WWF IND 2016

CLIMATE SOLVER 2015 AWARDEE

Energy Access: Prepaid DC micro grid (and USB stick based recharge)

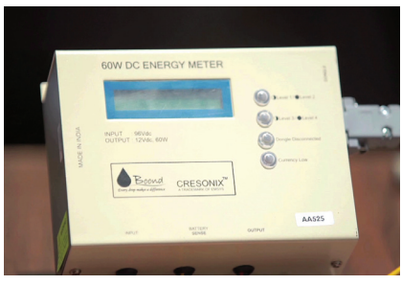
Developed by: BOOND Engineering & Development Pvt. Ltd.

INNOVATION

Access to clean and reliable source of electricity is vital to a country like India, where about 300 million people are still without access to electricity and 44 per cent households face erratic supply. The main source of lighting in such households is kerosene, which results in poor lighting, often at a higher expense, and leads to indoor air pollution as well. Thus, a basic need such as lighting still remains a far-fetched aspiration for a large number of people in India.

Though there are various solar technologies that can address the energy access challenge, there is a constant need to innovate the way in which technologies function along with an immediate need for developing innovative business models for wider penetration of clean energy solutions.

BOOND, a social enterprise company, has developed innovative technologies to facilitate energy access to remote and underserved communities in an effective and scalable manner. Through its prepaid microgrid solutions, Boond is especially addressing the needs of such communities for whom access to finance is difficult. The solution aims for execution of financially sustainable solar micro grids, while also addressing some of the key challenges associated with them. Through its democratic energy access, Boond consumers have 24x7 energy access, while allowing them



USB Stick and 60W DC Energy Meter by Boond

Boond's microgrid installed at Para Village, Uttar Pradesh

to pay as per their energy usage. The model has also helped address the issue of over-consumption through enabling features such as real-time display and dynamic pricing that helps customers self-regulate their usage. High voltage DC transmission along with prepaid model has reduced theft and has also eased the process of payment collection.

The key innovation of Boond's solution is the USB stick based recharge that allows the customer to buy energy units as per their needs. The customer can recharge the USB stick at a central station, with the lowest denomination of ₹10. The units are transferred to the USB stick via an easy-to-use android application and bluetooth technology. The customer can then plug the USB stick into the energy meter installed at their homes for the units to be transferred. Two types of connections are available that include a 20W energy meter providing basic LED lighting and mobile charging at a cost of ₹1200, and a 60W meter that includes DC fan and DC TV in addition to lighting loads at a cost of ₹2200.

Another interesting feature by Boond is the benefit offered to the consumer who lends his rooftop for the installation of the grid. This consumer, in turn, becomes an entrepreneur, and receives a commission with every recharge done through the system. Boond also provides ease of after-sales services, which is enhanced through its remote monitoring services that allow consumers to register the complaint at the central station for timely resolution.

BENEFITS

Through the USB stick based recharge, Boond offers ease-of-payment solutions for energy access as the consumers pay for the energy as per their needs. This innovative solution provides better lighting facility leading to reduced usage of kerosene, better communication through phone charging points, extended light-hours that enhance education and local business. Boond strives to build a last mile ecosystem where individuals and communities can have access to high quality, affordable clean energy solutions and after-sales support. If this solution is replicated at a large scale in the developing world, it has the potential to reach out to 23 million people by the year 2025.

ABOUT THE COMPANY

BOOND Engineering & Development Pvt. Ltd. is a solar energy access enterprise founded in 2010 promoting alternative energy in Rajasthan, Uttar Pradesh, Delhi NCR and other northern states of India. They have built a strong brand over the past five years now, specialising in solar microgrids (patented differentially priced prepaid technology), solar home systems and solar rooftop projects. Till date, they have electrified over 25,000 households and executed over 2MW of solar rooftop projects. The company is trying to reach the remote areas, to not just provide energy access, but also embed solutions for associated social issues.

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CLIMATE SOLVER 2015 AWARDEE

GHG Reduction: Radiant Cooling Solution for Building Sector

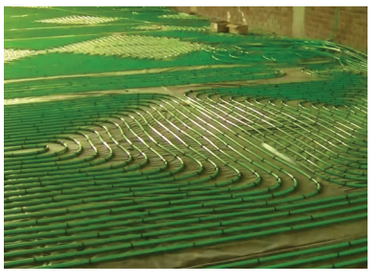
Developed by: Oorja Energy Engineering Services Pvt. Ltd.

INNOVATION

With rapidly increasing urbanisation and sprawling cities, building sector has become a significant contributor to the global energy consumption and associated carbon emissions. According to the Fifth Assessment Report (AR5) of the United Nations Intergovernmental Panel on Climate Change (IPCC), buildings accounted for 32 per cent of total global final energy use and 19 per cent of energy-related greenhouse gas (GHG) emissions in 2010. Additionally, GHG emissions from the building sector have more than doubled since 1970 to reach 9.18 $GtCO_2eq$ in 2010.

Most commercial buildings have a centralised Heating, Ventilation and Air Conditioning (HVAC) system to meet the indoor cooling demand. Enhancing efficiency in these systems mostly focuses on chillers by making the compressors more efficient. Also, the cooling distribution in these systems is a significant contributor to energy consumption in commercial buildings and uses air as a heat transfer medium. The distribution of cooling, however, still remains a neglected area in the HVAC systems.

Oorja Energy's "Radiant Cooling Solution" addresses this area by focusing on increasing efficiencies in cooling distribution. This solution turns surfaces in the room like the floor or ceiling into heat sinks that absorb the sensible heat in the room. These surfaces like the floors, ceiling or even false ceiling are turned into heat sinks by embedding pipes in them, instead of blowing the air over a heat exchanger as is done in an Air Handling Unit (AHU) in the conventional system.



Oorja's radiant cooling solution embeds the pipes to turn the floor into a heat sink

Being at a lower temperature than the heat sources, these surfaces embedded with pipes having cold water circulation absorb the heat radiated from occupants, lighting, equipment, walls, glazings, furnitures, etc. The heat is finally transmitted to the water flowing in these pipes. The heat thus taken away is rejected using a chiller. In addition to floor cooling, Oorja also offers radiant cooling solutions for walls and ceilings by placing the heat exchange panels in the room itself.

Oorja's radiant cooling system operates on chilled water supply between 16-20°C as compared to conventional centralised HVAC systems that require chilled water supply at 7°C. This leads to significant savings on the power as the compressor has to work more to produce chilled water at this low temperature.

Furthermore, the solution does not require high powered motor to transport large volume of air through the ducts. Instead, it requires much smaller motor for pumping the water for the same output. As a result of these innovative features, radiant cooling solution offers a reduction of 30 per cent in energy consumption. Depending on the nature of the projects, radiant cooling solutions can payback the cost in less than three years.

In addition to lower energy consumption, the system comes with added benefits. It helps reduce noise levels and lower radiating heat from various objects makes the occupants feel comfortable even at higher room temperatures. Radiant cooling reduces the need for air re-circulation, thus, leading to improved indoor air quality.

BENEFITS

With lower energy consumption, uniform comfort, reduced noise and better indoor air quality, "Radiant Cooling Solution" provides a sustainable and energy efficient way to cool buildings. If this system is implemented globally, it can mitigate 30 million tonnes of GHG emissions by 2025.

ABOUT THE COMPANY

Oorja Energy Engineering Services, a Hyderabad based company, offers cleantech based cooling & heating solutions for commercial and industrial establishments. With its "Radiant Cooling Solution", Oorja Energy offers a unique solution to significantly reduce the cooling energy consumption in the building sector and its associated carbon footprint.