aspects of a project. In order for these models not to be just wishful thinking, or worst still green washing, social and environmental aspects need to be fully integrated into the entire business. In other words, sustainability needs to be linked to profits.

The goal of sustainability must indeed be to create value for all– the industry, civil society, and the environment – and to conduct business that leads to shared, widespread and lasting Value. It's no coincidence that the United Nations (UN's)17 *Sustainable Development Goals* (SDGs) fully adopt this logic through "*doing well by doing good*". They advocate that a truly sustainable business can help respond to the needs of education, healthcare, and gender equality by promoting economic development, employment, and energy access for millions of people around the world. Many private companies have adopted the **model of Creating Shared Value** (CSV), making sustainability a fundamental driver for competitiveness. The sustainable construction site model is a practical, real, application of CSV which aims at reducing negative impacts on the local environment and communities, while maximizing positive ones on value creation.

In other words, by conceiving the deployment of renewable energy under a sustainable value creation model, further value for local development can be unlocked.

Construction is the phase when the presence of a large-scale RE project is most apparent, and is usually the most delicate phase, as the impact on the environment and on people's lives becomes perceptible and is realised by the community. The objective of the sustainable construction site model is to anticipate impacts in advance based on the knowledge already acquired during the development phase and then effectively manage these through mitigation, measuring, and mitigate reviewing, under the principles of a circular economy.

In the case of Enel, four major impact categories have been selected as more relevant to this phase: water, waste, emission and people.



We measure our impacts in order to mitigate or enhance them; for example, among our indicators are:

- percentage of water reused
- percentage of waste recycled
- percentage of renewable energy used at the construction site/camp
- expenditure on local suppliers
- percentage of local workers trained and employed
- days of stoppage due to safety or social issues
- safety indicators, and
- number of biodiversity projects.

Mitigation measures are very context-specific. Through a series of analysis in the business development phase we obtain a thorough under-

standing of socio-economic and environmental contexts. We thereafter identify the actions to be implemented at the construction sites to create value for both Enel Green Power and the community. Furthermore, in order to improve the sustainability and quality of projects in the design phase, feedback from other projects is considered and implemented through technology improvements across-the-board.

Some examples of mitigation measures include:

- use of sustainable certified materials
- maximum reuse of all excavated ground and rocks;
- donation to the community of surplus wood, iron and cardboard.
- reuse of water from treatment of grey water
- use of electric vehicles
- construction site lighting powered by photovoltaic cells or mini wind-power plants
- renewable energy systems to meet the power demand of the on-site facilities
- improvements in local infrastructure
- training of local workers and knowledge transfer, and
- provision of on-site structures and services for workers.

A key part of a sustainable construction site is effective and on-going engagement with the local community, to ensure a positive relationship is fostered and maintained. It is essential that such engagement starts at the early stages of the project development in order to manage community expectations, as well as to identify shared risks and values.

Is sustainability an added cost?

The sustainable construction site model can certainly create value at a local level by sensibly decreasing consumption of resources, such as water, wood, rocks etc., reducing emissions, and providing the local population with infrastructure, jobs, training and knowledge transfer. It can thus can certainly enhance the capability of renewable energies to be a flywheel to local development.

Furthermore, implementing sustainability as a core part of the business model reduces risks, potential delays, and supports financing. However, some may argue that such a model can do so only by adding costs, thus making the business at the end of the day less financially sustainable. Our experience at Enel Green Power is that this is a misconception. Let us look in practice at the sustainable construction site model; how did this go? Here are just a few real examples.

By reusing wood from pallets, for example donating them to a community, you avoid the costs of disposal. You can invest this saving, depending on the local needs, by training people in eco-carpentry. And if there is the need, you can even buy this eco – furniture for your offices (they are good for the environment and the people but also they cost less than some industrial product delivered from miles away).

When water is scarce, filtering and reusing grey water to manage dust may be economically more viable than buying and using tons of clean water.