

Approach for Target Setting in Perform, Achieve & Trade (PAT) Mechanism

A.K. Asthana
Sr. Technical Expert
GTZ/ BEE

NATIONAL MISSION ON ENHANCED ENERGY EFFICIENCY (NMEEE)

- The National Action Plan on Climate Change was released by Honorable Prime Minister of India in June 2008
- The Action Plan Outlines **8 Missions** including National Mission on Enhanced Energy Efficiency (**NMEEE**)

- The market based mechanism to enhance cost effectiveness of improvements in EE in energy intensive industries through certification of energy saving which can be traded.
(Perform, Achieve & Trade)
- Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the product more affordable
- Creation of a mechanism that would help finance DSM programs in all sectors by capturing future energy saving
- Developing fiscal instruments to promote energy efficiency

Industry Sector	Annual Energy Consumption Norm to be DC (mtoe)	No. of Identified DCs
Aluminum	7500	13
Cement	30000	127
Chlor-Alkali	12000	20
Fertilizer	30000	22
Pulp & Paper	30000	42
Power	30000	153
Iron & Steel	30000	65
Textiles	3000	226

Estimated Consumption in DCs

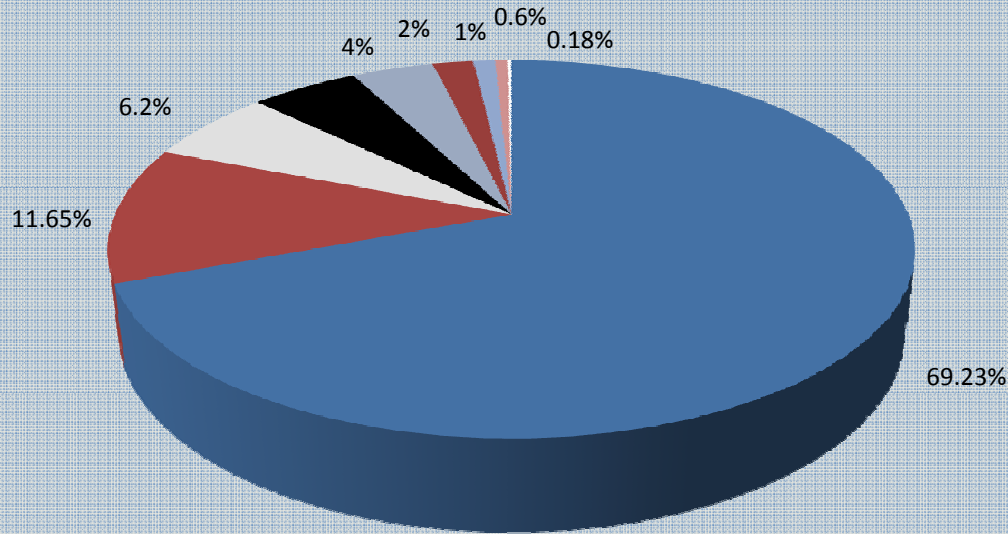
Sector	MTOE
Power (Thermal)	160.3
Integrated Steel	26.98
Cement	14.47
Fertilizer	11.95
Sponge Iron	9.1
Textile	3.5
Aluminium	2.42
Paper	1.38
Chlor-Alkali	0.43
TOTAL	230.53

**About 55% of DCs
 Contribute 96% of Total
 Consumption**

**About 45% of DCs
 contribute rest 4% of
 Total Consumption**

Energy Consumption (MTOE) Share Among DCs

- Power (Thermal)
- Integrated Steel
- Cement
- Fertilizer
- Sponge Iron
- Textile
- Aluminium
- Paper
- Chlor-Alkali



Energy Consumption (MTOE) Among DCs

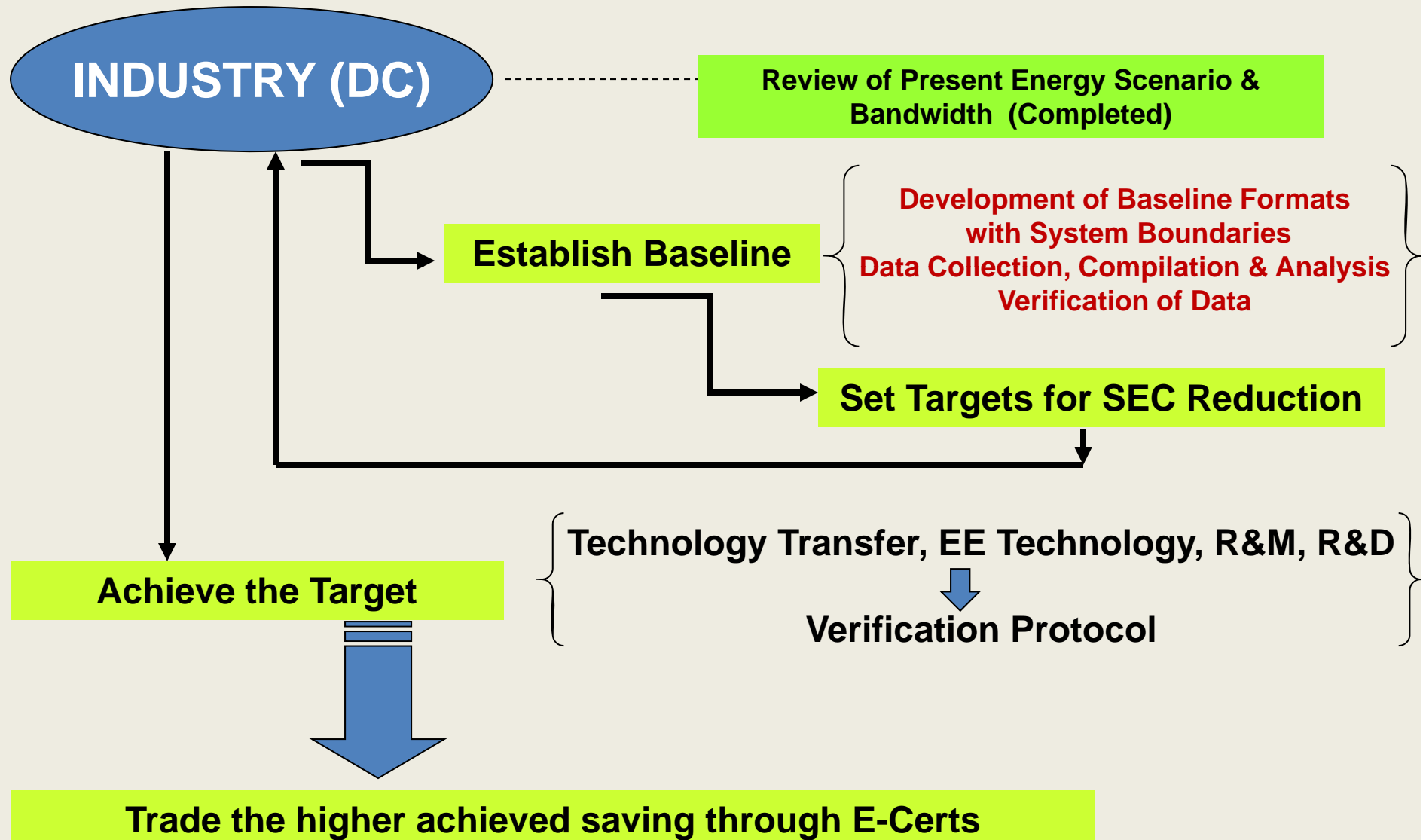


The energy usage pattern varies widely in industries of a particular sector due to various **diversities** like

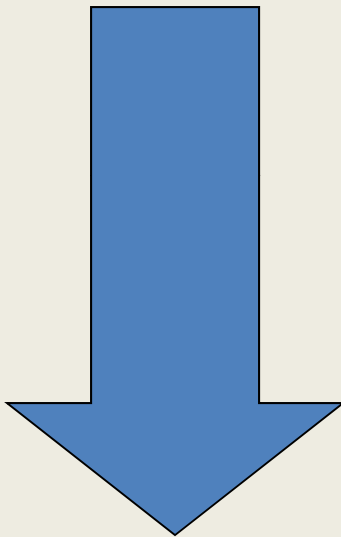
- Scale of Production (Installed Capacities) [*viz. Power Plant / Iron & Steel*]
- Use of Raw Material [*viz. Cement / Fertilizer*]
- Process Technology [*viz. Aluminium / Steel*]
- Vintage of Technology [*viz. Steel*]
- O & M Practices [*viz. All Sectors*]
- Type of Product Output etc..... [*viz. Textile / Paper*]

Sectoral studies by BEE on ‘*Setting Up of Sectoral Bandwidth for DCs*’ have revealed the impact on SEC due to above diversities

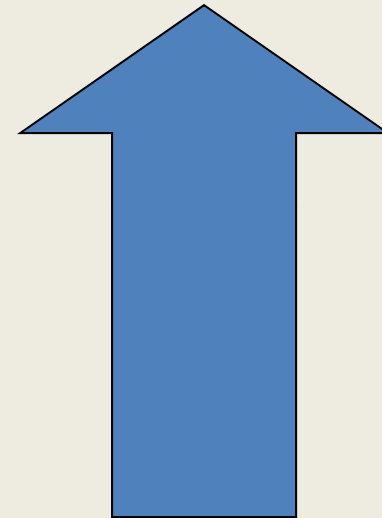
THE PAT SCHEME Approach



Target Setting in Thermal Power Plant



Reduction in APC



Improvement in HR

Example of Heat Rate Deviation in Power Station

Sl. No	Coal Based Power Station	Design Heat Rate	Average of Actual for 3 Years	Variation from Design Value %	Average Auxiliary Power Consumption %	Average PLF %
1.	4 x 500 MW	2234	2350	5.19	6.79	90
2.	2 x 500 MW	2228	2358	5.84	5.69	90
3.	5 x 200 + 2 x 500 MW	2312	2399	3.78	7.1	88
4.	3 x 200 + 3 x 500 + 1 x 500 MW	2250	2368	6.06	6.26	88

Sl. No	Coal Based Power Station	Design Heat Rate	Average of Actual for 3 Years	Variation from Design Value %	Average Auxiliary Power Consumption %	Average PLF %
1.	4 x 210 MW	2274	2409	5.95	7.37	95
2.	4 x 210 MW	2301	2432	5.7	8.79	90
3.	2 x 210 + 2 x 210 + 1 x 210	2295	2412	5.08	8.2	90
4.	5 x 250 MW	2234	2498	6.67	NA	NA
5.	2 x 250 MW	2227	2285	2.58	NA	NA
6.	6 x 210 MW	2301	2390	3.87	NA	NA

Target Setting of Power Plant Would depend upon Parameters Like

- **Net Heat Rate (NHR)**

Parameters	Plant – I	Plant – II
Gross HR (GHR)	2500 Kcal/Kwh	2500 Kcal/Kwh
APC	8%	10%
Net HR (NHR)	2717 (=2500/0.92) Kcal/Kwh	2777 (=2500/0.90) Kcal/Kwh

- **Quality of Coal**

- GCV (Kcal/Kg) & Ash Content (%)

- **Plant Load Factor (PLF) (%)**

Variation in Net Station Heat Rate from Design Net Heat Rate	Reduction Target for % deviation in the Net Station Heat Rate	% Reduction Target in Net Station Heat Rate
Upto 5%	10%	0.5
More than 5% and upto 10%	15%	0.75 to 1.5
More than 10% and upto 20%	20%	2.0 to 4.0
More than 20%	25%	5 and above

CEMENT SECTOR

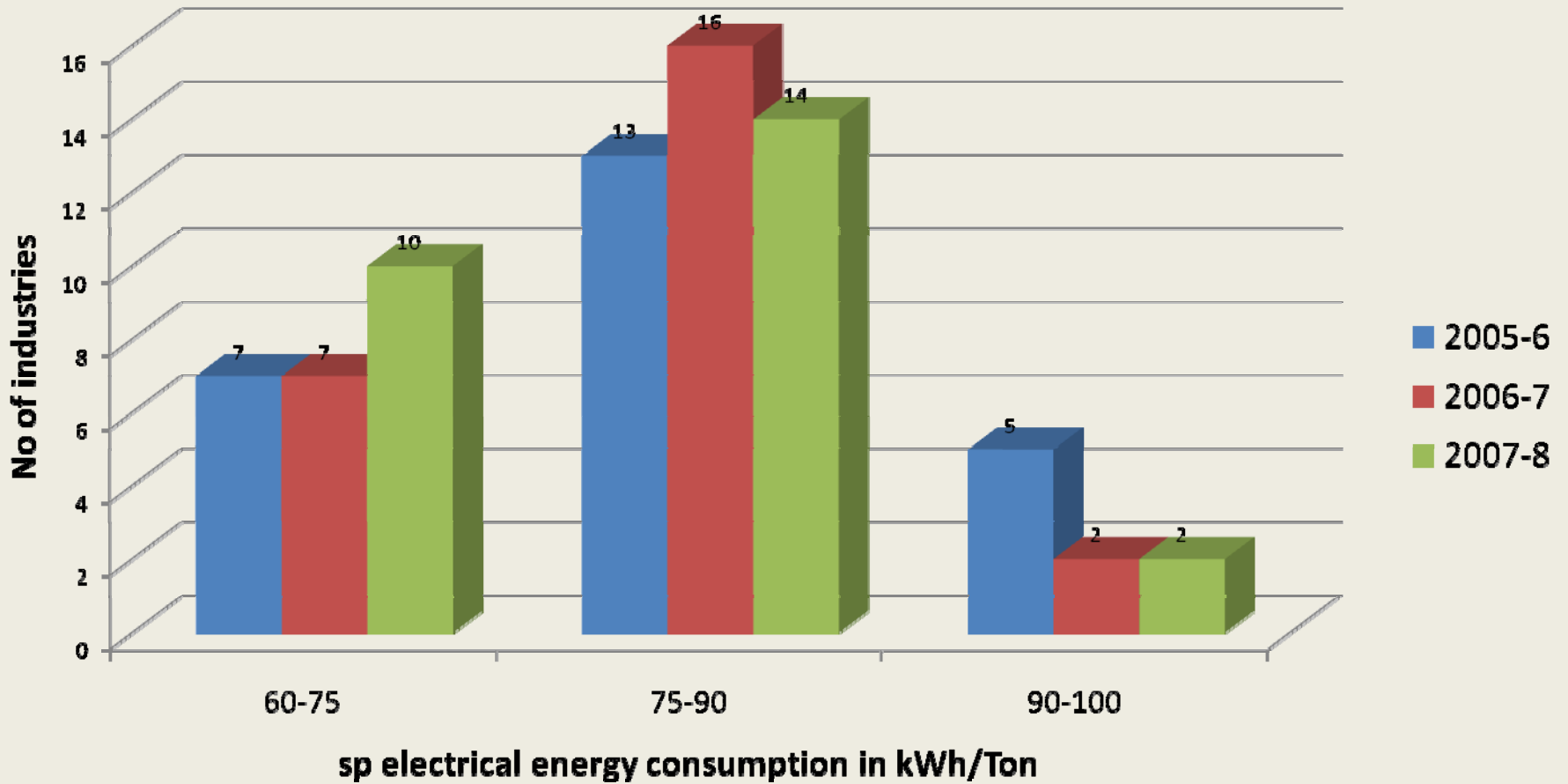
Cement Industry – Some Energy Fact File !

Major Energy Source	: Coal and Electricity
Energy Cost	: About 20-40% of total Manufacturing cost
Energy Consumption	: About 14.47 MtoE in 2007-8
No. of DCs	: 127 as on 2008-09 (with more than 30000 mtoe p.a)
SEC (Thermal) *	: 665 – 995 kCal/kg of Clinker
SEC (Electrical) *	: 66 - 127 kWh/Ton of Cement
Major Energy Consuming Area	: Clinker Production (about 80% of total)

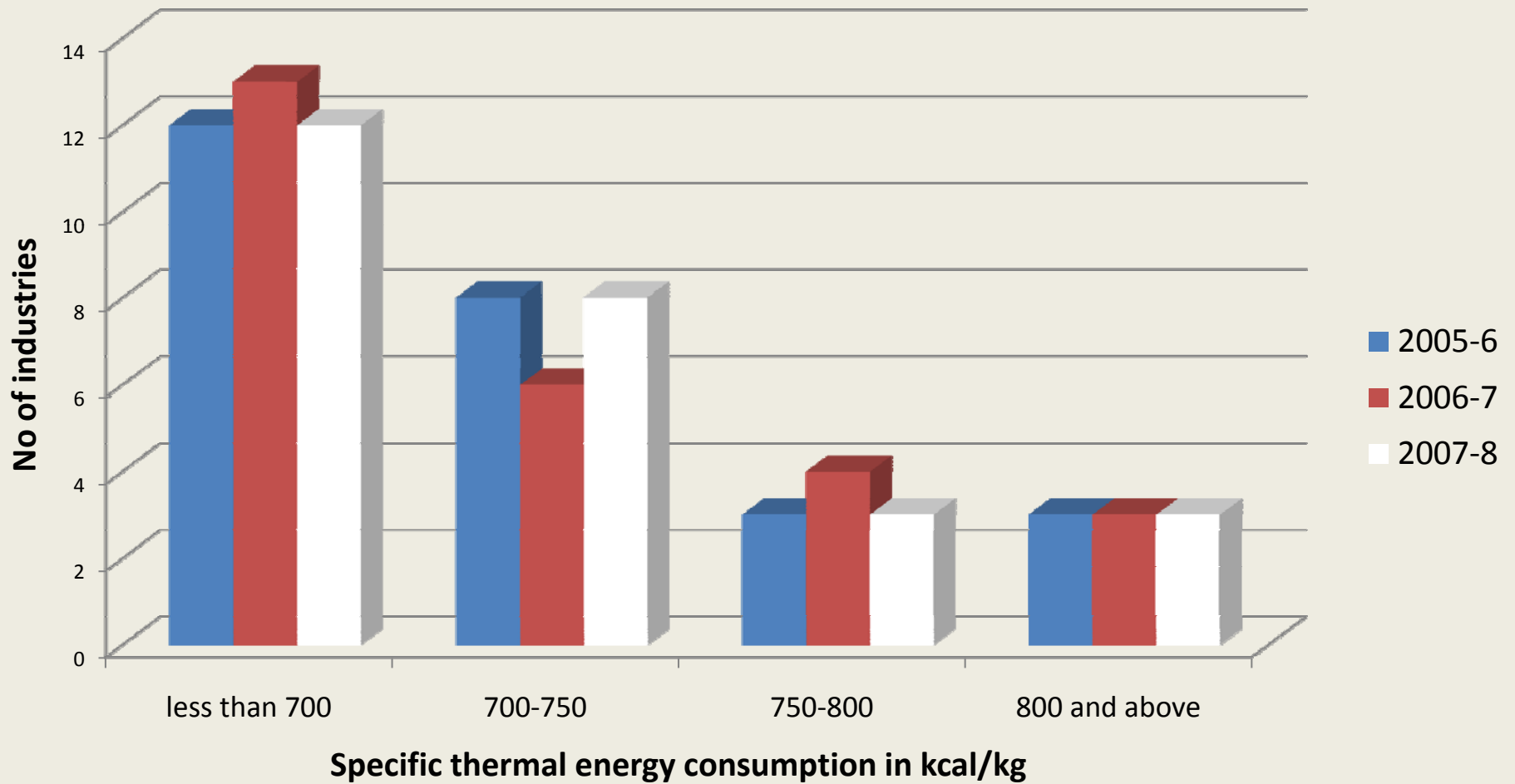
Source : Energy Guidebook, PCRA

* TEDY, 2007

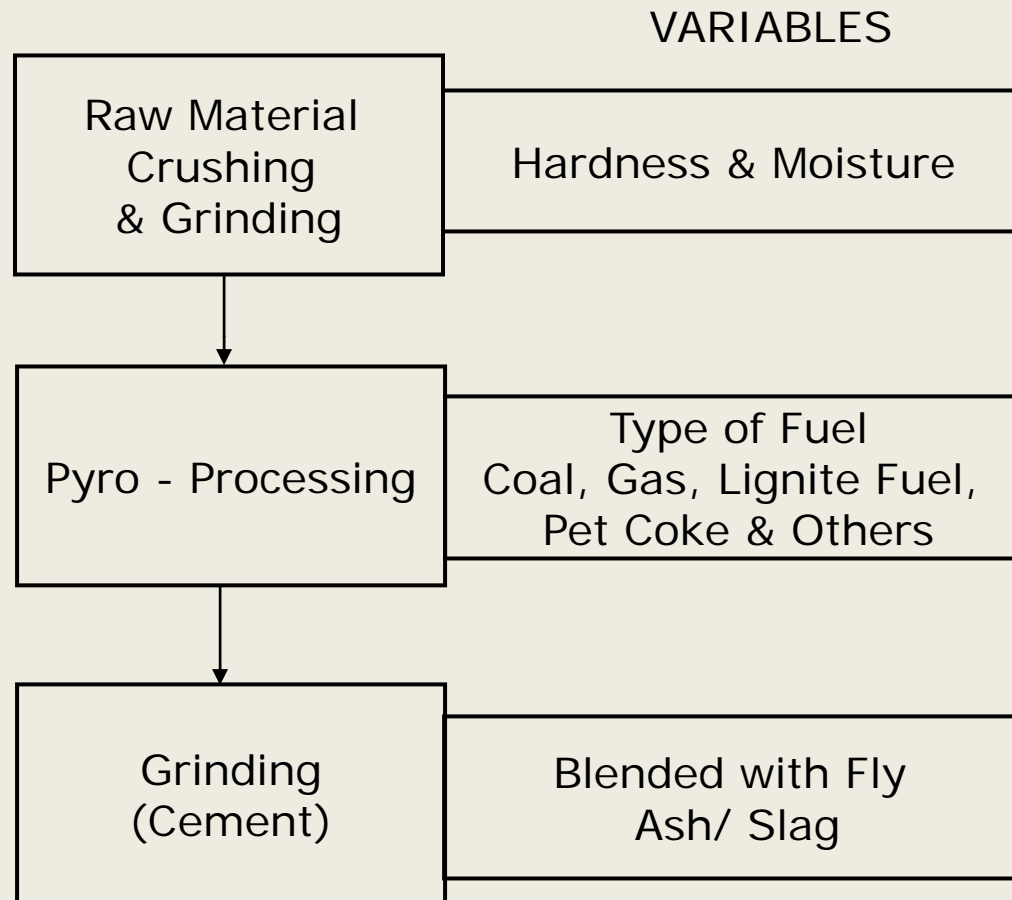
Bandwidth of SEC (Elect)



Bandwidth of SEC (Thermal)



System Boundaries for Cement Manufacturing



Increase in PPC production from 22.6% in 1999-2000 to 60.1% in 2006-07

STEEL SECTOR

Steel Industry – Some Energy Fact file !

Major Energy Source	: Coking Coal, Non-Coking Coal, Coke, Electricity
Energy Demand	: Expected about 28% of total industry by 2030
Energy Consumption	: About 35.5 MtoE in 2007-8 (Integrated Steel)
No. of DCs	: 65 as on 2008-09 (with more than 30000 mtoe p.a)
SEC	: 6.5-8.1 GCal/tcs (World Benchmark 4–4.5 GCal/Ton)
Major Energy Consumption	: Coke oven, Blast Furnace, Steel melting

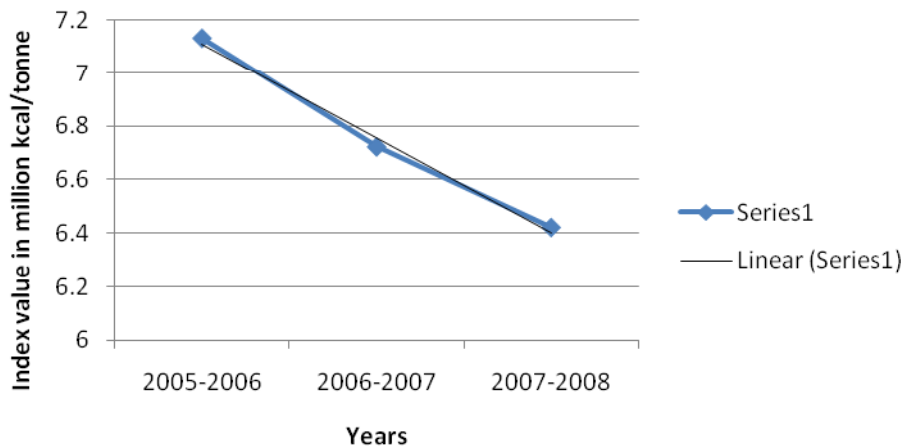
SEC (GCal/tcs) of Main Steel Producers

<i>Plant</i>	<i>2006-07</i>
Bhilai Steel Plant (BSP)	6.8
Durgapur Steel Plant (DSP)	7.07
Rourkela Steel Plant (RSP)	7.98
Bokaro Steel Plant (BSL)	7.09
IISCO Steel Plant (ISP)	8.19
SAIL (as a whole)	7.16
RINL	6.5
TATA Steel	6.7
JSW Steel	6.10

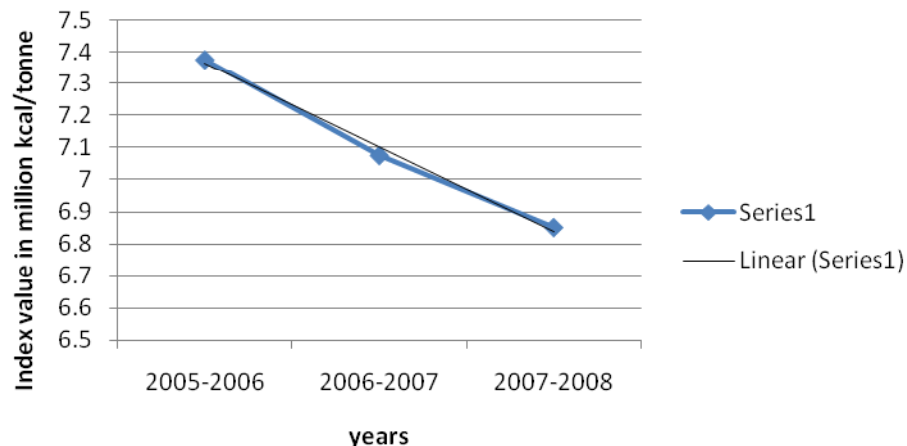
Source : Annual Report of Ministry of Steel, GoI, 2007-08

SPECIFIC ENERGY CONSUMPTION AND ITS TRENDS

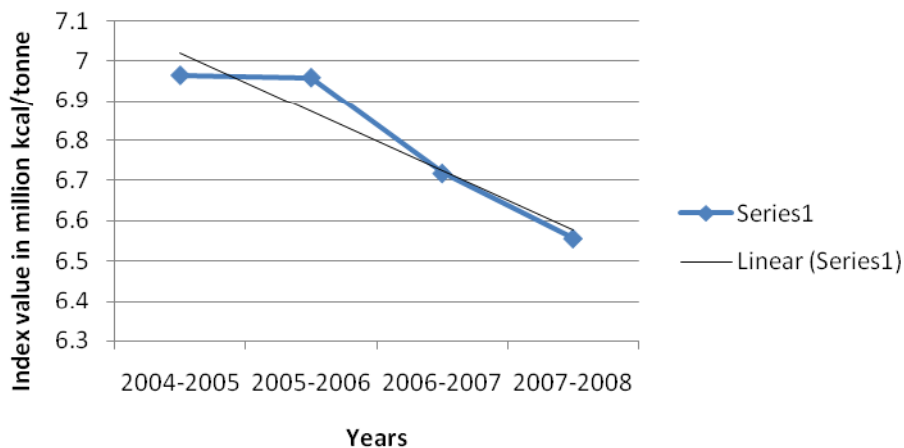
Jindal Steel & Power Ltd



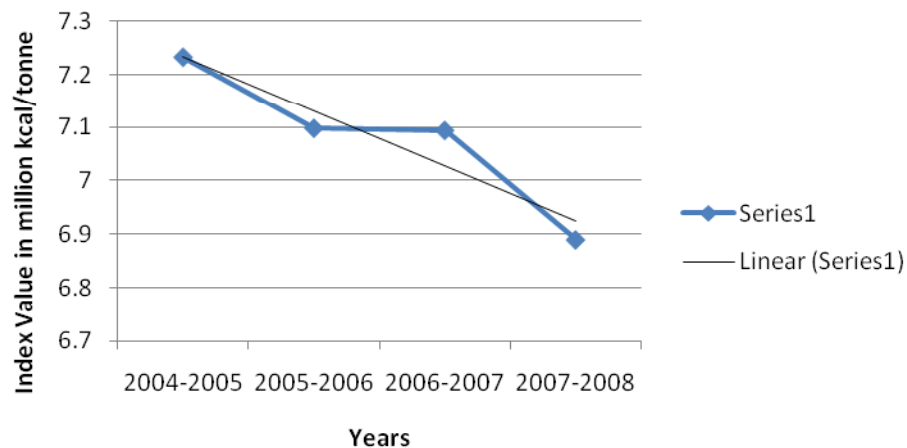
Durgapur Steel plant



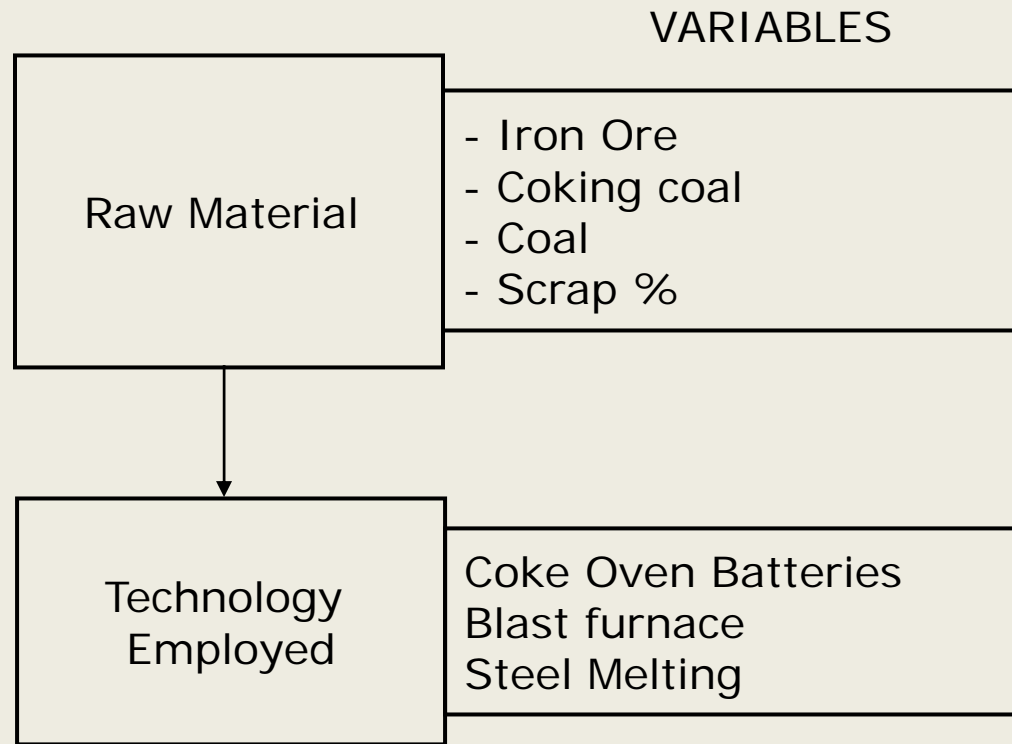
Tata Steel Ltd, Jamshedpur



Bokaro Steel Plant, Jharkhand



System Boundaries for Steel Manufacturing



Thanks