



# Green Power for Mobile



Supported by



## Case Study

### Green Power Feasibility Study – Digicel, Haiti



#### Key Facts

##### Haiti

Population: 8.94 million<sup>1</sup>

Mobile Penetration: 41%<sup>2</sup>

GDP Per Capita: US\$772<sup>1</sup>

Internet Penetration: 6%<sup>3</sup>

##### Digicel

Digicel, the largest mobile operator in the Caribbean and fastest growing operator in Central America and the Pacific, has over 10.7 million subscribers across 32 markets worldwide. Renowned for its competitive rates, unbeatable coverage, superior customer care, a wide variety of products and services and state-of-the-art handsets, Digicel launched in Haiti in 2006 and has since revolutionized the mobile market. Digicel is now the leading mobile operator in Haiti with just over two million customers and has invested a total of US\$370 million in building the Bigger, Better Network.

#### Executive Summary:

The GSMA Green Power for Mobile programme was commissioned by Digicel Haiti during Q4 2009 to complete a Feasibility Study to analyse the operator’s network and propose an implementation plan for a green power network. The study analysed the entire operator’s network and ranked the most suitable green sites according to specific criteria defined in the GSMA Green Power for Mobile (GPM) methodology.

The main findings of the study are as follows:

- GSMA analysed a sample of 50 off grid sites
- GSMA recommended an implementation of eleven solar, 39 hybrid solar/ wind
- The implementation of green power technology in

BTS sites represented a technically feasible and financially attractive solution with payback period of less than 3 years at 11 of the sample sites

- Energy analysis should be undertaken at network planning stage (i.e. during land acquisition process)
- Low power, diesel generator only sites show the best financial indicators
- Mobile operators venturing into green power solutions for their networks must be supported by resources experienced in the specific application of green power and telecoms. The GSMA offers technical assistance services through its GPM programme to provide operators with the skills and understanding to implement green power solutions.

1 International Monetary Fund World Economic Outlook ([www.imf.org](http://www.imf.org)).

2 The Voice of Network Convergence (VON) ([www.von.com](http://www.von.com)).

3 ITU 2006 ([www.itu.int](http://www.itu.int)).

**Power Infrastructure in Haiti:**

In Haiti, only 12.5% of the population have access to electricity “officially”, although the Ministry of Public Works estimate that the coverage could be around 25% when irregular connections are considered. In the capital, Port-au-Prince, the access rate is about 45% and service quality in Haiti is very poor. Those who have access received on average ten hours of electricity a day, with very large disparities among the areas covered. The lack of power infrastructure in rural areas and high demand for mobile communications has created a challenge for operators on how to power the telecoms infrastructure in these rural areas that lack power. To solve this problem operators have relied heavily on diesel generators to provide power to the telecoms equipment and this has created an environment of high operating costs and logistical challenges of diesel delivery. Despite these challenges and the poor infrastructure, Digicel has expanded into rural areas and covers more than 95% of the population. With the cost of alternative energy solutions improving, the challenge is now to come up with an easier, more cost effective and environmentally friendly way to maintain coverage in rural Haiti, and to replace existing generators on ‘off grid’ sites.

**Suggested Solution:**

Funded by Digicel Haiti, the GSMA Green Power for Mobile programme conducted a Feasibility Study, investigating the opportunity to deploy solar, wind or hybrid power generation equipment onsite to replace the existing diesel generator sets.

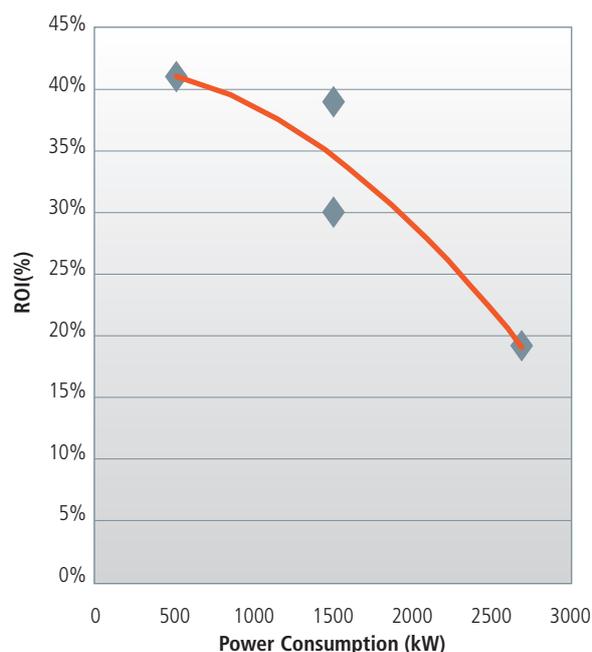
The combined GSMA and Digicel Haiti team studied 50 existing base station sites, analysed the power requirements for the sites and designed optimal solar power, wind power, hybrid or battery solutions. Given the favourable weather conditions in several of the rural areas of Haiti a number of technical solutions were feasible. Using detailed costing data for the operations and maintenance of each site and the CAPEX pricing of the solar and/or wind power equipment, the business case for installing renewable energy equipment was determined. The key financial indicators used to determine if the new solution would be a positive investment were ROI (Return on Investment), IRR (Internal Rate of Return), NPV (Net Present Value), Payback Period and initial CAPEX pricing. Using this analysis methodology it was found that 22% (11 sites) of all sites were found to have a payback period less than three years and ROI greater than 30%.



The green power solutions that were designed were a mix between solar, wind and hybrid (solar and wind power) integrated with deep cycling batteries, and reusing the existing diesel generator as a backup power solution. The preferred renewable energy component being used for a particular site was determined through analysis of the local weather and the space available on the site. Some other essential indicators in the decision making process included the power contribution coming from the renewable energy component to the overall system requirement and the battery backup time available for the system.

A key finding from the study, consistent with previous research and trials by Green Power for Mobile is that as the power load on a site increases the ROI decreases. The graph below shows this modelled over an analysis of 50 sites and the five models produced.

**Figure 2 – Return on Investment vs. Site Power load**



Other key findings from the analysis are:

1. The financial results showed a payback period ranging from 2.4 years to 5.1 years
2. 11 of the sites analysed were able to achieve a payback period of less than 3 years based on a delivered to site diesel price of US\$0.9
3. It was possible to find renewable energy solutions that had a payback period of less than 3 years in all regions of Haiti
4. The CAPEX range for the green power solutions is US\$55,900 to US\$99,600 per site
5. The GSMA Development Fund recommended that Digicel Haiti implement a 10 site trial before full scale deployment of 50+ sites, to test multiple vendor solutions.

**Table 1 – Example of Key Financial and Technical Indicators for Five Sites**

Site	Total Power (Watts)	ROI	Payback (Years)	NPV (US\$)	CAPEX (US\$)	Renewable Vs. DG Contribution	Battery Backup (Hours)
Site xxx	500	41%	2.43	60,625	55,900	100%	100
Site xxx	1500	39%	2.54	70,431	69,600	62%/38%	36
Site xxx	1500	30%	3.28	58,220	99,600	84%/16%	36
Site xxx	2700	19%	5.14	6,768	87,000	65%/35%	22
Site xxx	2700	19%	5.3	5,369	87,000	64%/36%	22

**Projected Results:**

- 50 Initial Sites
- Yearly OPEX Savings of US\$1.1 Million
- Diesel savings of approx 680,000 litres/year
- Reduction of carbon emissions 4171 tonnes/year

**The GSMA Development Fund:**

The GSMA Development Fund exists to accelerate economic, social and environmental development through the use of mobile technology. We believe that providing tangible, accessible mobile services to people in developing countries is invaluable to society and can help improve people’s lives.

The Development Fund leverages the industry expertise of the GSMA and its members, as well as the development expertise of international agencies and non-profit organisations to accelerate mobile services in three areas: Connectivity, Energy and mServices.

**GSMA Green Power for Mobile:**

In September 2008, the GSMA Development Fund launched its Green Power for Mobile (GPM) to ‘extend mobile beyond the grid’ with two primary objectives:

1. To systematically reduce diesel consumption by mobile operators through the promotion of renewable energy technologies and energy efficient base stations
2. To remove the barriers to handset charging in off-grid regions

Through its work the GPM programme aims to advance the use of renewable energy sources by the mobile industry to power 118,000 new and existing off-grid base stations in developing countries by 2012.

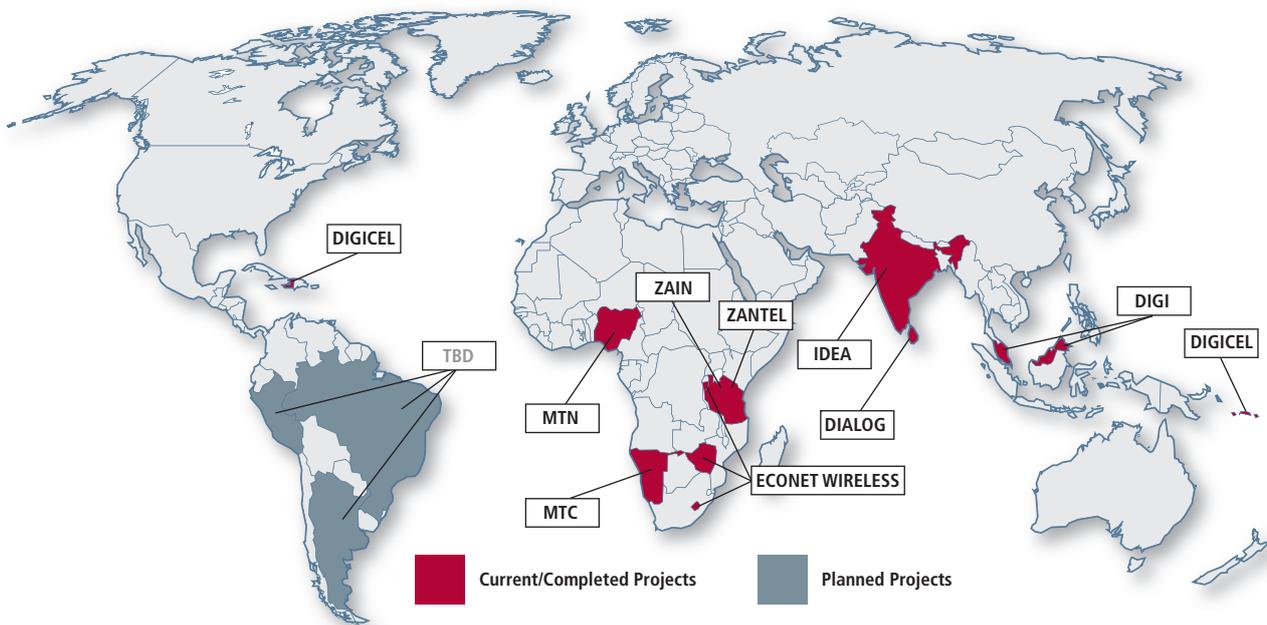
Achieving this target will save up to 2.5 billion litres of diesel consumption, cut annual carbon emissions by up to 6.8 million metric tonnes – which equates to Tanzania’s annual emissions – and connect 118 million people in developing countries to mobile networks using green power.

The programme has partnered with the International Finance Corporation. The IFC are providing both financial support for the programme's activities and seeking to assist operators with financing for green base station rollouts

Green Power for Mobile is now offering a Feasibility Study service for operators. This service analyses an operator's entire country network of base stations,

identifies those that are most suitable for green power solutions, dimensions the equipment required and forecasts CAPEX and ROI. Our primary goal is to maximize the Return on Investment for operators and providing training on the Green Power for Mobile Methodology. The service also assists operators with RFP design and interpretation of responses from vendors specific to the use of alternative energy.

**Figure 3: Project Locations and Operator Partners**



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