

# Project Otumfuo

Providing clean electricity to hospitals in Ghana

Overview upon Phase One project completion

September 2009



## Summary

Using our own funds and with technical collaboration from the Environmental Change Institute (ECI) in Oxford, SCCF has re-engineered two small rural hospitals in Ghana to enable them to run 24-hours per day using clean solar electricity. We plan to raise third party funding to convert at least 100 similar healthcare installations in West Africa and hope that regional governments and NGOs will follow our example.

## Benefits

<b>Emission Reductions</b>	<ul style="list-style-type: none"> <li>❖ 1,200 tonnes of CO<sub>2</sub> over lifetime of the equipment</li> <li>❖ 150,000 tonnes of CO<sub>2</sub> forecast from full implementation of project</li> </ul>
<b>Social Benefits</b>	<ul style="list-style-type: none"> <li>❖ the hospitals can now stock vaccines and blood supplies for the first time;</li> <li>❖ immeasurably better conditions for inpatients;</li> <li>❖ surgical procedures can be undertaken with much less risk;</li> <li>❖ they can easily boil water for sterilisation;</li> <li>❖ they can run medical equipment for the first time (ultrasound machines, x-ray machines);</li> <li>❖ they can maintain customer records electronically as opposed to on paper;</li> <li>❖ extremely valuable low carbon know-how has been transferred from Oxford to Ghana</li> </ul>

## Background

Ghana is a West African country of approximately 22m inhabitants. It has a good economic baseline, comprising gold and cocoa exports, and relative to many other African countries a favourable climate with around 2.5 litres average monthly rainfall per square metre. In spite of this, it does share many problems that are normally associated with the African continent:

- weak tax revenues compared with the size of population;
- State provision of social services and welfare is poor;
- inadequate energy supplies;
- large rural population to the north of the country, with huge income disparities versus the south / the coast.



Outside Accra (the capital, which is situated on the south coast) provision of basic services (healthcare, education) and supply of electricity is limited. On the social services side, the private sector – mainly the Church – has stepped in to fill the gap, such that close to 50% of all schools and hospitals are privately funded and run. The level of such services is in most cases, however, quite basic. Many education and healthcare facilities outside Accra and the regional capitals have no access to electricity and must use generators to fill the gap, if they can afford them. Not only is the cost of grid connection prohibitive for many would-be users, comprising a USD 400 connection charge plus the cost of an inverter, but so is the lack of infrastructure (particularly limited in rural areas). Even for those with grid access, electricity supply is sporadic with brown outs<sup>1</sup> occurring on average eight hours out of every twenty four.

As a result, healthcare is more often than not at an extremely basic level. Without power for refrigerators, hospitals cannot carry the vaccines and blood supplies that they need to function properly. Without light, even basic surgical procedures are complicated and dangerous. A further problem is that qualified personnel (doctors, senior nurses, midwives) are difficult to attract outside of the main city centres. This leads in turn to a vicious circle, as unless the facility has a qualified person attached to it, it cannot register with the State Health Insurance System, and all patients using the facility must pay a cash fee.

<sup>1</sup> Planned voltage reductions to counter excessive demand.

## SCCF's plan

On a visit to the Ashanti region of Ghana earlier this year, we saw a number of small hospitals and clinics that were off grid and in a very sorry state. Patients were lying in dark, hot, mosquito-infested wards. We determined that we would make efforts to reverse the vicious circle mentioned above by providing all of these hospitals and clinics with clean electricity and do our best to encourage qualified personnel to work there. Our objective as a charitable foundation is to demonstrate the viability and applicability of sustainable and low carbon energy sources, while at the same time providing social benefits. This project fit perfectly with our objective as it would result in reduced reliance on diesel-powered electricity whilst measurably raising the level of healthcare available to the rural communities of Ghana.

## Phase One

We contacted the Environmental Change Institute (ECI) at Oxford University. We knew that ECI had developed a highly efficient and small scale hybrid solar solution that had been tested in the Canary Islands. After meeting with ECI we established that their system would be applicable to the Ghanaian hospitals. We then engaged ECI as our consulting partner and took two of their Research Fellows – Daniel Curtis and Dr Christian Jardine – to Ghana in April 2009. They visited several hospitals with us and helped select two of them to convert to solar energy in Phase One of our project.

### St Peter's Hospital, Ntobroso

St Peter's is a medium sized clinic / small hospital situated some 95km south west of Kumasi (central Ghana). It was built a decade or so ago thanks to funding from the European Community, Barclays Bank and several other private sector donors. When built it was fully wired for electricity but has never been grid connected. It has a senior midwife (live-in) and several medical assistants (also live-in). It is linked to the State Insurance System and can provide consultations free of charge. Patient wards plus staff accommodation quarters amount to around 30 rooms all told. Water is supplied by an outdoor well plus hand pump on the property.

*St Peter's: entrance and consulting area*



At St Peter's we installed equipment to provide 24-hour power from a solar supply, supplemented by a diesel generator (genset). According to the ECI blueprint, the baseline power would be generated by fifteen 170 watt panels, stored in 12 Exide 'Sonnenschein' deep-cycle batteries. The generator is scheduled to run approximately 8 hours per month in one uninterrupted session, thereby maximising its efficiency while topping-up the solar energy stored in the batteries. Annual energy supply is approximately 3,000kWh

Incidental investment in fixtures required comprised fridge, freezer, indoor and outdoor lighting, ceiling fans (all of them highest available energy efficiency rating). Total cost of the conversion, including such fixtures, amounted to £27,000. Shipping costs were in the region of £2,000.

*St Peters: maternity and childcare wards*



### **St Thomas' Clinic, Hiya**

St Thomas' is a smaller facility with around four wards and limited staff accommodation. It had no full time qualified staff, only a medical assistant who seemed very demoralised. Patients tend to use the clinic only in an emergency as they ordinarily have to pay a fee to be treated. While it is around 85km south of Kumasi, it is within 25km of a mining town, Obuasi, where better medical facilities are available. Patients will often walk to Obuasi rather than be tended to at Hiya (because of the cash fee). The clinic has a hand-pump well but is not grid-connected, in spite of the fact that power lines are very close to the facility.

*St Thomas' clinic: entrance and consulting area*



At St Thomas' the energy requirement was around half what was required at St Peter's, 1,650 kw hours per annum. We installed nine 170 watt panels and 8 Exide Sonnenschein batteries backed up by a 1200 watt

genset. Incidental fixtures and fittings were similar to St Peter's (fridge, freezer, fans, lights etc) for a total installation cost of £18,260 pre shipping.

*St Thomas' clinic: children's ward*



### **Know-how transfer**

To execute our project we worked very closely with Dr Kwame Donkoh Fordwor, former President of African Development Bank, senior executive of World Bank, and one of the leading supporters of the Catholic Church in Ghana (he was knighted by Pope John Paul II for his work in this regard). Dr Fordwor provided considerable support for our project, including the assignment of a local team of experienced electricians guided by a German engineer resident in Ghana, Mr Werner Groen. This team (the 'local team') worked alongside ECI during the Ntobroso installation; for the Hiya installation, the local team undertook all the work while being supervised and assisted by ECI.

The result has been a transfer of know-how, such that future re-engineering of clinics and hospitals in Ghana can be carried out directly by the local team without the intervention of ECI<sup>2</sup>. This is important as it reduces the logistical challenge and cost of future installations.

### **Outcomes**

The two clinics now have 24 hour dependable, clean electricity supply. On the promise of this, we negotiated with the Kumasi district health authorities to win a commitment that the clinics would be included on the doctors' rota. They were previously not included on this rota. Each clinic will therefore, in addition to its existing staff (midwife, nurses and medical assistants in the case of Ntobroso; nurse and medical assistants in the case of Hiya) have a fully qualified doctor in attendance at least two days per week. This allows St Thomas' to register with the State Health Insurance scheme; it also allows both clinics to provide a wider range of care to their respective communities.

Other benefits include:

- the clinics can now stock vaccines and blood supplies for the first time;
- they can offer immeasurably better conditions for inpatients;
- surgical procedures can be undertaken with much less risk;

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<sup>2</sup> ECI will however be available for any critical consulting that might be required.

- they can easily boil water for sterilisation;
- they can run medical equipment for the first time (ultrasound machines, x-ray machines);
- they can maintain customer records electronically as opposed to on paper;
- emissions of some 60 tonnes of CO<sub>2</sub> annually will be avoided (ECI calculation) due to the use of solar energy and the more efficient deployment of the gensets;
- extremely valuable know-how has been transferred from Oxford to Ghana.

The impact on the two communities will be enormous. To properly evaluate this, we plan to re-visit the clinics in November this year.

## Phase Two

SCCF has commissioned the gathering of a large amount of data pertaining to the Catholic Church's healthcare facilities in Ghana. This data covers:

- size of installation (rooms, staff employed, square metre area);
- grid connected or off grid;
- generator deployed or not, type of generator, amount of fuel consumed per annum;
- inventory and energy load of equipment used at installation.

Using this data we have identified a target list of installations that would be suitable for the hybrid solar energy system. Exact cost and associated benefits (reduction of CO<sub>2</sub>, improvement in provision of healthcare) are calculated in each instance, permitting individual donor contributions related to a specific hospital, which range from £20,000 up to £80,000.

Partners are now being invited to fund the work. Our estimate is that up to 150 installations could be included (using only the Catholic Church network) on the basis that they will result in dual benefits (reducing emissions and improving care). We have also begun discussions with the Ghana Health Ministry to widen the scope of the project beyond the sphere of our initial project partners. SCCF has no religious affiliations and will work with representatives of any faith.

### "Otumfuo"

We dedicated our project to 'Otumfuo', which means 'His Majesty' in the Ghanaian language. This followed two meetings with the King of the Ashanti, Osei Tutu II, at which we explained what we planned to do and received his blessing and support. This was important: most of the land in Ashanti Region is held by local chiefs in fealty to the King. The two hospitals described above, for example, occupy land granted free to the Catholic Church by such chiefs.

It is critical to respect local systems and local traditions, and we believe we have done our utmost to achieve that in our project. We have also increased local skills and know-how and provided the potential for skilled job creation in the future. Our project also points to a different way forward, in terms of energy supply, and has provoked interest not only at the Palace but within Government Ministries and the Ghana Catholic Bishop Conference.

## About SCCF

Sindicatum Climate Change Foundation was formed in March 2009 and is funded by an endowment from Sindicatum Carbon Capital Ltd. ("SCC"), a leading project finance company active in the emissions abatement and clean energy markets. The foundation undertakes projects that combine GHG emission reduction with climate change adaptation and/or development aid.

It aims to demonstrate that these kinds of combined project can be successfully implemented in developing countries. Additionally, it seeks to stimulate the widespread adoption of sustainable energy technologies and encourage the flow of appropriate funding.

In addition to its projects in clean energy, which to date encompass solar and agro-waste to power, SCCF runs post-graduate scholarship programmes in sustainability and energy conservation in Asia and the Middle East and is actively working with a number of public sector and NGO counterparties to improve their effectiveness in the climate change area.

## How to participate

If you are interested to be a part of this project, please contact either Renita or myself using the email address or phone numbers below.

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