



NATIONAL SCENARIO : PROJECTIONS 2025

Source: Mc Kinsey Report



12.8% Increase in population



15.8% increase in municipal water

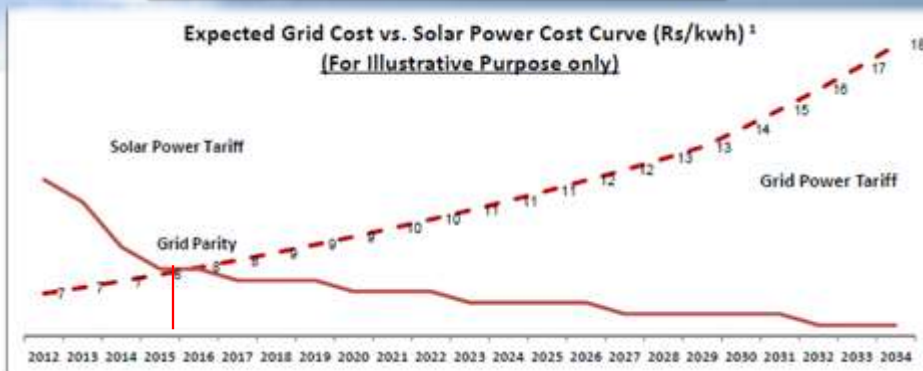
Cost of Water : COMMERCIAL Rs. 60 / KLD
RESIDENTIAL Rs. 7 / KLD

ECONOMICS OF SUSTAINABILITY?...

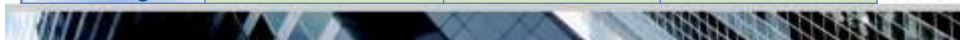
Not Everything in Life that can be
counted
'really Counts'
Immeasurable Dimensions of
sustainability
Ar. Shirish Beri




DYNAMICS OF ECONOMICS



Year	Unit (kWh) Rate	MD (kVA) Rate	Cumulative Rate
FY 2012-13	6.00	150	7.03
FY 2013-14	7.09	200	8.19
FY 2014-15	8.02	200	9.11
% Change	34%	33%	30%



GODREJ BHAVAN MUMBAI



❖ Built Up Area : 41,000 Sq. ft.
❖ No of Floors : G + 6

LEED For Existing Building Operation & Maintenance V-2

Gold	56 /92
Sustainable Sites	07/12
Water Efficiency	09/10
Energy & Atmosphere	18/30
Material & Resources	10/14
Indoor Environmental Quality	07/19
Innovation in Design	05/07
Regional priority Credits	04/04

L & T Office Building (North Block).... MUMBAI



❖ Built Up Area : 2.3 lac Sq. ft.
❖ No of Floors : G + 7

LEED For Existing Building Operation & Maintenance V-3

Gold	73/110
Sustainable Sites	19/26
Water Efficiency	09/14
Energy & Atmosphere	28/35
Material & Resources	05/10
Indoor Environmental Quality	04/15
Innovation in Design	04/06
Regional priority Credits	04/04

Rectifications to improve IAQ & Comfort



Rectification of Duct Leakages



- **INVST.** : Rs. 5 Lacs
- **SAVINGS** : Rs. 2.6 Lacs PA
- **PAYBACK** : 23 Months

Rectification of toilet exhaust fans



- **INVST.** : Rs. 1 Lac
- **SAVINGS** : Rs. 36,000 PA
- **PAYBACK** : 2.7 Years

Project : L&T NB2, Mumbai
Gold Rated IGBC EBO&M

CISCO BGL-13 .. BANGALORE



- ❖ **Built Up Area** : 2.6 lac Sq. ft.
- ❖ **No of Floors** : G + 4

LEED For Existing Building Operation & Maintenance V-2009	
Platinum	87 /110
Sustainable Sites	17/26
Water Efficiency	12/14
Energy & Atmosphere	34/35
Material & Resources	07/10
Indoor Environmental Quality	08/15
Innovation in Design	05/06
Regional priority Credits	04/04

ING VYSA BANK.. BANGALORE

- ❖ Built Up Area : 1.37 lac Sq. ft.
- ❖ No of Floors : G + 6

LEED For Existing Building Operation & Maintenance V-2009

Gold	75 /110
Sustainable Sites	19/26
Water Efficiency	11/14
Energy & Atmosphere	23/35
Material & Resources	06/10
Indoor Environmental Quality	08/15
Innovation in Design	04/06
Regional priority Credits	04/04

OBEROI MALL, GOREGAON



Project Details

Project Title	: OBEROI MALL
Building Use	: ENCLOSED MALL
Location	: GOREGAON, MUMBAI
Size	: 712957 SQFTS
Certification Level	: GOLD under LEED-EBOM

Project Team Profile

Owner	: OBEROI REALTY
Green Consultant	: Godrej & Boyce Mfg. Co. Ltd

**FIRST MALL IN INDIA TO GET
CERTIFIED UNDER LEED EXISTING
BUILDING CATEGORY**

BUILDING ENERGY EFFICIENCY

Design

- Technology



Execution & Commissioning

- Application Engineering



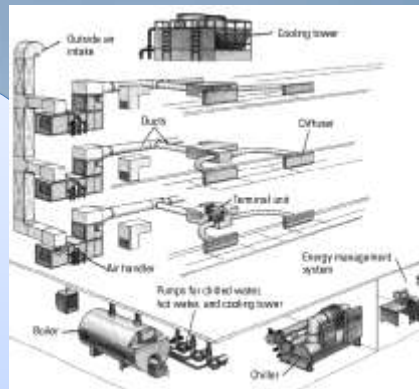
Operation & Maintenance

- M & V

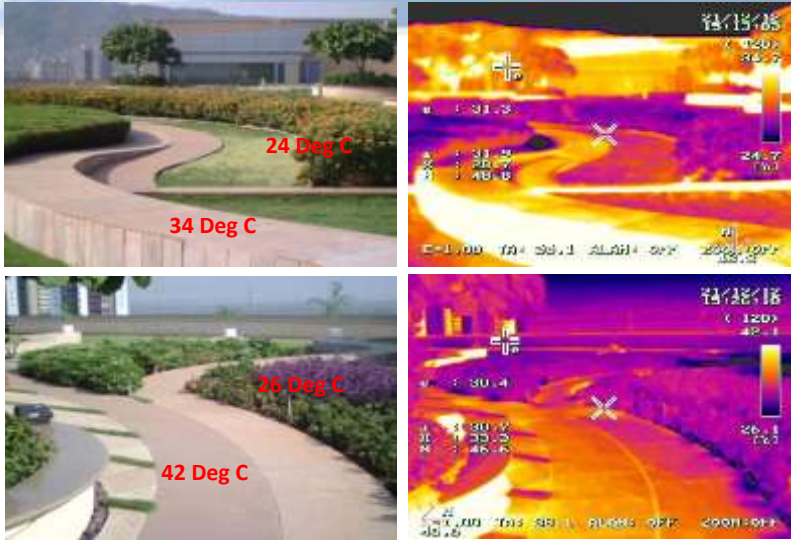


TECHNOLOGIES

- Regenerative elevators
- Hybrid cooling towers
- Evaporative cooling
- Automated shading devices
- Geothermal Cooling
- Radiant cooling
- Magnetic levitation compressors in chillers
- VAV-VFD Controls
- Vertical landscaping
- STP – Reed bed Root Zone

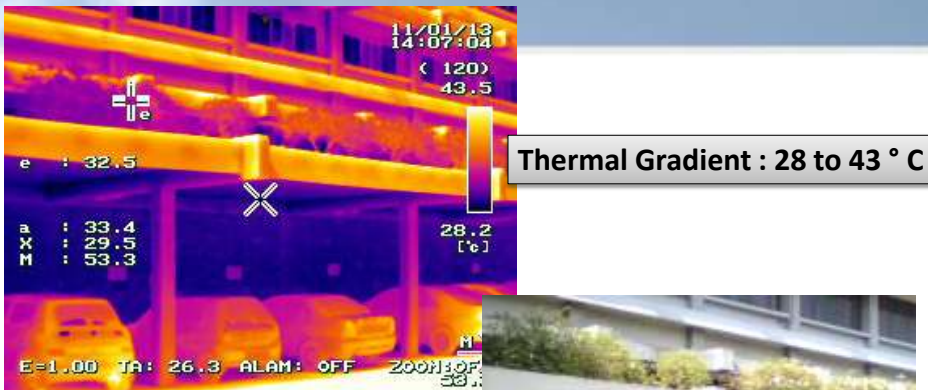


Reducing Heat Island Effect by Roof Garden



Project: Godrej IT Park at Mumbai
Platinum Project

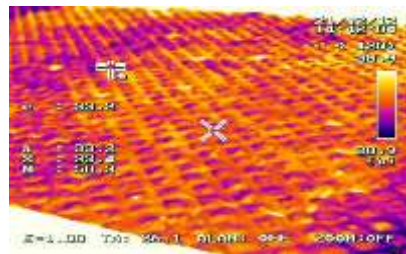
HEAT ISLAND EFFECT NON-ROOF



Thermal Gradient : 28 to 43 ° C



Parking Areas with open grid pavers



Project: Godrej IT Park at Mumbai
Platinum LEED Certified

Geothermal Cooling

Project Proposed: Replacing of Cooling Tower as a Heat Exchanger with Geothermal Heat exchanger in a Water Cooled Chilling System

Benefits

- **Energy Savings** : 3.2 Lac Units per annum
- **Water Savings** : 10 Million Liters per annum
- **Chemical Savings** : 25,000 Kgs per annum
- **Investment** : Rs. 1 Cr.
- **Savings** : Rs. 28 Lacs per annum
- **Payback** : 3.4 Years

*Project Evaluated: Annex Building at Godrej Mumbai
Attempting for IGBC EB*



Water Pumping System- An Efficient Pumping Solution



↗ Monthly Energy Consumption Reduction	: 44%
↗ Water Pumping Efficiency Improvement(kWh/KL)	: 12 to 4
↗ Payback (months)	: 30

Heat Pump

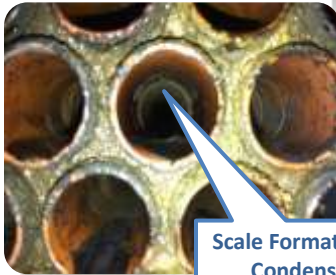
➤ PNG Consumption	: 1.8 Lac SCM/Ann.
➤ Proposed system	: 15 KLD
➤ PNG saving/day	: 95 SCM
➤ Cost of PNG/SCM	: Rs. 35/SCM
➤ Energy consumption of heat pump/day	: 182 kWh/day
➤ Working day/year	: 350 days
➤ Payback	: 2.4 Years



Operation & Maintenance : Area of Concern



CT Wr. Fills



Scale Formation in Condenser

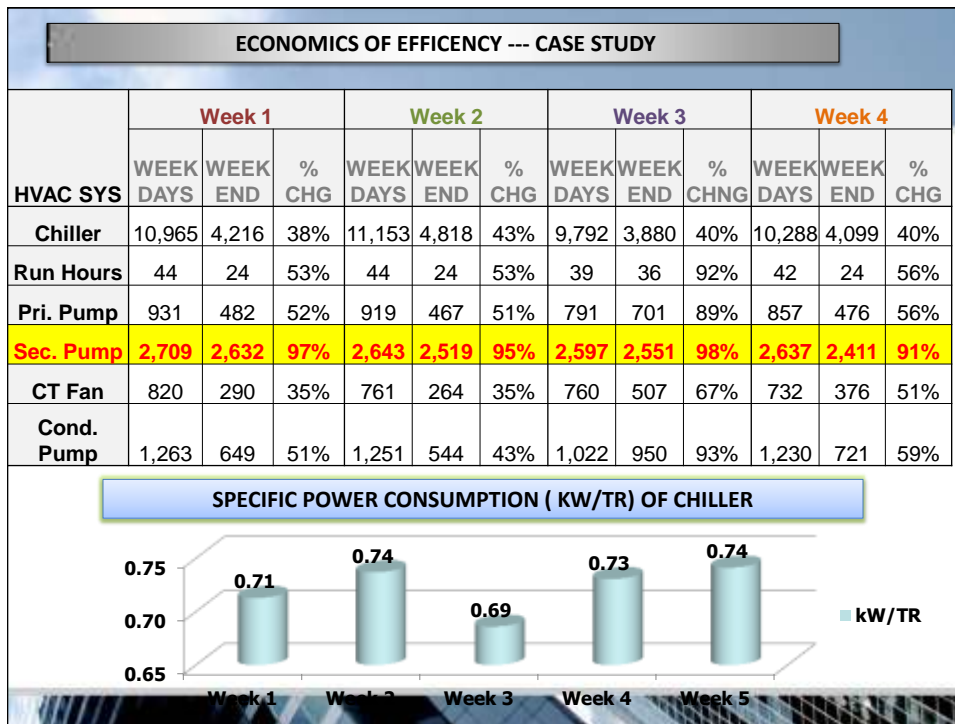


SCORE CARD --- ENERGY & WATER

Energy Cons.	Units	2009-10	2010-11	2011-12	2012-13	2013-14
Energy	kWh Units	48,703	45,406	42,928	44,257	43,655
	% diff	Base Year	-7%	-12%	-9%	-10%
Max. Demand	kVA	197	164	158	164	136
	% diff	Base Year	-17%	-20%	-17%	-31%

Water	Units	2009-10	2010-11	2011-12	2012-13	2013-14
BMC	kL	229	118	113	134	111
	% diff	Base Year	-49%	-51%	-41%	-52%





SAVINGS IN PUMP ENERGY IN HVAC SYSTEM

HVAC System	Units	Weekdays	Weekends	% Change
Before				
Run Hours	hr	44	21	46%
Chiller	kWh	11,490	4,081	36%
Primary Pump	kWh	932	539	58%
Secondary pump	kWh	2,838	2,585	91%
Condenser Pump	kWh	702	233	33%
CT Fan	kWh	1,394	684	49%
After				
Chiller	kWh	43	22	51%
Run Hours	hr	9,681	3,557	37%
Primary Pump	kWh	887	458	52%
Secondary pump	kWh	2,062	1,519	74%
Condenser Pump	kWh	542	173	32%
CT Fan	kWh	1,449	867	60%

ANNUAL SAVINGS		
Energy	kWh	288,576
Monetary	INR	2,020,032

GENERIC CHALLENGES.....

- ❖ Stakeholder Awareness
- ❖ Project Management : Motivation
- ❖ Energy / Water Accountability at System Level
- ❖ Selection & Sourcing of 'Appropriate' Technology / material
- ❖ Capacity Building : Skilled Workforce
- ❖ Integration of Systems with IBMS
- ❖ Documentation

*It's not about the **points** to get a Building certified...*

*The **points** are not the **point**
The **points** are not **sustainable**.
Are we missing the actual **point**?*

Courtesy : Ar. Karan Grover

Bouquet of services under one roof !



Green Building Design



MEP Design



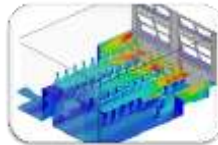
Building Information Modeling (BIM)



Building Simulation



Building Systems Testing Adjusting Balancing & Commissioning



CFD Analysis



Thermography Fire / Safety Energy / Water Audits

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