Energy Manager System
SEVEN REASONS FOR INSTALLING GLOABTEL ENERGY MANAGER SYSTEM

Before you can manage energy costs for **Power, GAS, AIR, STEAM** you have to know what they are! Gloabtel Energy Manager System provides feedback on how much energy is consumed in your organization during each process and how much it costs on daily and monthly basis. It also provides a means to effectively communicate energy data that facility staff, building occupants and managers can use to improve cost management. Gloabtel Energy Manager System has facility to collect data from different source of energy like **GAS, AIR & Power** as on but to integrate different energy source in system, EMS required digital output (Pulse or RS 485 or RS232, 4-20 mAmp Analog Pulse) from different source of energy meters for integration.

**Gloabtel Energy Manager System will help your organization:**

- **Record and attribute energy consumption and costs.**
  Energy costs depend on the amount consumed and its price. In an organization with many facilities, EMS makes it possible to compare energy use and cost among facilities and to monitor how energy use changes over time. Gloabtel offering common system which suitable and working with any digital meters like, **Conzerv, L&T, ABB, Siemens, DUKE, SECURE, TRINITY, DATA PRO, KRYKARD, ELECON, MECO, HPL** and so on.

- **Troubleshoot energy problems and billing errors:**
  By consistently tracking different source of energy use, you can identify problems. A sudden unexplained increase in power consumption, for instance, means it’s time to investigate the site for the cause.

- **Provide a basis for prioritizing energy capital investments:**
  Find out which facilities have the highest energy costs, and consider targeting them for energy by EMS.

- **Evaluate energy program success and communicate results:**
  Did you save what you thought you would from your energy management efforts? How did the actual rupee savings from your lighting, Compressor or HVAC retrofit compare to the savings predicted by your vendor or contractor? Without Gloabtel EMS, it’s virtually impossible to answer these questions. Once you determine the results of energy management activities, it’s important to communicate this information to decision makers and implementers who were responsible for the activities. EMS reports and graphs are the tools for this important feedback.

- **Create incentives for energy management:**
  It’s often difficult to get anyone in an organization to take the time and responsibility required for carrying out energy management activities because there is little incentive to take on the task. A maintenance director or site manager may not see much benefit in reducing energy costs if all of the savings revert to the general fund, or if lower energy bills only result in smaller allocations for utility costs in next year’s budget.

- **Budget more accurately.**
  Gloabtel EMS gives a historical look at costs that will help you budget more realistically for the future.

- **Consider a system of communication.**
  What kinds of reports and graphs will be needed, and by whom? When and how will information be reported? Make sure you get the right information to the right people, at the right time.
After Installing EMS you may able to answer questions such as:

- What quality of power getting from incomer SEB, T.G, D.G line
- Loading efficiency of Incomer Transformer
- What types of energy are used at distribution level?
- How much is being used?
- How much does it cost?
- Where is the energy being used?
- How efficiently is energy being converted, distributed and used?
- What are the potential savings?
- How can they be achieved?
- How much will it cost to achieve the savings?
- What are the priority areas?
- Monitoring & controlling of feeders or different machinery
- How much power is consumed by each motor (with and without load)
- How much power is consumed by each Boiler and Chiller OR from any other machinery

Note: EMS required Communication port in any energy meters for communication.
Energy Manager System

The Gloabtel’s Energy Manager System (EMS) is appropriate for industries, manufacturing plants, commercial buildings or any situation where electrical energy is used. The system is provides centralized power monitoring & control (optional). The EMS helps to savings in overall costing like energy Bill, reduction in maintenance, reduction in THD and maintain unity power factor.

The Energy Manager system continuously analyses data that can be linked to productivity. It records section or shift-wise consumption at various Distribution Boards, feeders and Machine level, please refer figure a. It reports frequency and other parameters beyond upper/lower limits. It detects power-sags and imbalances in critical energy parameters, which helps to avoid power-factor variations. In the event of an over-current, over/under voltage, circuit break, etc, an alarm is set off. This applies to all ports and parameters. This helps determine the cause of failure and prevent future occurrences.
The Energy Manager system (EMS) Comprises of Hardware and Software:

**Hardware:**
1. Energy meters with Modbus protocol on RS485 port
2. RS485 to RS232 converter or RS 485 to Ethernet Converter
3. Multi channel serial card for PC (PC should have at least 2 serial port - one for meter and other for modem)* required when more then 32 meters connection
4. PC – exclusively to be used for EMS only.
5. Data cable to interconnect each meter Necessary power supply for PC

**Software:**
1. Energy Manager System package is derived from total no of meters which is start from 4, 16, 32, 64, 12, 256 and 512. EMS compatible with any Modbus digital meter and Pulse meter. (Work on all make of meters).

**Note:** Integration with Flow meter will cost extra (Software & Hardware)
**Working of EMS:**

The Gloabtel has designed a 3-step plan module which work as jointly to save energy saving.

The Energy Manager System working:

**Acquire real time data:**

EMS acquires data from any make of digital meters, Pulse meter and Ethernet based meter, which helps user to monitor different electrical parameters on real time basis at centralized location.

**Monitor and Analyze:**

The monitoring and analyze services of an energy management system provide you with a better insight into your company’s energy flow. Load data recorded can be displayed in a clear layout which reveals major consumers, making it clear where to optimize first and identifies power-sags and imbalances in critical energy parameters.

Monitoring and analyze also reveal at what times there were particularly high loads. An analysis of these high-load events can show which situations typically cause load peaks. From here strategies can be developed to avoid such critical situations.

**Controlling and Reporting:**

Once the parameters have been monitor and identify the area of energy-loss, our EMS will control the power system that will ensures user to minimized energy losses and maximized power factors and Load factor. EMS also generates reports like frequency and other parameters beyond upper/lower limits. *Controlling module is optional and it will be charge extra.*
Network Schematic Diagram:

The above diagram shows the typical Energy Manager installation. Based on the number of meters connected and proximity of the meters, meters will looped together. Typically, RS485 allows only 30 meters on one port, if the more then 30 meters to be used user has to install serial PCI RS 232 card on PC so that they can use multiple of 30 meters. Further, if the distance between any meter or first meter and PC is more than 1000 mts or 1 kilometer, then data repeater will be installed. The meters should be strictly connected in a loop as shown above.

EMS continuously analyses and stores data from digital meters installed at different locations. The various electrical parameters are displayed from the meters at PC. These meters are connected with Master monitoring system through RS485 bus. It records section or shift-wise power consumption at various distribution boards, feeders and machines. It generates visual alarms for any parameters going beyond specified limits. It detects power-sags and imbalances in critical energy parameters, which helps to avoid power-factor variations.
**Features of Energy Manager System:**

1. **Data acquisition and analyzing:** Energy Manager System will acquire data from various sources of energy like Electrical Power. It will collect data from meters. The live data will be available in numerical and graphical format. These data will also be stored in the database for generating history reports and trends. Meters are capable of giving different parameters like Cumulates power consumption, Instantaneous power consumption, Import/Export. The acquired data will be on MS-Access. User can monitor data on real time basis in numerical and Single Line Diagram-SLD basis. It will also generate alarm whenever any parameter is not within the specified limit. E.g. Data from different feeders (15 to 20 nos.) on which the different make of meters is installed, on the server as well as five different locations where the client software is installed. EMS scans data from 128 meters in only **less than 60 seconds** of time.

![Single Line Diagram-SLD](https://example.com/sld.png)

2. **Hardware independent:** At present Energy Manager works with many different types and brands of energy meters with RS485 port and Pulse. It is integrated with meters developed by Conzerv, Ducati KRYKARD, L&T 300N and Quasar; any Pulse KWH meters, Elcontrol meters, Elecon series, MECO, EMCO, Alacrity Load Manager, and Programmable Logical Controller (PLC) etc. We are continuously adding new meters to the system.

3. **Integration of Pulse Meters:** Integrate Pulse type meter into EMS with the help of Gloabtel own Pulse to Serial RS 485 hardware.

4. **Load Management:** Improper loading can cause the source to trip or exceed MD in case of SEB. Gloabtel Energy Manger System is capable of monitoring critical load parameters to determine the level of energy usage in electrical network. Proper load planning can be carried out based on the report generated in order to take advantages of different tariffs offered during the day by utilities. The system is capable if giving each phase parameters. This helps in finding phase imbalance conditions of necessary actions can be undertaken to balance the same.

5. **Improvement of Power Factor:** EMS system predicts contract demand (KVA) with respect to time slot of SEB at the same time user can also get forecast for next 24 Hr energy consumption. User can also set upper lower of contract demand and according to availability of demand they can make variation in load.

6. **Live error warnings:** The user can specify lower and upper limits for various parameters. So whenever any parameter goes beyond the specified limit, the system will generate alarm. It will be displayed on the screen with the name of meter, name of parameters beyond the range and time stamp. The limit can be set for various parameters like voltage, current, frequency, power factor etc.
7. **Verification of Energy Conservation:** Often there is no systematic record and tracking of an energy conservation activity. Has resulted in net effect of increase or decrease of energy consumption? The system records monthly consumption and calculates the variance in terms of percentage increase or decrease of consumption. Hence if the organization is carrying out energy conservation activities the percentage increase or decrease in energy consumption on a monthly basis or yearly basis is calculated and displayed by Gloabtel Energy Management System.

8. **Department-Wise / Location-wise Energy Cost:** Apart from manufacturing, other departments are also consuming energy which is often goes unnoticed. Gloabtel Energy Manager system helps to segment the various cost counters like manufacturing units, administration building, Blocks and department. This determines how each of business units or process consumes electrical power to help promote accountability, increase efficiency and productivity.

9. **Location Wise Energy Consumption Difference:** Two production lines producing the same product may not be consuming the same amount of energy. Gloabtel Energy Management System helps to define zones, locations or area and see energy level difference between two locations. For e.g it is possible to calculate the energy consumption of Furnace 1 and Furnace production and see the difference. This will further help to know which Furnace not efficient or helps to calculate efficiency of different machinery.

10. **Effective utilization of Manpower:** Present manpower engaged in reading energy data at various load centres can now be utilized elsewhere for productive work. Thus the time and energy resources are productively utilized for upkeep while Gloabtel Energy manger system will carry out accumulation and evaluation.
11. **Plant Load Factor L.F:** Gloabtel Energy Management System also displays instantaneous values of Plant load factor indicating what percentage of the plant is loaded for all source of energy. This helps in identifying un-utilized capacities. This is a ratio of operating load to total connected load.

12. **Import / Export Report Generation:** EMS system is capable of generating various reports on Import / Export power generation and consumption. EMS generate report for how much generated power is delivered to SEB with time slot like 15min and 30 min. Peak consumption or export to SEB per day. To generate the various and accurate import/ export reports we are suggest company to buy same class and make of meters which is placed by electricity board. (We suggest company to provide class 0.2 or 0.1 class accuracy of meters to more accurate data for import/ export report generation).

13. **Percentage loading of Transformer:** Improper loading on transformer or generator will lead to Energy losses. Gloabtel Energy Management System gives a graph of percentage loading on the Transformer (State Electricity board) or the generator of distribution. This will give user an indication of the load factor on that particular source. This will also help in sizing the source (transformer or generator). Percentage loading can be seen on KVA basis or KW basis as loading on Generator has to be assessed from kW and kVA both simultaneously.
14. **Report Generation:**
The system is capable of generating quick **MIS reports in terms of pie chart, trends and tabular data related to electrical data & Energy data.** This helps in **saving time and generating timely and accurate report** (Auxiliary power consumption, Section wise, Machinery wise power consumption and other reports also customized but required necessary details) Gloabetel will provide maximum possible customized reports.

15. **Trends/Graphs:** History data can also be also viewed in graphical format. The user has option to plot any parameter of any meter on a graph for specified period of time. There are in-built graph in the system like three phase voltage v/s time, three phase current v/s time etc. user can specify meter number/name and time frame to generate the graph.

There is optional module whereby which user can select any four parameters from any four meters or same parameter for four different meters or same meter but four different parameters etc. to plot on a single graph for specified time period.
16. **Export data to MS Excel:** Energy Manager provides facility to export data to MS Excel. The user can select parameters and meter number and specify the time interval for exporting the data. This helps user to further manipulate the data and generate the desire reports and trends, which are otherwise not available. By default, all the parameters will be exported for specified time interval.

17. **Production and Energy:**

In today’s cost competitive scenario it is important for any organization to have and establish benchmark for energy input per product. Gloabtel Energy Manager System gives out production VS Energy consumption report. This report informs about the amount of production for per unit of energy. Production information has to be keyed in it also informs on the amount of energy consumed for per unit of production. This helps in sizing the energy requirements for a particular demand of production level. Note: Charges extra.

18. **Calculation of distribution losses within plant:**

Distribution losses from source and to load end are the result of low PF or old cables / Switch system. The loss often goes un-noticed. Our system can calculate and present these distribution losses in Energy terms. This helps in identifying areas of losses and eventually suitable action can take to curb them.
19. **Connecting new meters:** The software will have facility to add new meters as and when required. However while adding new meters, limitations of the RS485 port and Modbus protocol should be taken into account.

20. **Ease of use:** The system is **windows based** and very easy to use. The **user friendly front-end** bundled with **self-explanatory buttons** makes the system very simple and easy to operate. It **do not require highly qualified operator.** A person who can operate a PC can operate the system. He can even generate reports and export data to the Excel Sheet. The help file is also integrated within the system. The user can get the desire data with minimum clicks and do not have to browse through many pages.

21. **Alarm Notification:** User will get different set alarm notification on their mobile for feeder tripping data, ON-OFF machinery and so on.

22. **Feeder’s status Monitoring:** EMS system have facility to monitor status of different feeders with help of microcontroller based hardware called **Micro-RTU.** It’s having digital inputs and digital out put faculty to monitor the status of feeders **ON / OFF** and according to need of use user can control hardware from EMS system. Cost of the hardware will charge extra as per need of inputs and out puts.

23. **Identification of Line Harmonics:** EMS system is capable of identify harmonics percentage available in voltage/current. This helps user to monitor and identify level of harmonics available in incomer line and level of Harmonics available within the plant. If Harmonics is generate within the plant then system is also capable to identify the areas or machinery which is producing harmonics. Helps to maintain percentage of harmonics. Please see **Annexure 1**

* Only provide if meters is having facility

24. **Remote Consultancy Service:** Allow us to analyze the EMS System and makes this information instantaneously accessible to our energy expert & energy auditor.
The above diagram shows the typical installation of centralized Gloabtel Energy Manager System. It shows loop networking of RS 485 data bus with Energy Manager System. Based on the number of meters connected and proximity of the meters, meters will looped together. Section-1 and Section-2 are the different locations. Each location will be connected to a local PC through RS485 to RS232 Converter and data from section-3 collected over PSTN line by wire less to EMS and dump collected data at server PC. Typically RS485 allows only 30 meters on one port. Further, if the distance between any meters is more than 1000 mts or 1 kilometer, then data repeater will be installed.

It is possible to use existing telephone cable if it has twisted pair. Gloabtel Convergence recommends the use of specialized data cable for networking the meters. The data cable is specifically designed for such system and ensures fast, reliable and secure data transmission. It protects data from electrical noise and other interferences. We do not guarantee the data collection through telephone cable. Further, the connection between the meters should be same as shown in the below diagram within the loop, irrespective of the type of cable used.

The company should also use dedicated PC for the system as such system requires high resources for processing. Using PC for any other job will affect the performance of the system and may crash Energy Manager. The PC should have proper anti virus system and it should be updated regularly. PC should never be switched off.
Gloabet Convergence will modify its system to meet the specific requirement of your company. The server will be modifying to collect data from various locations on predefined conditions. It will dial to various locations and collect the desire information. The system supports different mode of communication like PSTN (landline), GSM, CDMA, Ethernet etc. It is advisable to use PSTN as all the locations have common telephone system. GSM and CDMA signals are weak in the area and hence it will not be able to support the requirements of data communication. Besides, PSTN is cheaper solution as there is no on going cost compare to GSM and CDMA as internal telephone system is used.
Advantages of Gloabtel Energy Manager System:

Energy Manager is meter independent software. It can collect data from most of the meters with RS485 port. Following points discussed the advantages of Gloabtel Energy Manager over other software available.

- Energy Manager is meter independent. It collects data from most available makes and brands that have RS485 port.
- Monitor Status of breaker and OFF time & RUN time of individual machinery (Note: Require RTU with EMS system, cost extra)
- Collect data from looms or any other textile machinery
- Online line monitoring and controlling of DG Engine or Generator
- Can be integrated with any digital meter
- If company opts for different meter in future, the same can be integrated without any cost.
- No need to rely on single meter supplier.
- The company has flexibility to use different meters in the same network
- Customizable in accordance with company’s requirement
- Data can be collected in the company’s existing database. The company need not buy additional database like MS-Access or MS SQL Server as data can be stored in present database server.
- Plot graph for four different parameters and four different meters or same parameter for four different meters or four different parameters of the same meter.
- Generate reports for specific time period.
- View live graph
- Export data to MS-Excel for various meters. The user can select various parameters for export.
- Provide instantaneous MIS reports for corrective and preventive action.
- Able to plan load distribution.
Following are some benefits that user can get from ESM:

- Improve data accuracy and no human error in the data collection.
- Monitoring power to determine usage and demand profiles.
- Lower energy costs
- Improved working conditions.
- Better control.
- Ensures legislative compliance.
- Identify the Electrical equipment that is inefficient.
- Demonstrates corporate & social responsibility.
- Helps to determine root causes of electrical problems.
- Helps to determine the poor power quality problems like voltage sags and swells.
- Reduction in Maintenance cost by forewarning problems in near future.
- Helps in pricing mechanism by giving data about exact cost of electricity spent during a process
- Reduction in power consumption through well laid out maintenance and process optimization.
- Reduction in T&D losses
- Helps to Identify and reduce in line Harmonics
- Reduction in high power consumption and helps to improve efficiency of motors/ machinery.

EMS provides a unified view of energy assets and consumption. They account for power distribution, backup and power grooming equipment, and cooling, Furnace and Motors as well as management of costs and efficiency.
Different Reports available in EMS:

- Daily & Monthly- Monthly Energy reports
- Daily & Monthly- Monthly Energy reports
- Monthly- Year Energy report
- GroupWise or Section wise all meters reports
- Shift Report (3 shifts with user define time & date)
- Shift Report with specific energy consumption
- Daily log book- Area wise or Section wise
- Energy Bill for individual feeder/office/shop
- Total Energy Bill with respect to Total Power consumption
- Customized reports for the different Energy
- THD V & C

* Reports can be customized as per need and details provided by customer and proposed system.
**Personal Computer- PC Specification:**

- Pentium IV Core 2 duo
- 2GB MB RAM minimum
- Serial port: 6 nos
- 120 GB HDD disk space (* Please see HDD selection details)
- 52x or above CD ROM drive
- 2 USB ports
- 17” LCD (to view data in SLD and other graphical format)

**MS Windows Operating System**

- Windows XP Professional with SP2 with MS office latest
- Windows 2000 Professional with SP2 with MS office latest

**HDD Space Utilization (Approximately)**

With one minute data –log time interval, HDD space utilization for Two year of data storage will be as follows:

- 1 Meter: 200 MB
- 4 Meters: 800 MB
- 16 Meters: 2.9 GB
- 32 Meters: 5.8 GB
- 64 Meters: 11.6 GB
- 128 Meters: 23 GB
- 512 Meters: 93 GB

**Communication cable specification:** 2 core shielded high speed data communication cable with 0.75 Seq mm.