



Industrial Energy Efficiency -India

Presentation

to

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The Story Line

- ▶ Industrial Energy Efficiency Market & Opportunities
- ▶ Current Scenario
- ▶ Policy, Program & Actions
- ▶ Looking Ahead



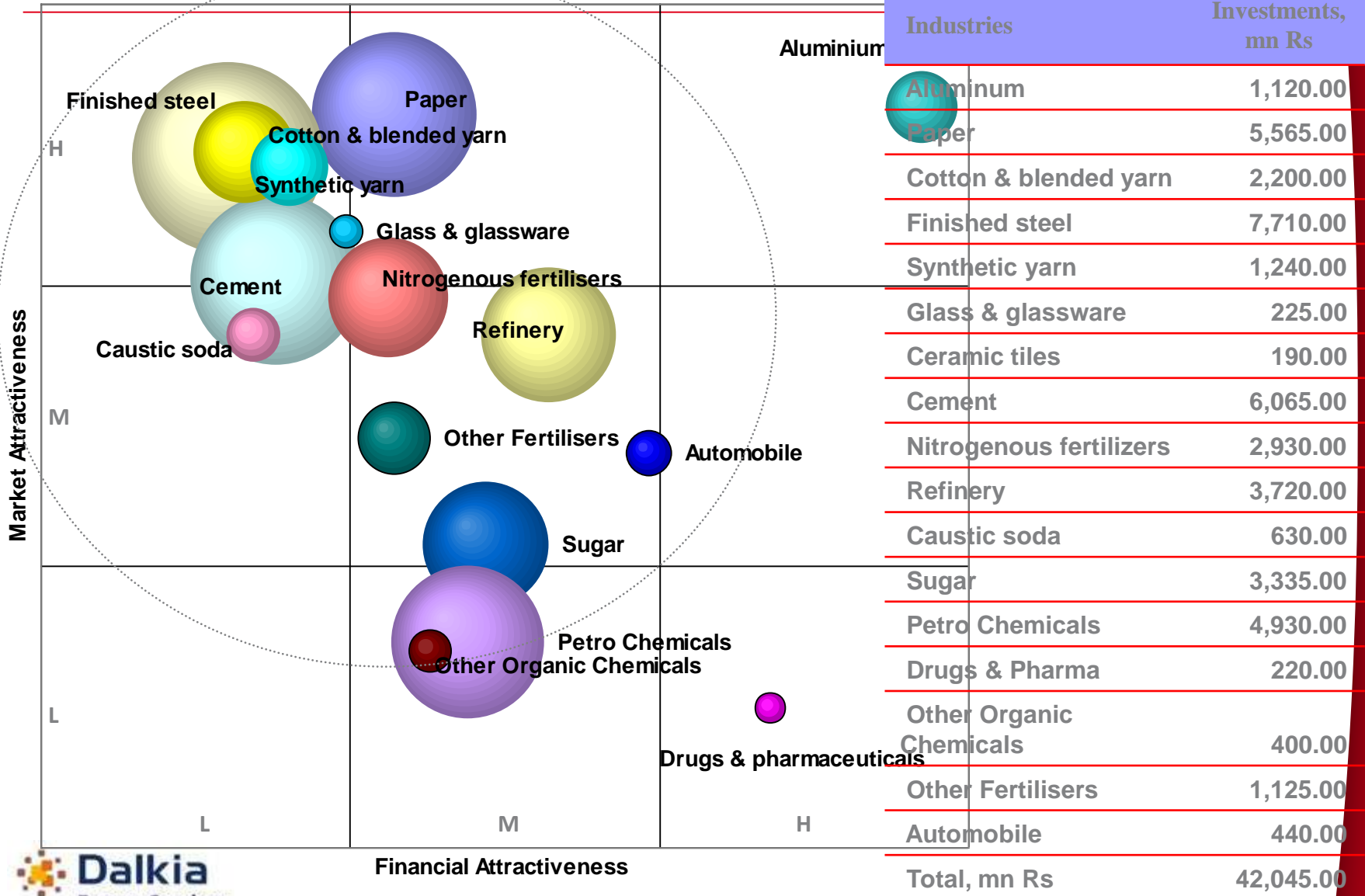
IEE Market in India

DESL Study

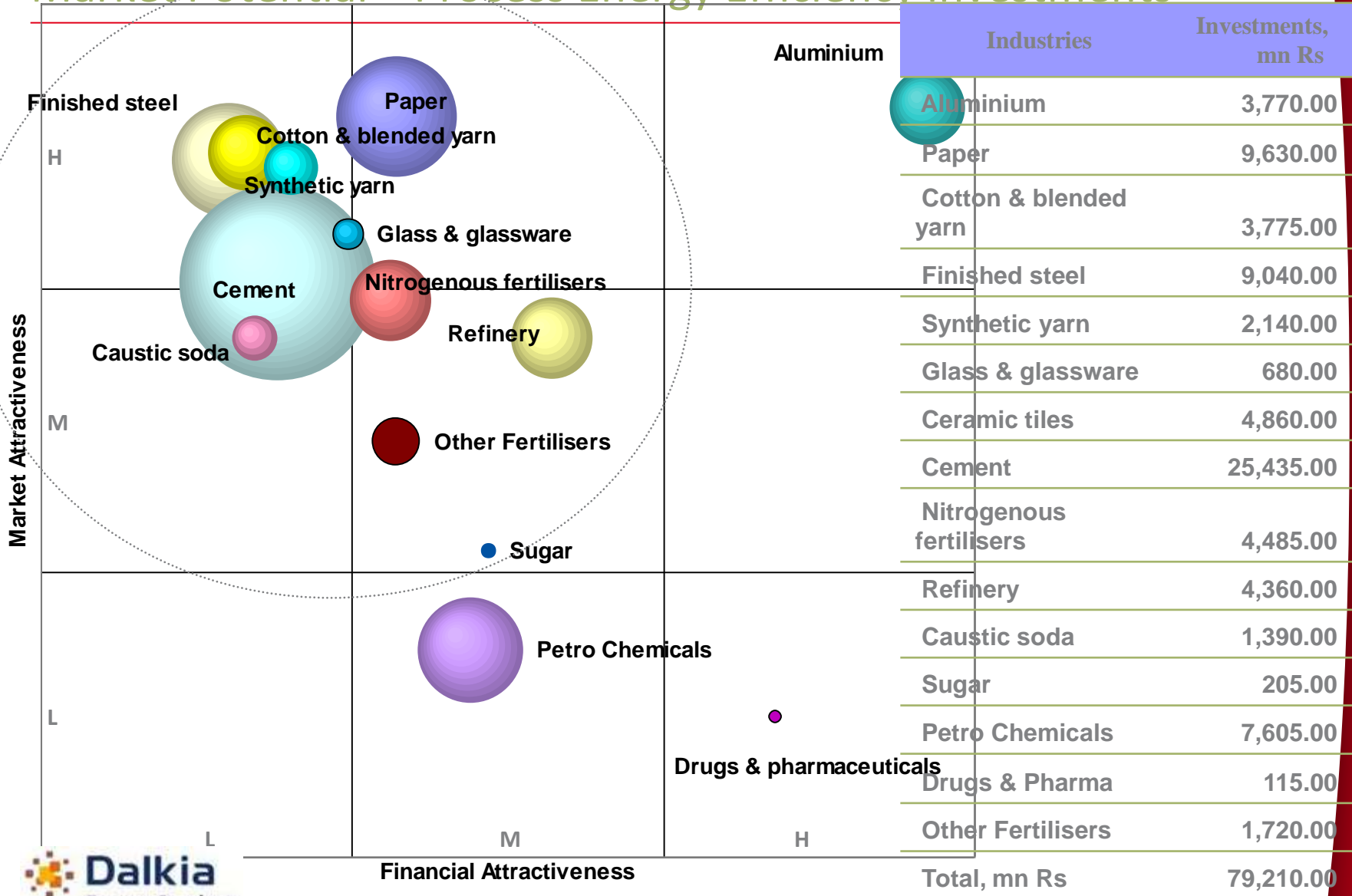
Energy Efficiency Investment Market

Activity	Industry Aggregates Analysis	Investments (Generic Energy Efficiency)	Investments (Process Energy Efficiency)	Illustrative Companies
Data Source	Prowess	Energy Audit Reports MoP Awards CII Awards	Various other reports	Prowess
Processing	<ul style="list-style-type: none"> Market characterization for Market and Financial Attractiveness Data Extraction for different industries from Prowess Rating and ranking of industries based on the selected parameters 	<ul style="list-style-type: none"> Typical savings achieved in the individual representative companies in the industry sub-sector Corresponding investments Average RoIs Average energy savings as a % of energy bills Extrapolation for industry energy savings and investments 	<ul style="list-style-type: none"> Typical savings achieved in the individual representative companies in the industry sub-sector Corresponding investments Average RoIs Average energy savings as a % of energy bills Extrapolation for industry energy savings and investments 	<ul style="list-style-type: none"> Company financials analysis and rating Company energy performance analysis and rating Overall ranking of companies in industry sub-sectors
Output	Market Segments	Investment Market Size at the initial stage (simpler projects w/o process energy efficiency)	Investment Market Size for process efficiency improvements	Typical companies profile in the industry sub-sector with ranking

Market Potential – Generic Energy Efficiency Investments



Market Potential – Process Energy Efficiency Investments



Projects Segmentation

Projects with Investment of

Sector	0 – 10 mn RS	10 – 50 mn Rs	50 mn Rs & above
Paper	78.00	106.98	80.00
Cotton & blended yarn	35.49	13.40	-
Finished steel	12.72	16.40	60.50
Synthetic yarn	18.81	13.40	-
Glass & glassware	-	48.00	-
Ceramic tiles	9.05	-	-
Cement	147.74	270.50	-
Nitrogenous fertilisers	5.10	45.60	58.04
Refinery	-	61.40	-
Chloro Alkali	29.59	41.09	-
Sugar	39.00	46.40	70.00
Petro Chemicals	2.60	120.75	269.05
Drugs & Pharmaceuticals	1.07	-	-
Other Organic Chemicals	5.90	-	-
Other Fertilisers	5.10	45.60	58.04
Automobile	34.25	-	-
Overall	424.42	829.52	595.63
	22.95%	44.85%	32.20%

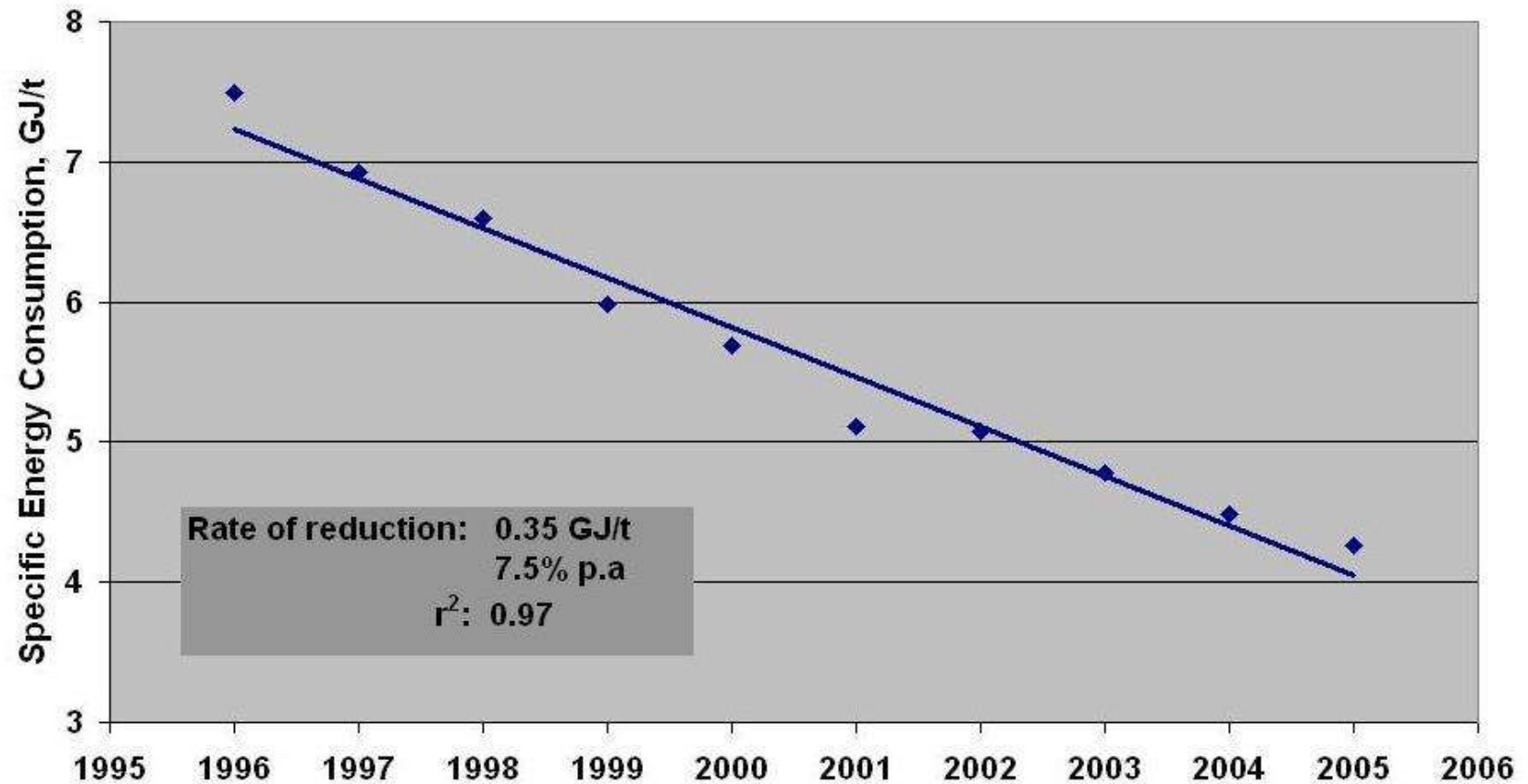
Projects Matrix

- Generic Energy Efficiency Projects-Upgrades
 - Pumps , Fans & Compressors
 - Boilers
 - Turbines
 - Lighting
 - Heat recovery
 - Automation
 - Load optimization
 - Fuel substitution
 - Cogeneration/CHP
- Process Energy Efficiency Projects
 - Process technology upgrade (High efficiency evaporation)
 - Synthesis of HEN (Pinch)
 - WHR Power (WHR Power generation-cement, sponge iron)
 - Equipment replacement projects (Milling in cement)
 - Synthesis of control system (Process integration/optimisation in petrochemicals)
 - Utility optimization (Water management in paper)

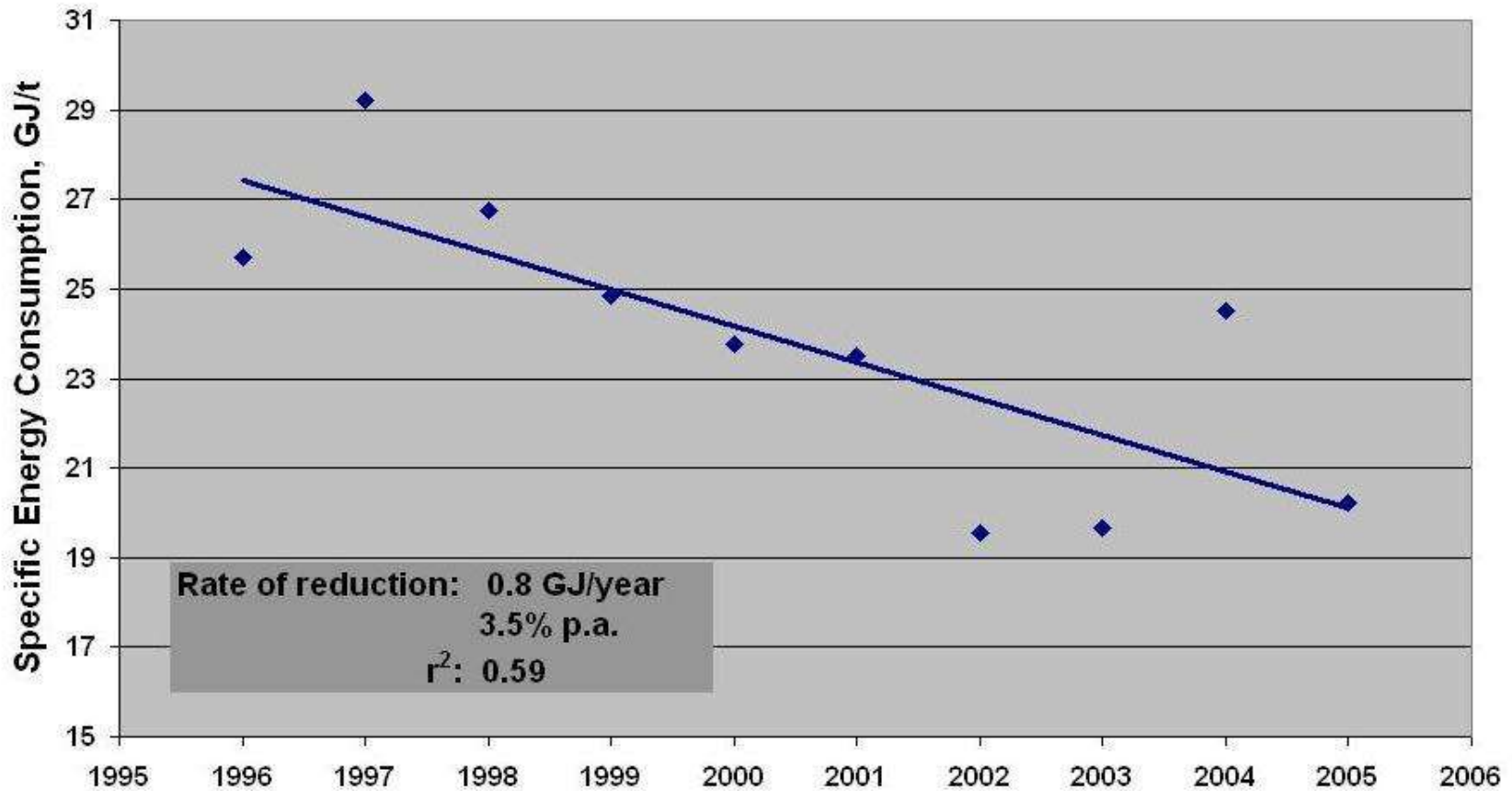


Situational Analysis-Illustrative Examples

Cement sector



Iron & Steel



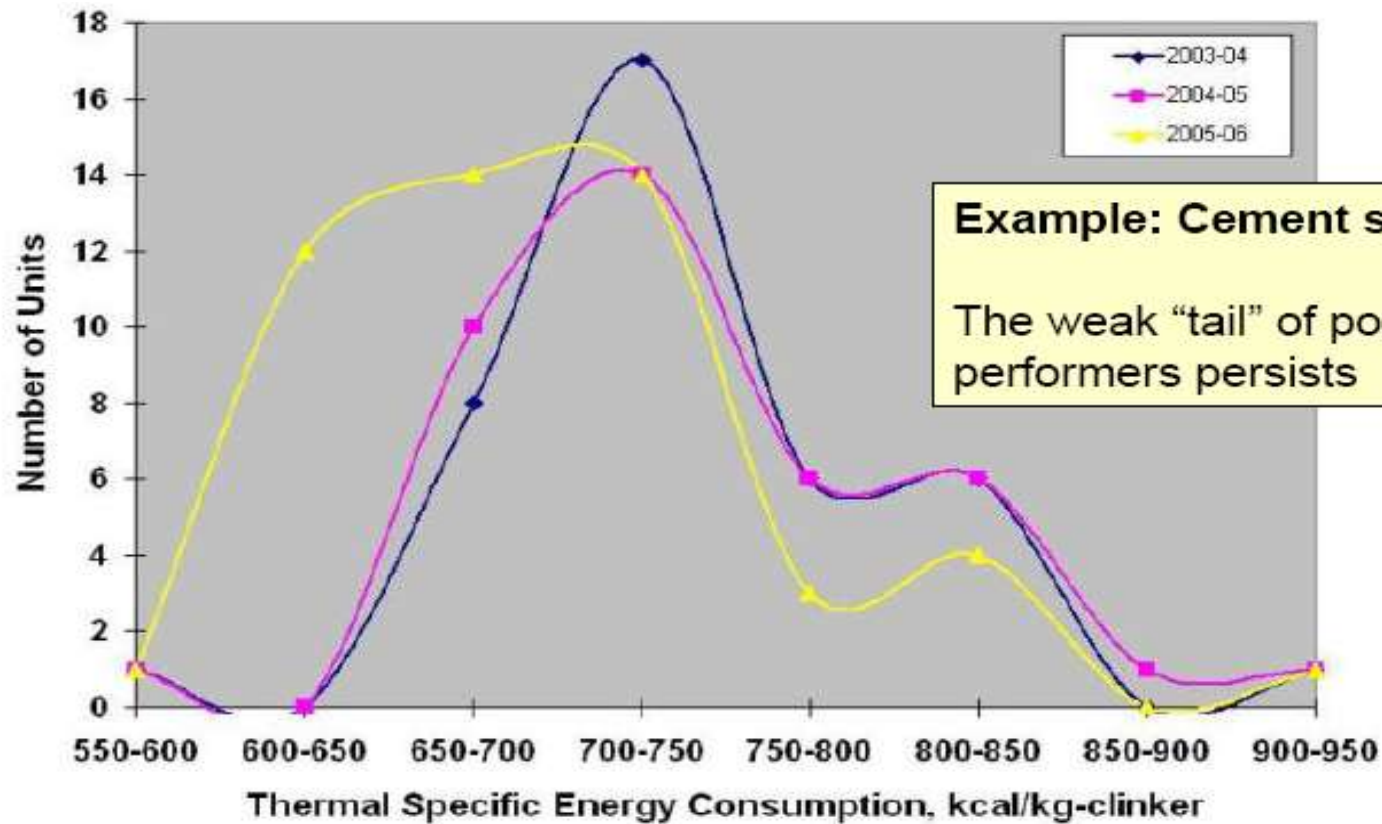
Case Study-Fertilizer

AMMONIA : (2007-08)	ENERGY CONSUMPTION
	MKCal/MT
Europe	8.37
Indian Gas based Plants	8.49
World (excl. China)	8.82
All Indian Ammonia plants	8.97
North America	9.06
World (incl. China)	9.94

Unit	Specific Energy consumption (MKCal/MT Urea)		
	2007-08	2008-09	2009-10
Tata Chemicals	5.16	5.31	5.17
INDOGULF	5.56	5.41	5.43
NFCL-1, Kakinada	5.55	5.55	5.44
IFFCO, Aonla-I	5.71	5.6	5.48
NFL, Vijaypur-II	5.53	5.56	5.54
IFFCO, Aonla-II	5.52	5.6	5.59
Chambal -I	5.62	5.67	5.64
NFCL-II, Kakinada	5.68	5.68	5.59
KRIBHCO-SHYAM	5.78	5.81	5.78
Benchmark			
Best possible			5
Best in India (Tata)			5.17
Average India Gas based (09-10)			5.9
Average India all plants (09-10)			6.28

Best in class Indian plants are global benchmark but adverse impact of weak tails on overall average

Parallel existence of inefficient sectors & units





Policy, Programs & Actions

Policy & Program-Evolution



- Phase-1-Pre-1983
 - Fuel policy-1st structured report in 1964
 - Setting up of fuel efficiency cell in National Productivity Council (NPC)-1967
 - Introduction of energy audit in industry-NPC
- Phase-2 Following-IMWG Report on Energy Conservation 1983
 - EMC/PCRA set up-initiations on formal policy and programs
 - Obligations-Annual report
 - Fiscal incentives
 - National EC award
 - Voluntary initiatives by Industry
 - Growth of the EE service industry (Global Support-UNDP, WB/GEF, ADB, USAID, GTZ, Dfid, CIDA, SIDA and others)
 - EM Cell by CII/FICCI-audit and consultancy supports
 - EM award by CII
- Phase-3 Following EC Act 2001
 - BEE program
 - DC
 - Energy Audit/Cluster programs for SME
 - IIPEC
 - PAT
 - Supported programs (UNDP/GEF, WB, ADB, USAID ECO, GIZ, JICA & others)

Mandatory Information in Annual report (1988 onward)

- Energy conservation measures undertaken
- Additional investment plan for EC
- Impact of above in
 - Reduction of energy consumption
 - Reduction of energy cost of production

Main contribution in taking
the EE awareness level to the
Board room

Indian Industry Program for Energy Conservation (IIPEC)-2002-2008

- Voluntary program under BEE covering large number of sectors (Iron & Steel, Cement, Paper & Pulp, Sugar, Textiles etc)
- Led by Industry facilitated by BEE
- Industry self-help group assisting peers through transfer of knowledge & management processes
- Results mixed
 - Top 10 to 20% gained immensely raising the average sectoral efficiency
 - Not much impact on the tails
 - Very little participation by SME

Largest impact on the Cement Industry

GOI Energy Management Award-1993-Continued

- Instituted by the then EMC in 1993-continued by the successor BEE
- From less than 50 participants covering less than 10 categories, it has grown to close to 600 participants from 35 Industrial sectors, Power sector and 7 other sectors in 2010
- In the period 1999-2010, savings estimate are:
 - 1.45 billion units of electricity (Avoided capacity addition of over 2000 MW)
 - 2.7 million liter of oil
 - 9.1 Mn T of coal
 - 22 billion m³ of gas

Most successful voluntary
program

Perform Achieve & Trade Scheme

- Launched 2011
- Mandatory backed by an Act of Parliament
- Target
 - 477 units in 8 energy intensive segments including power plants
 - Individual unit based-gate to gate SEC performance
 - Savings of over 10 Mn TOE in three years

For the first time net is cast wide-capturing number big enough to make overall impact

Looking Ahead

• PAT Scheme

- Immediate benefit
 - For the 1st time availability of reliable data for a large number of industries
 - Development of structured database and benchmarking
 - Establishment of Baseline & M&V protocol for determination of true savings
- Longer term
 - Driving force for continuous improvement movement
 - Realisation of targeted savings
 - Increasing the basket size

• Challenges & Opportunities

- Learning journey for PAT
- Investment in EE-different models & implementation
- Getting SME industry on board