



Name: Narasimhan Ganesan

Company: M. K. Raju Consultants

Email: gkaveri@vsnl.net

Internally charging the energy consumption to individual departments will be advantageous for controlling the energy consumption. How? It is explained with case study below.

Energy Cost: Depending on the type of industry, energy cost varies anywhere between 1% and 60% of the total manufacturing cost. For example, the energy cost in automobile and ancillary unit varies between 1% and 5% and in Ferro Alloys and cement industry it is about 60% of total manufacturing cost. Therefore, accounting energy consumption of individual major equipment's is necessary for monitoring and controlling the energy input for a given production.

Energy and Production Report: Typically plants are normally manufacturing more than one product (minimum) and reported daily production, department wise, has no. of controllable and uncontrollable variables.

Similarly, daily energy report has an overall consumption for given different productions. Also, the plant depends on operators who normally take much time for recording energy consumption (depending on the size of the plant) from individual feeders manually. Therefore, the reported daily energy consumption will vary day to day.

In most of the plant, utilities like fuel, compressed air, steam and water are common to all manufacturing sections and depending on the usage pattern approximate % is apportioned for accounting the energy to individual departments.

Therefore, for proper accounting and controlling energy input to individual equipment in any manufacturing section of plant, one should have on-line monitoring for both energy and production.

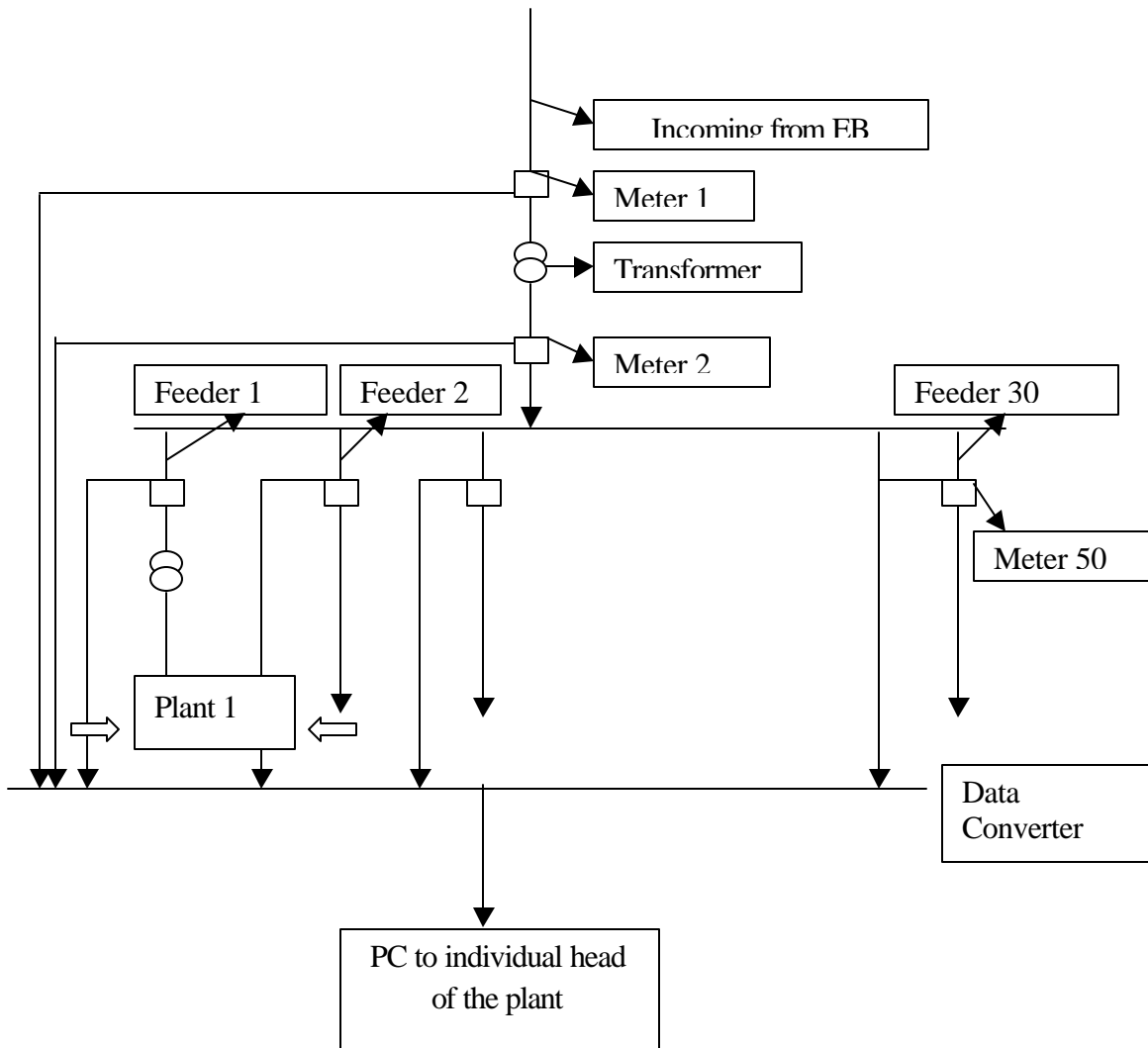
On-line monitoring system: It helps for a company/firm to monitor the energy cost for each product and eliminate errors from manual recording and assumptions used while making daily report on energy and production. On-line monitoring will also help to

analyze the specific energy consumption (SEC) for each product and the operating SEC can be compared with best-achieved in India and abroad.

If operating SEC is found to be on the higher side, the plant can take corrective action for fixing the in-efficient equipment either internally or by engaging external consultants. Also,

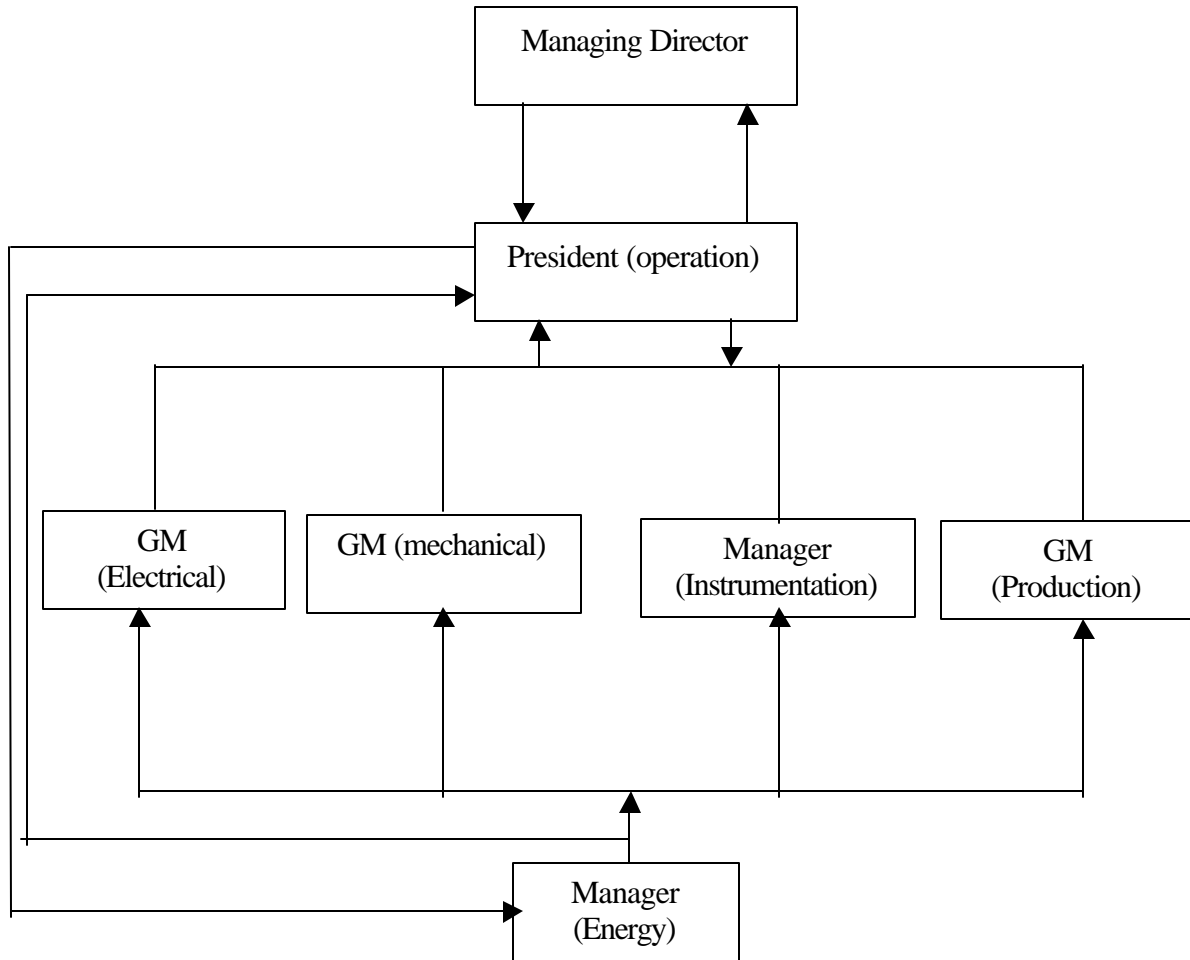
1. variation in energy consumption for the same product will be eliminated and targeted SEC can be maintained all the time
2. input energy, output energy and energy losses for each equipment will be available and based on the energy losses, in-efficient equipment can be replaced
3. incorporating the latest technology to improve the energy efficiency of each equipment will reduce operating SEC further

A typical on-line monitoring system in one of our clients is given below. Low cost meter for both energy and production along with individual transducer for voltage and current to measure electrical operating parameters was used and the meters are developed by CSIO (government organization).



Based on our experience, we have observed that the online monitoring system is working in one or two companies only, that too where the top management is convinced on the system. It was also observed from them that the return on investment for such system is less than a year.

An organization chart is given below where the energy input to individual equipment is being monitored and controlled successfully for a given production. Therefore, **it is advantageous for an organization to have on-line monitoring system and set the target for energy for individual equipment/department for a given production.**



How does on-line monitoring system help to reduce the energy cost?

Energy consumption by individual equipment is monitored for a given production by individual department head who take corrective action then and there for maintaining the targeted SEC by controlling the variable consumption. The top management discusses the energy consumption and production on each day and they want to ensure that the targeted SEC is maintained for each product all the time.

An Energy manager analyze the data collected from individual equipment and discusses with individual departmental heads for reducing the consumption by either changing the process parameters or otherwise replacing existing in-efficient equipment

with energy efficient equipment. He will also discuss with top management directly for getting approval for implementing energy saving proposals. It is an ongoing activity for energy manager in the plant and his success mainly depends on the authenticated data collected from on-line monitoring system. The same on line system will be used for establishing the base data and savings, projected from individual energy saving proposals.

Based on energy consumption pattern over a period of time for a given product and production rate, the management can also direct the operating team for setting the lowest achieved SEC as new base. The operating SEC can be reviewed once in 15 days and further steps can be taken to achieve the lowest SEC in India and abroad. Some of the successful case studies are given below where the energy consumption for individual equipment/department is fixed for a given production and it is being maintained and controlled all the time.

Case Study 1:

In one of the Rayon manufacturing plant, the operating SEC and energy consumption per day was 7000 kWh per ton and 175000 kWh during the year 1994. No details were available on section wise energy consumption and they were not comparing the operating SEC with their competitor and best available norm in India. When they installed energy meter for individual major energy consuming equipment and during this period the plant was implementing various energy saving proposals identified by external consultants for reducing the energy consumption and its cost, the overall operating SEC was reduced to 6500 kWh per ton from 7000 kWh/ton. More importantly, MD of the plant was involved for implementing one of the non-capital proposals, which yielded substantial reduction (3% of total power generation) in energy generated by the in house steam based power plant (MD was personally involved to implement the proposal).

Since, MD of the plant was convinced very much on energy conservation and they started monitoring energy consumption for each day, week and month for a given production. Separate cell for Energy division was created and they were asked to fix the consumption for individual major energy consuming equipment for a given production. And the operating SEC was compared with their competitor and best achieved in India and abroad and over a period of time it was reduced to 4500 kWh per ton from 7000 kWh/ton during the year 2002-03 and per day consumption reduced to 125000 kWh from 175000 kWh. This was possible only when they monitor and control the energy consumption for each department and incorporating latest technology for improving the efficiency of the equipments.

The plant was awarded as best energy efficient plant in Rayon industry from Indian government for several years in a row from 1995 onwards. The targeted SEC for the year 2003-04 is 4000 kWh/ton and groundwork for this was made already.

Therefore, it is advantageous for charging energy in to individual department and more equal important is monitoring and controlling the energy consumption in all equipments in the department.

Case Study 2:

In one of the petrochemical industry, the over all daily energy consumption of the plant was monitored from the main incoming EB meter and it was reported to top management. The overall energy consumption of the plant per day was 60000 kWh. When they installed on-line energy monitoring system (about 55 energy meter for all major energy consuming equipment in different feeder), they could able to bring down the energy consumption per day to 48000 kWh from 60000 kWh per day, which represents a reduction of 20% of total consumption. Reduction in consumption was mainly due to monitoring and controlling the unused energy in each of the department.

Also, more importantly when they found surplus capacity in one of the major energy consuming equipment in utility department, they stopped similar running equipment in another plant which is located about 2 km distance from this plant and they started supplying that plant utility requirement from the first plant (through underground pipe). The cost of the online monitoring was paid back in couple of days.