SHAKTI
SUSTAINABLE ENERGY
FOUNDATION

Confederation of Indian Industry

ENERGY IS LIFE
BEE
CONSERVE IT

16th NATIONAL AWARD FOR EXCELLENCE IN ENERGY MANAGEMENT 2015

Most Innovative & Innovative Energy Saving Products

Confederation of Indian Industry

16th National Award for Excellence in Energy Management 2015

This is to certify that the product

SUPERFAN

offered by

VERSA DRIVES PRIVATE LIMITED, COIMBATORE

Has been rated as "Most Innovative Energy Saving Product"

This is based on the feedback of participants at the National Competition for Excellence in Energy Management held on 2 & 3 September 2015 at Hyderabad

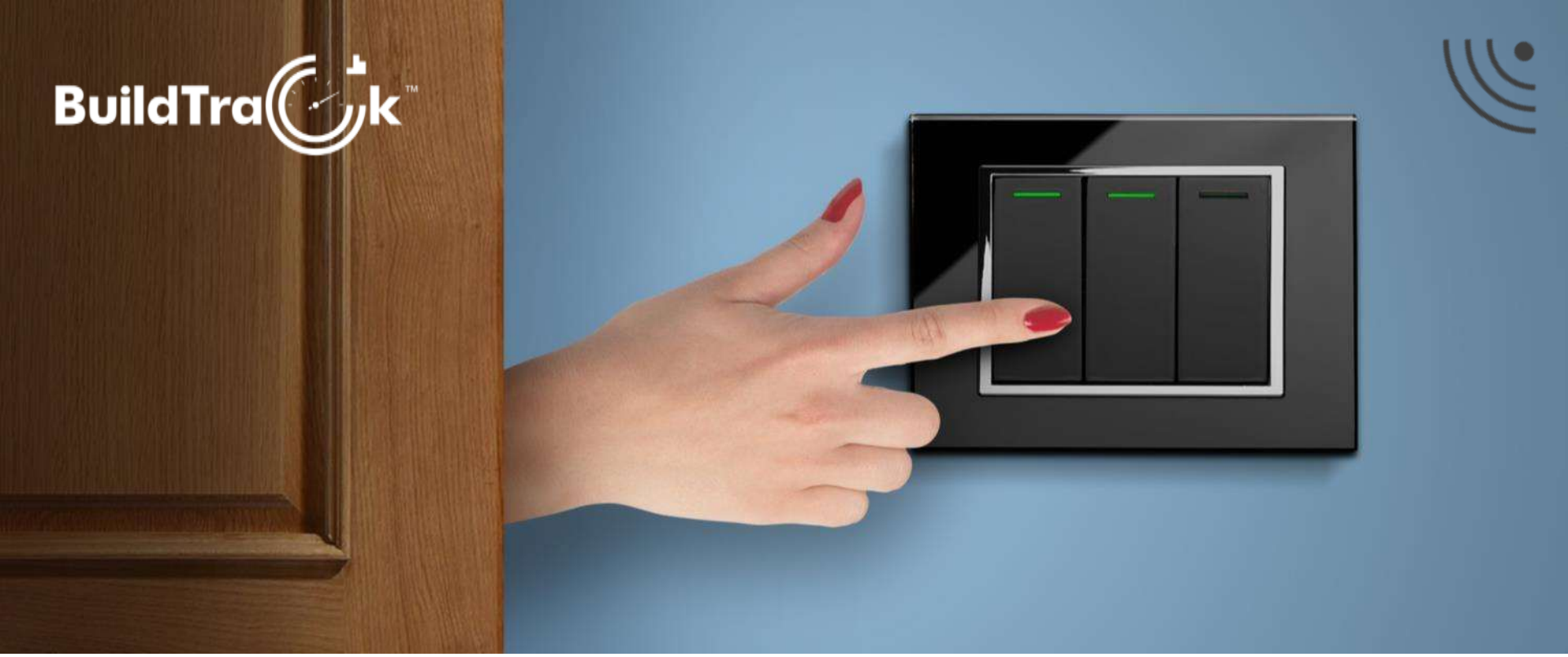
S RAGHUPATHY
Executive Director
CII-Godrej GBC

Dr NAUSHAD FORBES
President Designate, CII &
Chairman, Energy Efficiency Council
CII-Godrej GBC

Dr A R K Rao
Co-Chairman
National Award for
Excellence in Energy Management 2015

Most Innovative Energy Saving Products

Award Winners



Guaranteed Energy Savings for your existing and new projects with wireless sensors

PROUDLY MADE IN india

Every Switch is a Green Opportunity

Switches control almost every electrical device

Switches need to be AUTOMATICALLY controlled in order to reduce Energy Bills

Control the Switch for Savings

People forget to turn switches OFF resulting in energy wastage

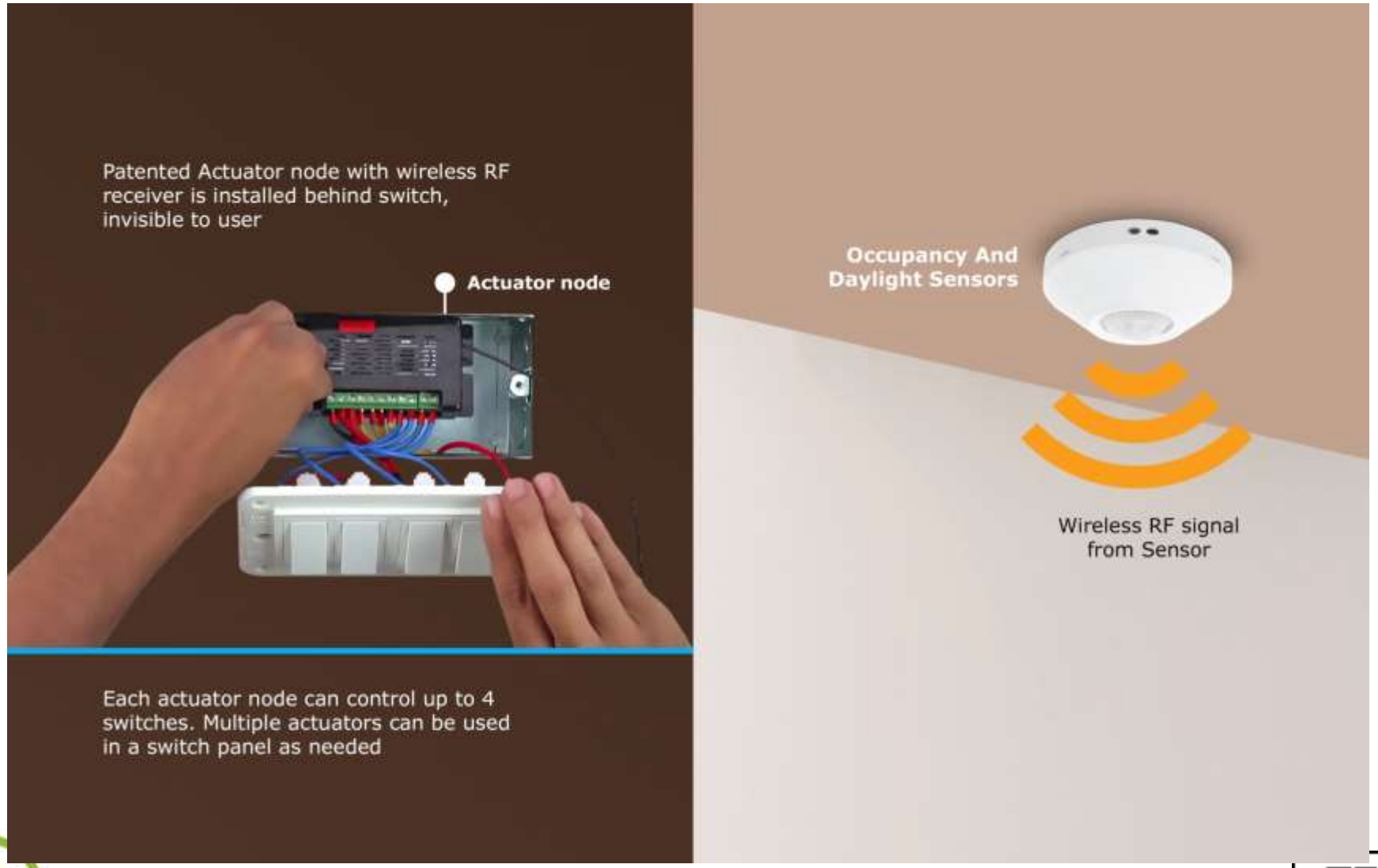
DEVICE	BULB	T5 TUBELIGHT	T8 TUBELIGHT	CEILING FAN	EXHAUST FAN	SPLIT A/C UNIT
TYPICAL WATTAGE	60-100 WATTS	28 WATTS	36 WATTS	80-90 WATTS	35-60 WATTS	1100-1200 WATTS

This results in higher energy bills

The Solution

BuildTrack
WIRELESS SENSORS

How do they work?



Wireless Sensor: Benefits

- No Wiring NEEDED

- Sensor can be freely placed where required

- Rapid deployment, often in under an hour

- Aesthetics of the room is maintained intact

- Single sensor can control multiple switches located in a single switch panel or even in multiple switch panels

- Switches will work, even if sensors fail or run out of battery !

- Users can still turn off individual devices with switches

- Variable delay timings for different devices

- GOOD PAYBACK

- CONVENIENCE to users

Components

Occupancy &
Daylight Sensors

Actuator Node

Payback in < 1 year !

There is a huge savings possible with the use of wireless sensors

Some estimated energy savings in a few cases are provided below

PRIVATE OFFICE
10%-50%

CONFERENCE ROOM
20%-50%

CLASSROOM
25%-40%

RESTROOMS
30%-70%

CORRIDORS
30%-70%

STORE AREAS
(INCLUDING WAREHOUSES)
30%-80%

Payback of the wireless sensors can be 1year or under for daylight and intermittent use areas.

Useful Deployment Situations

- **High Value & Quick Payback is obtained in situations where intermittent occupancy happens and/or adequate daylight is available. such as**
  - Private offices & cabins
  - Conference Room
  - Classrooms
  - Kitchens/Pantries
  - Restrooms
  - Safe Deposit Box rooms (banks)
  - Corridors
  - Warehouse aisles
  - Stairwells
  - Elevators
  - ATMs

INDIA'S FIRST SUPER EFFICIENT CEILING FAN

superfan

by

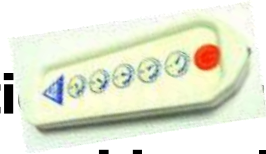
VERSA DRIVES

Coimbatore

appliance DESIGN EID EXCELLENCE IN DESIGN BRONZE 2014

Category: Small Appliances

Redefining Ceiling Fans
Key differentiators

- More than 50% energy savings
- No compromise on air delivery
- Remote control
- Low voltage operati  peed even at 140Vac)
- No speed change for wide voltage range (140Vac to 300Vac)
- Precise speeds
- No heating of motor

Electrical Performance

	Speed	Superfan	EE fan	Conventional fan
Active power (W)	Low	3.9	18	12.5
	Medium	13.3	45	36.7
	High	34	55	76.2
Power factor	Low	0.51	0.49	0.37
	Medium	0.88	0.82	0.64
	High	0.96	0.99	0.99
Total demand (VA)	Low	7.6	36.7	33.8
	Medium	15.1	54.9	57.3
	High	35.4	55	77
VAR demand for 500 fans (kVAR)	Low	3.3	16	15.7
	Medium	3.6	15.7	22
	High	5	5.2	5.4

Superfan has built-in power factor control and low power consumption helps in large installations.

VERSA DRIVES

Superfan Attributes	Innovation	Inclusive	Sustainability	Scalability	Energy & Environment	Mass Appeal	Originality	Safety
Energy saving, air delivery	✓	✓	✓	✓	✓	✓	✓	
Remote control , precise speeds	✓	✓				✓	✓	
Low voltage operation	✓	✓						
Colors & aesthetics		✓				✓	✓	
No speed change with wide supply variation	✓						✓	
Twice longer, quiet running on inverter						✓		
Material			✓		✓			✓
Green product			✓		✓		✓	
High/Low voltage & overload protection	✓							✓
Solar friendly		✓	✓		✓			
Technology, Construction, other uses				✓			✓	✓

WindStream Energy Technologies India Pvt. Ltd.
Company Presentation – August 2015

The simple, efficient & cost effective way to utilize highly available Wind and Solar resources in "India"

The SolarMill®

An Efficient Way of
Combining the Power of Wind and Solar!

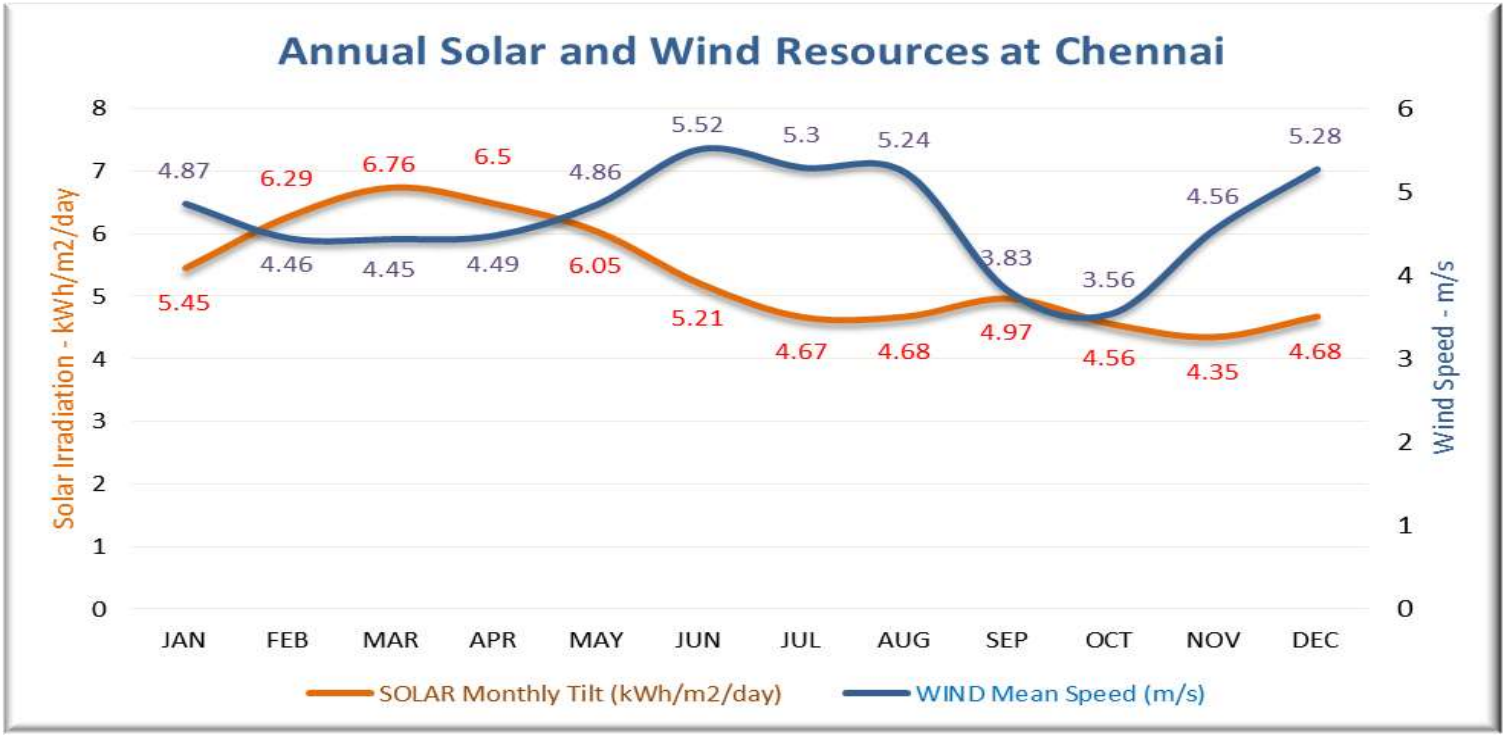
The SolarMill Generates:

- Daytime energy from the sun and wind
- Day & Night energy from the wind
- Energy even on cloudy days
- More energy on hot sunny days due to cooling effect on solar panels by wind

- Standing about 1 meter tall, SolarMills meet most permitting building code requirements.
- SolarMills harvest energy from the sun and wind simultaneously and also independently.

Why SolarMill?

- The SolarMill technology smooth's out the highs and lows of energy generation periods due to seasonality as **solar irradiation and wind speeds change** throughout the course of the year.
- The hybrid solution will compensate for seasonal losses of power generation while depending on any one type of renewable energy system.



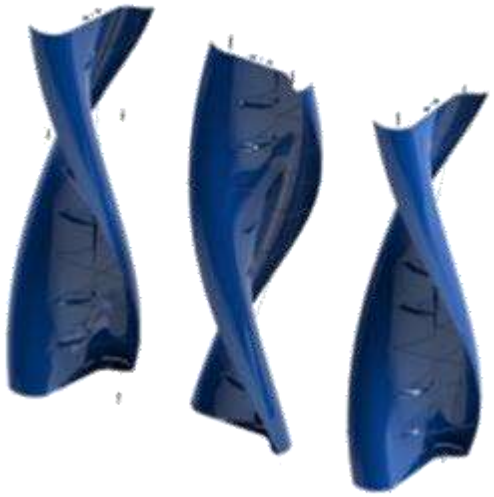
Product overview-SolarMill

- SolarMill is a Hybrid energy system which deals with both **Solar and wind energy.**
- Hybrid system is based on a modular, scalable, distributed renewable energy system designed and optimized for both **on and off grid installations.**

- Wind energy device, utilizing **three low-profile vertical axis wind turbines** (VAWT) mounted on a single base.
- Incorporates **P.V. technology,** creating the greatest energy generation.

The Technology:

- **Savonius Turbines** accept wind from any direction and accommodate changes in wind direction.



- SM1 is capable of producing **576 kWh/ Year** (@ 6kWh/m2/day and 5m/sec average yearly wind speed)

- WindStream's **Maximum Power Point Tracking** (MPPT) is applied to each turbine independently.

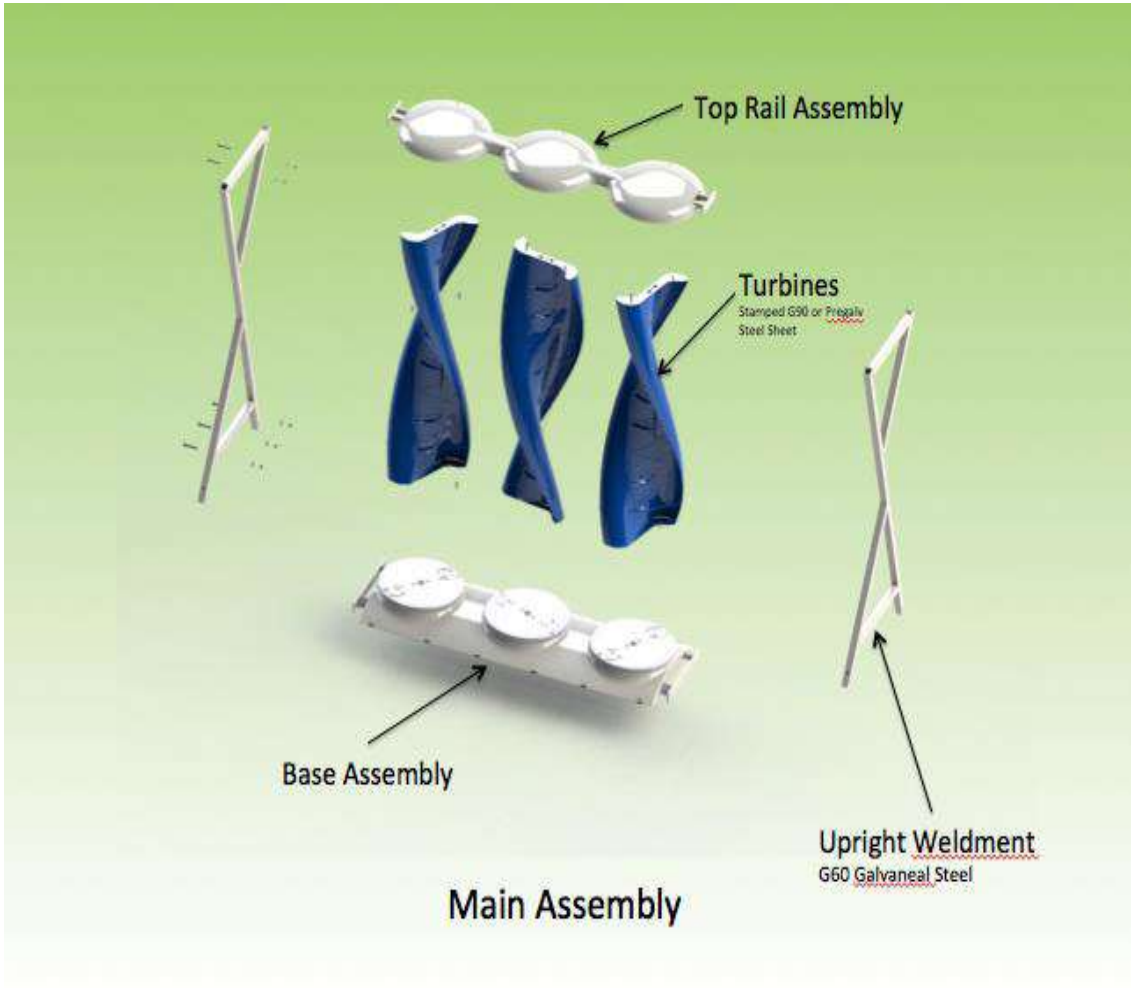
- Onboard **"Smart" electronics** designed to control 3turbines connected in series running the length of the tower, outputting power to the equipment locker.

- Current production technology and configuring for this unique application, the turbines, generators, and electronics will allow for the addition of wind generating power with a minimal amount of added weight.

Construction

SolarMill Assembly:

- 3 Vertical Axis Turbines mounted on a single base
- Turbines (Savonius) produce energy by accepting winds coming from any direction
- Cut-in wind speed – 2 m/s & Cut-out wind speed – 18 m/s
- Silent operation
- Designed for both On-Grid and Off-Grid applications



Construction contd..

Reliable

- Corrosion Resistant Material: all steel parts are pre-galvanized.

  Aluminum or stainless components are used where appropriate.

- Circuit Protection: Electronics provide protection for over-voltage and over-current by monitoring the current and voltage in each system.

- Mechanical Braking: The unit is equipped with a failsafe centrifugal

- braking system designed to protect the turbines and generators

- at high wind speeds (beyond 18.5 m/s).

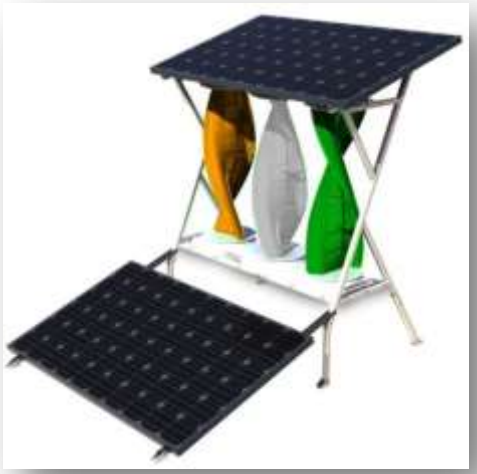
- Able to withstand temperature ranges from -**30°C to 50°C.**

Advantages of SolarMill

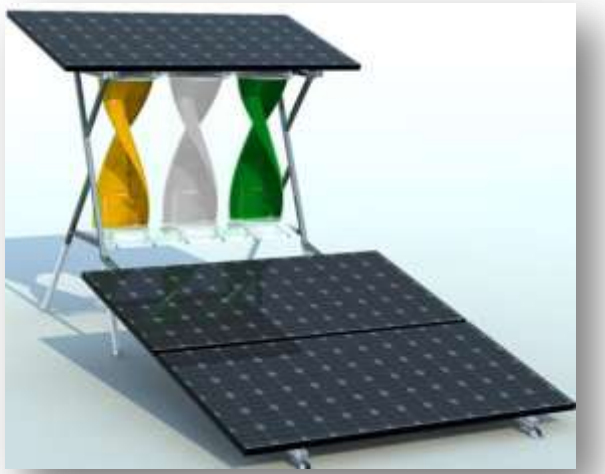
- Easy to mount on any rooftop; no complicated masts, guy wires, or towers.
- Simple ballasted installation that avoids roof penetration.
- Environment-friendly, silent operation.
- Higher power density per square foot.
- Scalable power generation.
- Mechanical braking at high-speed winds beyond 18 m/s.
- Increases the battery life & minimizes the battery storage capacity.

SolarMill Models

SM1-1P (750W)



SM1-2P (1kW)



SM1-3P (1.25kW)

SM2-3P (1.75kW)

SM2-6P (2.5kW)

SM2-9P (3.25kW)

Few of the installations in India

Baraut, Railway Station

CTARA, Ministry Of Railways, Hyderabad

Delhi

Nagpur

Innovative Energy Saving Products

Award Winners

COPELAND® CRK8M Recip Platform *Compressors*

CII Energy Efficiency Summit

2nd -3rd September 2015, Hyderabad

EMERSON
Climate Technologies

Residential AC Regulations - BEE v/s M.E.

BEE

Table 2.3: Star level valid Split type air conditioners From 01-01-2014 to 31-12-2015

	Energy Efficiency Ratio (Watt/Watt)	
Star level	Minimum	Maximum
1 Star *	2.70	2.89
2 Star **	2.90	3.09
3 Star ***	3.10	3.29
4 Star ****	3.30	3.49
5 Star *****	3.50	

Table 2.4: Star level valid for unitary type air conditioners (From 01-01-2014 to 31-12-2015)

	Energy Efficiency Ratio (Watt/Watt)	
Star level	Minimum	Maximum
1 Star *	2.50	2.69
2 Star **	2.70	2.89
3 Star ***	2.90	3.09
4 Star ****	3.10	3.29
5 Star *****	3.30	

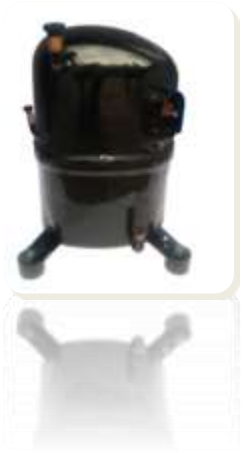
Middle East

Air Conditioner appliance type	Cooling Capacity limit (CC) (Btu/h) At test condition (T1)	(EER) Value (Btu/h)/watt To be applied mandatory starting from the beginning of Sept 2013		(EER) Value (Btu/h)/watt To be applied mandatory starting from the beginning of Jan 2015	
		T1	T3	T1	T3
Window Type	18000 > CC	8.5	6.12	9.8	7.06
	18000 ≤ CC < 24000	8.5	6.12	9.7	6.98
	CC ≥ 24000	8.5	6.12	8.5	6.12
Split Type and the other types	All Capacities	9.5	6.84	11.5	8.28

- Middle East Energy Labels Are Stringent Than India Label
  - India Lower By One Level
  - Example For WRAC 2015
    - India Star Is 8.5 Till Dec 2015 (Calculated T 3 = 5.95)
    - Saudi Star 1 Is 9.8 From Jan 2015 (T 3 = 6.7)
- India Is Only T1, No Mention About T3; M.E. Is T1 & T3
  - T 3 Difficult To Achieve Than Only T1
- India Launched Energy Label In Jan 2009; Saudi Sept 2013
  - India Proposed 8.5 In 2015; Saudi With 9.8 In Jan 2015

1 W/W = 3.412 BtuHr

New CRK8M Ultra High EER Compressors



- 11.5% Higher Efficiency Than Equivalent Compressors
- Better Efficiency At Same Sound Levels
- Better Performance Than Rotary At High Ambient Applications
- Suitable For Both Window AC Applications
- 6 Star Rating Under SASO
  - Only Recip Compressor Qualifies

CRK8M Series Highlights

- Innovativeness In Design Ensuring
  - Low Cost Product With Higher Efficiency
  - Made Suitable For Domestic And Export Markets
  - Primary Supplier For Window Application In Middle East
  - Optimization Of Recip Technology To Achieve Higher EER
- Product Acceptance In Domestic And Export Market
  - Over 0.4Mn Pieces Sold In FY15
  - Over 1.0Mn Plan For FY16

Energy Saving Work Out : CR19K8M UHEER savings wrt competition

Average Energy Savings From CR19K8M w.r.t. Competition Models Under Same Conditions	**11.5%**
Average Annual Savings Per AC using CR19K8M (In Terms Of Energy Units)	**300 KWh / Year**
Annual savings per household due to higher efficiency	**~ INR 1500 per AC**

Total CRK8M Series UHEER Pcs Sold In FY15	**0.4 Mn Units**
Total Potential Energy Savings for FY15	**120 Million Units**
Total CRK8M Series UHEER Pcs Planned In FY16	**1 Million Units**
Total Potential Energy Savings for FY15	**300 Million Units**
Global 1.5 - 2 Ton AC Market With Recip Technology	**8 Million pcs**

Energy Saved is Energy Generated

A Power plant with capacity of 14 MW is required to generate 120 Million KWh of energy in a year

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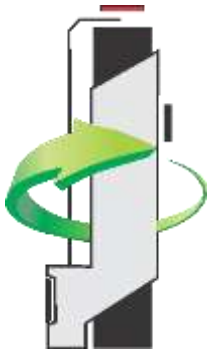
Trusted Partners.
Innovative Solutions.

FLASH JET PUMP



Energy Conservation | Environment | Process Efficiency

www.forbesmarshall.com

CONDENSATE RECOVERY

Forbes Marshall
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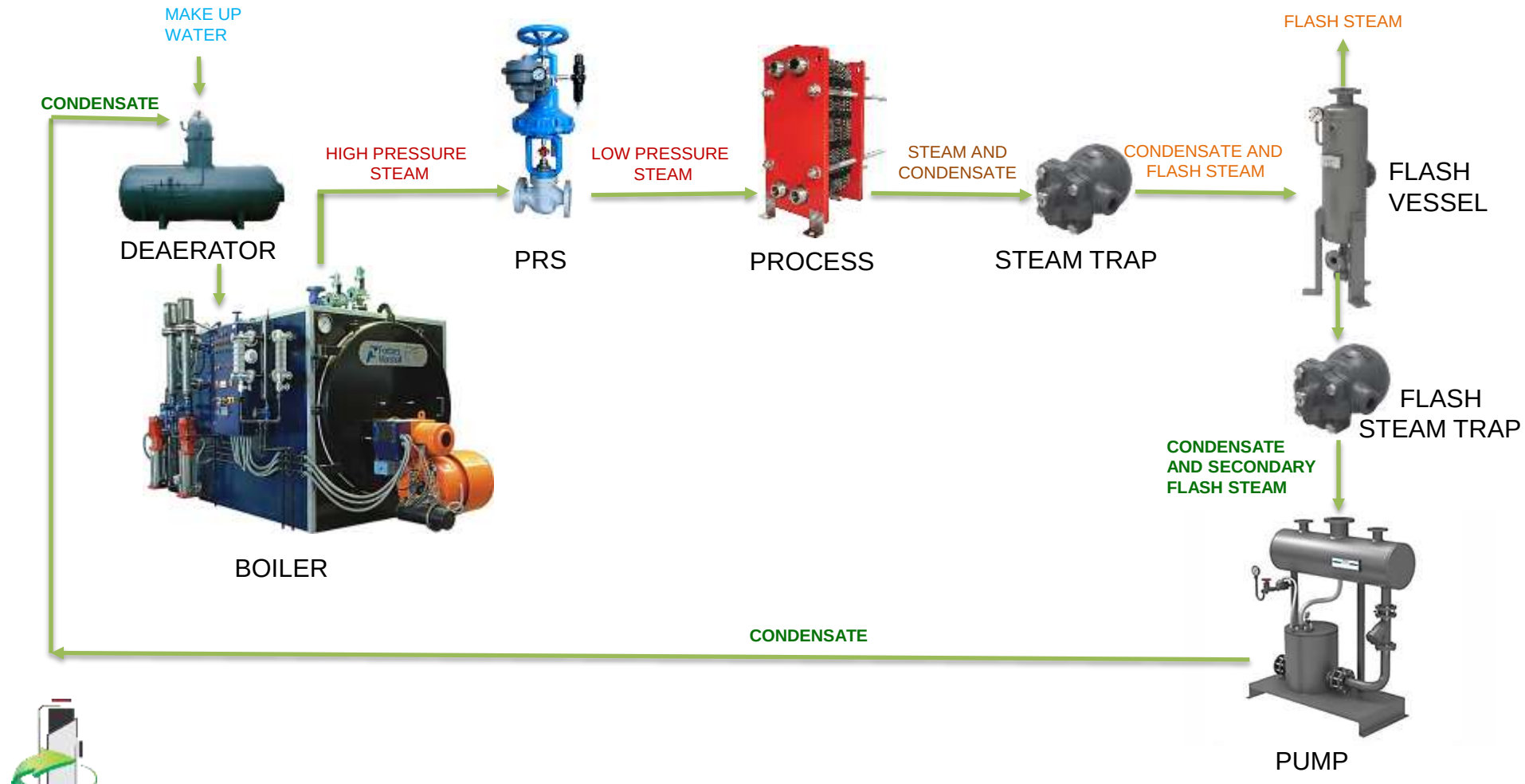
Innovative Solutions.

NEED FOR CONDENSATE AND FLASH RECOVERY



CONVENTIONAL SYSTEMS

Forbes Marshall
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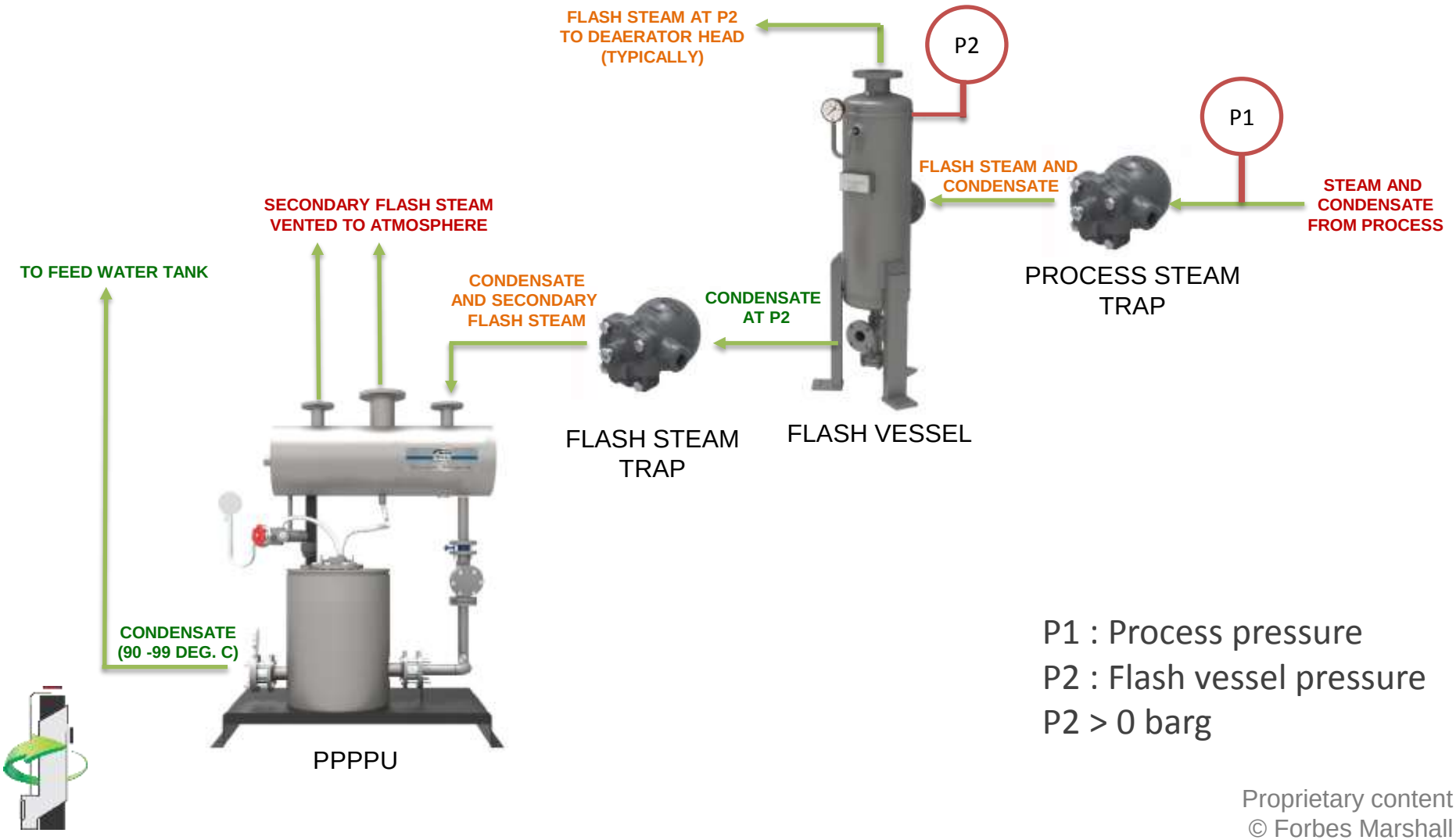
FLASH PRESSURE > ATMOSPHERIC PRESSURE

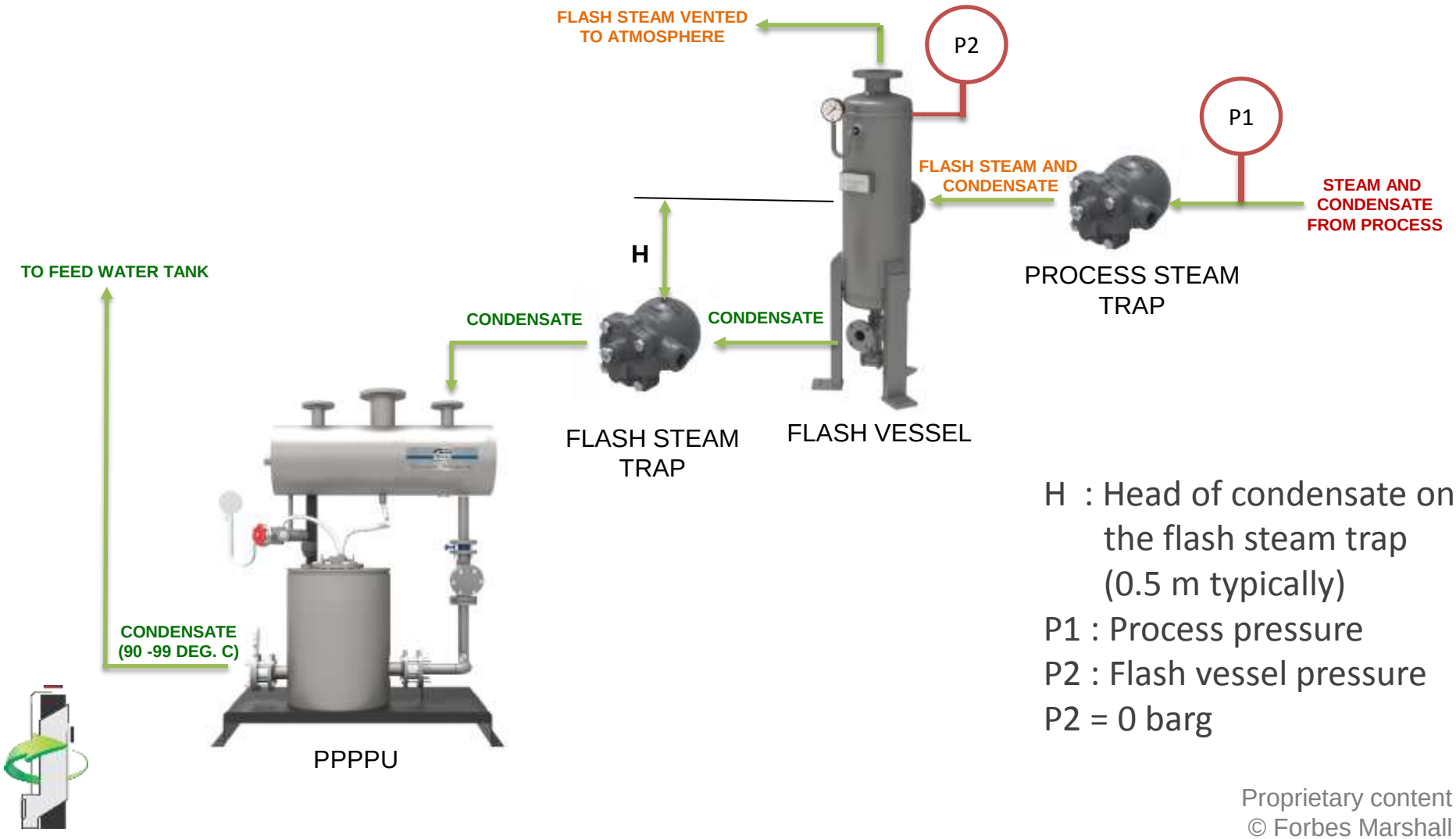


P1 : Process pressure
P2 : Flash vessel pressure
P2 > 0 barg

CONVENTIONAL SYSTEMS

Forbes Marshall
Trusted Partners.
Innovative Solutions.

FLASH PRESSURE = ATMOSPHERIC PRESSURE



H : Head of condensate on the flash steam trap (0.5 m typically)

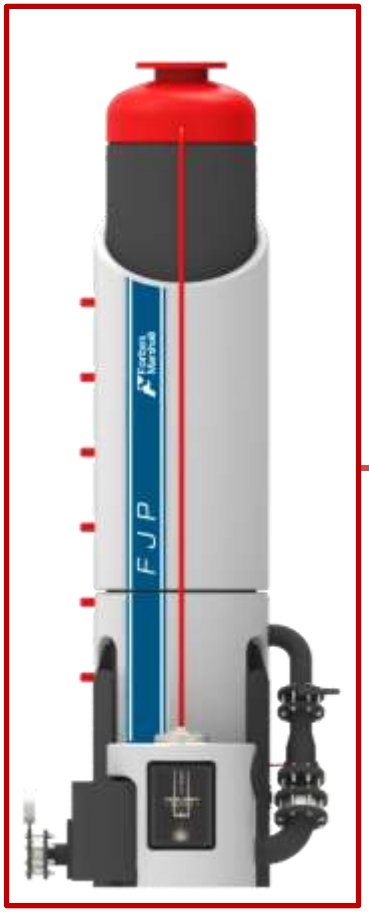
P1 : Process pressure

P2 : Flash vessel pressure

P2 = 0 barg

FLASH JET PUMP

Forbes Marshall
Trusted Partners.
Innovative Solutions.



Integration of a PPPPU and a flash vessel , complete recovery of flash steam and condensate.

Pressure balancing prevents secondary flashing.

Condensate is pumped at temperatures above 100 Deg. C

PRODUCT SPECIFICATIONS

Forbes Marshall
Trusted Partners.
Innovative Solutions.

Specification & Capacities:

- FJP4500 -->4.5 TPH
- FJP3000-->3.0 TPH
- FJP1500-->1.5 TPH

Limiting Conditions :

- FJP4500 FJP Motive :- 3.5-7.5 bar g
- FJP1500 / 3000 Motive :- 3.5-8.7 bar g
- Back Pressure all sizes :- 0-2 bar g

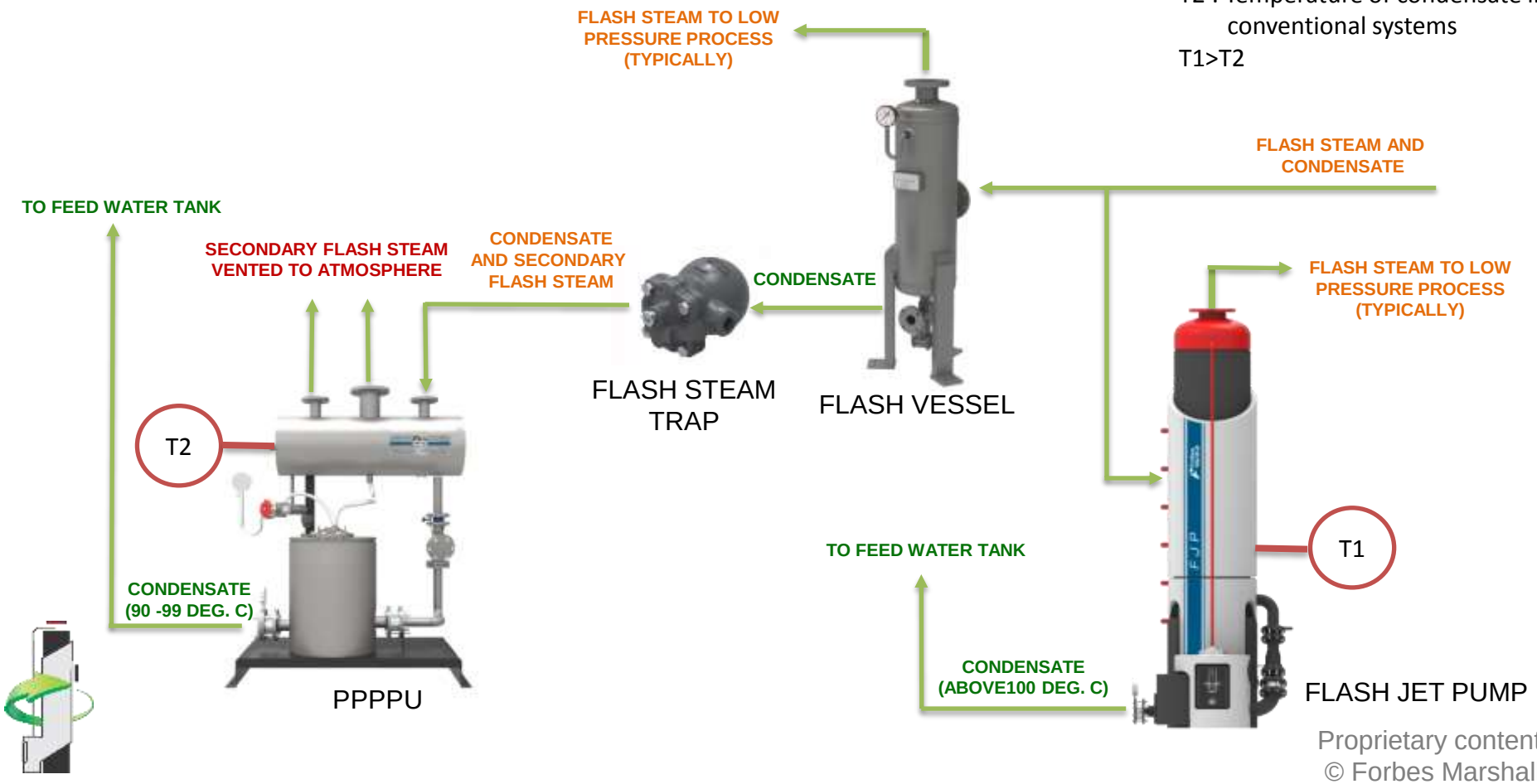
Body Design Conditions :

- FJP4500 FJP : 10 barg @ 180 deg. C
- FJP3000/1500: 8.7 barg @ 198 deg. C

SITE INSTALLATIONS

- Birla Century, Gujarat
- Bindal Silk Mills Pvt. Ltd., Surat

T1 : Temperature of condensate in FJP
T2 : Temperature of condensate in conventional systems
T1>T2



RESULTS

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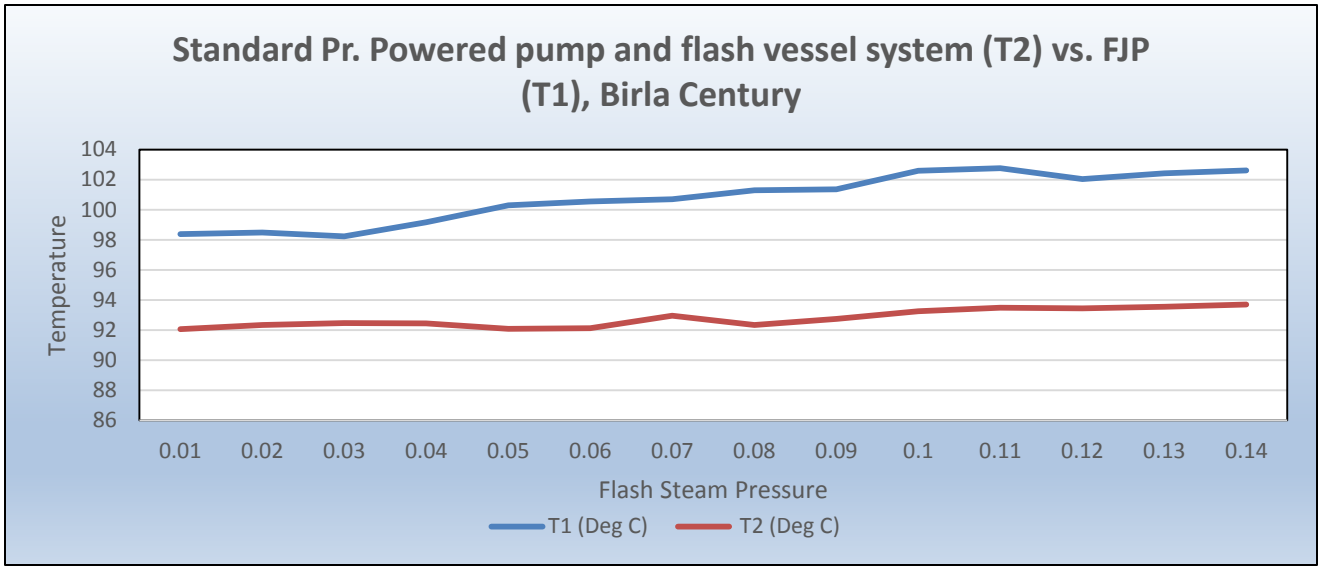
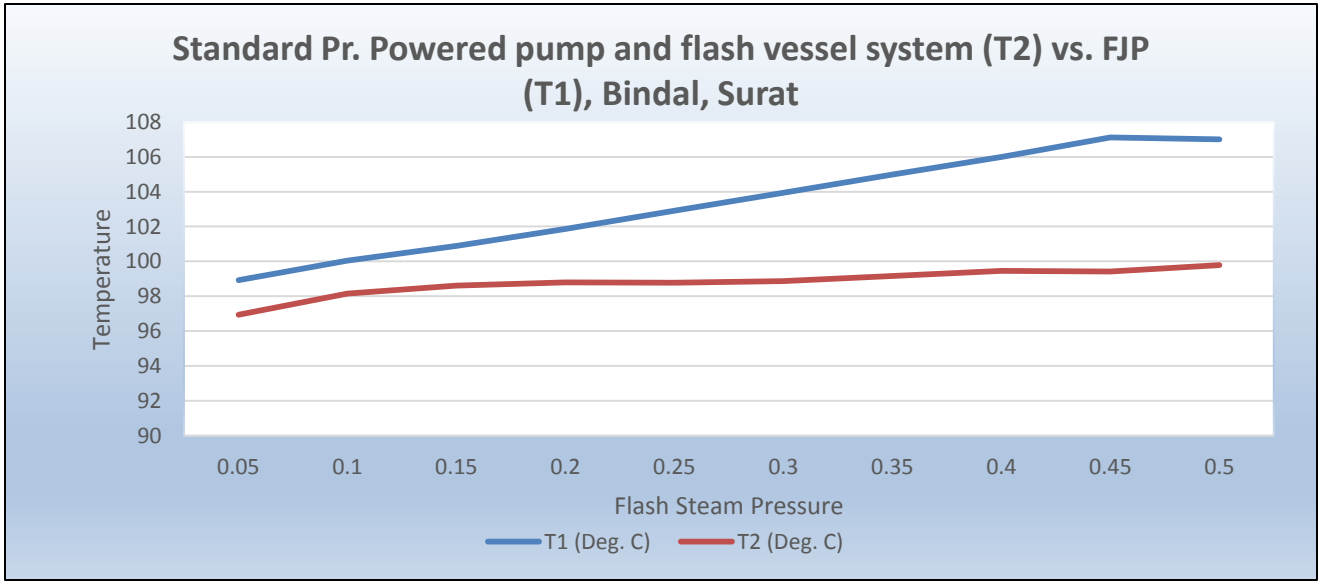
Innovative Solutions.





SAVINGS – BIRLA CENTURY

Forbes Marshall
Trusted Partners.
Innovative Solutions.

E = Efjp – Efvp = m*Cpav * (T2-T1)
= 810*4.22*(375-367) = **27345 KJ/hr**

- E = the energy savings of Flash Jet pump over existing systems (KJ/hr)
- Cpav = 4.22 KJ/kg - K
- T1 = 375 K
- T2 = 367 K
- m = mass flow rate of condensate (kg/hr) = 810 kg/hr

GCV of coal = 15072 KJ/kg
Boiler efficiency = 70 %
Mass of fuel saved = E / (G.C.V * boiler efficiency) = 2.6 kgs/hr
Cost of coal = 5.5 Rs/kg
No. of hours the boiler operates in a year = 8000 / year
Savings in a year = savings in an hour * boiler operation hours
= 8000 * 2.6 * 5.5
= Rs. 1,15,000/-

Payback period = investment / savings =385000/115000
= **3.3 years = 3 years 4 months**

SAVINGS – BINDAL SILK MILLS

Forbes Marshall
Trusted Partners.
Innovative Solutions.

E = Efjp – Efvp = m*Cpav * (T2-T1)
= 1667*4.22*(380-372.8) = **50650 KJ/hr**

- E = the energy savings of Flash Jet pump over existing systems (KJ/hr)
- Cpav = 4.22 KJ/kg - K
- T1 = 380 K
- T2 = 372.8 K
- m = mass flow rate of condensate (kg/hr) = 1667 kg/hr

GCV of coal = 15072 KJ/kg
Boiler efficiency = 65 %
Mass of fuel saved = E / (G.C.V * boiler efficiency) = 5.2 kgs/hr
Cost of coal = 5.5 Rs/kg
No. of hours the boiler operates in a year = 8000 / year
Savings in a year = savings in an hour * boiler operation hours
= 8000 * 5.2 * 5.5
= Rs. 2,27,500/-

Payback period = investment / savings =315000/227500
= **1.4 years = 1 year 4 months**

Ecogenic....

The LED based Cogeneration magic

Innovation from INDIA

GTCS with its 18 years of Consulting expertise has been continually initiating changes to improve the water and environment scenario.

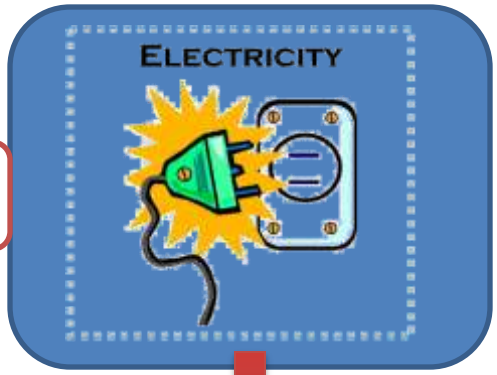
- Green Building Consultant
- Energy Audits by BEE Certified Engineers
- Waste water treatment plants: Design and Build
- MEP Designs
- Chilled Water Re Balancing
- Equipment Efficiency Audits

GTCS

L E D

Light emitting DIODE
Is currently used as

POWER SUPPLY



AC TO DC DRIVER

LIGHTING DEVICE

L E D

The lighting Industry worldwide has lapped up the LED as a replacement for lighting systems made till date.

BUT

DRIVER INEFFICIENCIES ACCOUNT FOR CONSIDERABLE AMOUNT OF POWER ACTUALLY CONSUMED

70% TO 80% OF POWER PROVIDED BY THE DRIVER IS USED BY THE LED TO GENERATE HEAT

TECHNICALLY, LIGHTING ACTUALLY CONSUMES ONLY 15% TO 25% OF THE POWER SUPPLIED

** Exact % distribution data is not very clear to scientists. This is data from LED related information available in public domain*

ASHRAE IAPMO MEMBER IGBC AP MEMBER Indian Plumbing Association GTCS

10 WATTS SHOWN ON POWER METER AS CONNECTED LOAD

7 TO 8 WATTS DC OUTPUT FROM DRIVER

L E D

2 TO 3 * WATTS USED IN LIGHTING ???

5 TO 6 * WATTS USED IN HEATING ???

****Exact % distribution data is not very clear to scientists. This is data from LED related information available in public domain***

WHILE ALL THE CLAMOUR IN THE WORLD IS FOR MANAGING THE HEAT FROM LEDs…….

USING VARIOUS TYPES OF HEAT SINKS

Ecogenic....

The LED based Cogeneration magic

HEAT IS GOOD.....USE IT !!

GTCS

Patent Applied

Ecogenic....

The LED based Cogeneration magic

Potential to SAVE 1500 MW in INDIA

MADE IN INDIA

ONE INPUT THREE OUTPUTS

10 W

- 3 W → Driver Losses
- 5 W → Water Heater (1)
- 2 W → Lighting
  - → Using Solatube or Similar utility (2)
  - → Storage Batteries charged using PV Panels (3)

ASHRAE IAPMO MEMBER IGBC AP MEMBER Indian Plumbing Association GTCS

Patent Applied

Ecogenic....

The LED based Cogeneration magic

MADE IN INDIA

Potential to SAVE 1500 MW in INDIA

1.1 kW Connected System can produce upto 2 deg C rise in temperature of water flowing @ 6 lpm in 5 minutes

1.1 kW Connected System can produce upto 4 deg C rise in temperature of water flowing @ 3 lpm in 5 minutes

1.1 kW Connected System can produce upto 9 deg C rise in temperature of 2 ltrs stored water in 2 minutes

ASHRAE IAPMO MEMBER IGBC AP MEMBER Indian Plumbing Association GTCS

Patent Applied

Ecogenic....

The LED based Cogeneration magic

MADE IN INDIA

Potential to SAVE 1500 MW in INDIA

Ecogenie can give

1. heated water PLUS
2. Light PLUS
3. Enough electricity to charge a battery

CAN BE USED with

- SOLAR Water heater
- SOLATUBES
- SOLAR PV Power Generation Systems
- PREHEATING for BOILERS
- PREHEATING of Thermic Fluids in process and Industry

ASHRAE IAPMO MEMBER IGBC AP MEMBER Indian Plumbing Association GTCS

Patent Applied

Ecogenie....

The LED based Cogeneration magic

MADE IN INDIA

Potential to SAVE 1500 MW in INDIA

Ecogenie can give

1. heated water PLUS
2. Light PLUS
3. Enough electricity to charge a battery

PROPOSED REDUCTION IN

- Water Usage
- Demand for Mixers, Divertors
- Heat Energy lost in Geysers due to usage, sudden heating and scalding issues
- PLUMBING COSTS
- CONNECTED LOAD BY 30%
- ELECTRICITY USAGE BY 45%

ASHRAE IAPMO MEMBER IGBC AP MEMBER Indian Plumbing Association GTCS

"Green is Competitive"