# 2.The Implementation of Community Power

The rest of the paper analyses the third party green ESCo model which is the most ambitious of all of the market scenarios defined in Chapter 1.

**Premise:**

- There is a latent demand for medium-scale rural electrification and new base stations (BTSs) in off-grid locations
- Renewable energy can be used to provide 10 – 50kW peak load, making biomass and to some extent wind, the most appropriate renewable technologies. Currently, solar carries greater uncertainty due to high investment costs and land requirements at such loads
- Third party ESCos own/operate these renewable energy plants located close to both rural communities and the base stations
- Mobile operators provide anchor demand for power and a stable revenue stream
- Provision of power to local communities drives additional revenue for the third party ESCo
- Development finance and/or carbon finance may be incorporated to improve business case
- Regulatory environment allows - or is forecast to allow in the short-term - for distributed power generation and distribution with favourable terms.

This chapter aims to highlight how such a market scenario can be developed in a number of emerging markets in which the deployment of rural electrification and increased telecommunication infrastructure are in demand by the government and local communities.

Initially, it lays out the range of different renewable technologies appropriate for Community Power and assesses the global market opportunity.

A generic business case is provided, which details the economics of different solutions based on varying supply constraints and demand requirements.

In Chapters 3 and 4, the opportunity to implement this scenario is illustrated by studying two regions in detail. India and East Africa were chosen, with the objective of providing for each market:

- Context on state of market: development needs in the market, state of rural electrification, state of telecoms infrastructure development, regulatory regime
- Specific policy barriers and enablers in market
- Financing and external support available to market
- Case study of an existing rural electrification programme in market
- Value proposition for Community Power

## 2.1. Technology Choices

A wide array of green power technologies have been assessed for Community Power. An overview of this analysis is shown in Table 3.



**Table 3 - Technology Choices**

| | Diesel (BTS Only, No Community Power) | Wind with Diesel Backup | Biomass Gasification (Vegetation) with Diesel Backup | Biodigester (Manure) | Pico Hydro with Diesel Backup | Solar PV with Diesel Backup |
|---|---|---|---|---|---|---|
| **Power Output** | 5kW – >100kW | <1kW - >100kW | 3kW – >100kW | 1kW – >100kW | <1kW - 100kW | Scalable |
| **Asset Lifetime** | 3 years | 20 years | 10-15 years | 20-30 years | 25-30 years | 20-25 years |
| **Maturity** | Very mature – widely used | Established | Mature | Mature | Lacks commercial maturity | Price points declining rapidly |
| **Requirements** | Diesel supply chain | Wind speeds 5m/s for >50% of year | Large volumes of vegetation feedstock ≈ 50 hectares worth of crops | High concentration of collectable manure e.g. a dairy with 500 cows | Stream with a head of 60m and flow of 100l/s year round | Insolation >5kWh/m$^2$/day |
| **Reliability of Energy Source** | High, but dependant on distribution partners | Wind speed is unreliable | Subject to harvest | Dependent on local buy-in and incentivisation | Consistent and predictable | Some variation, depending on location |
| **Advantages** | Tried and tested technology<br>Skills available for maintenance | Relatively cheap, low maintenance | Can use products that would otherwise be wasted, generator also runs on diesel | Manure is cheap and locally sourced, generator also runs on diesel | Small OPEX, constant supply of power, low maintenance | Very little maintenance |
| **Disadvantages** | High carbon footprint, fuel is expensive and volatile, needs regular maintenance | Variability in wind speed is hard to gauge | Supply chain of fuel may break down if farmers have more lucrative land uses, fuel crops could compete with food crops | Fuel supply may run out, dependent on local supply chain | Very few suitable sites | Expensive at scale, risk of theft |

Source: GSMA Research

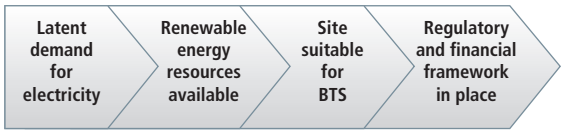
Biomass gasification technology is presently evaluated as the most suitable technology to utilise for Community Power due to the maturity, wide applicability and attractive energy price. Wind solutions can also be attractive with external financial support.

## 2.2. Market Sizing

In this section, the opportunity to implement Community Power is studied at a high-level, with the objective of assessing the total market opportunity for implementing Community Power. This analysis is used to prioritise countries or regions for a more in-depth investigation.

### Methodology

The key conditions that need to be in place in order for Community Power to be viable are summarised below:




Each of these attributes will be considered in turn. The regulatory and financial environment is specific to each country. Therefore, this will only be considered on a case by case basis once the countries with the most potential for Community Power have been identified.