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## Recommendation for Aggregated Data Reporting under the EC- Act

### Task-1

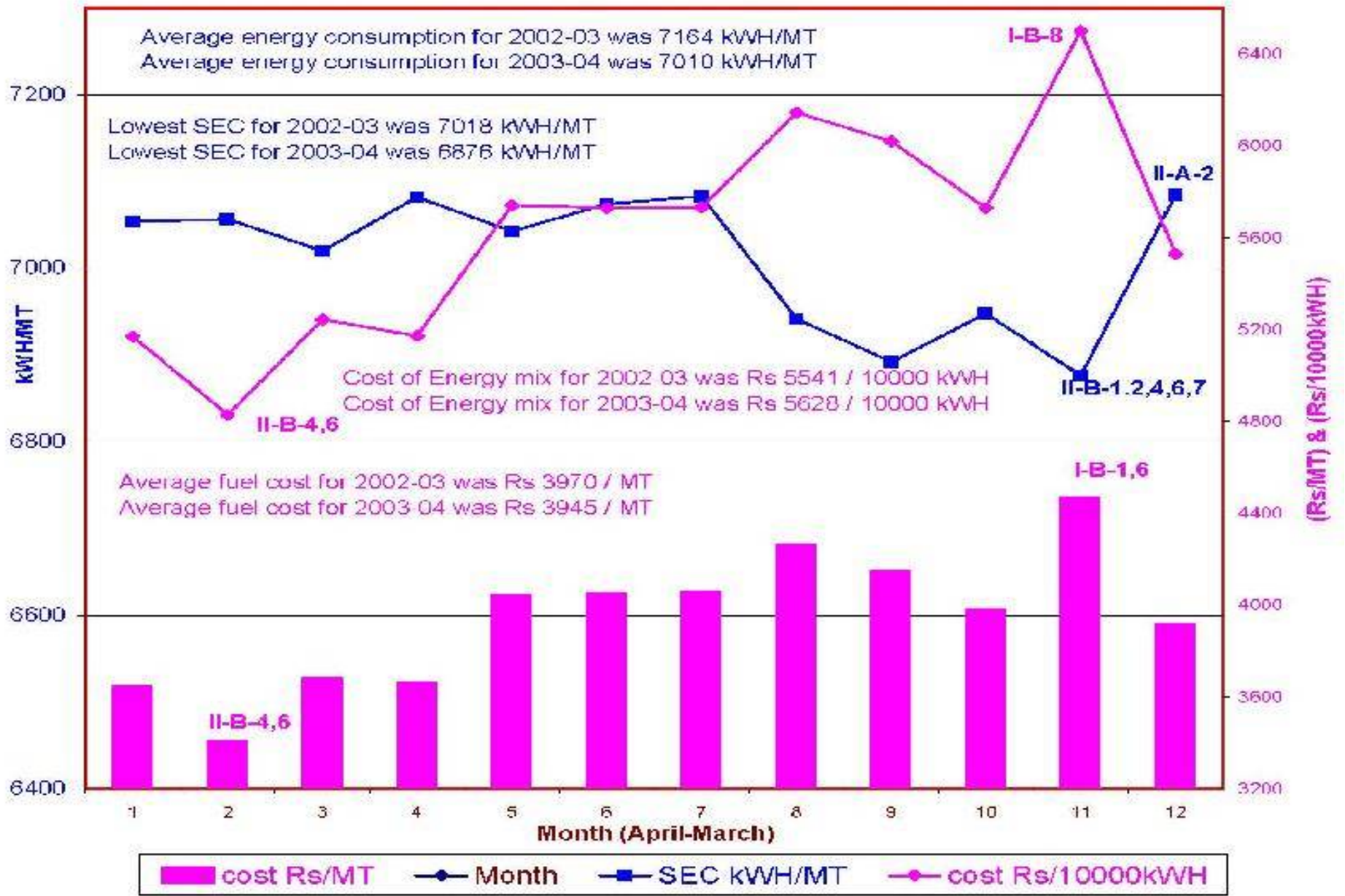
Table showing pop up explanations for change in consumption and costs are listed below.

<b>(I) Increased specific consumption or cost list</b>		
<b>S.No.</b>	<b>(A) Reason for increased energy consumption kWh/unit output</b>	<b>(B) Reason for increased energy cost Rs/unit output</b>
1	Increase in forced outages.	Fuel Cost increased.
2	Increase in scheduled outages.	Specific consumption increased.
3	Labor unrest.	Revenue from diverted energy flow decreased.
4	Reduction in output due to lack of fuel.	Output mix changed to more energy intensive products.
5	Reduction in output due to lack of resource material.	Change of fuel composition.
6	Reduction in output due to high inventory.	Use of more costly fuel.
7	Process reaction catalysts high slip.	Increase in labor / manpower cost.
8	Process reaction catalysts higher pressure drop.	Increased taxes / duties on raw material, fuel.
9	Reduction in plant cooling water exchanger performance due to scaling.(Before Shutdown)	Exchange Rate.
10	Excess process steam consumption in heating equipments due to scaling.	
11	Higher cooling water temperature.	
12	Low ambient temperature.	
13	Less average plant load and high on-stream factor.	
14	Higher flue gas temperature due to dirt surface, load condition.	

<b>(II) Decreased specific consumption or cost list</b>		
<b>S.No.</b>	<b>(A) Reason for decreased energy consumption kWh/unit output</b>	<b>(B) Reason for decreased energy cost Rs/unit output</b>
1	Higher average plant load with optimum on-stream factor.	Specific consumption decreased.
2	Decrease in forced outages.	Decrease in fuel cost.
3	Decrease in scheduled outages.	Revenue from diverted energy flow increased.
4	Raw material available.	Output mix changed to less energy intensive products.
5	Less inventory.	Change in fuel composition.
6	Higher Capacity utilization.	Use of less costly fuel.
7	Energy saving scheme implementation.	Decrease in Manpower / labor cost.
8	Process optimization.	Good housekeeping.
9	Improved housekeeping.	Preventive maintenance.
10	Lower cooling water temperature.	Incentives on taxes / duties on raw material, fuel.
11	Lower flue gas temperature due to clean surface, load condition.	Use of cost effective technology.
12	Preventive maintenance.	Use of in-house expertise for maintenance jobs.
13	Shifting to new process technologies.	Development of workshop facilities for in-house jobs.
14	Shift to new less energy intensive product lines.	Development of indigenous suppliers for spares and inventory.
15	Shifting of product mix.	Exchange rate.
16	Equipment retrofit.	Cogeneration of steam and power.
17	Cogeneration of steam and power.	
18	High efficiency steam driven equipment.	
19	Recovery of letdown energy thru. Back pressure turbines etc.	
20	Recovery of low temperature / low grade heat.	

**TASK-2**

**Month Wise Energy cost (Rs/MT)&(Rs/10000kWH) and SEC kWH/MT**



**LEGEND:**

- On X-axis months for 2003-04 is plotted, starting from April-03 to March-04 numbered as 1-12.
- On left hand side Y-axis specific energy consumption (SEC) kWh/MT of product is plotted.
- On right hand side Y-axis energy mix cost in Rs/10000kWh and specific fuel cost in Rs / MT of product is plotted.

- Lowest and Average Specific energy consumption in kWh/MT of product, Fuel cost and cost of energy mix for 2002-03 and 2003-04 is

	2002-03	2003-04
Lowest SEC in kWh/MT	7018	6876
Average SEC in kWh/MT	7164	7010
Average Fuel cost in Rs/MT	3970	3945
Cost of energy mix in Rs / 10000kWh	5541	5628

- SEC for the year 2003-04 has been lower w.r.t. to average and lowest for 2002-03. Average fuel cost has decreased from Rs3970/MT to Rs 3945/MT.
- Cost of energy mix has increased for 2003-04. This is due to higher cost of costlier fuel i.e naphtha which has to be supplemented to overcome the shortage of cheaper fuel(NG). **This has offset the much of gain due to lower SEC.**
- Pop up table reference for **Specific Cost of product** reason for lower consumption is II-B-4,6 and for higher consumption is I-B-1,6.
- Pop up table reference for **Specific Energy consumption** reason for lower consumption is II-B-1,2,4,6,7 and for higher consumption is I-A-2. In graph shown above reason for higher SEC is wrongly listed as II-A-2.
- Pop up table reference for **Cost of energy mix** reason for lower consumption is II-B-4,6 and for higher consumption is I-B-8.

## FACTORS ON WHICH SPECIFIC ENERGY CONSUMPTION IS DEPENDENT

1. Specific energy consumption is dependent on three different but related parameters which are Average Plant Load, On-stream factor or efficiency and capacity utilization.  
**Capacity utilization** is the ratio of actual production to the rated production for the specified period.  
**On-stream factor** or efficiency is the ratio of number of hours of plant in operation to the number of hours available.  
**Average plant load** on hourly basis is the actual production to the number of hours plant has remained on-stream.  
This can be explained by taking 330days production for 100% capacity utilization factor. For the 100% production level if more than 330days are taken than on-stream factor will increase but average plant load will decrease. This implies running plant on low load operation. For the 100% production level if less than 330days are taken than on-stream factor will decrease but average plant load will increase. This implies running plant on higher load operation. In the first case of lower average plant load energy consumption will be higher than the second case where average plant load is higher. However this is only true for comparing the same level of production.
2. Number of interruptions causes consumption of unproductive energy in startup and shutdowns. Interruptions can be forced or planned. Un productive energy consumption in forced interruptions is higher than in planned shutdowns. Interruptions / outages and average plant load factor are interdependent and influence the specific energy consumption directly to the greater extent.
3. Forced outages / interruptions are dependent on the maintenance / level of technology / housekeeping etc. All the factors which effect will influence the forced outages and ultimately affecting specific energy consumption.
4. Retrofits of equipments / technology up gradation affects specific energy consumption. These measures are one timely and reduce specific energy consumption in one go to lower level. For maintaining at that level points listed at 1,2,3 are to be maintained for keeping specific energy consumption to lower level achieved due to retrofit / technology up gradation.