

## **Services offered by V CONSERVE**

V CONSERVE offer **COMPREHENSIVE ENERGY AUDIT** services of Installation but can also offer services for following areas separately as per customer requirement

1. **Power Factor & Harmonics Studies-Power Quality Studies**
2. **Transient Study- Voltage Dip/Sag /Fluctuation and other Transient Events for 24 hours or upto 1 month as per requirement through advanced waveform and transient recorders.**
3. **Thermography / Thermal Imaging**
4. **Earthing Checkup Of Installation**
5. **Diesel Generator Efficiency Test**
6. **Energy Meter Accuracy Check / Calibration used for sub metering**
7. **Health Checkup of existing power factor system and recommendation for design / upgradation to improve power factor.**
8. **Voltage Transients / Dips & Fluctuation Studies**
9. **Root Cause Analysis of any operation problem due to suspected Power Quality issues in network.**
10. **Power Quality Analyzer**
11. **Designing And Installation of advanced Energy Management System & feasibility of existing EMS Integration with new software and new analyzers / Energy Meters.**
12. **Indoor Air Quality Checkups for PPM, CO<sub>2</sub> Etc.**
13. **Checking Efficiency of existing lighting.**
14. **Noise Level Check Up**
15. **Electrical Safety Audit**
16. **Water Audit**

### **1) SIGNIFICANCE OF POWER FACTOR & HARMONICS STUDIES:**

#### **POWER FACTOR STUDIES:**

The Power Factor Correction of electrical loads is a problem common to all industrial and commercial users. Every user which utilizes electrical power to obtain work in various forms continuously asks the mains to supply a certain quantity of active power together with reactive power. Most loads on an electrical distribution system can be placed in one of three categories.

- Resistive
- Inductive
- Capacitive

The most common of these on modern systems is the inductive load. Typical examples includes transformer, fluorescent lighting, AC induction motors, Arc/induction, furnaces etc. which draw not, only active power (KW) from the supply, but also inductive reactive power (KVA<sub>r</sub>). Common characteristics of these inductive loads is that they utilize a winding to produce an electromagnetic field which allows the motor or transformer to function and requires certain amount of electrical power in order to maintain the field. Therefore Active Power (KW) actually performs the work whereas Reactive Power (KVA<sub>r</sub>) sustains the electro-magnetic field. This reactive power though is necessary for the equipment to operate correctly but could be interpreted as an undesirable burden on the power supply /Distribution companies. They in turn offer benefits or incentive to consumers for maintaining higher power factor near to unity. Most industrial and commercial users are billed in KVAH units therefore higher the power factor

lower the KVAH units and KVA demand thereby bringing direct savings to consumers maintaining high power factor. Some distribution companies offer discount on KWH billing depending on power factor values. Maintained during monthly billing cycle.

Though Power Factor is normally maintained by connecting fixed power capacitors or automatic power factor correction system on mains or load end. Rampant use of the same particularly fixed capacitors, unprotected capacitors or slow response APFC system should be avoided without understanding characteristic and behavior of loads for which compensation is sought as it can increase losses, create operational problems in PFC system/network and increase harmonic distortion (power quality problems) which is covered under next topic. **Power Factor Studies thus assume major significance in regard to designing and installation of correction PFC equipment which is in line with load characteristics and offer most optimized power factor without any power quality and operational issues.**

## **2) HARMONICS STUDIES IN NETWORK:**

There has been much discussion and interest in recent years on the subject of Harmonics under ambit of network power quality. More and more frequently, industrial and commercial users are finding they have to deal with the problem of "polluted power. Many seminars and awareness programs have been conducted to effectively deal with the problems of harmonics. Lot has been done but still there are gaps in knowledge of harmonics in network and methods to effectively deal with them. **Therefore harmonic studies assume great significance to understand network power quality and negative impact they can have on network. Our company can offer continuous studies from 24 hours to many days by high end waveform and PQ recorders so that to comprehensively understand harmonics during various load cycles and their impact on network devices.**

Every Electrical Engineer would like to have a power system having voltage and frequency at every point constant, no interference of one load with other, power factor is unity and wave form of both voltage and current is sinusoidal. But this is a theoretical perception which is not possible in practical situations.

Presence of harmonics in electrical systems is gradually becoming more and more important with the spread of AC/DC conversion systems using SCRs, for example driving DC motors for metal rolling & extrusion lines, in the rubber, plastics, textile and paper industries and so on/VFDS, UPS, Energy saving lighting and many other modern day efficient equipment's. They offer energy efficiency but being nonlinear in nature pollutes the electrical network and creates different type of distortions & deviation to the parameters of electrical supply network.

Harmonics in electrical system results in wave form distortion. In general harmonics are periodic disturbances in voltage and current. Any non-sinusoidal periodic wave form can be considered as combination of sine waves of certain frequencies, amplitudes and phase angle (fourier series). In simple terms Harmonics are multiple of the normal main power frequency, like "3rd order" harmonics has got frequency of 150 Hz and "5th order" has to 250 Hz frequency. Harmonics causes pollution in electrical systems, which may affect the equipment at much larger distances from origin and if not controlled can become expensive proposition.

In a wave shape only the fundamental component of voltage and current contribute to power translation. The harmonics only load the translation system and cause increase in apparent power of source. This non-active power due to harmonics is referred as distortion power.

Power factor correction capacitor banks of such loads are put under considerable stress by presence of harmonics in network. Wrongly designed PF equipment can magnify or aggravate

harmonic distortion resulting in lot of **operational problems therefore PF studies along with harmonic studies of harmonic infested network assume bigger significance.**

Some significant problems because of high harmonic distortion are as follows

- Overload and failure of capacitor banks used for Power factor correction .The capacitors are subjected to an overload and their lifetime is drastically reduced.
- Overload and failures of Motors; Reduced motor life, inability to fully load motor.
- Low efficiency of transformers and cables- The user transformers, wires and loads are affected by this increase in current, which leads to increased  $I^2R$  losses and eddy current losses in transformer. This reduces the capacity of transformer resulting into economic loss as well. Apart from this transformer may also be subjected to excessive overheating and saturation. This will shorten the life of transformer. When transformer fails, the cost of loss of productivity during emergency repair time far exceeds the replacement cost of transformer itself.
- Malfunctioning and failure in computers, microprocessor, solid state controlled and other Electronic equipment.
- High voltage distortion shall also be encountered when shifting from mains to emergency generator as they offer high impedance than supply transformer.
- Tripping of protection switchgear and relays without apparent reason.
- Large current in neutral wires of power distribution system. This is a real fire hazard as usually phase wires are only protected by circuit breakers or fuses.
- Poor power factor: As mentioned earlier the harmonic current caused by non-linear loads do not carry any real power (KW) even though they do increase the volt amperage (KVA). This lowers the power factor at ( $Pf=KW/KVA$ ) the main distribution transformer.
- Over heating in fuses resulting in false blowing and in some cases because of resonant condition result in burning of HRC or even fuse base because of resonant conditions. False / spurious operations of breakers, which may lead to variation in other characteristics.
- Low efficiency of UPS- Reduction of power generated by UPS.
- Interference in communication networks.

### 3) THERMOGRAPHY / THERMAL IMAGING:

#### **A Safe and Powerful Tool for Utility & Maintenance Managers**

Electrical network is the most critical part within Building and industrial applications. There are considerable benefits to be gained by protecting this network and reducing unplanned stoppages of energy supply. Statistics reveal that 30% to 35% of all failures in switchboards, switchgear, cables and cable termination are main reasons for faults resulting in electrical equipment damage, loose connections, fires etc. These types of faults are easy to detect using Thermography so that corrective action can be taken well in time before any actual fault or incident takes place.

- Increase safety of installation
- Improve reliability
- Reduce fire Hazards
- Reduce unscheduled outages
- Reduce maintenance and repair costs
- Improve production rate and quality
- Better assurance of repairs and new installations

**Thus Thermography studies are recommended every three months for following types of equipment:** Fuse boards, Electrical Distribution boards, Busbar systems, LV and MV Control panels, High voltage and medium voltage systems, Power line connections and insulators, Switchgear, Electronic components, UPS and battery systems, PLC connections, Motor control centers, Transformer, DG Set.

### 4) EARTHING CHECKUP:

Over 25% fires and damages in network are due to faulty earthing. Inadequate earthing and its hazard continue to threaten safety of people and property in the form of electric shocks, burns, injuries, fires and explosions. The main reason why grounding is used in electrical distribution network is offer safety and to avoid these problems.

Earthing wires should not carry current except during faults. If the earthing wire carries any current there will be a potential difference between different grounding points (because the current flowing in wire causes voltage drop because of wire resistance). The leakage current and inadequate earthing needs to be arrested well in time before

**For safety, it is recommended to carry regular Earthing Checkup surveys twice in a year.**

### 5) DG EFFICIENCY TEST:

**DGs should be checked for their efficiency at regular intervals because of increasing fuel cost and to maintain it running at optimized efficiency.**

- Review of operation & performance of DG set through units generated, combustion analysis and Diesel consumption.
- Specific Fuel Consumption in terms of g/kWh, g/KVAh & to suggest for energy conservation opportunity and suggestion for optimization.
- Further suggestion for improving DG efficiency through PF improvements, Harmonic filtration etc.



## 6) ENERGY METER ACCURACY CHECK / CALIBRATION USED FOR SUB-METERING:

We offer Meter Calibration services that is carried out by advanced and accurate reference energy analyzers. Meter calibration is very important to ensure that right energy charges are collected by bulk consumer from various sub metering consumers. These services are widely appreciated for their reliability and accuracy Further, these are services are provided according to the requirements of the clients and at most affordable prices.

## 7) HEALTH CHECK UP OF POWER FACTOR PANEL (PFC) AND UPGRADATION:

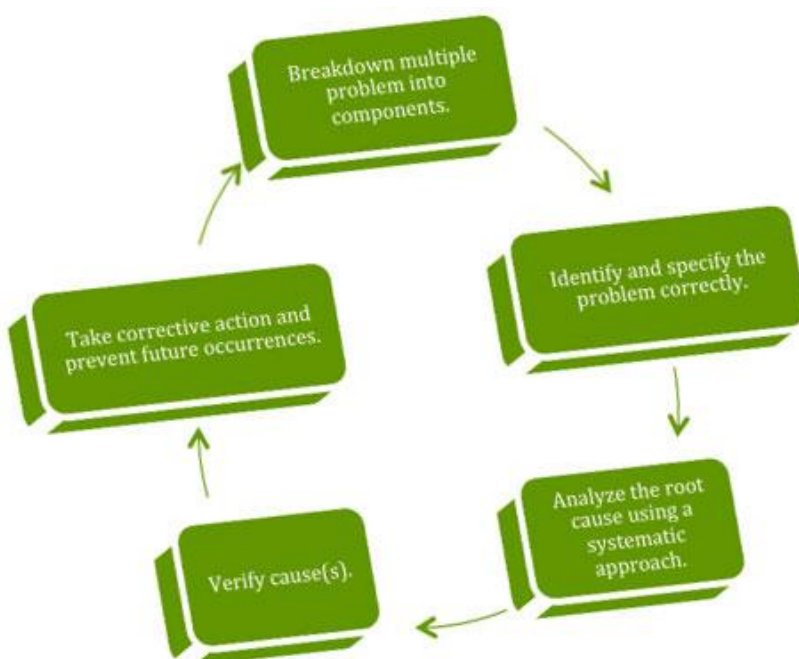
Existing power factor systems older than 7 to 8 years or not properly designed keeping in view load addition / changes in network over period of time, may not offer right and optimized power factor control. The banking size, switching time, harmonic protection, Losses and many such issues may be there which warrant up-gradation of APFC system which is suitable to existing load conditions and characteristics. We can thoroughly checkup existing systems from its output power to design specification and offer design modification if feasible or newly designed system for most optimized PF control with minimum losses.

## 8) VOLTAGE TRANSIENTS / SAGS/ DIPS & FLUCTUATION STUDIES:

One of the most basic power quality problems in many network is of voltage sag (dip), voltage flickering and the micro interruption etc. These problems could be generated because of load characteristics or from utility distribution company. These transients are capable to creating lot of operational problems depending on their frequency and amplitude. Normal PQ analyzers are incapable of recoding these transients phenomenon on continuous basis which occur for very short duration. Our high end wave form and fault recorders can record continuously for hours, days or months these transients which are than analyzed in PQ SCADA investigation software's to pin point the exact reason for these transients and how to reduce or eliminate the same.

## 9) ROOT CAUSE ANALYSIS OF POWER QUALITY & OTHER CHECKUP:

The problems faced by industries vary widely. We with an expertise in the field of power quality Analysis and heath checkups of utilities from problem identification and providing meaningful solutions to its customers.



**We help our clients identify the root cause of their problems and design customized solutions to solve even the toughest of problems.**

### **10) POWER QUALITY ANALYZER:**

We offer a wide range of power quality analyzer from basic to most advanced power quality data and energy loggers, and recorders to handle a broad range of power quality applications. We have gained expertise in delivering an extensive range of Power Analyzers to our esteemed clients. These products are manufactured by employing latest technology that makes them highly efficient in measuring wide range of Power Quality Parameters in LT and HT side. Moreover, quick harmonic analyses through easy to use software make them a preferred choice of the clients.

### **11) ENERGY MANAGEMENT SYSTEM & FEASIBILITY OF NEW SOFTWARE:**

The increasing cost of electrical energy is driving industries to use energy as efficiently as possible. Our **Energy Management Systems** is a vital component in gaining control of those costs. The traditional way of reducing energy usage is monitoring and targeting (M & T); Monitoring and targeting determines when and where energy is being used, Energy management systems are being deployed around the world to improve energy, facilities management and to help reduce electricity and fuel. Our clients can avail from us high grade Energy Management System. These are designed to recognize energy consumption and monitor the energy consumption and wastage by recording meter data of the machine. Moreover, these systems provide a proper way of utilizing the available energy.

### **12) AIR QUALITY CHECKUPS:**

The quality of the air we breathe, both indoors and outdoors, has a great impact on lung health. Fragile lung tissue is easily damaged by pollutants in the air, resulting in increased risk of asthma and allergies, chronic bronchitis, lung cancer and other respiratory diseases.

Poor indoor air quality can cause or contribute to the development of chronic respiratory diseases such as asthma and hypersensitivity pneumonitis. In addition, it can cause headaches, dry eyes, nasal congestion, nausea and fatigue. People who already have respiratory diseases are at greater risk.

The simplest and most affordable indoor air quality analysis we offer, the onetime on-site check-up allows us to quickly and efficiently analyze your indoor air for signs of moisture that may lead to mold, the presence of airborne particulates which may be dander, mold or pollen, as well as the presence of carbon monoxide. The check-up is an affordable first step in analyzing the indoor air quality of Office and Industries.

### **13) LIGHTING AUDIT (checking efficiency of existing lighting):-**

The most important facet of reducing operating costs may be upgrading the lighting system that most people outside of the building/Industry never see. We provide a detailed analysis custom tailored to your needs. We work with you on each and every application. We strive to give you confidence in the foundation of your lighting project, to reduce costly change orders and create a lighting environment suitable to your objectives.

A lighting audit conducted by us, is to check for compliance with benchmark levels of acceptable and required lighting in the workplace.



#### **14) NOISE LEVEL CHECK UP:**

Excessive noise at work is a significant yet preventable problem affecting thousands of India workplaces. Now is the time to address noise in your workplace, and Control the noise levels. Noise audit method to quantify noise levels emitted in the workplace

We can help you to determine noise exposures using appropriate instrumentation, calibration, measurement and analysis techniques.

#### **15) ELECTRICAL SAFETY AUDIT:-**

Electricity is very safe and easily controllable form of energy only if the installations, plant and equipment are built with adequate safety precautions and users are aware and follow safety rules in every action.

The accidents occur due to unsafe conditions or unsafe practices and unsafe acts, lacks of awareness by management, unawareness of individuals, lack of training, lack of procedures and carelessness. Behind every accident there are several near miss situations.

#### **WHY ELECTRICAL SAFETY AUDIT IS IMPORTANT:-**

- To know unsafe electrical conditions & unsafe acts
- Hazards identification and risk analysis ( probability & Consequence)
- To reduce incidents by following:
  - Elimination of hazards
  - Substitution
  - Engineering controls
  - Signage warning boards and administrative controls
  - Use of Personal protective equipment

#### **16) WATER AUDIT:-**

After Water audit we help you to reduce the water consumption and in terms decrease your water bill. During Water auditing of an industry the probable points are identified where water can be conserved, at the same time qualitative analysis is done to find possibilities of reuse the water. VCONSERVE carries out the audit to reduce the water consumption in your faculty.

A comprehensive water audit will examine all of the major areas in which a facility uses water, including sanitation, maintenance, mechanical systems, building processes and irrigation. For each of those areas the water use audit will provide a breakdown of the how, when and where of water use.



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POWER OF ENERGY SAVING

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