KNOWLEDGE SERIES

2019

nzeb

net zero energy buildings

USAID FROM THE AMERICAN PEOPLE

GOVERNMENT OF INDIA
MINISTRY OF POWER

An initiative under

MAITREE

MARKET INTEGRATION AND TRANSFORMATION FOR ENERGY EFFICIENCY

maitree.edsglobal.com

eds environmental design solutions

Implementing Partner

12th July, 2019

GODREJ PLANT 13 ANNEXE : an IGBC NZE Rated Building

KNOWLEDGE SERIES

SESSION MODERATOR

DEEPA PAREKH
Sr. Project Manager
Environmental Design Solutions

EXPERT SPEAKER

RUMI ENGINEER

Senior General Manager

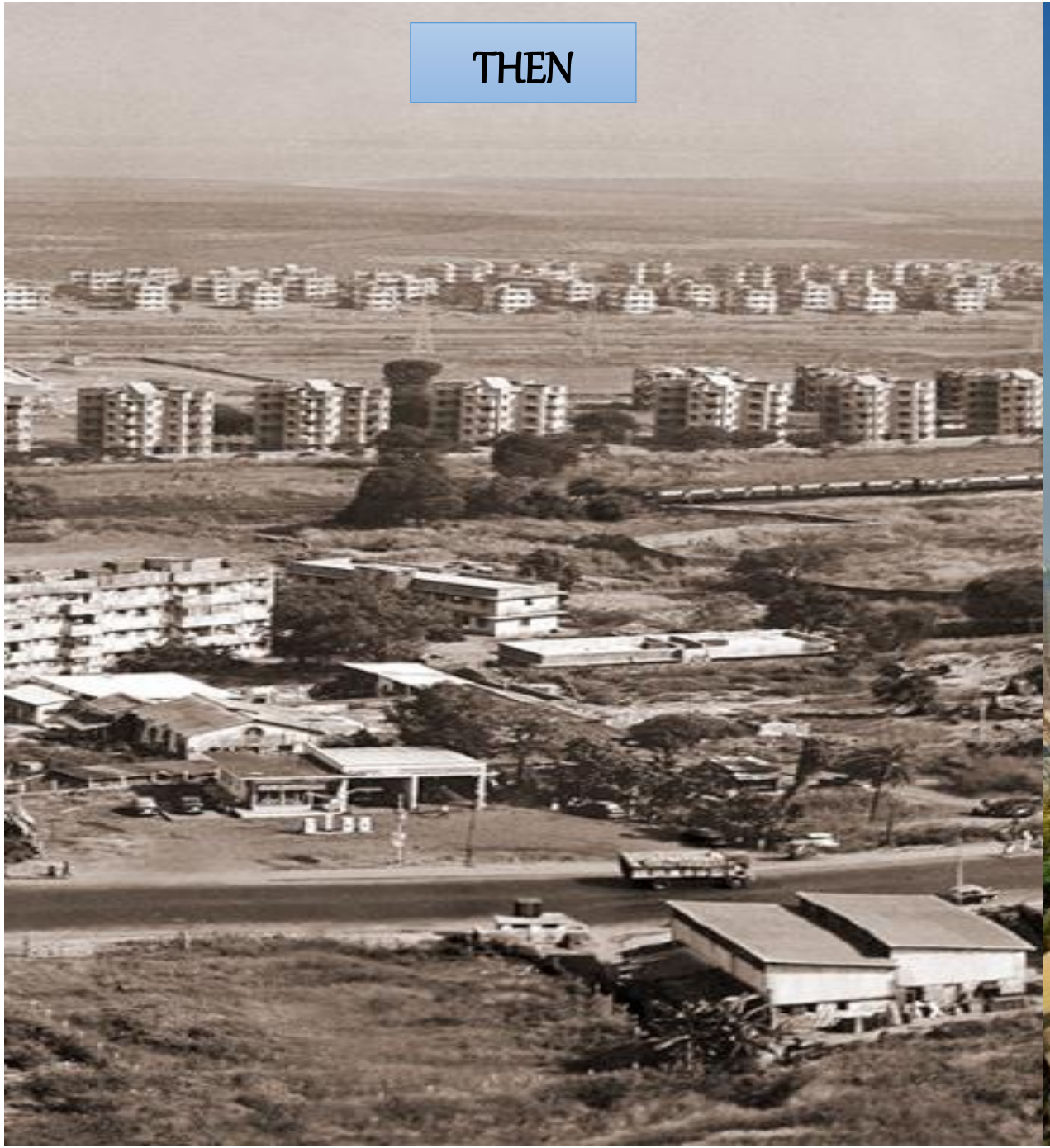
Greener India & Energy Management

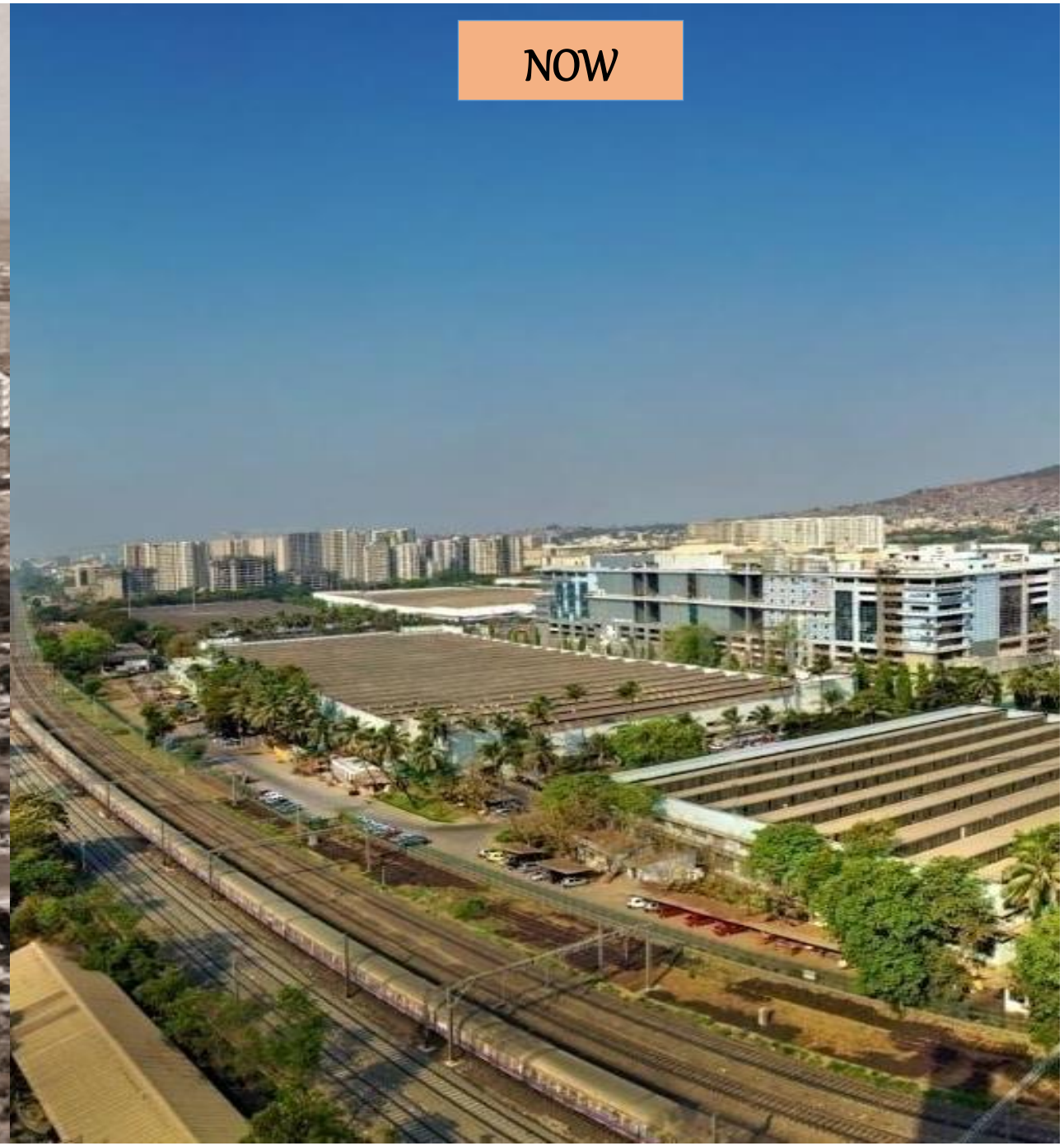
Godrej

BRIEF BACKGROUND ABOUT THE PROJECT

- A sustainably designed office-cum convention centre built in 2008
- Achieved IGBC-EB Platinum & BEE 5 star rating
- Certified Net Zero Energy by IGBC in 2019


GREEN FROM
THE GROUND UP.
Godrej


THEN


NOW

SUSTAINABLE DESIGN STRATEGIES IMPLEMENTED IN THIS PROJECT

Pl 13 Annexe Building – a journey to 'Net Zero'

IGBC EB PLATINUM : 2015
(Score : 90/100)

BEE ENERGY 5 STAR : 2016
(EPI: 97 kwh/sqm/pa)

IGBC NZEB 'NET ZERO' : 2019
(EPI: 74 kwh/sqm/pa)
ECBC Base case EPI 137

THEMES

- **ENERGY EFFICIENCY**
- **WATER EFFICIENCY**
- **ZERO WASTE APPROACH**
- **INTEGRATED BMS**
- **HEALTH & COMFORT**

1st Net Zero Bldg in the country under IGBC

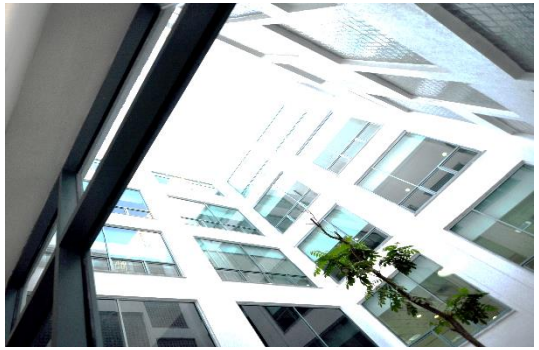
Right Steps in the Right Order

- Reduce Loads
- Be Lean
- Demand Management
- Meet Loads Efficiently
- Efficiency Improvement
- Use Clean Energy
- Be Green

Building Envelope

Sr. No.	Building Components	Conventional	"U" value	EE Bldg.	"U" value	% Reduction in Heat Gain
1.	External Wall	Clay Bricks	2.03 w/sq.m.*k	AAC Blocks	0.79 w/sq.m.*k	61%
2.	Roof	No Insulation	3.92 w/sq.m.*k	2" XPS/PUC/PIR	0.33 w/sq.m.*k?	92%
3.	Glazing	Single Glazing SHGC: 0.67	5.7 w/sq.m.*k	Double Glazing SHGC: 0.3	1.7 w/sq.m.*k	70%

Strategic Initiatives : Building Envelope, Daylight across the Building space

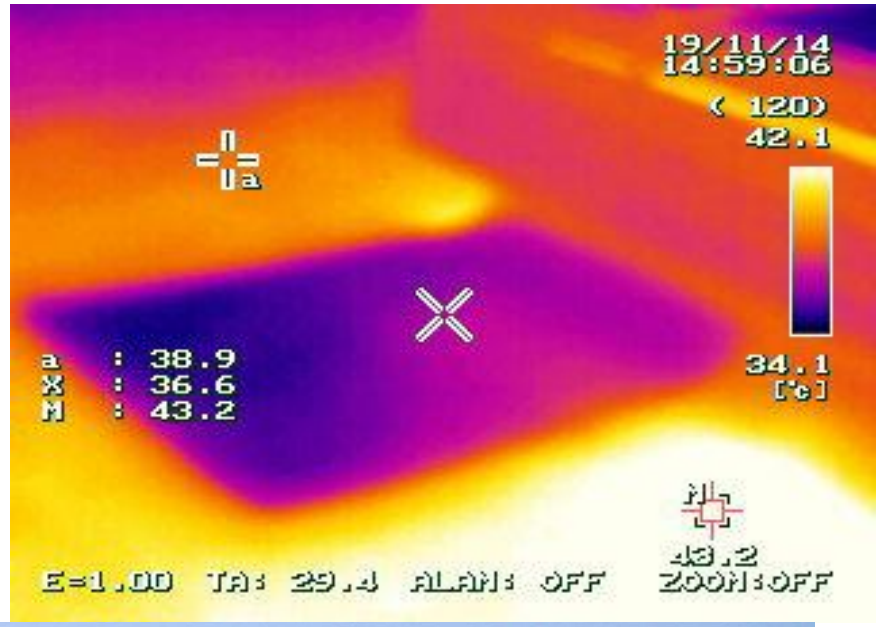


DAYLIGHT SHAFT

ATRIUM

Max. Use of Daylight

Strategic Initiatives - Reduce Heat Island Effect



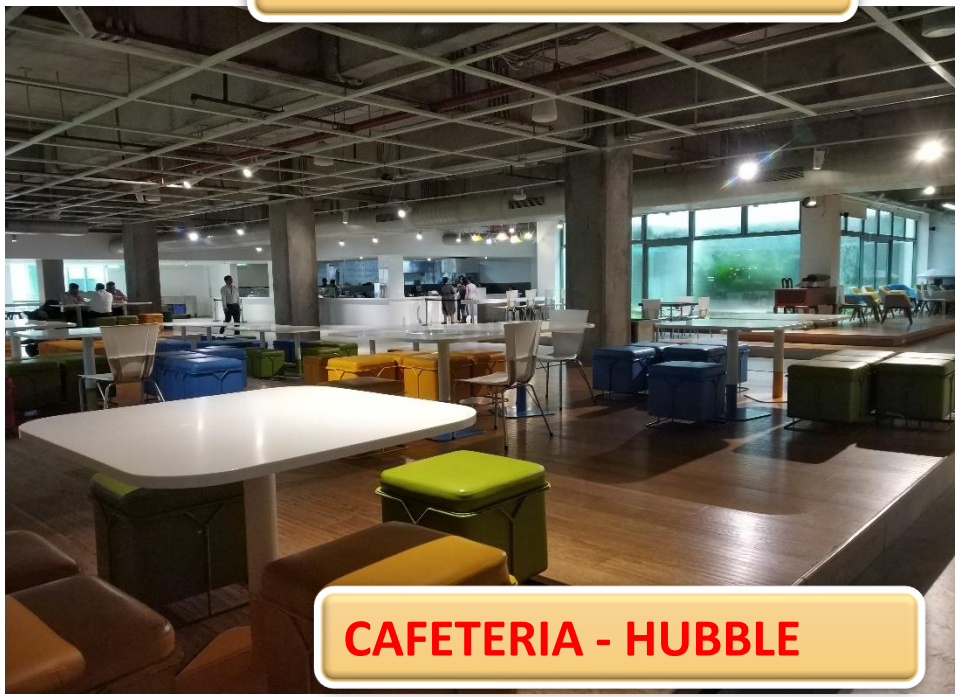
High SRI Paint @ Terrace

Landscape @ Terrace

76 % OF TOTAL LANDSCAPE AREA IS WITH NATIVE/ ADAPTIVE SPECIES

LED @ WORKMEN’S DINING AREA

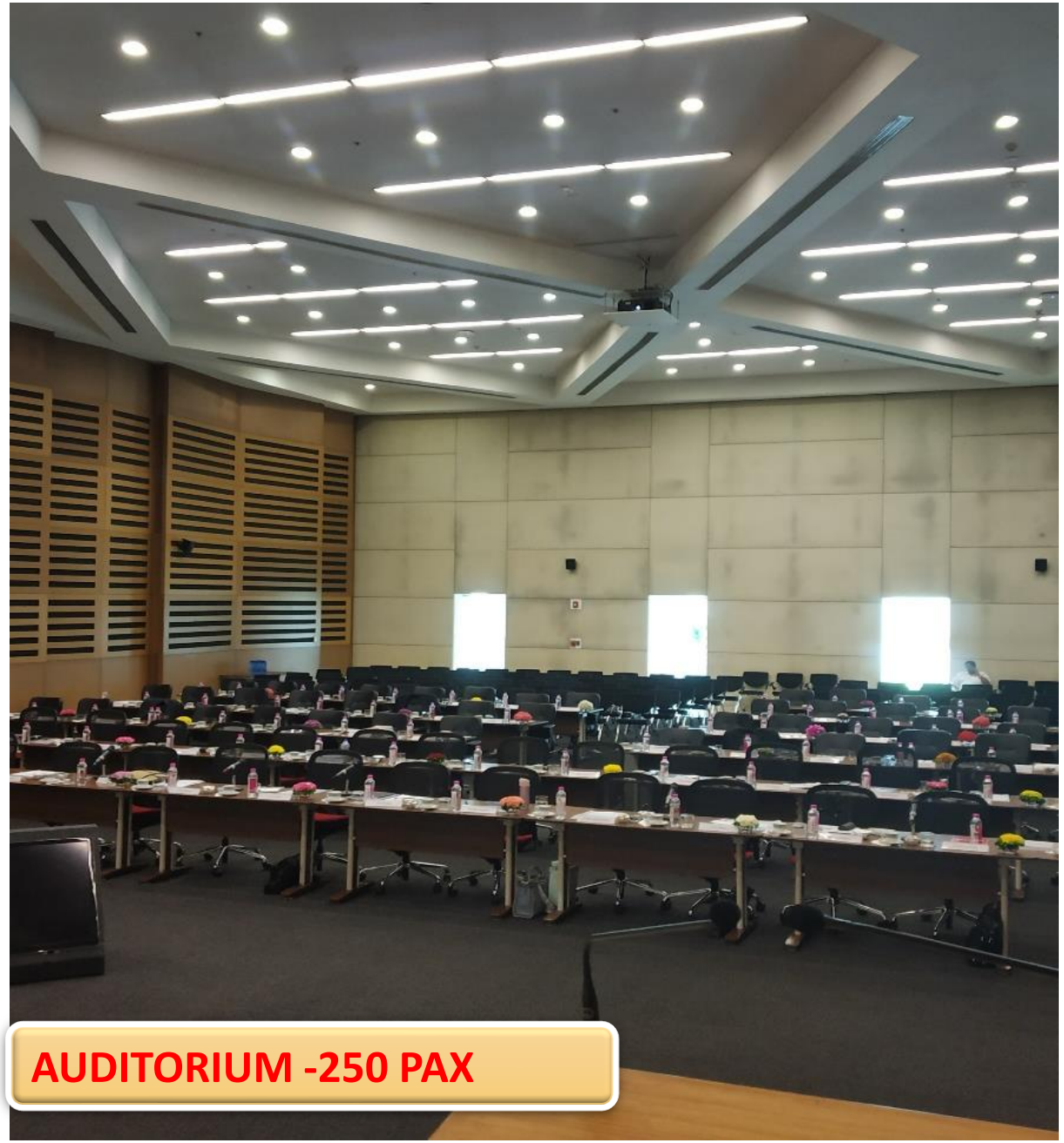
MANAGER’S DINNING



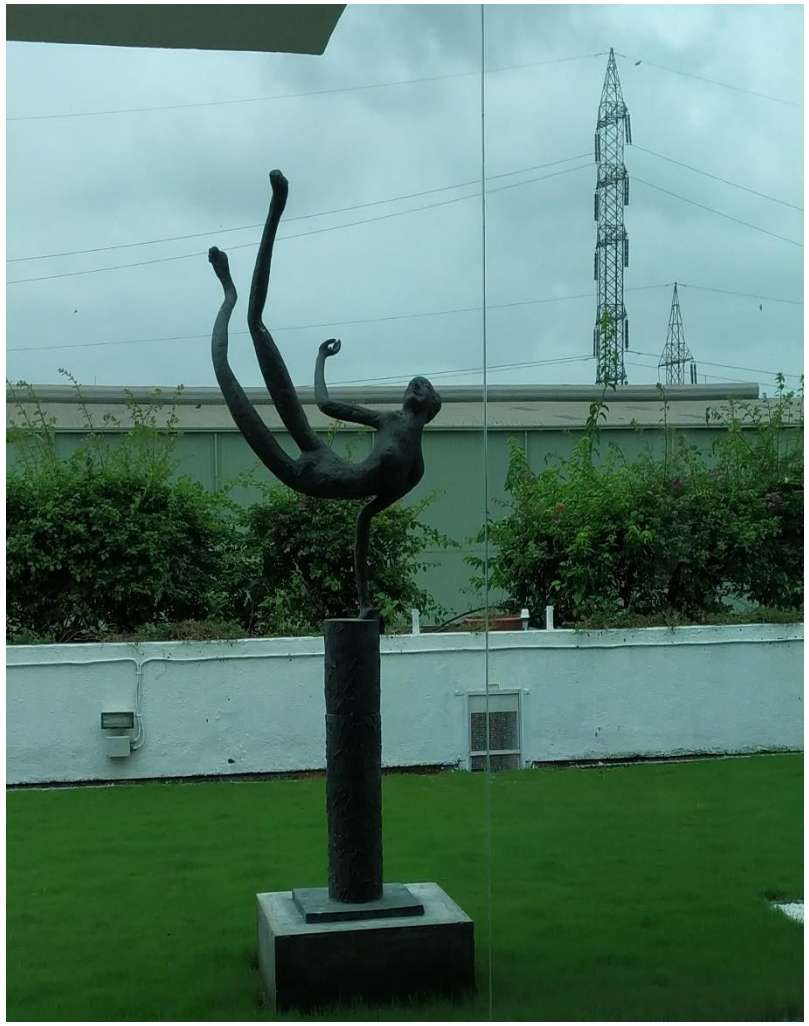
CAFETERIA - HUBBLE

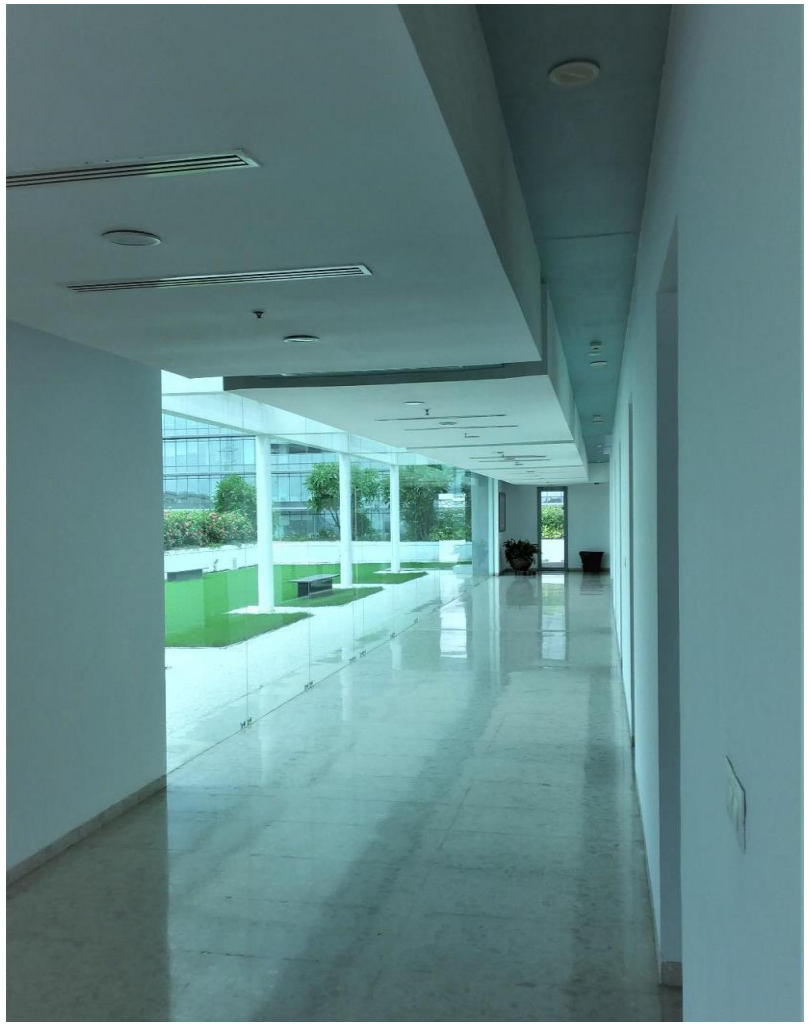
BANQUET AREA

2019/7



AUDITORIUM -250 PAX





LANDSACAPE & PASSAGE AREA @ 4 FLOOR

DATA MANGEMENT & ANALYTICS

METHODOLOGY CALCULATING TOTAL ENERGY CONSUMPTION OF A BUILDING (All Figs. In 'kWh')

- TOTAL BLDG. ENERGY CONSUMPTION = TOTAL METERED ENERGY (GRID SUPPY) + DG ENERGY – ONSITE RENEWABLE ENERGY

THERMAL ENERGY NOT CONSIDERED IN CALCULATIONS

 # Period : One Year Sept-17 to Aug-18

Details	Consumption in kWh
Total Energy consumption as per ECBC	**3,364,834**
Actual Energy Consumption	**18,25,276**
Savings per Annum (ECBC – Actual)	**15,39,558**
Energy Savings in Percentage	**45.75 %**

- **BUILT UP AREA : 24,443 sq. mtrs.**
- **AC AREA : 16,050 sq. mtrs.**

ENERGY PERFORMANCE INDEX (EPI)

ENERGY PERFORMANCE INDEX (EPI) = $\frac{\text{ACTUAL ENERGY PERFORMANCE INDEX}}{\text{DESIGN ENERGY PERFORMANCE INDEX}}$

ACTUAL EPI ≤ DESGIN EPI

EPI BASE CASE	**137.66**
EPI ACTUAL	**74.67**
EPI RATIO	**0.54**

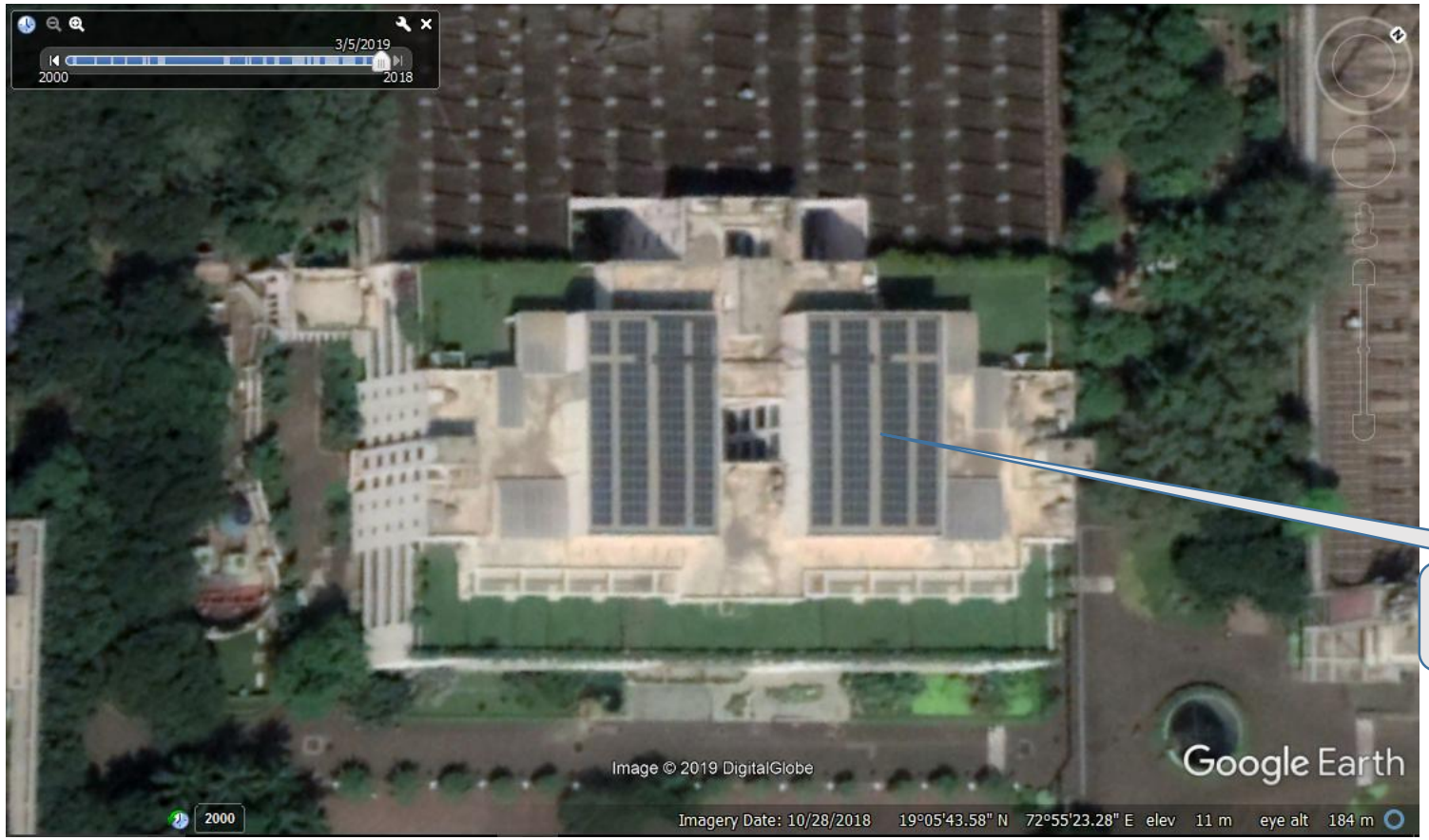
EPI RATIO	POINTS
0.95	15
0.90	30
0.85	45
0.80	60
0.75	75

ENERGY SCORE CARD

ALL FIGS. IN 'kWh'

 # Period : One Year Sept-17 to Aug-18

TATA ENERGY	ON-SITE ENERGY	OFF-SITE ENERGY
18,25,276	1,48,487	16,76,789
	8%	92%



120 kWp Solar Plant

HOW EASY OR CHALLENGING IS IT TO OPERATE A NET ZERO FACILITY?

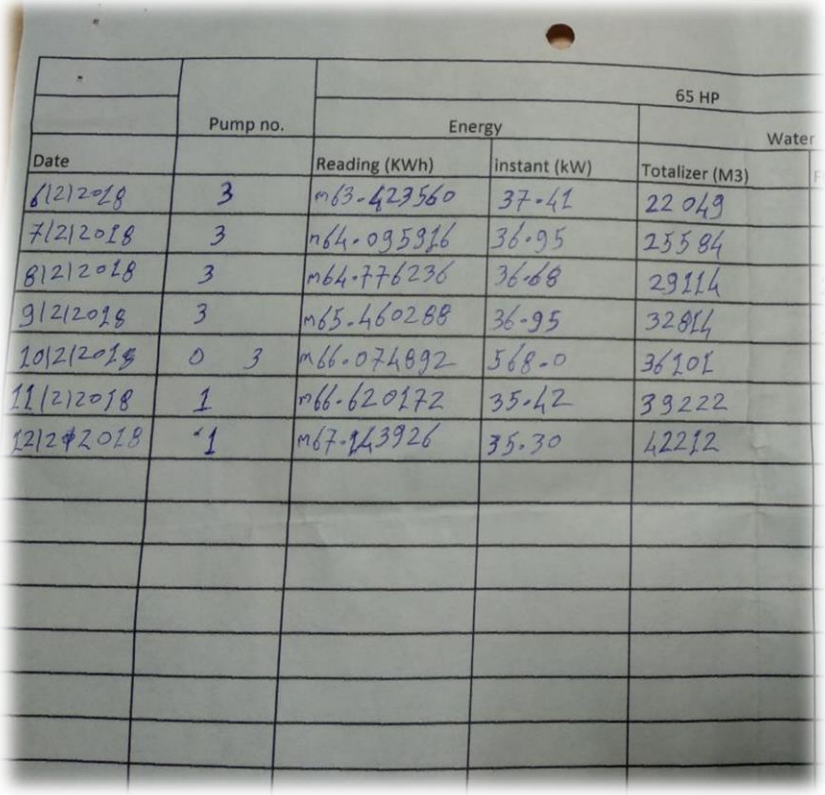
DATA MANAGEMENT

- ❑WHAT TYPE OF DATA…??
- ❑HOW MUCH DATA…??
- ❑WHAT TO DO WITH DATA…??

METERS @ STRATEGIC LOCATIONS

CONVENTIONAL :

MANUAL DATA RECORDING

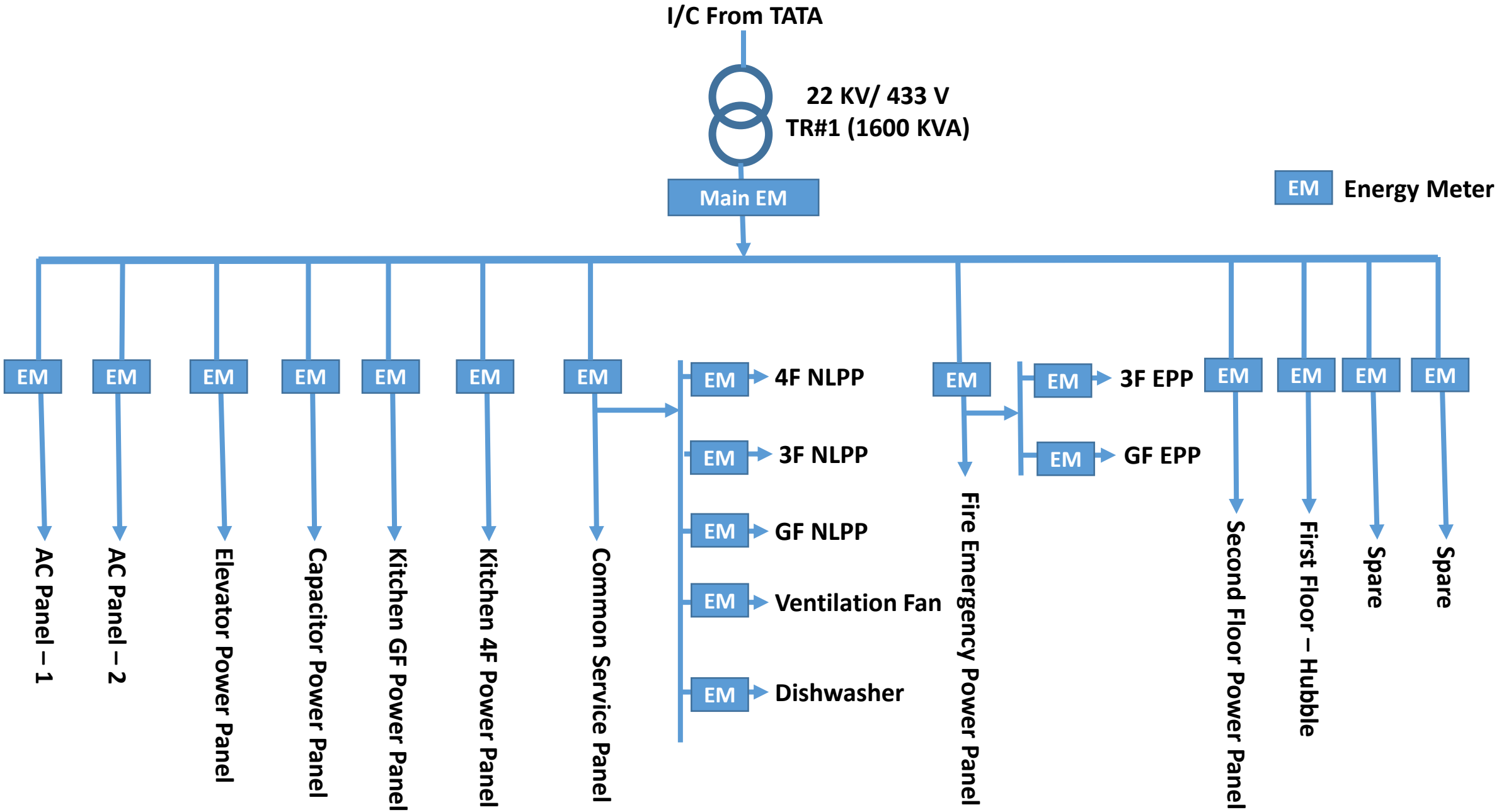


	Pump no.	65 HP		
		Energy		Water
Date		Reading (KWh)	instant (kW)	Totalizer (M3)
6/2/2018	3	m63-423560	37-41	22049
7/2/2018	3	m64-095316	36-95	25584
8/2/2018	3	m64-776236	36-68	29114
9/2/2018	3	m65-460288	36-95	32814
10/2/2018	0 3	m66-074892	568-0	36101
11/2/2018	1	m66-620172	35-42	39222
12/2/2018	1	m67-143926	35-30	42212

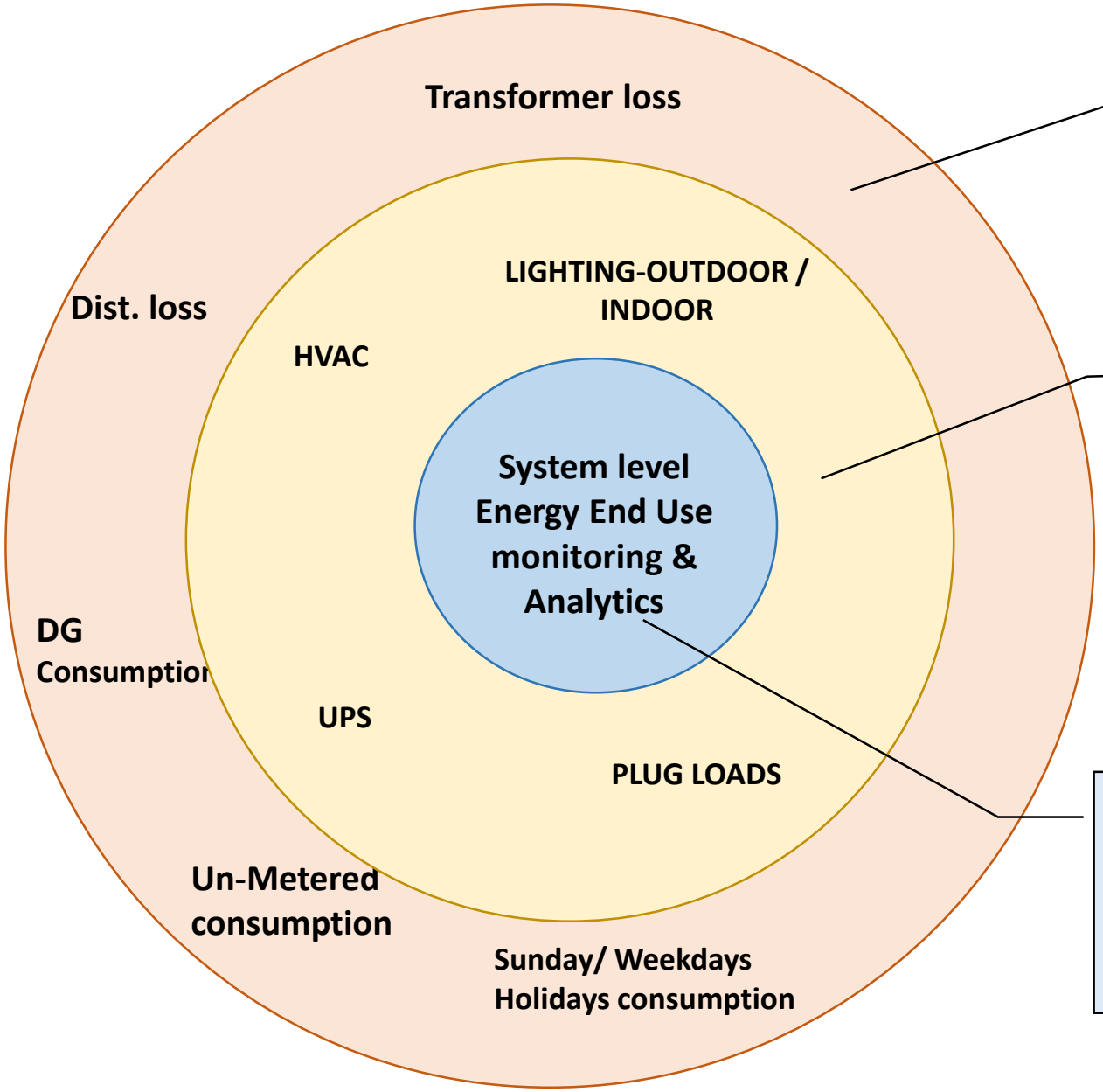
ESSENCE : ONLINE REAL-TIME ANALYTICS

SYSTEM LEVEL METERING & ONLINE MONITORING

Sub Metering : Monitor & Enhance Energy Performance



SYSTEMIC APPROACH



MACRO LEVEL : INCOMING SUPPLY & DISTRIBUTION

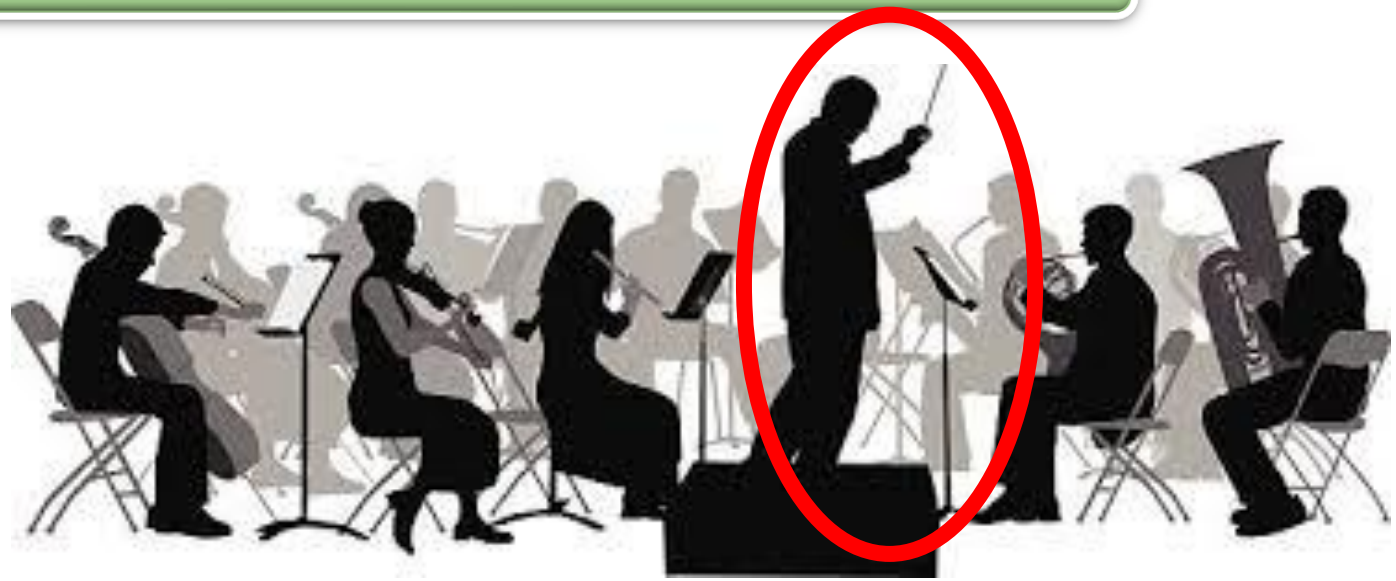
CENTRALIZED UTILITY LEVEL

MICRO LEVEL ENERGY

LET US LISTEN TO MUSIC

BEST PERFORMANCE BY ARTISTS…..

SYMPHONY ……ORCHESTRATED APPROACH



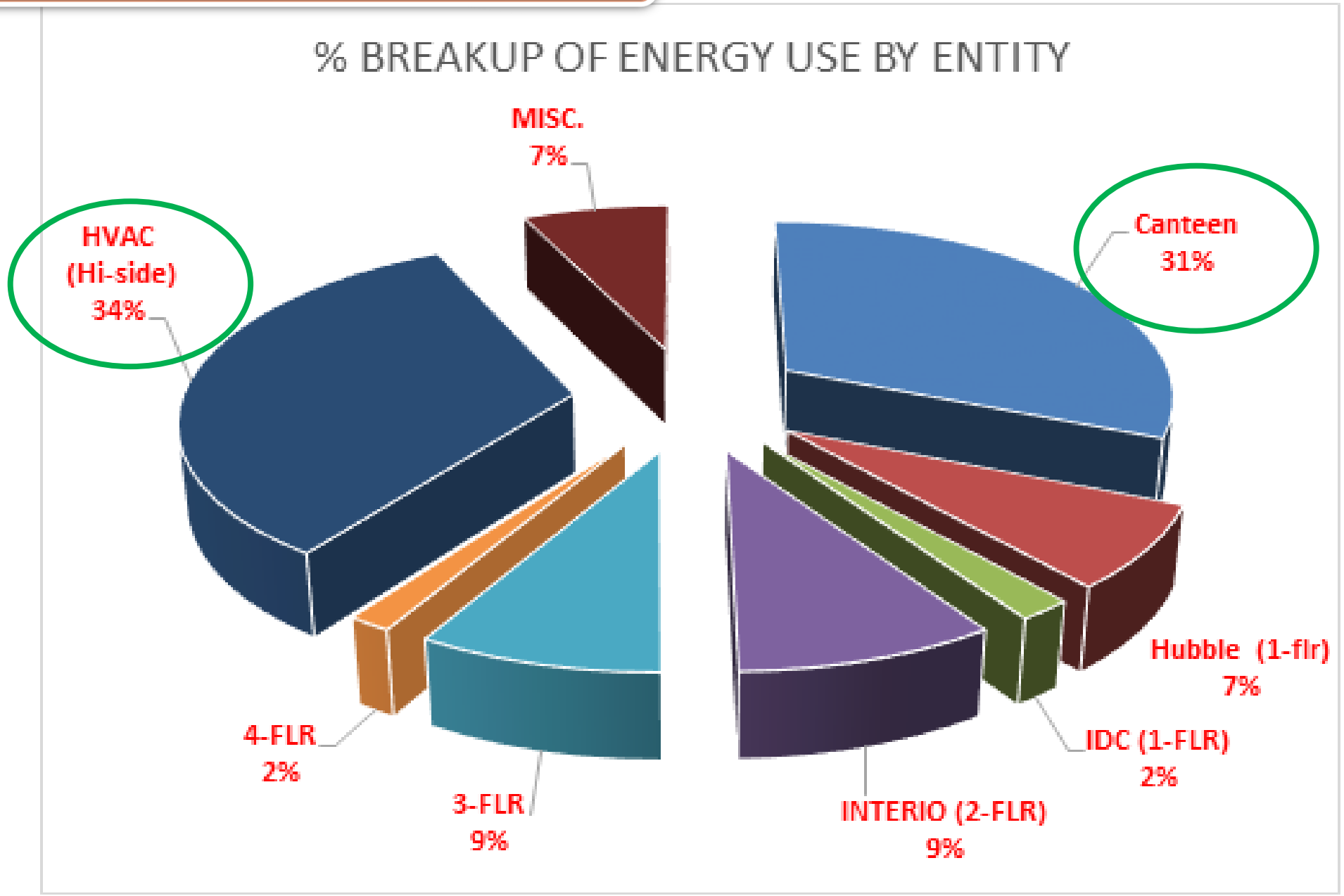
DATA : EAST TO WEST, NORTH TO SOUTH…..

DATA OBESITY SYNDROME

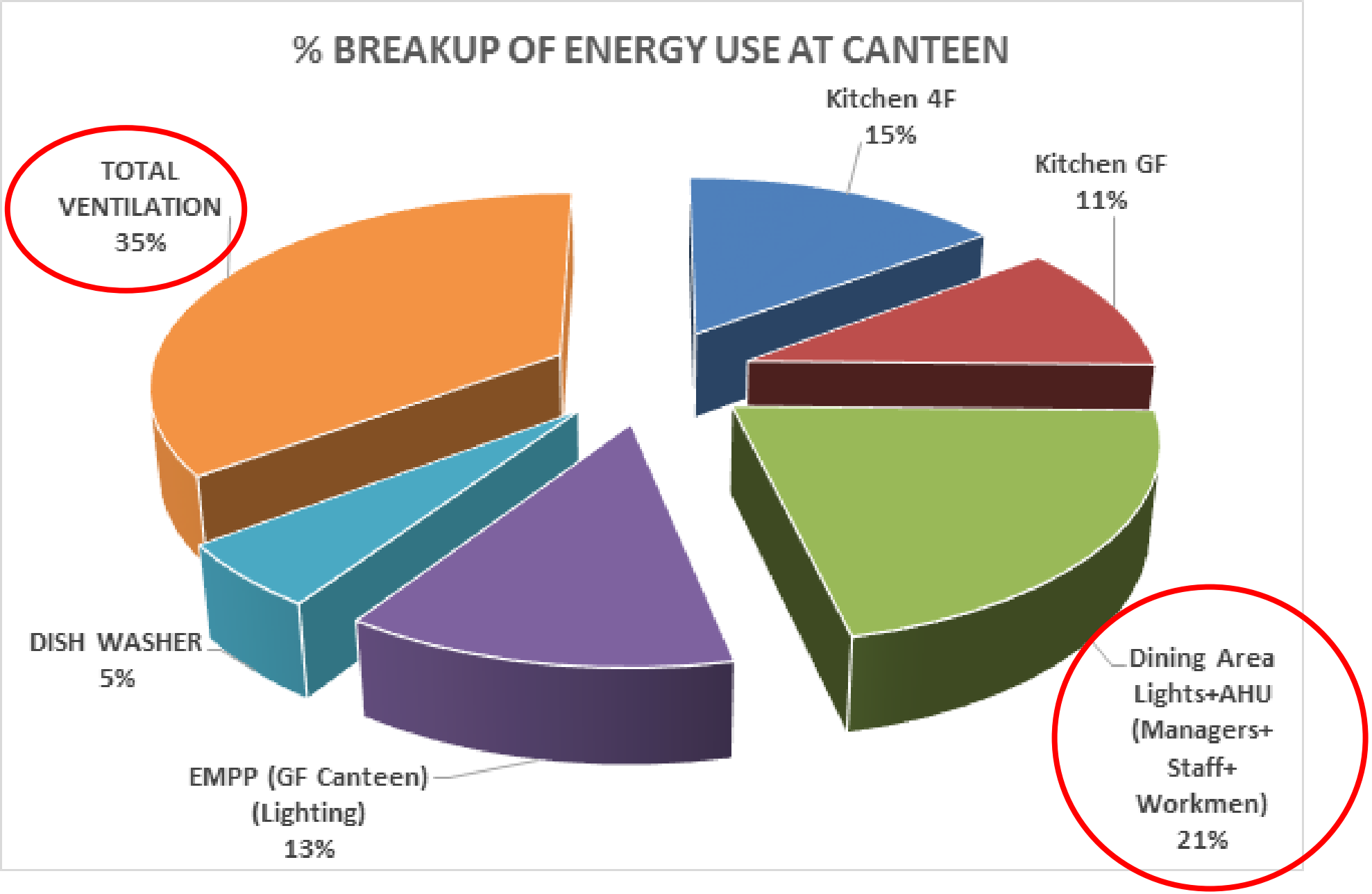
PL-13 ANNX. ENERGY DATA SHEET

Date	TATA PWR. @ Main L T Panel	Solar PWR.	TOTAL (TATA+ SOLAR)	AC Panel -1	AC Panel -2	TOTAL AC	Emgcy. Pwr. Panel	Common Services	Kitchen 4F	Kitchen GF	2nd FIR. Interio(LGT. +PWR.+AHU)	1st FLR HUBBLE (LGT.+ PWR)	Elevator
01/01/2018	3958	347	4305	327	775	1102	1063	790	300	153	493	401	20
02/01/2018	4102	369	4471	328	846	1174	1085	854	288	158	531	376	22
03/01/2018	4257	336	4593	328	846	1174	1149	875	287	168	509	423	21
04/01/2018	4131	329	4460	324	902	1226	1015	854	279	162	514	397	20
05/01/2018	4433	337	4770	332	950	1282	1120	962	289	163	541	401	21
06/01/2018	4282	369	4651	333	876	1209	1104	982	307	181	476	399	24
07/01/2018	976	389	1365	77	70	147	542	342	38	93	21	141	8
08/01/2018	4306	360	4666	844	358	1202	1094	977	299	156	537	393	19
09/01/2018	4679	334	5013	329	951	1280	1137	1106	414	162	548	391	22
10/01/2018	4456	349	4805	325	934	1259	1122	998	309	177	534	400	20
11/01/2018	4406	339	4745	334	895	1229	1100	1000	291	173	527	417	22
12/01/2018	4602	294	4896	352	986	1338	1106	1055	293	171	526	400	22
13/01/2018	4668	298	4966	348	1058	1406	1074	1051	315	175	519	415	23
14/01/2018	1107	291	1398	77	94	171	548	360	43	98	32	118	10
15/01/2018	4940	287	5227	452	921	1373	1127	1207	301	177	600	436	22
16/01/2018	4764	310	5074	468	868	1336	1096	1099	305	170	629	429	20
17/01/2018	4716	370	5086	475	887	1362	1105	1057	292	175	642	438	21
18/01/2018	4924	390	5314	546	986	1532	1102	1167	298	169	611	422	23
19/01/2018	4990	332	5322	631	1099	1730	1109	1041	290	165	580	432	22
20/01/2018	4740	409	5149	358	1077	1435	1110	1165	291	162	505	431	24
21/01/2018	1186	356	1542	75	86	161	591	423	48	98	62	124	11

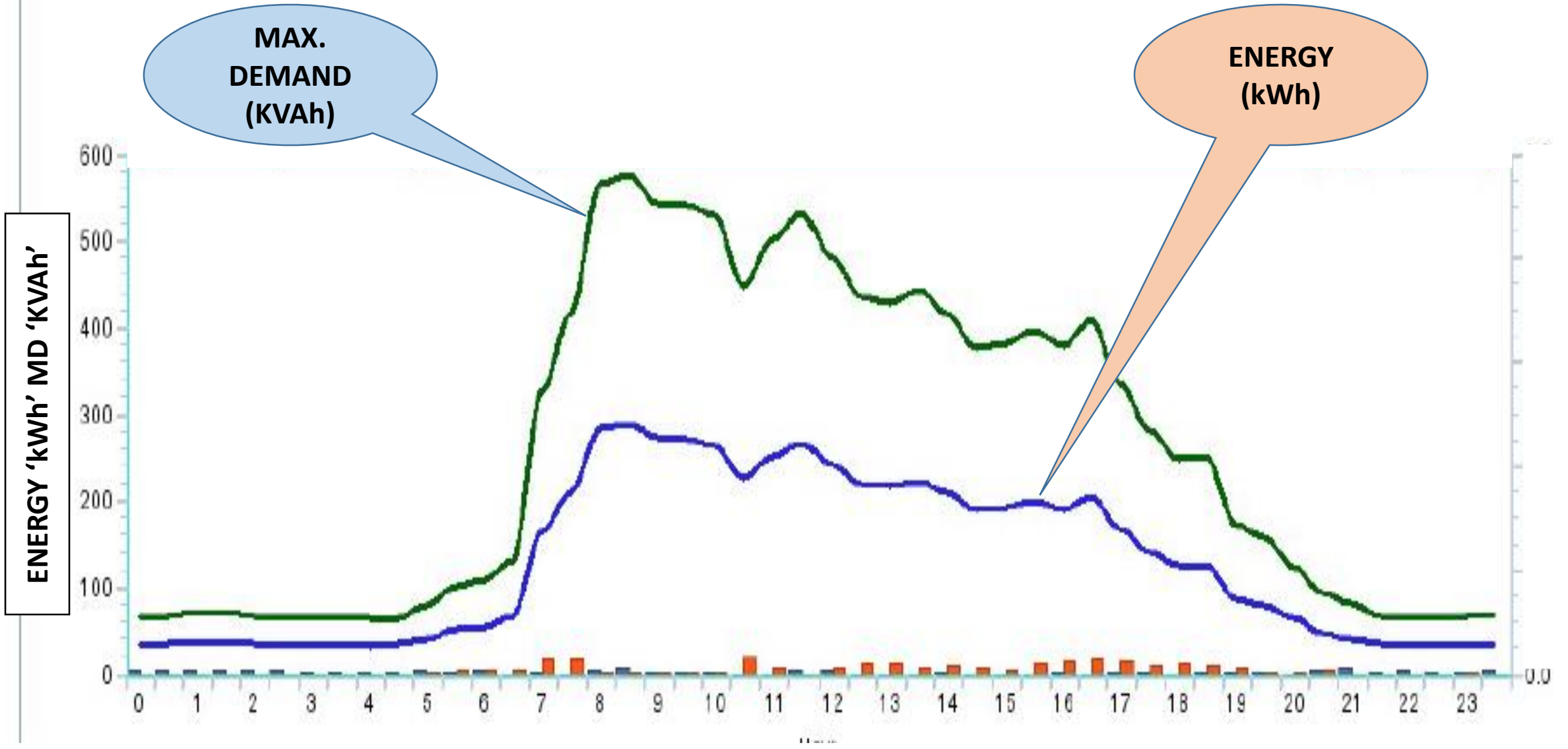
PL-13 ANNEX – DATA ANALYSIS



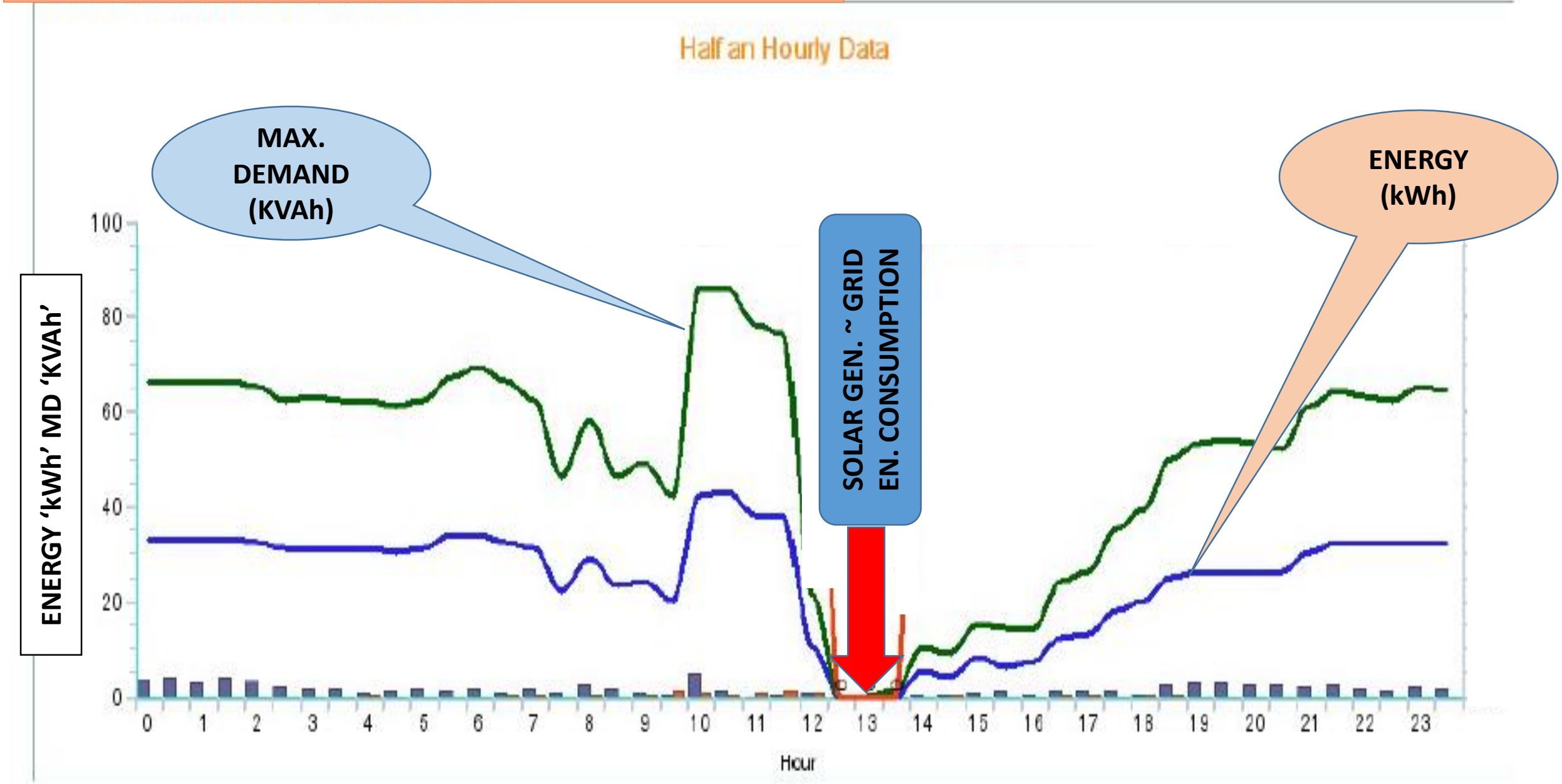
PL-13 ANNEX – DATA ANALYSIS



WORKING DAY (31-5-19) ENERGY PROFILE

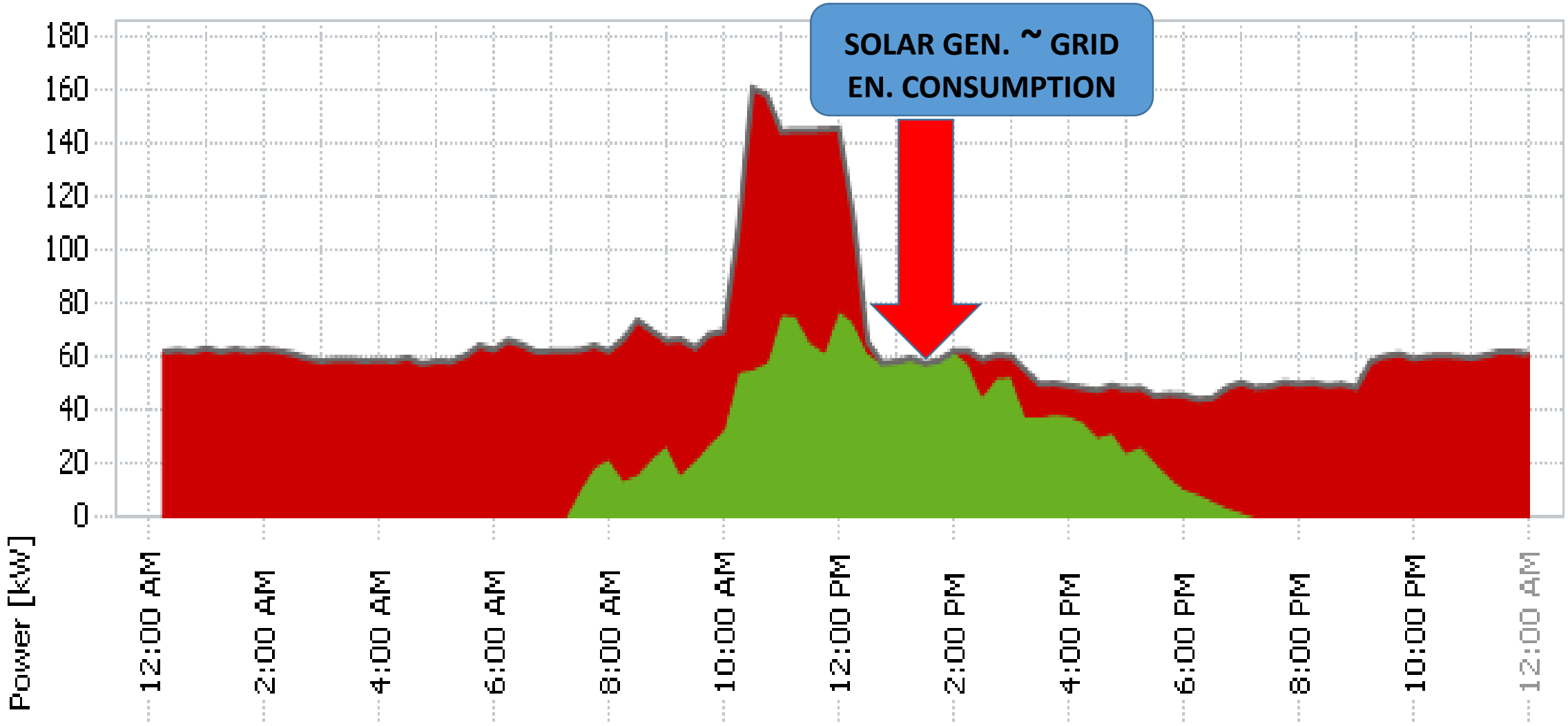


SUNDAY ENERGY (2-6-19) PROFILE TATA METERING POINT

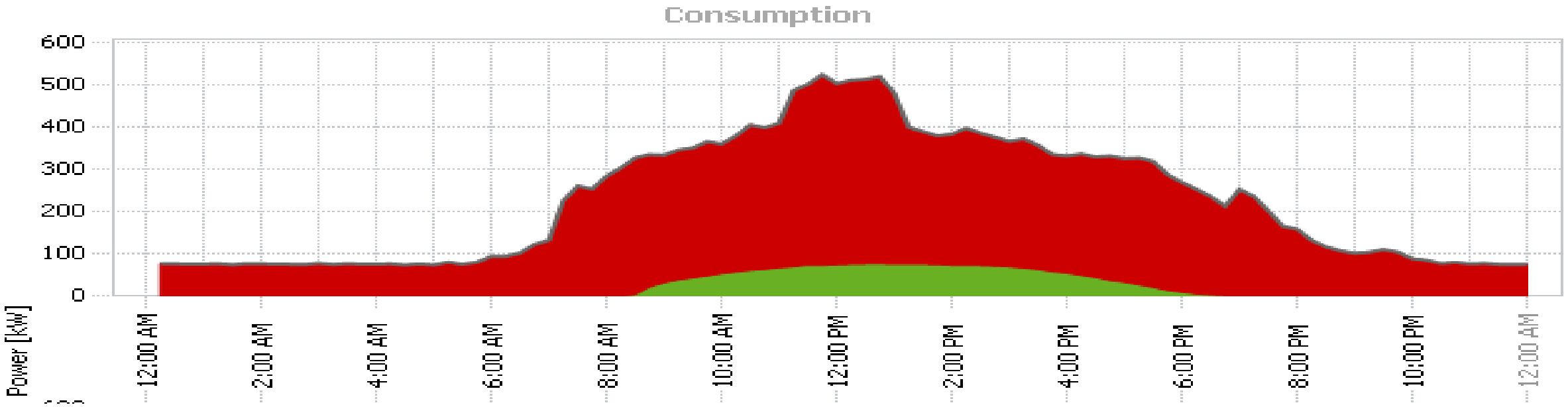


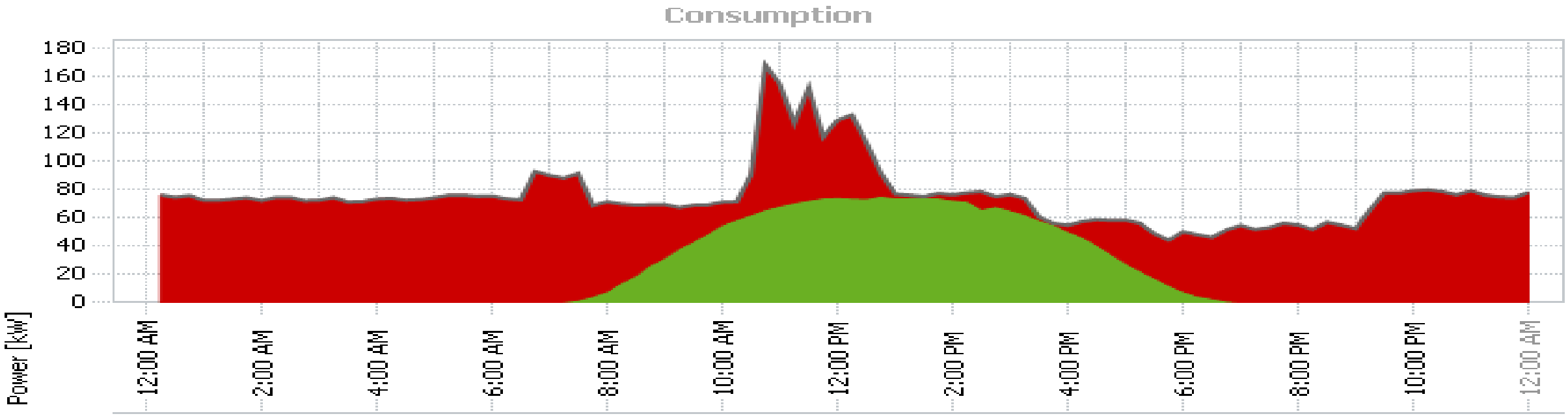
SUNDAY (2-6-2019) ENERGY PROFILE

SOLAR ENERGY W.R.T TOTAL ENERGY PROFILE



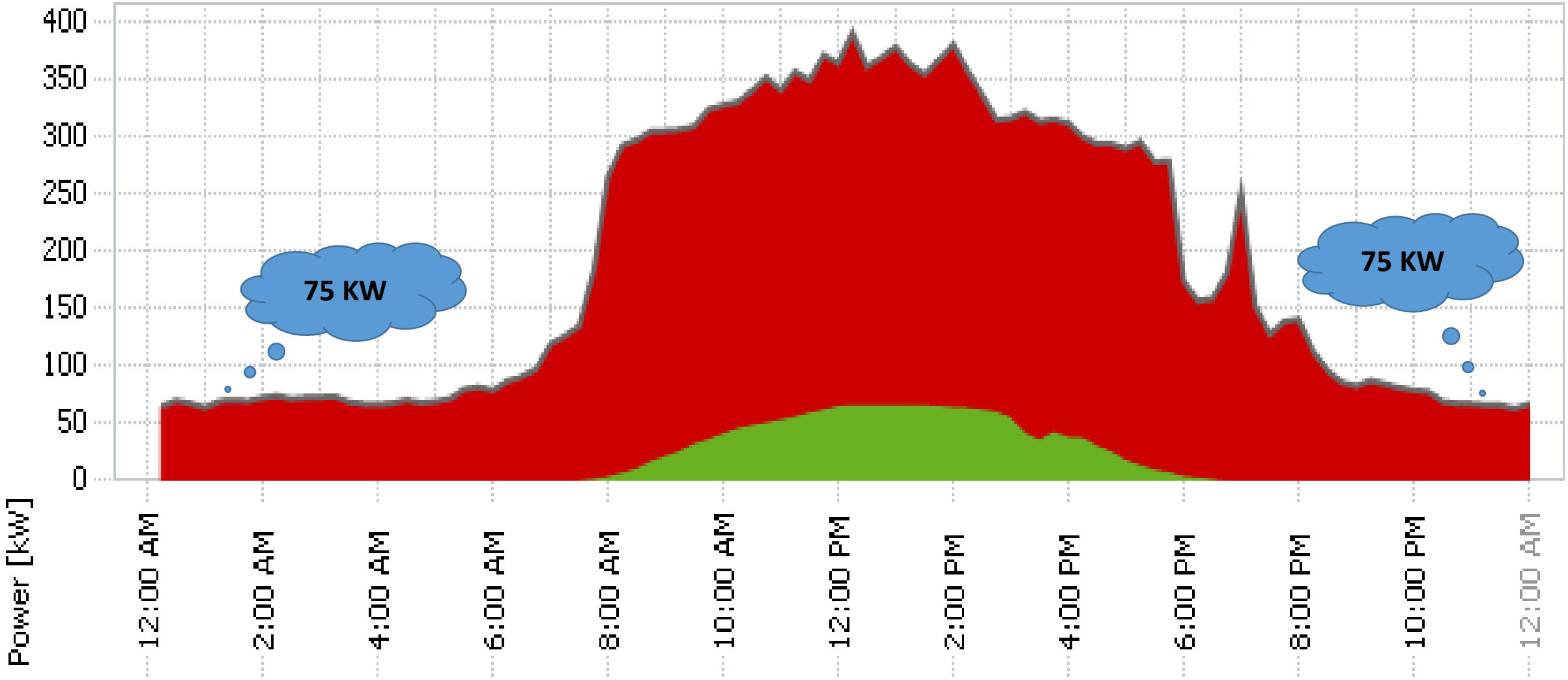
ENERGY PROFILE (TIME OF THE DAY)





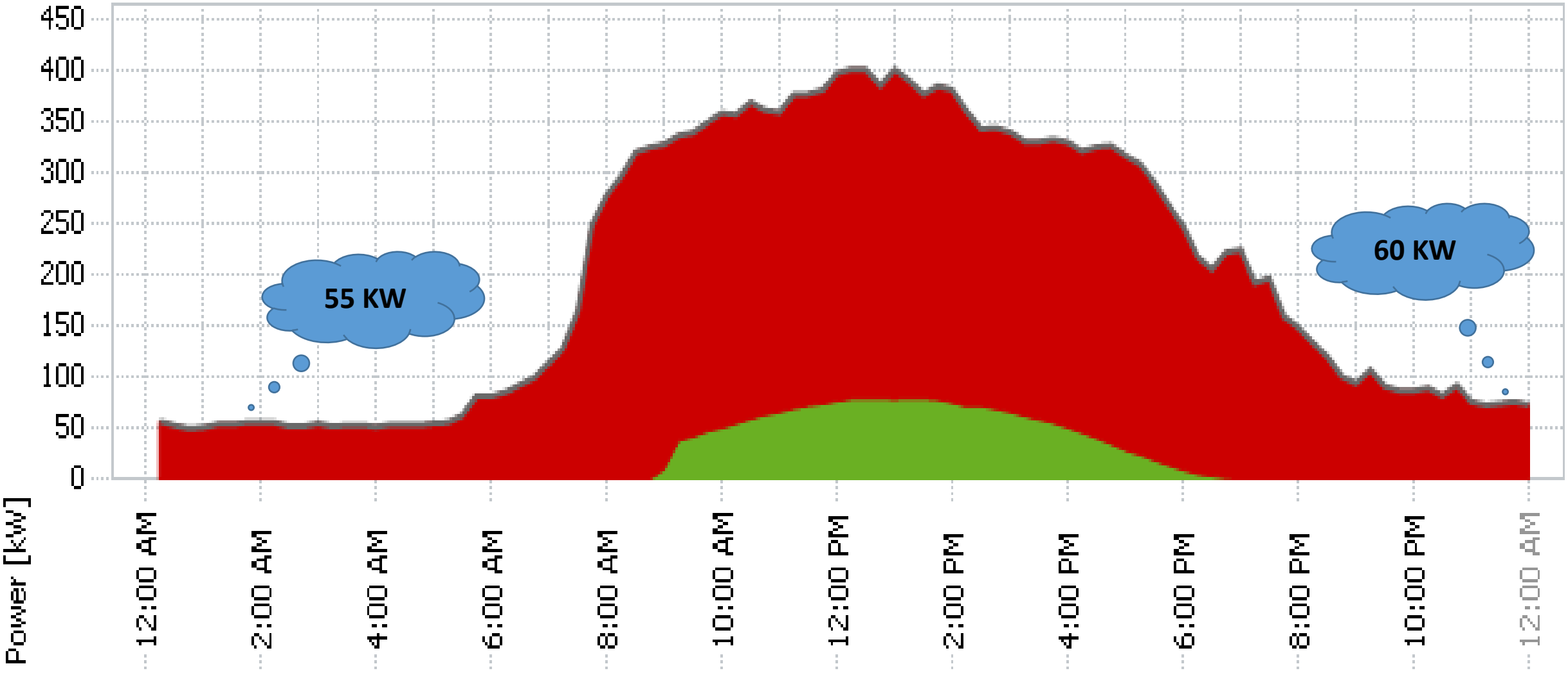
TOTAL BUILDING ENERGY PROFILE ‘BEFORE’ INSTALLATION OF VFD AT CANTEEN BLOWERS

DATE : 13-2-2019



TOTAL BUILDING ENERGY PROFILE 'AFTER' INSTALLATION OF VFD AT CANTEEN BLOWERS

DATE : 7-3-2019



Heat Pump

- Type : Air to Hot Water
- Rated Capacity
- H. Pump : 38 kW
- Hot Water : 15 KLD
- Invest. (Rs. Lacs) : Rs. 20
- Savings / Ann (Rs. Lacs) : Rs. 6
- Payback (Yrs.) : 3.5

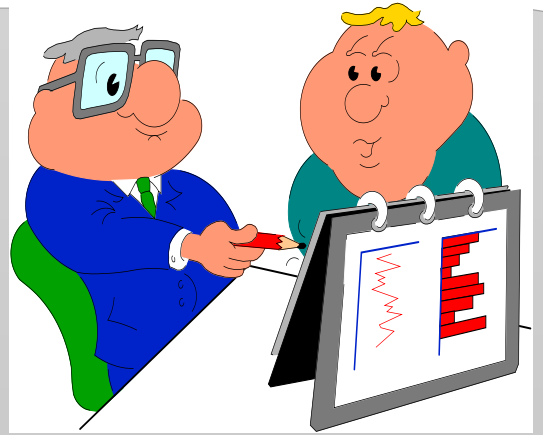
FINANCIAL IMPACT : CHANGE IN SEC (KW/TR) by 0.1

ASSUMPTIONS :

- CHILLER CAPACITY : 300 TR
- OPERATIONAL HOURS PER DAY : 10 HRS
- OPERATIONAL DAYS / ANN. : 300 DAYS
- LOAD FACTOR : 60%

SEC (KW/TR)	ENERGY (KW)	Energy (MWh/ ANN.)	Operations Cost / Ann. (Rs. Lakhs)	SAVINGS /Ann. (Rs. Lakhs)
0.9	270	4.86	53.46	
0.8	240	4.32	47.52	5.94
0.7	210	3.78	41.58	11.88

FOOD FOR THOUGHT……????



- CANNOT MANAGE …….. WHAT IS NOT MEASURED
- INFORMATION :

  - INSIGHTFUL
  - DECISIONS
  - ACTIONABLE MEASURES……

- ECONOMIC SUCCESS α ENVIRONMENTAL RESPONSIBILITY

CHALLENGES IN ACHIEVING NET ZERO GOAL

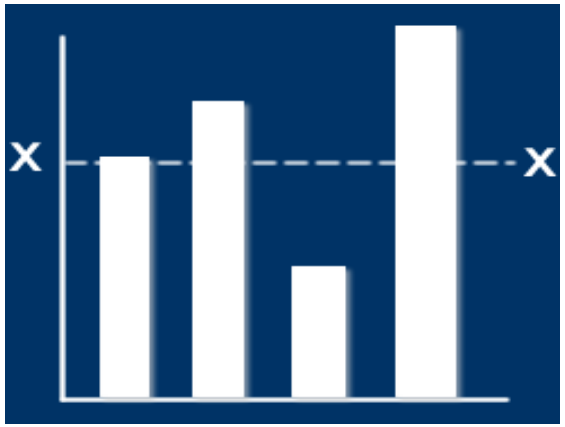
Challenges

Diverse Usage of Building

Varying Occupancy Profile

Formation of Team

Benchmarking



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

TIPS FOR EXISTING BUILDINGS

ROAD TO NET ZERO FOR INDIA…

We all share the same sky
More important
Must also share the same horizon


Any
Questions


END
OF
WEBINAR

SITE VISIT

July-Aug, Date TBD

Register soon!

#nzebindia
contest

July 2019

Show us **an innovative rainwater harvesting system-** It should be **a pic that YOU have taken**

Share it on social media with location & **#nzebindia** by **26th July, 2019**

#nzebindia
contest
July 2019

Show us **an innovative rainwater harvesting system-** It should be **a pic that YOU have taken**

Share it on social media with location & **#nzebindia** by **26th July, 2019**

#nzebindia
contest
July 2019

Show us **an innovative rainwater harvesting system-** It should be **a pic that YOU have taken**

Share it on social media with location & **#nzebindia** by **26th July, 2019**

Win a 2-month subscription to our online education library!

#nzebindia
contest
July 2019

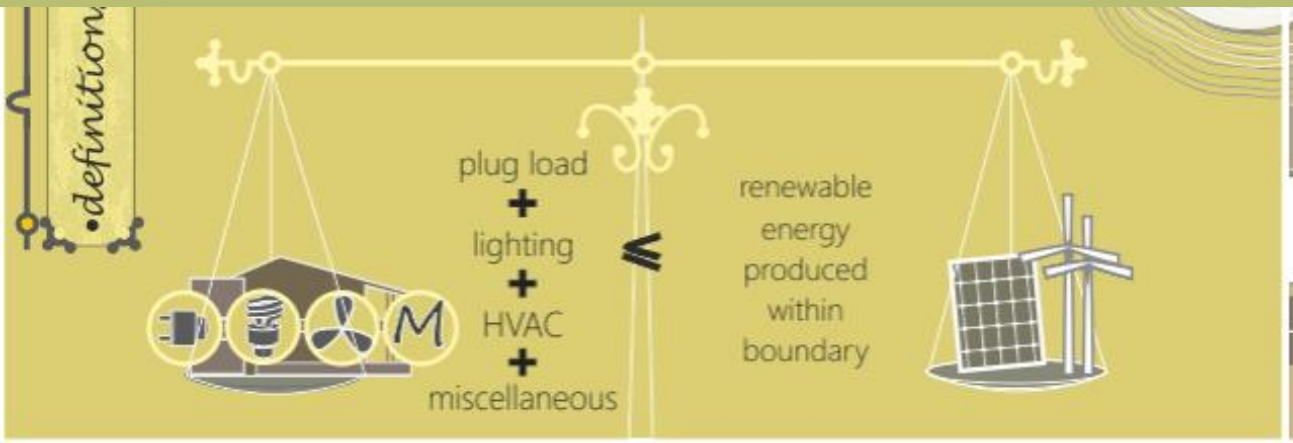
DON’T FORGET TO #nzebindia

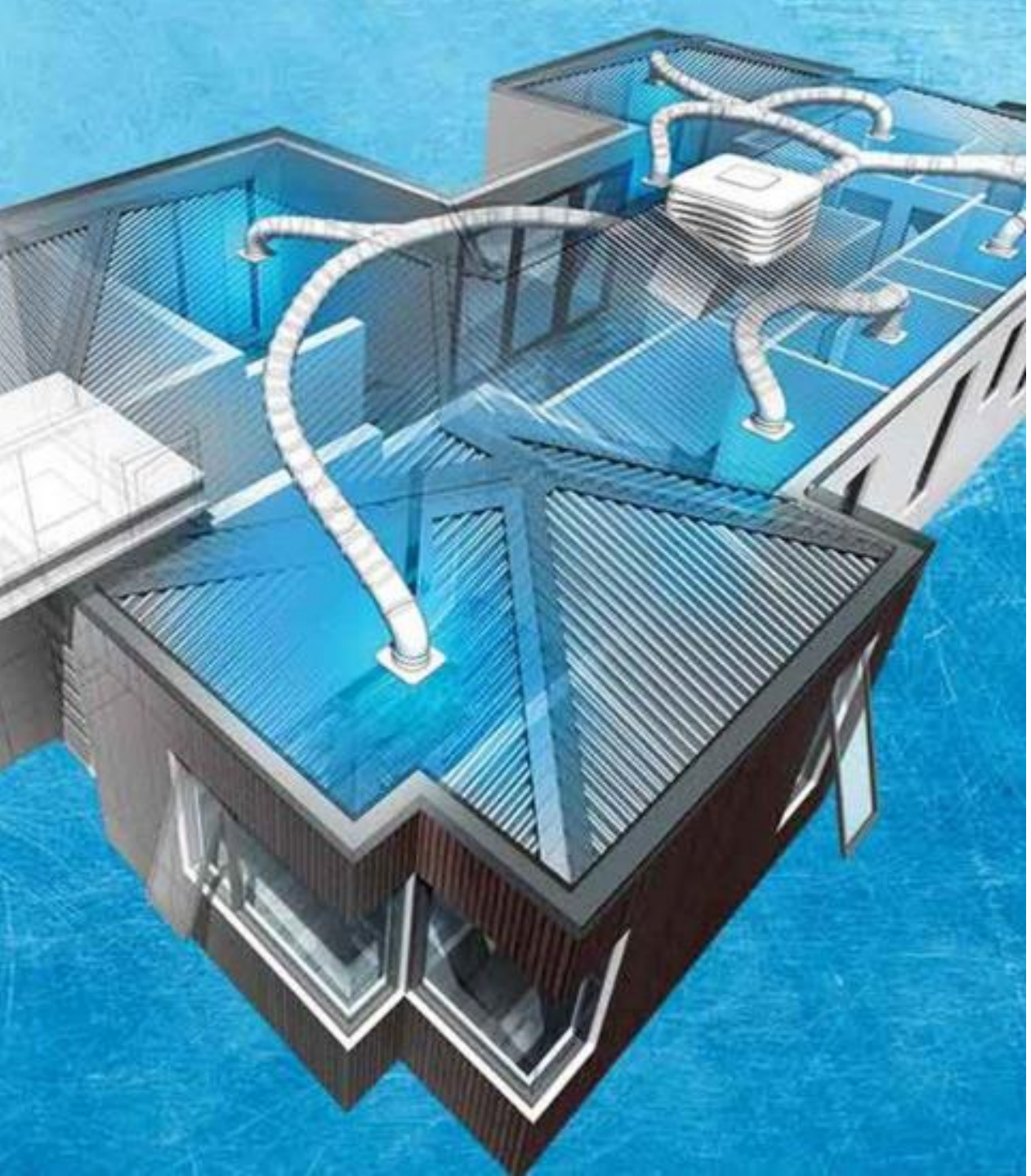
Home | Knowledge Centre | Definitions & Policies | Case Studies | Alliance | News & Events | Blog | About Us | Glossary | FAQs | Resource

nzeb
net zero energy buildings

SIGN UP TODAY!

http://www.nzeb.in/





17th July, 2019

@ 4 PM

EVAPORATIVE COOLING TECHNOLOGIES

Technique and application

Presentation by

Shamkant Mirashi

KNOWLEDGE SERIES

USAID FROM THE AMERICAN PEOPLE

MAITREE

MARKET INTEGRATION AND TRANSFORMATION FOR ENERGY EFFICIENCY

eds environmental design solutions

THANK YOU !

http://www.nzeb.in/

USAID
FROM THE AMERICAN PEOPLE

GOVERNMENT OF INDIA
MINISTRY OF POWER

MAITREE

MARKET INTEGRATION AND TRANSFORMATION FOR ENERGY EFFICIENCY

eds
environmental design solutions

Implementing Partner