Access to Energy

Quarterly Bulletin




ISSN 2278 - 5663 *Vol 1, 2018*

EDITORIAL

Dr. Akanksha Chaurey
CEO, ITP India

Dismount from roof-top and float on water- obedient solar PV in India

The largest floating solar PV (FSPV) in India, 500 kW, was inaugurated in November 2017 in the state of Kerala. The second largest is 100 kW at another site in Kerala which was commissioned in May 2017. There are several other projects in the pipeline including MW scale FSPV proposed in Andhra Pradesh and Kerala by the Solar Energy Corporation of India (SECI). However, the total PV capacity floating on the waters of India is probably less than 1 MW as on date. Nevertheless, SECI has called for an EoI for 10 GW of FSPV to be commissioned in next three years on Build-Own-Operate basis.

Floating solar is relatively a new concept globally as well as in India. The first global floating PV came into existence around 2010 and there are less than 100 such installations worldwide. The largest one is 40 MW in China, which is now building a new 150 MW installation. India's first such project of 10 kW was commissioned in Kolkata in the year 2014. It is catching up fast, not only to address the challenges associated with land-acquisition for ground- mounted solar, but presumably also to look for alternatives that can fill the gap in the likelihood of India not achieving its 40 GW roof-top solar targets.

The 500-kW project has proven the sturdiness of its anchor design, one of the main challenges of FSPV. However, there are other factors that have to be kept in mind while floating a PV plant on water bodies. The environmental impacts of such projects are often neglected in the wake of solar being categorized as a green technology in the context of its environmental impacts. Easing of environmental clearance norms for solar projects through a recent government announcement will further undermine the importance of conducting a thorough environmental and social impact assessment of such projects. For instance, the impact on tourism and fisheries; contamination of water by paints and chemicals used in materials for floating platforms; or the risk of unauthorized entry into restricted water reservoir areas through maintenance accesses to PV floats cannot be ignored, and therefore, have to be assessed carefully for every project before it is given clearance.

While we all focus on MW scale FSPV projects to meet the ambitious solar targets, we must also consider the options of small-scale distributed and decentralized floating PV plants on local water bodies installed mainly to cater to localized demand. This is a market segment that often gets discriminated in any new solar scheme, but if affirmative actions are taken to support this category, it has the potential to achieve mega numbers – not for watts but for people who will be benefitted by small scale FSPV plants.

Environmental assessment for a proposed battery storage facility

Rebecca Todd
Principal Consultant
ITPEnergised

Island Green Power applied to Fife Council, United Kingdom for planning permission in principle to construct a 49.9 MW grid-scale battery storage unit in Fife, Scotland. The proposed facility will store excess energy from the grid at times of plentiful supply and release energy back to the grid at times of peak demand.

The proposed facility will comprise a large shed containing the batteries. Ancillary plant will include 20 HVAC units for cooling and 20 transformers. The battery storage unit will be contained within a shed designed to integrate with the surrounding farm buildings and will be accompanied by surrounding native planting and a sustainable drainage system. ITPEnergised have supported Island Green Power through the submission of the planning application by managing and undertaking the environmental assessment of the battery storage unit. ITPEnergised also undertook ecology and noise surveys, ground conditions assessment and designed and produced the information boards for the public exhibitions which included photomontages of the battery storage unit.

The environmental assessment included potential contaminant pathways and pollutant linkages related to the controlled waters, human health, ecology and built environment. The environmental sensitivity included geology, hydrogeology, and hydrology. The noise assessment was done by undertaking a baseline noise survey at identified Noise Sensitive Receptors, prediction and operational noise levels in the context of guidance provided in British Standard BS4142, and specification for outline mitigation. Further, the study also included habitat baseline survey to record and map the habitats covering three designated sites or Statutory Nature Conservation Sites as well as for Non-Statutory Nature Conservation Sites for ancient woodland, invasive plant species, mammals, amphibians and birds. The study also made recommendations for biodiversity enhancements.

Based on the above study, the Fife Council approved the planning permission in principle to the proposed storage facility.

Integrated design process including energy simulation and climate analysis increases the energy star rating of a building

P C Thomas
Director, Team Catalyst, Australia

Corporate Square was approximately twenty-five years old when it underwent a refurbishment that has seen its base building electricity use fall 46% and its NABERS Energy rating double to 5 stars. (www.nabers.gov.au)

The challenge

Corporate Square is a six-storey building in Burelli Street, Wollongong, Australia. Built in 1988, it has approx. 10,000sqm of floor space, which is currently mainly tenanted by government agencies.

it had 'good bones' - it was well designed, had an authoritative presence, distinguished architecture and large floor plates, but its 'internal engine' - primarily its Heating, Ventilation and Air Conditioning (HVAC) system was badly in need of an upgrade. Its NABERS (National Australian Built Environment Rating System) Energy rating was 2.5 stars.

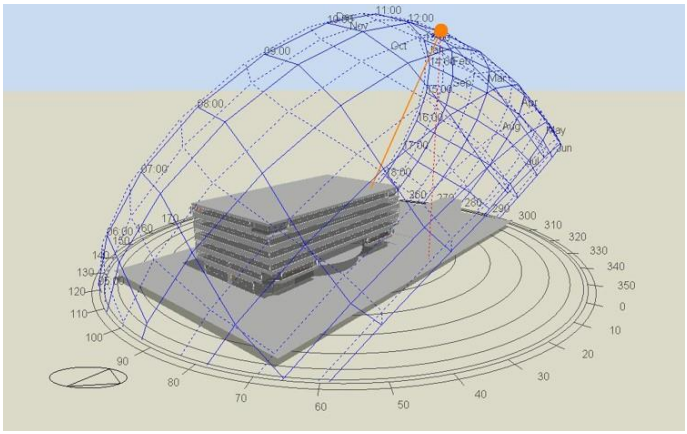
Renovating this building required a system to be implemented that would provide better comfort conditions, greater reliability, cost savings and energy efficiency. Simultaneously, it would have to cater for the region's challenging climate (high humidity, sudden drops of temperature, wind shear issues and large amounts of direct sunlight) as well as legacy architectural factors of the late 1980s that a more contemporary building would not face. The project team also wanted to design a solution that would cause minimal disruption to the 500 people who worked there.

The solution

The solution provided by Team Catalyst, was built around an integrated design process using a modern load calculation and energy simulation analysis along with climate analysis. The chosen solution involved replacing the aging R-22 chillers with efficient screw chillers, bringing in six new air handling units (AHUs) to more efficiently move air around the building, and fitting a Dedicated Outside Air System (DOAS) cooling coil to dehumidify the coastal air prior to it entering the building. Along with HVAC Improvements, the common area and car park lighting has also been upgraded and a new energy efficient, condensing boiler has been installed. A new Building Management System (BMS) has also been installed.

The results

As a result of the above, the electricity use in the building was reduced by a staggering 46% (which equates to bill savings of approximately $120,000 per annum), the NABERS Energy rating doubled to 5 stars and the building is now 98.7% occupied in a city where the total vacancy rate is 12.2%. Besides, the valuation of the building has also increased and half of it is attributed to the energy saving initiatives. The upgrade also leads to a greenhouse gas emissions reduction of 932,806 kg CO_2-e p.a.



Notes

NABERS is the "National Australian Building Environmental Rating Scheme", for office buildings in Australia. Implemented since 2001, it is one of the world's most rigorous operational rating scheme. Ratings are based on actual consumption data for the previous 12 months (electricity, gas, water), and are only valid for 12 months. Buildings need to remain efficient to maintain their NABERS ratings

Base Building refers to utilities that are the landlord's responsibility and typically include HVAC, common area lighting, lifts and escalators, basement car park lighting and ventilation, and condenser water for supplementary HVAC systems

The DesignBuilder building performance software was used for cooling load estimation and annual energy consumption predictions. A detailed model of the proposed HVAC systems was modeled at an advanced level by Team Catalyst

A case study on this project was independently developed by the NSW Office of Environment and Heritage (NSW OEH) who administer the NABERS scheme nationally in Australia

Team Catalyst and ITP India collaborate to support green buildings sector and compliance with Energy Conservation Buildings Codes (ECBC) in India using DesignBuilder, a building energy simulation software.

Catalyzing the growth of SMEs by energizing Hisar-e-Shahi Industrial Park in Afghanistan

Abdul Jamil Musleh
ITPI Associate, Kabul

The national unity government of Afghanistan has committed to create sustainable job opportunities for the people of Afghanistan by promoting & developing small and medium size industries. However, access to affordable power and infrastructure support are the key prerequisite for the development of the industrial sector.

Jalalabad city, one of the major cities of the country, is located about 90 km from Torkham at Afghanistan and Pakistan border. It is the main business center for the four eastern provinces of the country and has attracted the attention of many private investors to establish small and medium size industries. Due to lack of affordable power and absence of well-equipped industrial area, many investors have either closed their industrial units or have limited their productions capacity. This has led to insufficient supply from the local market and have reduced job opportunities for many resident of Jalalabad city.

To overcome the above challenge, Government of Afghanistan, with the support of funding agencies, has established Hisar-e-Shahi industrial park, 22 km southeast of Jalalabad city on the Jalalabad-Torkham highway.

The industrial park is spread over an area of 207 hectares and 295 plots have already been developed & allocated to small and medium size industries in the first phase of 125 Hectares and rest of the area is being developed for the second phase.

Within the above objective of providing affordable power to industries in Hisar-e-Shahi industrial park, a feasibility study was conducted that recommended 40 MW hybrid On-grid solar PV power plant as the viable option for electrification of

industrial park in the first phase. In the second phase of the project the further 40 MW can be installed to electrify the entire park.

Implementation of the 40 MW hybrid On-grid solar PV power plant project will not only establish around 150 small and medium size industries in the light engineering, food processing, leather, garments and cleaning products, but also create around 7,500 direct jobs and thousands of indirect jobs to the resident of Jalalabad city and surrounding areas. It will also help in reducing the dependency of the country on the imported products and ultimately contribute in improving the economy.

The above feasibility was conducted by ITP India under the Asian Development Bank's 'Technical assistance for renewable energy development in Afghanistan.' Recently, the 40 MW hybrid On-grid solar PV power plant project was announced by the National Procurement Authority of Afghanistan for bidding in design & build mode, under ADB funding. The actual construction work is expected to start in 2018.

Ujala: The LED revolution in India

Ananya Chaurey
Master of Environmental Management, Energy & Environment
Duke University '18

The Government of India's flagship lighting efficiency scheme, *Ujala*, Hindi for illumination, aims to replace 770 million incandescent and fluorescent lamps with energy-efficient LEDs. Simple back-of-the-envelope calculations reveal that by 2019, *Ujala* can help save 35-50 billion kWh of electricity, enough to electrify 44 million people who currently have poor or no access. It will shave peak hour load by up to 20 Gigawatts, leading to reduction in load-shedding. Further, at a total capital cost of $1.2 billion, it is a seven-fold cheaper route to electrification than a modern natural gas power plant. The government claims that *Ujala* will help save $5.4 billion in cumulative electricity bill savings. However, let us keep the tall claims aside for now, and focus on some of the more striking, and impressive aspects of *Ujala*.

Three years ago, in January 2014, the procurement price of a 9 Watt LED bulb for the *Ujala* program was $5. In two years, in September 2016, the price had crashed to a mere $0.60. Accounting for fair returns for *Ujala's* implementing agency, Energy Efficiency Services Limited (EESL), distribution costs and taxes, the cost to the consumer today is $1 (Rs. 65) per LED bulb. The same bulb costs $1.50-2 in the retail market. What is even more commendable is that this was achieved not through subsidies to manufacturers, but simple economies of scale.

India sold 5 million LED lamps in 2014. After *Ujala* kicked off, market demand for LEDs saw such a monumental growth that just two years later, in 2016, India sold 251 million LED lamps. The aggregation of demand and bulk procurement by EESL led to a tremendous expansion in local manufacturing, which in turn drove down costs. Further, EESL created a transparent e-bidding platform that made it easy for manufacturers to bid aggressively. As a consequence, in the latest round of procurement, the winning bid was a mere $0.65/bulb.

Behind every successful product is an effective marketing campaign. *Ujala* seems to be hitting the nail on the head in that respect - according to one survey, more than half the people who bought LED bulbs in Lucknow learned about them through *Ujala*. Further, between half and three quarters of surveyed households in Pune, Lucknow and

Puducherry reported that they would not have bought LED bulbs had it not been for *Ujala*.

Ujala has pursued varied routes for its marketing campaign. In addition to the traditional methods such as newspaper advertisements, mobile van publicity and billboards, it has two online marketing schemes. The first is a dashboard that presents users with vital, albeit partly incorrect, electricity savings statistics, while the second is the *#iledtheway* campaign. Numbers from the dashboard have been widely quoted by the Prime Minister, Minister of Power, and the media. The website for *#iledtheway* allows users to sign online pledges to adopt LEDs and provides an electricity savings calculator. To date, 91 million pledges have been signed. Finally, local distributors contracted by EESL to sell *Ujala* bulbs have devised inventive methods of their own - one EESL employee demonstrated the performance of LEDs, incandescent bulbs and CFLs at low voltage to prove that LEDs work better than the other two.

Ujala's primary goal is market transformation - from inefficient, but cheap incandescent bulbs to efficient, but costlier LEDs. In that respect, it has so far been successful. LEDs accounted for just 0.3% of all lamp sales in India in 2014, but by 2016, that share had leapfrogged to 16%. In addition, *Ujala* catalyzed a spurt in domestic manufacturing, adoption of performance standards, and setting up of accredited testing laboratories - activities that are indispensable for a sustained market for LED lamps. However, *Ujala* has failed to achieve popularity among low-income households. To address this issue, its awareness generation programs can do with expanded emphasis on low-income households. For instance, the long-term savings potential of LEDs can be elucidated through simpler ways. The on-bill financing scheme, where the cost of an LED lamp is made in easy installments paid via a user's electricity bill, can be made more transparent and easier to avail.

Ujala has been one of the most promising energy efficient lighting programs in the world. Its business model is sound and quality control has been well enforced. With improved public awareness, it can well be extended to other appliances such as agricultural pumps, grain mills, and industrial motors.

ITPEnergised Offices

Bristol
ITPEnergised
29 Great George Street
Bristol, UK BS1 5QT
T: +44 (0) 117 214 0510
E: info@itpenergised.com

Edinburgh
ITPEnergised
7 Dundas Street
Edinburgh, UK EH3 6QG
T: +44 131 557 8325
E: info@itpenergised.com

Glasgow
ITPEnergised
The Whisky Bond
2 Dawson Road
Glasgow, UK G4 9SS
T: +44 (0) 131 557 8325
E: info@itpenergised.com

London
ITPEnergised
Unit 3.14-15
18 King William Street
London, UK
EC4N 7BP
T: +44 (0)20 3700 6111
E: info@itpenergised.com

Mainland Europe
ITPEnergised
Lisbon, Portugal
T. +351917208573
E: info@itpenergised.com

Latin America
ITPEnergised
Buenos Aires, Argentina
T: +54 11 3750 9853
E: americas@itpowergroup.com

China
IT Power China
Beijing
T: +86 10 6413 6295
E: china@itpowergroup.com

Australia & Pacific
ITP Renewables / ITP Thermal
Canberra
T: +61 2 6257 3511
E: info@itpau.com.au

New Zealand
ITP Renewables
Auckland
T: +64 275 818 989
E: admin@itpau.com.nz

Published by:

IT Power Private Limited
410, Ansal Tower, 38 Nehru Place
New Delhi – 110019, INDIA
Tel: +91 (11) 4600-1191/92
Fax: +91 (11) 4600-1193
Web: www.itpower.co.in
Email: info@itpower.co.in