" Building EE Retrofit-Transcending the 15% gravity pull "
Dr G C Datta Roy
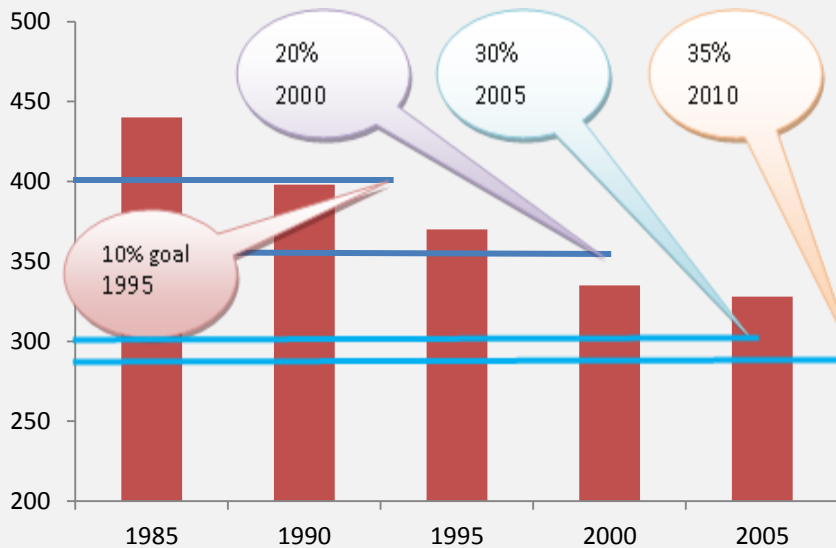
The GRIHA Summit, 2017 (New Delhi)

Development Environergy Services Ltd.

2017

Contents

- Targeting & Goal setting-Shift of Paradigm
- Jumping the Orbit
- Getting there
- First few steps

Targeting & Goal setting-US Case study (Federal Facilities)

DESL

Specific energy consumption in federal buildings-kWh/SqM/Year

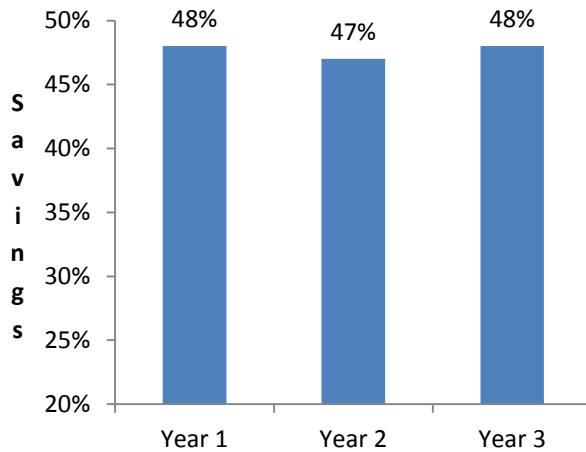| Category	Target	Baseline year
Reduction of Scope 1 & 2 GHG emission	40% by 2025	2008
Reduction of Scope 3 GHG emission	28.5% by 2020	2008
Reduction in energy intensity in facilities	25% by 2025	2015
Use of renewable energy	30% by 2025	
Reduction in potable water intensity	30% by 2025	2007
Reduction in fleet GHG emission/per mile	30% by 2025	2014
Spread of green buildings (Existing>5000 Sq ft)	Min 15 % by number or area	

OMB 2016**

Reduced energy intensity by 47% since launch of FEMP in 1973*

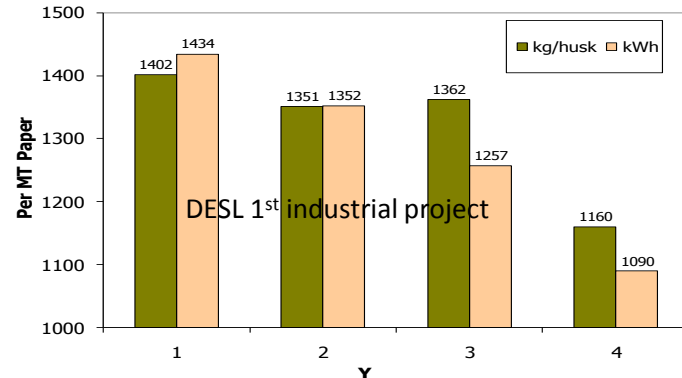*www.ecofys.com (Evaluation of the market transforming effects of FEMP
**www.energy.gov/FEMP-OMB score card on sustainability

3

Jumping the Orbit

⦿DESL

Chart: DESL 1st ESCO project-Govt building — Savings (%) by year:
- Year 1: 48%
- Year 2: 47%
- Year 3: 48%

DESL 1st ESCO project-Govt building

Chart: DESL 1st industrial project — Per MT Paper (kg/husk and kWh):

Y	kg/husk	kWh
1	1402	1434
2	1351	1352
3	1362	1257
4	1160	1090

DESL 1st industrial project

Over 40% savings in all cases

Getting there

DESL

Methodology	Guiding Principle
Conventional energy audit	Mainly evaluation of efficiency of the existing operating system, used only for retrofit
Benchmarking	Comparing against the existing best-Gap analysis-Project design
MED (Minimum energy design)	Challenging the existing best and setting new targets based on fundamentals. Can be used for new design as well as retrofit

MED Backbone-Synthesis

DESL

Design, Engineering, O&M

MED EMS

MIS

Smart system

Functional synthesis

Creating & harnessing knowledge

EE technologies

Data & analytics

EXPLORE

What it could do-a small illustrative example

BEPI : Building Energy Power Index			
Energy Consumption Area	**kWh/Sqm/Month**		**% improvement**
	Normal Bldg.	BEE Actual	
Airconditioning	27	12	55
Lighting	6	1.6	74

What to benchmark

SI	Parameters	A	B	C	D	E	F	G
1	Rs./Sq.M/ Month	65	213	175	134	157	87	157
2	Kcal/Sq.M/ Month	14167	44345	41385	30615	34928	19082	29724
3	Kwh/Sq.M/ Month	8	25	23	22	21	11	20
4	Rs./Room night	1172	652	367	431	364	990	502
5	MnKcal/ /Room night	0.25	0.14	0.09	0.10	0.08	0.22	0.09
6	Kwh/Room night	150	76	49	72	50	131	65
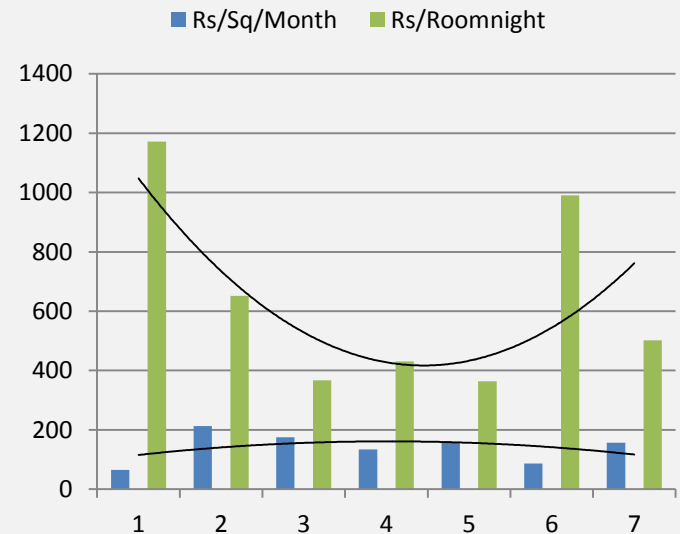
Anomaly between absolute energy spend vs. business energy spend
Inadequate functional synthesis at design stage; can be partially rectified by retrofit & recommissioning

Challenges-getting quality information

A real time monitoring system installed at Tshingua University in Beijing covering 36 commercial buildings- found buildings with windows consume 35% less energy in aggregate & provide healthier working environment

Few steps forward

- Best of class technologies (EESL has shown what can be done)
- Benchmarking
- User friendly design of retrofits
- Real time monitoring

How about GRIHA developing a monitoring pilot