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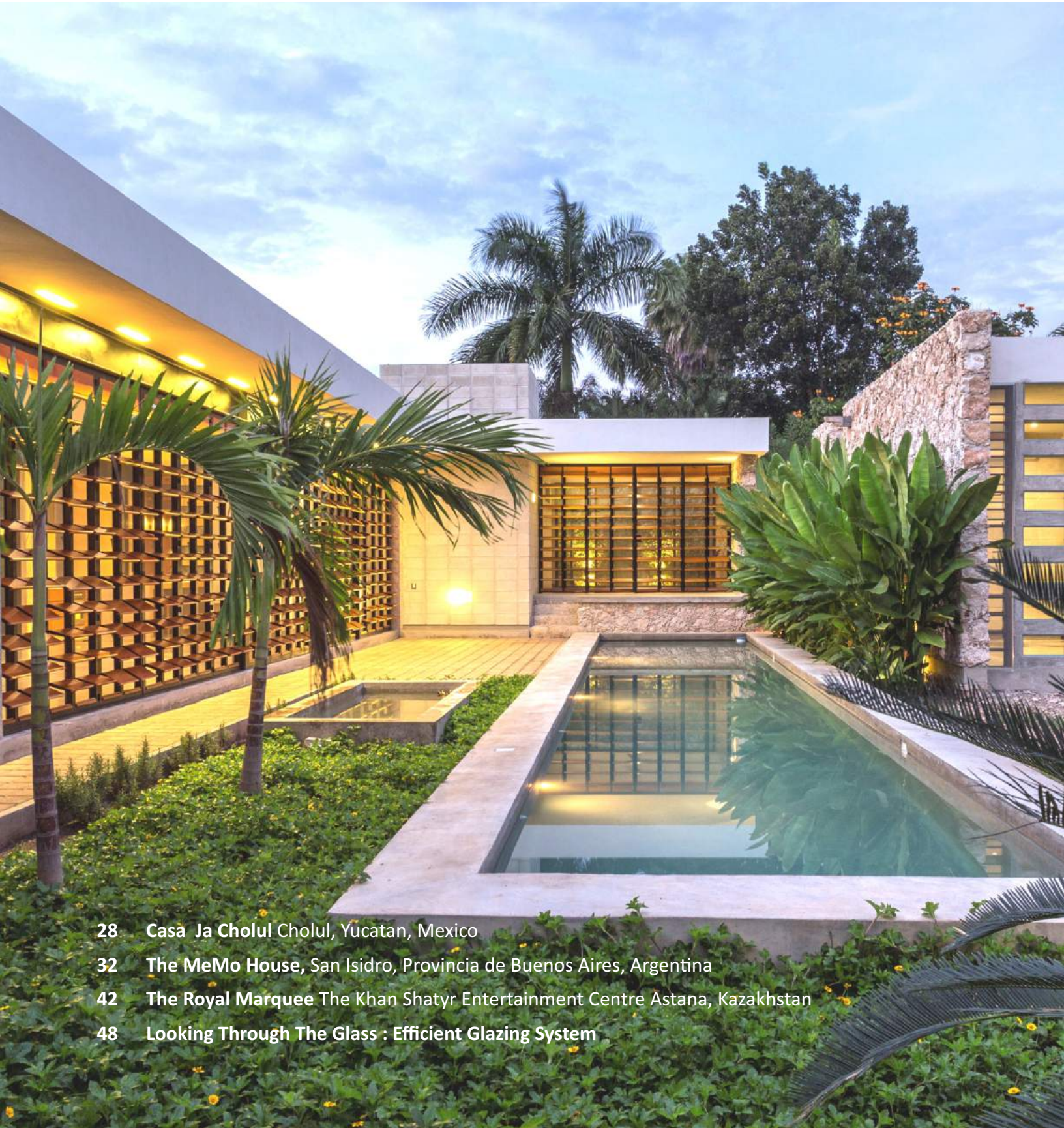
GREEN CONSTRUCTION+DESIGN

The Complete Guide to Sustainable Architecture and Design

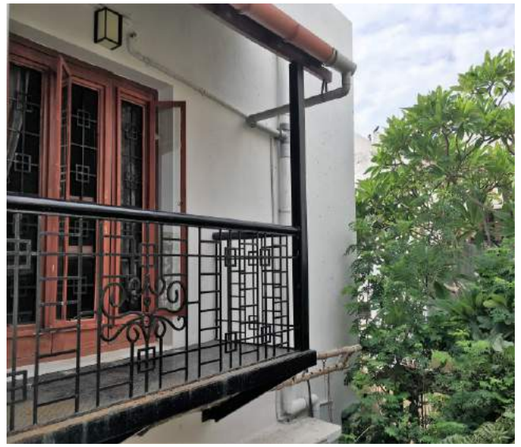
June 2017



Green Project

A “Green Transformation” Of A Home In Besant Nagar, Chennai

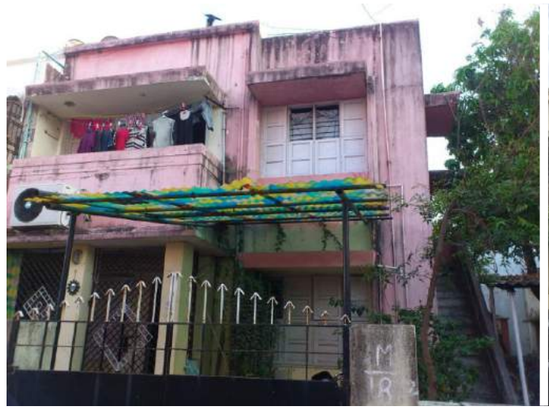
From Futility to sustainability



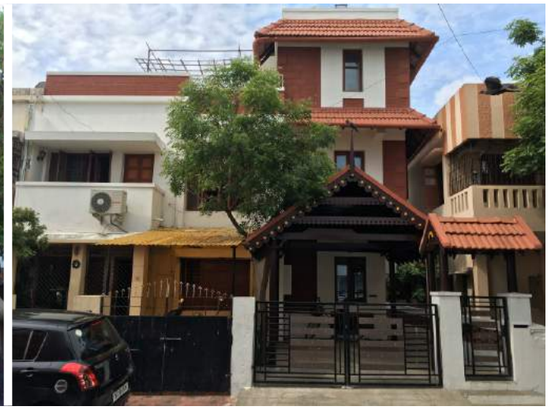
Balcony Rain Water Harvesting Pipes

Green Evolution, an architecture firm specializing in environmentally sustainable design and construction, was approached by Dr. Roshini and Dr. Radhakrishnan to renovate and extend an old and dilapidated flat they had purchased close to Elliot's Beach in Besant Nagar, Chennai. The flat was the upper right unit of a 4-units-in-1-block apartment developed in the 1970s by the Chennai Municipal Development Authority. The flat had developed water seepage and leakage issues over the years and was also extremely hot and stuffy despite being located close to the breezy sea shore.

Owners' Brief: The brief from the owners was to renovate the flat to eliminate the leakage and heat issues and to extend the flat to get more livable space. The eco-conscious owners were also keen on their new home being environmentally sustainable. They wanted



Existing home



Renovated home

a home that was energy and water efficient with a healthy indoor environment that was well lit and ventilated naturally. A home that reflected their love for South Indian tradition was another key requirement. The owners also desired access to the terrace to enjoy breezy evenings.

The Renovation Process:

Upon an evaluation of the existing home, it was found that the peripheral spaces were too 'closed' and, as a result, natural light and ventilation in the central dining and living rooms was not adequate. The first step was to open out the kitchen, avoiding a full wall between the dining and the south facing kitchen. This not only provided adequate natural light into the dining but also allowed the sea breeze to come into the central spaces.

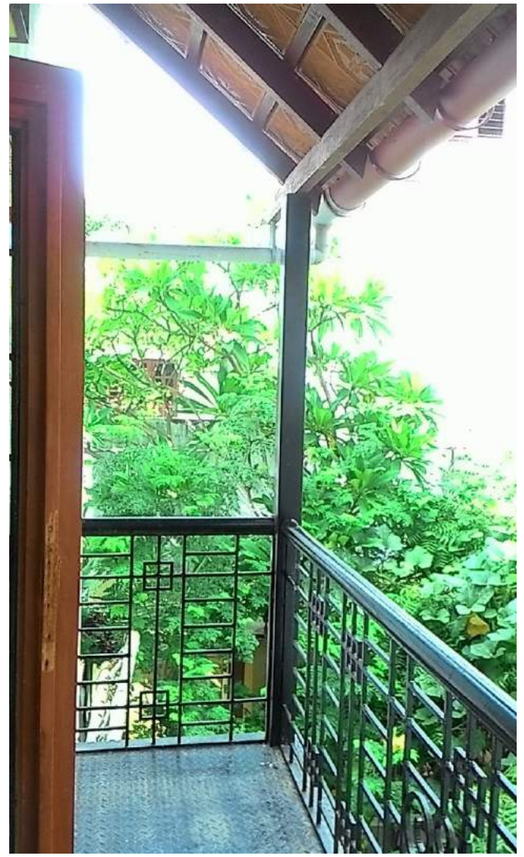
A new balcony, fabricated in metal, was added to the master bedroom, opening up the room as well as providing a shaded outdoor space for stepping out. The existing, external stair was demolished and a new, enclosed staircase was built to provide access to the first-floor unit as well as the terrace. A study, laundry room and toilet were new spaces that were added to the house.

Incorporating Energy Efficiency:

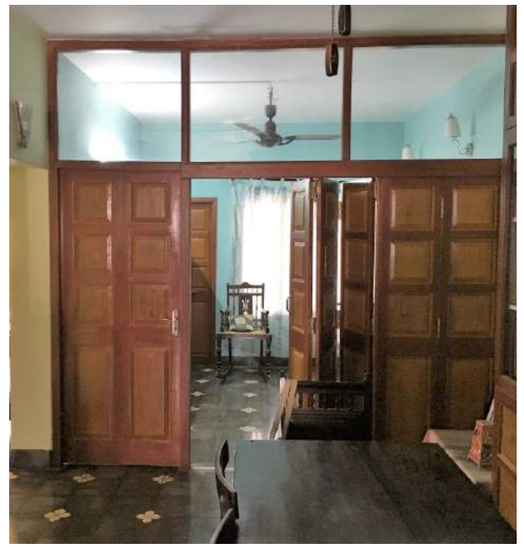
While opening up the peripheral spaces allowed more sea breeze to come in, thereby resolving the stuffiness issue, water leakage and heat issues were addressed by redoing the weathering course on the roof. The old brick bat weathering course was replaced by a membrane water-proofing layer with a layer of XPS (extruded polystyrene) insulation above, which eliminated heat ingress from the roof.

The exterior walls of the newly constructed portions were built using hollow terracotta blocks which are twice as insulating as conventional clay bricks. The plain glass installed in existing windows was replaced by a solar control glass which reduces heat ingress by 20%. Additionally, Mangalore tile sunshades were added to windows to enhance shading. These interventions greatly helped in protecting the interior spaces from the weather conditions outside and keeping them cool with only minimal use of air-conditioners.

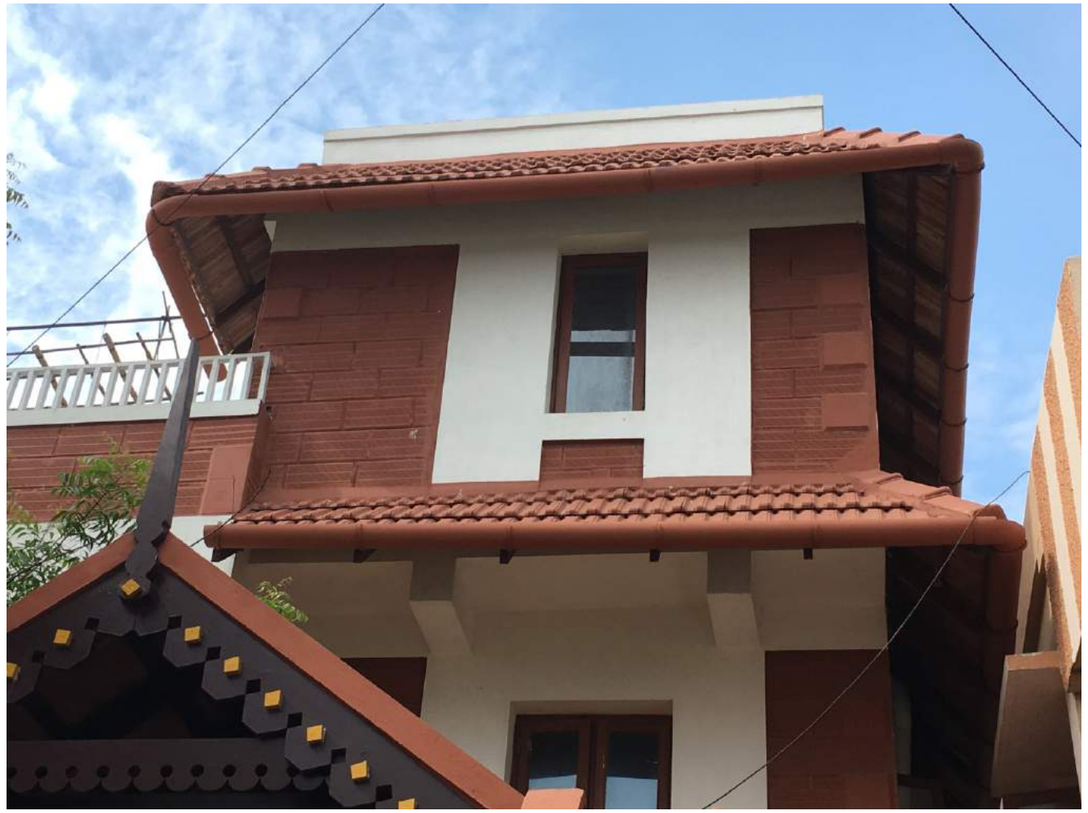
A 1.5 KWp grid-connected solar photovoltaic system was installed which offsets energy consumed in the house. This system allows for electricity to be fed to the city's power grid even when electricity is not consumed inside the house. LED lights and BEE 5 Star rated energy



New balcony for bedroom



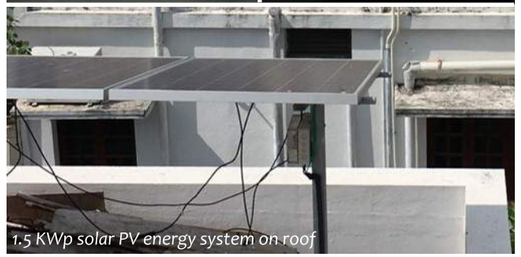
Salvage doors used for partition



Insulating hollow terracotta blocks, well shaded windows with solar control glass

Kadappah stone & Athangudi tiles for stairs

Pre-cast jaalis



1.5 KWp solar PV energy system on roof

efficient fans have also contributed to significant energy savings.

Reuse Of Salvaged Material:

All existing door frames, door shutters, windows frames and window shutters were reused thus avoiding use of new wood; thereby saving cost as well as ensuring that the traditional, good quality, reliable wood was retained. The central wooden panels of the existing window shutters were replaced with glass to provide views and natural light. A sliding folding partition fabricated using wood salvaged from the existing house, with the addition of frosted glass, formed one wall of the second bedroom in lieu of the existing brick wall. This allowed for the room to be opened out into the dining/living areas whenever the bedroom was not used. This being the guest bedroom was not to be used all the time. The opened-up guest bedroom served to make the living / dining areas more spacious and suitable for entertaining visitors.

Sustainable material use: The existing mosaic flooring

was not in good condition and was replaced by Athangudi tiles, giving a traditional touch to the spaces. Use of hand-made Athangudi tiles, which consume minimal energy to manufacture, not only encourages local artisans but also offers a more cost-effective and eco-friendly alternative to contemporary tile flooring. Dr.Roshini's selection of the traditional tile design for the flooring as well as for the kitchen wall dado added a quaint and rustic charm to the home. Her personal interest and involvement in tile design selection and installation also helped make the process very efficient and smooth.

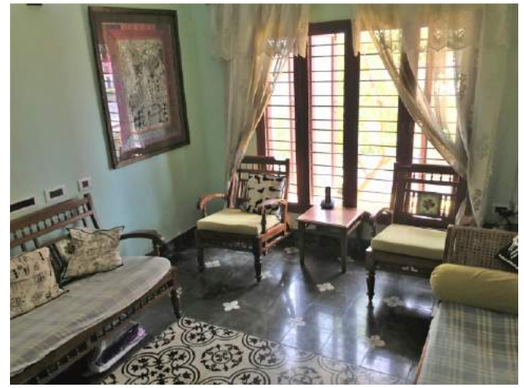
Traditional Mangalore tiles were used for the roof of the car shed as well as for new sunshades for windows. Precast 'jaalis' added interesting patterns to the building façade. Kadappah stone was used for the treads in the staircase. The walls of the new portions have been left unplastered to save material and to also give the renovated home a rustic charm.

Water Conservation And Reuse:

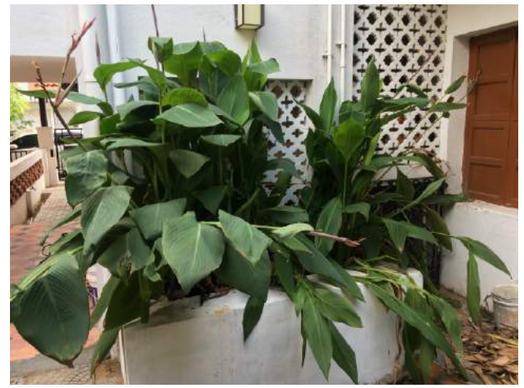
All water closets are dual flush with 4 litre and 2 litre options, which reduce water consumption for flushing by 75%. Low-flow showers and faucets further contribute to water savings. Grey water from wash basins, showers and the washing machine is directed into a natural grey water treatment system consisting of planter boxes planted with Indian Canna- a plant that purifies waste water through its root zone. This cleaned-up water is then reused for landscape watering in the garden. Dr. Roshini's interest and personal involvement in setting up the waste water treatment system ensured its effective functioning. Rain water from the roof is channeled into percolation pits on site to enhance ground water recharge.

Other Enhancements:

The existing home did not have access to the terrace, preventing occupants from using the terrace for any activity. A new stairwell which was added solved this problem and ensured the terrace space could be effectively used. The terrace now hosts the solar PV system and an organic terrace garden. Built-in



Athangudi tile flooring



Natural grey water treatment

benches and trellis for creepers set up by the owners on the terrace provides a charming space for outdoor dinners with a lovely view of the sea beyond!

The renovated home has attracted a lot of attention in the neighbourhood and has helped in spreading awareness of environmental sustainability. The success of the project was in large part due to the owners' interest in sustainability as well as their personal involvement in design and implementation decisions.

Architect's Profile

Anupama Mohanram is an architect with a passion for environmental sustainability. She has an undergraduate degree in Architecture from the School of Architecture and Planning, Anna University, Chennai after which she moved to the USA to pursue a Master's degree in Architecture from Kansas State University.

Post this phase, she worked as an architect in Chicago for ten years before moving back to Chennai India to start her own architecture firm, Green Evolution, which focuses on environmentally sustainable design and construction. Anupama is also a LEED Accredited Professional and a certified GRIHA Evaluator and Trainer.

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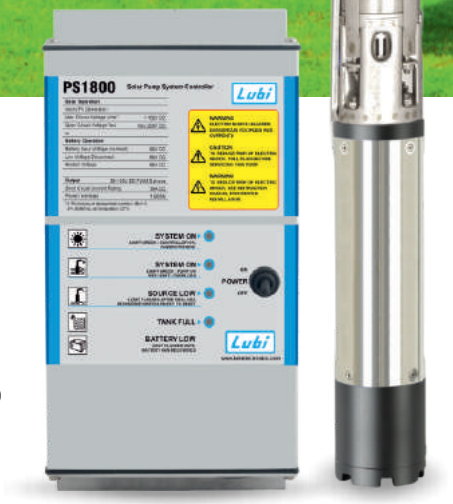

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