

Developmental Impacts created by Off Grid Homes (OGH) project:

**A case study on Cygni's OGH project
at Irakkam Island**

*Field Study and Report done by,
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Introduction



Intent of the Report

The vision of IITMs Rural Technology and Business Incubator (RTBI) is to incubate start-ups which focus on impacting rural/ underserved societal segment, leveraging ICT (Information & Communication technologies). Cygni Energy is one such company, jointly incubated by RTBI and IIT Madras Incubation cell.

This study is conducted by RTBI is an attempt to understand if/how the Off Grid Homes (OGH) project has improved the lives of Irakkam Island people in various aspects.



About Cygni Energy Private Limited

Cygni Energy Private limited believes in a better way to power homes and businesses at a lower cost while contributing to a cleaner planet. At present Cygni is implementing three projects:

1. GREEN OFFICE APARTMENT (GOA) – DC power solution to next generation Green Apartments and Offices.
2. OFF GRID HOMES (OGH) - to provide solar-DC back-up power to houses of remotely located areas.
3. UNINTERRUPTED DC (UDC) - to provide uninterrupted (24 x 7) solution to avoid complete black outs.

We will draw our focus on the OGH project, for the purpose of this report.

OGH PROJECT at Irakkam village: One of the Off Grid Homes (OGH) project by Cygni was commissioned in February 2015, implemented in Scheduled Tribes (ST) colony, one of the hamlets of Irakkam Island. Irakkam Island is located in the middle of Pulicat Lake and comes under the Tada Mandal of Sri Potti Sri Ramulu Nellore District of Andhra Pradesh. Ironically, Irakkam village is proximal to India's one of the two satellite launch centers, Sriharikota, but only majority of the households are grid connected but gets electricity once in a while. For the remaining households (ST Colony), they had no access to power. Hence Cygni's OGH solution was considered for such households in the island. There are 26 households in the ST colony. Most of them work as agricultural wage laborers as they own only 50 cents of land. All the households are economically backward and their houses are located in a remote area within the Island.

The innovative model of Cygni OGH project provided very quick access to electricity and thereby creating crucial developmental impacts on the project beneficiaries in a cost effective way.

The 26 beneficiary households were divided into 8 clusters and one solar power generation unit was installed in each cluster.

Functionality of the system in day time: The DC power generated through the solar panels is directly used by DC devices installed in the beneficiary households. At the same time, some portion of the energy is stored in the batteries.

Functionality of the system in night time: A suitable battery is used to store the AC power that will be used during the night times.

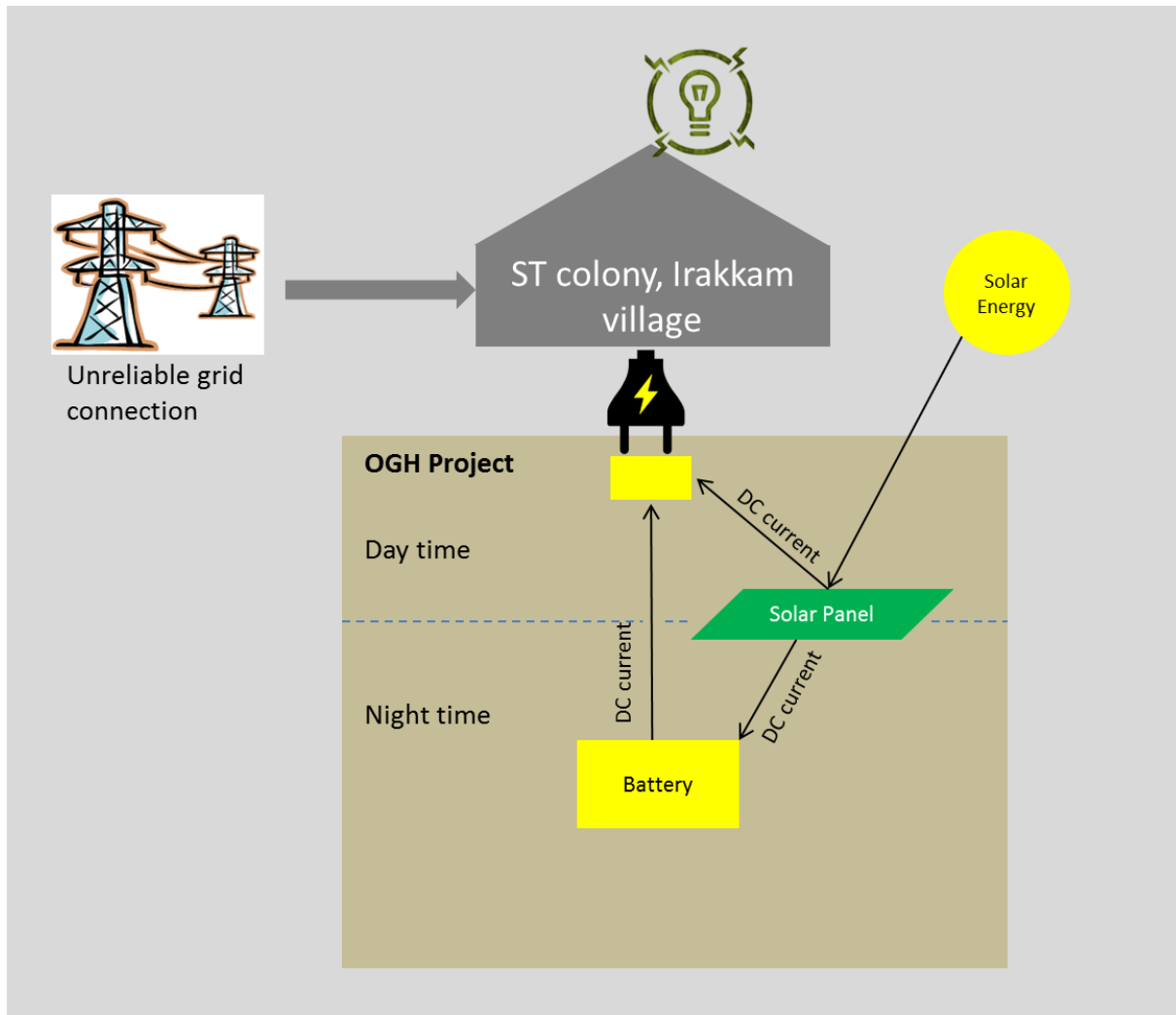


Figure 1 Functional model of the OGH project

Objectives & Methodology of this Study



This impact study done in April 2015 attempts to study how the Off Grid Homes (OGH) project has improved the lives of Irakkam Island people in various aspects:

1. Impact on the 'standard of living' of the beneficiaries.
2. Impact on other developmental indicators like education, livelihoods, health, entertainment; as a result of this implementation.
3. Environmental and ecological impact.

Methodology

The research is having an exploratory purpose and there is a need for information for making quick decisions in future implementations. So, a qualitative case study research was used to explore the impact created by the project on the beneficiaries. An availability sample of 10 beneficiaries out of 26 households was selected and interviewed using a semi-structured interview schedule. Apart from exploring impact at a household level, the community level impact was also explored by interviewing key resource persons of the village. For this purpose, the temple priest, a local electrician and the community hall in-charge were interviewed using a semi structured interview schedule.

Study Results

A study by the World Bank for 11 countries reveals that rural electrification results in great benefits such as improvement of health facilities, better health from cleaner air as households reduce use of polluting fuels for cooking, lighting and heating, improved knowledge through increased access to television and better nutrition from improved knowledge and storage facilities such as a refrigerator (Buragohain, 2012).

Though all that is said, the urban counterparts have long seen the benefits of being powered for 24 hours, and perhaps will not understand how it is to live without electricity. The occasional power outages in the urban cities during summer seasons, leave its dwellers in fury, however, here the Irakkam community that is connected by the OGH project, is for the first time experiencing how life can be with lights on.

The results that you will be seeing below, may come across as mundane and not that exhilarating, but see them from the perspective of the dweller and how it has changed their lives and lifestyle.

At the local level, the OGH project acted as a catalyst for various developmental activities and created many direct impacts on the beneficiaries. The impact details are categorized under various headings and presented below:



Impact on health and safety

Before OGH project	After OGH project
✓ Respiratory problems due to usage of kerosene lamps.	✓ Beneficiaries are not using the dangerous kerosene lamps.
✓ Insects falling in food during cooking and eating.	✓ Beneficiaries are dining under the bright light and not having any threat of insect ingestion.
✓ Beneficiaries faced eye problems as the poor light created lots of stress on the eye.	✓ The bright light reduced the stress on the eyes of the people.
✓ Beneficiaries had threat of fire accidents due to usage of kerosene lamps (People reported 3 such major fire accidents)	✓ Beneficiaries are not using the dangerous kerosene lamps. Beneficiaries have very low threat of fire accidents
✓ Threat of wild boar, fox, snakes and other wild reptiles due to lack of light during the night times (People reported 2 snake bite cases).	✓ The people could see the presence of any dangerous animals or reptiles after the installation of bright lights inside and outside home.
✓ Beneficiaries spent their night lives in moon light (Frequent power cut is common in the area and some of the households didn't get the electricity connection)	✓ The tube light illuminated the living space and made the night life brighter & easy.
✓ Beneficiaries feared to venture out during the night time. They could not charge their torch lights which they used to carry while going out during night time.	✓ The lights outside the houses illuminate the streets for some distance. This gives good visibility for the people living in the area.

“Relief from the dim and smoky kerosene lamp”

“We used kerosene lamp in our home before we received the lights and fan from the project team. The kerosene lamps produced dim light and more smoke. Every day morning we used to blow our nose to remove the black carbon layer formed in the nose due to usage of kerosene lamp. Rooms in our house are small and fearing for the wild animals we won't sleep outside. So, we had to inhale all the smoke produced by the kerosene lamps. Elderly people in the village suffered a lot from the kerosene lamp smoke. Apart from creating the health problems, the kerosene lamps created three big fire accidents in the village.

Three houses were completely burnt in the fire but thankfully nobody got hurt in the accident. Another important problem during night time is due to the poor visibility we cannot identify if any insect fell in the food during cooking and eating. One time, in my brothers home, without noticing the lizard fallen in the food all family members ate the food. Then they got hospitalized and escaped from a big danger. From that time, every time I would be careful while cooking and serving. But still I would be having some kind of fear while serving the food in the dim light, as I have three small children in my home. The biggest relief for me after the arrival of tube light is the freedom from dimness in the night.”

Nagamma T, Beneficiary of OGH project

Impact on education

As Irakkam village is remotely located and having poor development scope, teachers are not willing to work in the village school. So most of the children then study, while staying in the boarding schools in nearby towns. Around 50 children are studying in the local elementary schools and they suffered a lot while studying under the kerosene lamp.

Before OGH project	After OGH project
<ul style="list-style-type: none">✓ For children it was very tough to study or do homework after evening. They used kerosene lamps for studying which affected the children's respiratory system and strained their eyes.	<ul style="list-style-type: none">✓ Children, who are studying in the village, now study during night time under the tube light. This has increased their interest towards studies and improved their learning experience.

Impact on Livelihoods

Before OGH project	After OGH project
<ul style="list-style-type: none">✓ Beneficiaries spend whole nights in paddy fields during harvesting seasons. They faced lots of problem in charging their torch lights during prolonged power cuts.	<ul style="list-style-type: none">✓ Beneficiaries are not dependent on the power from the grid connection as they can charge their torch lights/batteries from the solar powered batteries.
<ul style="list-style-type: none">✓ Some people go for fishing during night times. They also faced similar problem of charging their batteries during prolonged power cuts.	<ul style="list-style-type: none">✓ Beneficiaries find it easy to guard their produces in night during harvesting seasons. They also easily went for fishing in night times.
<ul style="list-style-type: none">✓ Beneficiaries faced problem of mosquitos and hot temperature during nights. Due to the threat of dangerous reptiles and animals, people didn't sleep outside their homes. So, people had an unpleasant sleep and it affected their productivity during the day	<ul style="list-style-type: none">✓ The fan installed through the project enabled the family members of the beneficiaries to have a peaceful night sleep. This helped them stay physically and mentally fresh & active during the day

Impact on basic 'Standard of Living'

Before OGH project	After OGH project
<ul style="list-style-type: none">✓ Threat to life: Beneficiaries and children faced problems from wild animals such as, Hyena, fox, wild boar, poisonous snakes and other reptiles. So, they always lived with the fear of threat to life.	<ul style="list-style-type: none">✓ After the installation of the lights, the living space became brighter and safer. The fear of wild animals and dangerous reptiles has been reduced.
<ul style="list-style-type: none">✓ Electrical devices: Some of the beneficiaries did not have any electrical devices in their homes. Very few beneficiaries had lights in their home.	<ul style="list-style-type: none">✓ Every beneficiary household is having one tube light, one small light and one fan. These devices have improved the living experience of the beneficiaries in the remote village.

✓ **Electronic devices:** Most of the beneficiaries had mobile phones but faced severe problems in charging their mobile phones.

✓ Beneficiaries can now regularly charge their mobile phones in their home without any hindrance.

✓ **Social life:** People were socially active only during the presence of sun light and they usually stayed inside homes during night time.

✓ People gather in the community hall/ outside their houses to talk about the social issues. This improved the quality of social life in the village.

Other developmental impact

1. The substantial reduction in usage of the kerosene in the beneficiary households helped them to save cost on kerosene. Before the implementation of the OGH project each household was using 5 to 6 liters of kerosene every month. Now they never use kerosene lamps and use the saved money for other productive purposes.
2. Due to the remote location, the people in the Island had very little hope of getting uninterrupted power supply from the grid. The project gave them the confidence of being able to achieve a state of energy self-sufficiency, at least at the local level.
3. The project created a 'demonstration effect' in the village and nearby villages. People became aware about solar power and off grid solar power solutions for such areas.

Key challenges & Recommendations

Though the project has created significant positive impact in a short span, it could have some challenges in the long run.

Operational level challenges:

1. As the batteries and other units of the Off Grid power generation system are kept inside one house of a cluster, the remaining houses in the cluster are dependent on the house where the physical devices are installed. In the Island, employment is seasonal and people may migrate during lean seasons. The beneficiaries who are having the physical devices sometimes move out of the village for various reasons. So, the remaining households in the cluster did not have any access to the system.
Two out of ten households interviewed reported this problem.
2. The users of the system have inadequate knowledge about the functionality of the devices. They were also advised by the local electrician not to repair/explore the devices of the system. So, some of the households stay in dark if any problem occurs or they are opening the devices). Some of the members of the households open the devices to charge their batteries.
3. The devices are operated by remote control. So, it will be tough for the beneficiaries to replace the remote in case of any problem. Two out of ten households reported this problem. In the long run, this problem is likely to arise in all households.

4. The small lights installed outside the houses are not theft/vandalism proof. During the interview with 10 households, it was found that, lights of three households had been stolen.
5. In case of any repairs to/loss of the devices, beneficiaries are finding it difficult to repair/replace them. They complained that the devices are not available in the local market.

Environment Sustainability

People are having poor knowledge about the maintenance and disposal of the devices of the system. While the devices used in the system have to be properly and responsibly disposed of, people are unaware of the proper maintenance/disposal of the devices. This will be a big threat to the Island ecosystem and nearby environment once the devices reach the end of their lifetime.

Recommendations

1. Training to the local people about the various aspects of the system – operation and maintenance- can be conducted before exiting from the project site completely.
2. Users can be informed about /connected with the market where they can buy the devices (especially DC devices), if they need to replace them for any reason.
3. The beneficiaries can be trained/ informed about the proper disposal of the waste materials of the system.
4. Presently, the devices are operated only through remote control. Some manual controls can be provided in the devices, so that even in case of failure of the remote control, the devices can still be used.
5. Users can be informed about the scope for increasing the capacity of the system by increasing the panel and battery capacity in future. Many of the households interviewed, complained about the insufficient capacity of batteries for a cluster.

Conclusion

This study shows that Cygni's OGH project at Irakkam village influenced the beneficiaries' lives significantly. Most of the beneficiaries are very happy about the easy operational model of the project and its benefits. The project has mostly benefitted the children, elderly people and women. Women find it helpful while cooking and serving the food whereas children and elderly people get sufficient light during the night time to move from one place to another. After the implementation of the project, the beneficiaries could spend their nights more restfully and be more productive during the day. Thus, a significant number of beneficiaries reported positive changes in the way of their living due to the OGH project.

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