



A
DESSERTATION REPORT
ON

**“A STUDY ON OPTIMIZATION OF ELECTRICAL POWER CONSUMPTION
AND APPLICATION OF GREEN TECHNOLOGY AT
M/s IEC DOW CHEMICAL INTERNATIONAL PRIVATE LIMITED”**

MBA (POWER MANAGEMENT)

UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN

INDIA

**SUBMITTED
BY**

**NAME: HARI KRISHNA TIWARI
SAP. ID. 0500065512**

SUBMITTED TO



**CENTRE FOR CONTINUING EDUCATION (CCE)
UPES, DEHRADUN**

ABSTRACT

So as to acquire an essential mix of productivity and adequacy in the opportune spot and at the ideal time Facility Management at M/s IEC perceive a requirement for an apparatus to streamline its electrical force utilization to improve its operational effectiveness and a successful force the board procedure 'use of green innovation' in its site. Streamlining influence utilization and the use of Green Technology is an office the board technique that helps organizations does both "bringing in cash" and "sparing the planet". At the point when we monitor vitality assets, our country can appreciate cleaner air and a more advantageous condition, and we can help ensure the atmosphere. Building Green Buildings or vitality productive structures won't just set aside your cash, permitting us to give increasingly solid, agreeable and practical future.

I Gopinath J led an exploratory investigation entitled "An examination on streamlining of electrical force utilization and use of green innovation at M/s IEC Dow synthetic worldwide private restricted" involving fine-grained techniques as assessment of different advances for appropriation and assessment of different components that prompts higher force utilization, diminishing essential vitality utilization from HVAC framework and to decide a framework for M/s IEC that upgrade power utilization, through an examination of concentrated contextual analyses and through our involvement with different activities that are appropriate for this kind of ventures, that can address inquiries regarding the procedure, setting, and customization of progress methodologies that lead to practical execution (Pettigrew et al., 2001).

The paper deliberately arranges the distributed writing utilizing various systems, and furthermore recognizes the potential holes.

The paper traces significant procedures utilized in different upkeep advancement models including the Brain Storming method to discover why power utilization is more at IEC, Rating framework to assess the underlying driver, Fish bone graph. There is a developing pattern towards employments of Why investigation of choice of plausible main drivers and them restricted down the likely underlying driver to a couple.. This examination arranges the writing on electrical utilization enhancement models and dependent on developing patterns it plots the headings for future research in the territory of comparative Facilities Management. Services.

The flow study targets filling this hole through an investigation of far reaching electrical force utilization streamlining framework for M/s IEC.

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RESEARCH BACKGROUND

Generally, vitality has been seen as a cost, a bill to be paid and a cost to be controlled. The individuals who are prepared for the future, anyway have developed into another point of view towards vitality and are moving their activities, to profit by the full estimation of vitality as a "crude material", an asset that can be applied to develop and continue their business into what's to come. Among the various difficulties looked by offices administrators, wasteful vitality utilization of structures, and a requirement for use of green innovation for a Green and Clean Building are the present two significant difficulties. Advancing influence utilization and the use of Green Technology is an office the board system that helps organizations does both "bringing in cash" and "sparing the planet". At the point when we monitor vitality assets, our country can appreciate cleaner air and a more advantageous condition, and we can help secure the atmosphere. Building Green Buildings or vitality proficient structures won't just set aside your cash, permitting us to give progressively solid, agreeable and feasible future.

Written works show advancement of intensity utilization and use of Green Technology is that development which decreases squander by changing examples of utilization as well as creation and. It is additionally characterized as natural recuperating innovation, which decreases ecological harms made by the items and advances for people groups' accommodations. The vast majority of the organizations may not be eager to "become environmentally friendly" by lessening the utilization and outflows since their



adage is to bring in cash not to spare the planet. The worldwide system ought to be to assist organizations with doing both.

Vitality utilization of structures presents half of the absolute essential vitality utilization in India. Regularly, this vitality is devoured wastefully. By tending to 'circumstances and logical results' connections; a large portion of the issues overwhelmingly emerge from the structure specialized activity and the board. An investigation of 132 business structures has discovered that 60% of the structures have control issues. Reserve funds of up to 77 % have been accomplished by amendment of control issues. This exhibits tackling control related issues contributes fundamentally in essential vitality investment funds.

M/s IEC recognized an open door that present Electrical Power Consumption can be decreased by at any rate 7% by utilizing comparative force sparing venture understanding, Moreover this task will lead further comparable examinations at other M/s DOW different areas comprehensively.

INTRODUCTION TO THE INDUSTRY

Office Management administrations suggest the utilization of an outsider specialist organization to keep up some portion of the structure office or re-appropriating the administration of whole offices to an association that executes this administration expertly. It incorporates hard administrations or building activity and upkeep and delicate administrations or bolster administrations, and vitality the board administrations. Hard administrations incorporate electrical, electro-mechanical, mechanical; water the executives and vitality the board. Delicate administrations incorporate housekeeping, security, cleaning, providing food, transportation, cultivation, arranging, and front office the executives, and so forth. In created markets, FM administrations are firmly coordinated with different administrations, for example, lease assortment and rent the board. Anyway in India, the idea of FM has not developed enough to give total property the board arrangements. Increment in interests in IT/ITeS/BPO, fund/banking, telecom, retail/shopping centers, and mechanical divisions will keep on seeing solid development in the following 2-3 years and because of the normal deluge of major worldwide Multinational Companies (MNC) in India across different end-client verticals.

FM advertise incomes in India are higher than different countries, for example, Singapore that are littler in topography. Be that as it may, as far as market development and understanding and tolerating of such administrations by end clients, India has far to

go. The market for re-appropriated FM benefits in India was evaluated to be USD 850 million of every 2014. About 54.9 percent of the general market was for delicate administrations and 45.1 percent for hard administrations in 2010. The market for delicate administrations includes an enormous group of organizations that offer single types of assistance and spend significant time in administrations, for example, providing food and wash room, cleaning and housekeeping, security and others. The market for hard administrations has high noticeable quality in the IT division as it re-appropriate the work to professionalized and well-prepared specialist co-ops. Cleaning and Housekeeping administrations contribute a higher level of the market followed by support and designing administrations lastly security administrations and others.

The business part saw the most noteworthy rate portion of the general FM administrations showcase. The business area is developing, giving immense potential among different segments, for example, telecom, retail and modern as Global MNCs, for example, Accenture, Nokia, Cisco, Microsoft, and others request re-appropriated FM benefits in India. Nearness of worldwide and Indian MNCs is the significant driver for the development of this market across different end-client parts as they are the potential clients because of their expanded mindfulness levels and readiness to put resources into such administrations. Re-appropriated administrations combined with the venture blast in land and development parts. Development of this market is driven by the requirement for wellbeing, comfort, and sound condition of the workers just as the expansion in mindfulness about re-appropriated administrations among clients. The market continued the circumstance and improved its entrance to a great extent through existing agreements despite the fact that the economy saw stoppage in the last 2-3 years. Thusly, it is seen that the current financial circumstance winning in the US and Euro zone won't have a lot of

effect on the development of this market. India's development is required to be unblemished with a GDP development pace of 7.5-7.9 percent in the coming a very long time because of the current financial situation and its long haul ramifications on the rising nations.

INDUSTRY CHALLENGES

Absence of accessibility of specialized and non-specialized labor is perhaps the greatest test the business is confronting presently. The absence of qualified staff has expanded the lead times in assembling assets/staff after a task has been effectively contracted. Increment in swelling and work cost have constrained numerous clients to supplant long haul contracts with medium-term ones. Numerous clients think that its simpler to keep up medium-and transient agreements as opposed to long haul ones as the last will prompt value rise.

The following huge factor acting like a hindrance is rivalry. Since the market is loaded with minimal effort disorderly specialist organizations, valuing and edges go under weight as these sloppy players offer types of assistance at low rates, basically abandoning the opposition from enormous sorted out players. Be that as it may, numerous global property the executive's organizations have gone into this market and accomplished sensational development rates in the course of the most recent five years.

Green Technology

As a rule, the advancements and related administrations in the "green" part can be gathered into the accompanying classifications:

Energy

- Renewable and alternative energy production
- Energy conservation
- Energy storage

Water

- Water conservation
- Water recycling
- Production of water from alternative sources, such as desalination

Environmental and Pollution Devices and Services

- Waste management, disposal and recycling
- Toxic waste elimination, remediation
- Emission control
- Inspection, engineering, testing and consulting
- Product and systems design and re-engineering

Engineering, Architecture and Design

- Product Design
- Industrial Process Improvement
- Factory Automation
- Packaging
- Heating and Air conditioning Efficiencies
- Lighting Efficiencies

Other Resources

- Recycling and conservation of metals, woods, paper, chemicals and plastics
- Conservation of land, waterways and wildlife habitat

Primary industry sectors targeted for the application of green technologies

include:

- Agriculture
- Food processing and distribution
- Oil and gas
- Manufacturing and other industrial processes
- Transportation, logistics and shipping
- Automobiles and trucks
- Construction, building operation and building maintenance
- Power generation and distribution
- Water systems

- Retailing
- Supply chains

Green innovation influences these segments in a wide assortment of ways. For instance, the wide field of vitality keeps on creating transportation fuel and power in a to a great extent conventional way (from flammable gas, coal and oil). Simultaneously, in any case, a noteworthy exertion inside the vitality segment is centered around protection and productivity just as the advancement of sustainable power sources. Truth be told, all through the green innovation field, protection is the place the low-hanging natural product lies. The most effortless green arrangements will be in better protection in structures; lighter materials

in autos, trucks and planes; decrease of the present enormous breaks in metropolitan water frameworks; and better stockpiling, in the developing scene, of rural items so as to diminish deterioration.

Basically making proficiency, in materials and vitality use, a thought in building and plan of numerous types is as of now dramatically affecting manageability. For instance, Wal-Mart, the world's biggest retailer by a long shot, set an objective for its providers to diminish bundling on normal by 5% from 2008 to 2013. From the start, this may not seem like a lot, however the truth of the matter is that the measure of bundled items that move through Wal-Mart in a given year, with its \$476 billion+ in yearly incomes, is gigantic to such an extent that 5% will signify an enormous sum.



As a component of this procedure, the organization has made a practical bundling scorecard for in excess of 627,000 things that are sold in its stores and Sam's Clubs. The scorecard assesses the ecological properties of bundling, and empowers its providers to gauge whether their bundling decreases vitality utilization, cuts waste and encourages supportability. The organization even has a yearly "Maintainable Packaging Expo" where its providers can meet with driving bundling makers and planners to find out about the most recent advances and developments. Long haul, Wal-Mart has define an objective of being bundling unbiased by 2025. That is, the organization intends to reuse bundling and waste to the degree that it utilizes no more bundling materials than it makes. By 2013, the organization was at that point 80% viable.

LITERATURE REVIEW

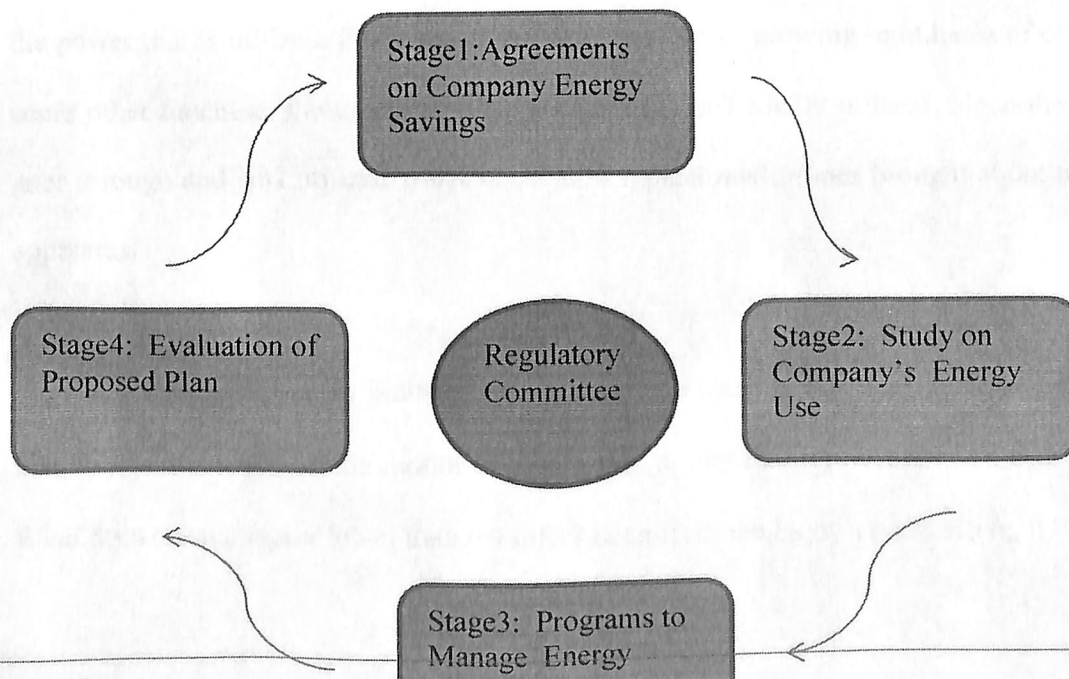
- ✍ NEED FOR AN ENERGY SAVING MODEL**
- ✍ CONCEPTS & INDICATORS**
- ✍ BUILDING ENERGY MANAGEMENT SYSTEM**
- ✍ BREAKING THE MYTH THAT GREEN ALWAYS COSTS MORE**

NEED FOR AN ENERGY SAVING PROGRAM MODEL

Proper vitality use and the board are the initial steps to genuine investment funds and to making a viable vitality reserve funds plan. The approach appeared in Figure can be utilized to set up this kind of plan. This philosophy looks to make an upright pattern of consistent improvement that builds up least effectiveness parameters inside an organization.

The reason for this approach is to have an apparatus to expand a work plan that diagrams a helpful and material vitality investment funds program. Similarly as with any system procedure, certain estimates must be accessible to screen progress, including ideas and markers that help manage the organization and permit it to comprehend its wellbeing as far as vitality utilization.

In any case, it is important to follow a successive structure to build up an activity plan. The accompanying straightforward and organized procedure can be utilized as a model to construct a solid work plan.



The past chart attempts to set up a gauge for a whole organization; be that as it may, it is important to include standard estimations and ideas. There are elements and markers that can be utilized as apparatuses to gauge certain significant parameters as far as vitality use, age and utilization. Certain viable information is expected to decide operational effectiveness.

Some fundamental pointers, for example, request factors, creation elements and most extreme interest, among others, offer an away from of an organization's vitality wellbeing. What's more, they show which territories need improvement so as to arrive at certain vitality investment funds. This is pertinent to the two workplaces and ventures.

Concepts and indicators

Power factor

On the off chance that the business is sufficiently huge, it might be punished by its capacity factor (pf). This factor is fundamentally a marker of electrical effectiveness or the power that is utilized. For instance, an electric stove or glowing light has a pf of 1. In some other machine, the electrical charge's capacity isn't totally utilized, since the flow goes through and isn't utilized 100% because of typical misfortunes brought about by the apparatus.

The force factor for an industry should approach roughly 0.9. Any number beneath that will be punished on the month to month bill, at any rate on account of Costa Rica. What does a force factor lower than 0.9 infer? Seen from the buyer's perspective, it

implies an expansion in power utilization, solid drops in conductor strain, a decrease in the helpful existence of machines and apparatus awkward nature.

Then again, from the point of view of the power merchant, a low force factor implies more noteworthy interest in electrical age hardware on the grounds that KVA (kilovolt amperes) limit is affected.5 what's more, the wholesaler needs to utilize lines and transformers with more noteworthy limit, expanding vitality misfortune and related expenses.

Electric current

Electrical vitality stream, or electric flow, is estimated in amperes (A). To produce an electric flow through a link, there must be a "distinction of pressure or voltage" between the two closures, which is communicated in volts (V). Water and power have fundamentally the same as practices regarding streams. As a similarity, if an individual needs water to travel through a cylinder, there must be various weights between the two parts of the bargains. This equivalent standard applies to power.

By making an incredible contrast in pressure, a lot of power – or power – can be moved every second utilizing transmission lines or links. Electric force is estimated in watts (W), and equivalents the voltage duplicated by the amperage.

$$\text{Power} = V \times A.$$

Two kinds of electric flows can be delivered by electrical generators:

Direct current (DC): vitality ventures or is moved in just a single bearing, from positive to negative. Direct current is utilized in low-capacity frameworks, for instance, batteries, wireless batteries and low-tension photovoltaic frameworks.

Alternating current (AC): this current persistently interchanges bearing in a recurrent wave design, causing a sinusoidal voltage wave with both positive and negative pinnacles. The quantities of cycles every second is the recurrence and is communicated in hertz (Hz). An electrical network ordinarily has a recurrence of 50 Hz (Europe) or 60 Hz (Continental America). This sort of flow is utilized in enormous, high-tension frameworks, for example, electrical stations, and is sent through the electrical lattice to houses and gainful focuses. One reason why exchanging flows are utilized is on the grounds that it is less expensive to increment or abatement its voltage, and less vitality is lost utilizing high-tension frameworks to move vitality over long separations.

For the most part, watts every hour are utilized to communicate the measure of electrical vitality utilized (or Wh). One watt/hour is identical to the measure of changed over vitality during one hour for a machine with 1 watt of intensity. Vitality utilization is likewise consistently communicated in kilowatts every hour (kWh).

$$Wh = V * Ah$$

Where V is the general framework pressure or voltage.

Capacity factor

Capacity factor is utilized as a marker to quantify the efficiency of an electrical age of any utility for instance, a hydroelectric, biomass, wind or close planetary system, among others. This marker is the correlation of genuine creation during a given measure of time with the measure of vitality delivered hypothetically, if the plant had been creating at 100% limit during that time span. See the accompanying recipe.

$$\text{Capacity factor} = \frac{\text{Real production}}{\text{Theoretical Production}} \times 100$$



Think about the accompanying model: an arrangement of 1 kW could hypothetically create 8,760 kWh in one year. This computation was made utilizing:

- Energy= power x time.
- Therefore, the vitality created would be $1\text{kW} \times 24 \text{ hours/day} \times 365 \text{ days} = 8,760\text{kWh}$

Note that an electrical age plant can't work 100% of the time, because of support and framework and gear specialized disappointments, among different reasons. Proceeding with the past model, in the event that this present plant's genuine yearly creation was 5,000 kWh, at that point its ability factor would be:

$$\text{r capacity factor} = \frac{5,000}{8760} \times 100 = 57\%$$

This is a decent limit factor. A decent factor is normally one rising to 60-70%, in any event, arriving at over 70% in outstanding cases, contingent upon the business and business.

Maximum demand

Greatest interest is illustrative of a timeframe and has to do with electrical charges, from engines, blowers, and lighting and refrigeration gear, among others, that are being used during that time allotment. At the end of the day, request is the particular incentive in time for vitality utilization of decided charges, estimated in power units called kilowatts (kW).

Pinnacles of greatest interest can be controlled. One approach to do so is to abstain from utilizing electrical charges inside the structure simultaneously. Another route is to plan areas of creation when the expense per kW is lower, for instance, around evening time. Organizations can likewise scale the planning when gear is turned here and there. This can be booked to consolidate preventive support and offers two advantages. To start with, it stays away from dead time and costs underway because of upkeep issues. With great upkeep, the accessibility of gear can increment by up to 90%. The subsequent advantage originates from diminishing over the top vitality use from pointless hardware in a manufacturing plant.

Production schedules, an easy tool to use.

There are a few basic and low-cost devices that we can actualize to spare vitality without making a gigantic speculation. One is knowing the various rates for kWh, contingent upon the timetable, area or nation. Pinnacle utilization hours are times when electrical vitality request is high. Planning scaled creation dependent on utilization hours and changing the occasions that individuals start work during the year, can bring about investment funds of up to 20% in every month to month power bill.

Demand factors

This is the connection between electrical framework's most extreme interest and the absolute charge associated at a particular time. This can be communicated utilizing the accompanying:

$$\text{Demand factor} = \frac{\text{Maximum demand}}{\text{Total potential charge}}$$

This factor gives a scene of the level of genuine interest at a manufacturing plant or building.

Building Energy Management Systems

Building Energy Management Systems (BEMS) is extraordinary compared to other realized arrangements in improving structure activity. The BEMS are can be applied to the control of dynamic frameworks, for example warming, ventilation, and cooling (HVAC) frameworks, while likewise deciding their working occasions . In spite of the fact that utilizing BEMS has demonstrated that it is one of the successful ways for building activity, it is as yet limited to straightforward information estimating and metering for warming and cooling on a month to month premise. Moreover, this technique permits just for recognition of high vitality utilization without identifying the principle explanations behind issues in the framework particularly in complex frameworks, for example, the HVAC.

Recreation based control is an innovation in cutting edge building frameworks where it can aid progressively proficient activity for the Building Energy Management frameworks. Besides, it has the capacity for deficiency recognition and conclusion. This requires making an aligned model that demonstrations nearly as the genuine structure. The momentum explores spin around control advancement utilizing either forward model or information driven model. A large portion of the examines embraced the information driven model for fathoming warming, ventilation and cooling issues which was effective for controlling a few sections yet it didn't contemplate the physical communications of the entire structure framework.

Breaking the Myth that Green Always Costs More

While many green materials and advancements do cost more, it has been exhibited that many green procedures and innovations really cost the equivalent and some even cost not exactly customary "not really green" advances. By mixing the correct blend of green innovations that cost less with green advances that cost the equivalent or marginally more, it is conceivable to have a green structure venture that costs equivalent to a regular one. Frequently the way in to a savvy green structure and site configuration exists in the interrelationships and related expense and execution exchange offs that exist between various structure frameworks. For instance, the utilization of elite windows and window outlines expands the main expense of the structure envelope, anyway the subsequent decrease in the size and cost of the structures warming and cooling framework more than counterbalances the additional expense of the better coating framework. The outcome is a structure that has a tantamount or maybe even a lower previously cost, a higher solace level, lower vitality use, and lower vitality charges and working expense for the life of the structure. There are many living instances of savvy green structure in Chennai.

CHAPTER III

OBJECTIVES, SCOPE AND LIMITATIONS

✍ **OBJECTIVES OF THE STUDY**

✍ **SCOPE OF THE STUDY**

✍ **LIMITATION OF THE STUDY**

OBJECTIVES OF THE STUDY

- A framework for upgrading Electrical Power Consumption at M/s IEC
- Reducing present Electrical Power utilization by at any rate 7%,
- Reducing essential vitality utilization from HVAC (Heating, Ventilation, Air-condition) framework
- Reviewing the difficulties and accessible choices for the use of Green Technology

SCOPE OF THE STUDY:

The extent of the examination "An investigation on streamlining of electrical force utilization and use of green innovation at M/s IEC Dow substance worldwide private restricted" is in discovering the main driver and the ascribes to be considered in advancing the present electrical force utilization and to discover the characteristics for use of Green Technology which has critical effect on the exhibition of Facilities Management at M/s IEC

This examination is worried in finding different reasons for high power utilization, lessening essential vitality utilization from a HVAC framework at M/s IEC, the properties for improving the force utilization and usage of Green Technology.

This examination was led by looking over different comparable tasks, reports, materials, reviews and books identified with the subject, and by talking scarcely any specialists.

LIMITATIONS OF THE STUDY

A decent venture report portrays and clarifies the outcomes inferred at through the examination. Therefore, whichever impediment happens in the investigation, likewise creep into the extend and turn into the confinements of the report. In Short, it very well may be said that an investigation is as exact as the restrictions of its examination. Each task has its own restrictions thus did by me. I have recorded a couple of the restrictions of my examinations underneath:

1. The investigation was constrained to traits distinguished at M/s IEC may not be applied by different organizations for decreasing its capacity utilization similarly.
2. Timing of the investigation might be a factor, results dependent on credits identified with the time of study
3. The timespan of the examination being just barely any weeks, it was unrealistic to direct an exceptionally inside and out and nitty gritty investigation, which thus may influence the discoveries.
4. Different individuals have distinctive point of view and various perspectives. Accordingly, assessment of specialists may contrast. Thusly, the outcomes got from this examination varies when apply at other setting.

CHAPTER IV
METHODOLOGY

Research Design

“An exploration structure in the determination of techniques and systems for securing the required data it is the overall operational example of edge work of the undertaking that stipulates what data is to be gathered from which sources by what methods”

To test the unwavering quality, of the force utilization advancement arrangement and to characterize a key standards, innovation and procedures for use of green innovation a mix of subjective quantitative methodology was followed right now. The proposed arrangement will help the office administrators at M/s IEC. Where it gives a rule for identifying high vitality utilization issues looked in places of business and operational cycle. By the by, it explains the technique and the factors that ought to be considered during the procedure, consequently a precise model carries on nearly as the genuine structure could be made. The proposed system comprises of five layers

- An examination layer,
- Validation layer,
- Analysis layer,
- Optimization layer lastly
- Communication layer.

The primary layer spins around doing examinations where at this stage all the applicable information to address all the force devouring hardware and building conduct ought to

be assembled. In this way, power metering were introduced to cover all hardware. The subsequent layer considered as portrayal for the structure viable, in this way it ought to be aligned to arrive at the best fit between the model and genuine information estimated. The third layer is investigation of issues happened in hardware, its situation in the structure and its connection to the present warming control design. The fourth layer is streamlining layer, at this stage operational control and the hardware control elective prospects are produced and assessed.

DATA FOR THE STUDY

Information gathered for 24 days during the long stretch of March which is neither excessively cold nor too hot atmosphere, the temperature during the period mirrors the normal temperature of the city. Remenyi et al (1998) declares that likelihood inspecting is the space of the positivist, while non-likelihood testing is that of the phenomenologist. This venture has phenomenologist underpinnings and likelihood inspecting would not be fitting, accordingly. Nonprobability information examining strategy has been chosen for this task. This choice depended on Rubin and Babbie's (1997) counsel that information on the populace (association) is significant while setting out on the utilization of such testing strategy. The examination depended on past comparative tasks performed

Primary Data for the Study:

Performance Measure: Measuring the flow execution of Electrical Power Consuming gear inside M/s IEC in Kwh

Operation Definition: Every typical working day power utilization at M/s IEC

Data Source & Location: Readings from TNEB understanding meter and Base Builder information

Sample Size: 24

Measurement System: Total force utilization figure is summation of Power utilization taken from TNEB Reading from 6 Nos Kwh meter perusing inside IEC premises) and Power utilization towards chilled water use .(Data outfitted by Base developer.

TOOLS FOR MEASURING DATA

Complete force Consumption Except power utilization due to Chilled water use TNEB (Tamilnadu Electricity Board – statutory position's meter to quantify Power utilization perusing from KWH meters (Energy meter) introduced at the IEC Facility) outfits IEC utilization information.

Force Consumption for Chilled water use: Base developer outfits IEC power utilization towards chilled water Consumption use dependent on committed BTU meter perusing.

Day by day absolute utilization is outfitted by CBRE dependent on chilled water use and TNEB tax.

Secondary Data for the Study:

Optional information source incudes past comparable experience and activities accomplished for different locales. Meeting and Consultation from directors, Data from Books, Journals and different sites.

Analysis and presentation of results

After meeting with Seniors to decide all conceivable main drivers of electrical force utilization and to talk about the green choice standards and advancements. 35 main drivers are short recorded for underlying driver assessment then a positioning framework to assess the underlying driver are resolved and positioned, profoundly scored underlying drivers are taken for "WHY" examination to discover a definitive main driver. Toward the End of Why examination ,the absolute 5 Probable main drivers have been tight down to 3 plausible underlying drivers, which are extreme underlying drivers of superfluous force utilization.

In the wake of deciding a definitive underlying drivers of intensity utilization, for manageable advancement and standards for keeping up the site green were characterized.

CHAPTER V

ANALYSIS AND INTERPRETATION OF DATA

Different main drivers examined for the examination to be introduced here and how they are found to 3 extreme underlying driver

How 7% decrease in utilization charges to be clarified

CHAPTER VI

CONCLUSIONS

✍ Findings

✍ Suggestions

✍ Conclusion

Findings:

Coming up next are the 3 extreme main drivers of superfluous electrical force utilization at M/s IEC

- VFD not utilized, subsequently all floors provided with surplus air
- Lighting in gathering room and workstation not turn off when not required
- Energy sparing practice not implemented.

These three extreme main drivers are found from 5 likely underlying drivers decided after " why" examination they are

- VFD isn't utilized in AHUs
- Conference room lighting not trun off
- Workstation lights not turn off
- Each floor is provided with same amount of molded air independent of tenants
- Importance of vitality sparing isn't demanded to workers like security

Standards, Key procedures and Technologies prescribed for making M/s IEC building a "Green Building "

Key Principles:

- Minimize unfavorable effects on the earth (air, water, land, regular assets) through streamlined structure siting, enhanced structure re-plan, material determination, and forceful utilization of vitality preservation measure.
- Building execution ought to surpass least International Energy Code (IEC) consistence level by 30 to 40% or more.
- Maximize the utilization of sustainable power source and other low effect vitality sources.

Key Strategies and Technologies:

- Optimize latent sun based direction, building massing and utilization of outside concealing gadgets with the end goal that the structure of the structure limits unwanted sunlight based increases throughout the late spring months while boosting attractive sun powered additions during winter months.
- Optimize building direction, massing, shape, structure, and inside hues and completes so as to

- maximize the utilization of controlled normal day lighting which fundamentally lessens counterfeit lighting vitality utilize subsequently decreasing the structures inside cooling burden and vitality use. Think about the utilization of light rack innovation.
- Use of superior low-e coating, can bring about huge all year vitality reserve funds.
- Use of Insulated twofold coating, triple coating or twofold sheet coating with a suspended low-e film.
- Selective coatings offer ideal light transmittance while giving insignificant sun powered increase and negligible warmth transmission.
- Window casings, scarves and blind divider frameworks ought to likewise be structured for optimum vitality execution including the utilization of numerous warm breaks to help lessen vitality use.
- Optimize the estimation of outside protection and the general warm exhibition of the outside envelope get together.
- Consider propelled/elite envelope building frameworks, for example, auxiliary protected board frameworks (SIPS) and protected solid structure frameworks (ICF's) that can be applied to light business and institutional structures.

- SIPS and ICF's and other thermally "decoupled" envelope frameworks will offer the most elevated vitality execution.
- Use vitality productive T-8 and T-5 bulbs, high effectiveness electronic counterbalances, and lighting controls.
- Consider utilizing circuitous surrounding lighting with workstation based direct assignment lighting to improve light quality, lessen glare and improve by and large vitality execution as a rule office zones. Fuse sensors and controls and configuration circuits with the goal that lighting along edge zones and workplaces can be turned off freely from other inside lights when day lighting is adequate in border zones.
- Use best in class, high productivity, warming, ventilation and cooling (HVAC) and plumbing gear, chillers, boilers, and water radiators, and so on. Utilize variable speed drives on fan and siphon engines.
- Use heat recuperation ventilators and geothermal warmth siphon innovation for up to 40% vitality investment funds.
- Avoid the utilization of HCFC and Halon based refrigeration, cooling and fire concealment frameworks. Upgrade
- the utilization of regular ventilation and where commonsense utilize evaporative cooling, squander heat as well as sunlight based



- regenerated desiccant dehumidification or retention cooling. Distinguish and use wellsprings of waste vitality.
- Use Energy Star guaranteed vitality productive apparatuses, office gear, lighting and HVAC frameworks.
- Consider for location little scope wind, sun oriented, and additionally power module based vitality age and co-age.
- Purchase ecologically ideal "green" power from affirmed inexhaustible and feasible sources.

Suggestions:

Suggestions:

Coming up next are Suggestions gotten from the investigation for M/s IEC for Maintaining Optimum Electrical Power utilization at its structure and for moving towards Green Energy:

Conducting a comprehensive energy audit on:

- Building Shell
- HVAC (Heating, ventilating, and air conditioning) and Other Systems
- Office and Industrial Equipment
- Lighting

Improving energy efficiency of building

- Tighten the structure envelope (vitality productive windows and entryways, satisfactory protection, climate stripping and caulking to seal air holes).
 - o Energy Star direction for structures and plants

- o International Energy Conservation Code for business structures
- Control direct sun through windows with sunlight based screens, window movies, canopies and vegetation.
- Paint outer dividers and rooftop white to reflect heat.
- o Information on Cool rooftops
- o Information on Green rooftops which can lessen heat additions and misfortunes

Improving efficiency of HVAC and Other Systems.

- Investment in vitality effective HVAC gear.
- Performing ordinary upkeep on HVAC frameworks and change channels as per framework particulars.
- Operating tips and devices on ignition frameworks, steam heater frameworks and procedure warming frameworks
- Eliminate squander heat by protecting funneling and warmth creating hardware.

- Install variable recurrence drives on HVAC siphons, fans, and packed air frameworks.
- Install programmable indoor regulators and change for non-work hours.
- Install high-volume, low speed fans to improve air flow and spare vitality costs.
- Improve efficiency of compressed air and steam systems.
 - o Check for spills.
 - o Avoid 90 degree edges in the channeling.
 - o Use the least weight setting that gives solid execution.
 - o Consider ducting outside air when temperatures are lower since less vitality is expected to pack cool air than warm air..
- Install cogeneration (joined warmth and force) framework

Improve efficiency of office and industrial equipment.

- Invest in vitality productive hardware and apparatuses.
 - o Energy productive PCs, screens, and other office hardware
 - o Demand (tankless) water warmers
- Install variable recurrence drives on siphons, fans, and engines
- Upgrade to increasingly proficient and appropriately measured electric engines



- Consolidate office hardware. Utilize fast printers or multi-work arranged copiers that can be utilized as printers to diminish the quantity of printers in your office.
- Consolidate utilization of little apparatuses (microwaves, toaster, espresso pots, smaller than usual coolers, and so forth.) by utilizing bigger more vitality effective machines in break rooms.
- Install electrical extensions to permit representatives to effortlessly control "ghost" power loads from chargers for PCs and other electronic gadgets or basically teach workers to unplug when not being used.
- Improve effectiveness of PC servers by merging and utilizing virtualization programming that streamlines IT resources. Use PC the executives programming that permits programming patches to be performed without being left on the entire night and force the board programming or force sparing modes on PCs.
- Use vitality the executives programming to kill candy machines and other gear when not being used.

Improve efficiency of lighting

- Replace glowing lighting with fluorescent lighting and light-producing diodes (LEDs) or other vitality proficient lighting. Supplant all T-12 fluorescent lighting with vitality productivity T-8 or T-5 apparatuses and introduce LED leave signs.

- Install movement sensors, clocks, and manual dimmers or programmed sunlight diminishing controls.
- Maximize utilization of regular light (windows, lookout windows and sunlight based cylinders) and use task lighting where additional lighting is required..

Use vitality the board programming frameworks to control lighting, HVAC frameworks, and to kill PCs and printers, candy machines and other great

- **Tips on energy management systems**

Train representatives on essential preservation practices, for example, killing lights and gear when not being used, controlling indoor regulator, and actuating vitality sparing highlights on hardware.

Contact your utility or an interest reaction the board organization about pinnacle load the executives. Alter creation timetables to constrain top vitality use and set aside cash.

Renewable Energy

- Install on location sustainable power source frameworks, for example, photovoltaic, sun based water warming, sun based controlled outside lighting, geothermal frameworks, or wind vitality.

CONCLUSION

Right now structure for executing an answer for enhancement of intensity utilization has been acquainted with diminish the electrical force utilization and essential vitality utilization from a warming framework in M/s IEC working in Chennai. This decrease was accomplished by investigating main driver of wastage and controlling a few parameters that impact high vitality utilization

The aftereffect of this examination bolster the thought that M/s IEC can possibly build the operational proficiency, quality and hierarchical viability through decreasing in its present electrical force utilization by 7%, and lessening its essential vitality utilization from HVAC framework and can keep up a framework for improving electrical force utilization. The demanding and preparing workers on significance of vitality sparing, foundation of new techniques for lessening power utilization and appropriation of efficient power vitality and re-designing of operational procedure and strategies with the standards of environmentally friendly power vitality are some significant issues, which ought to be inspected for consistent improvement in the framework and the issue identified with these worries are deserving of future research.

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