GESS

Global Energy Saving System

PRESENTED BY
Dr. Mark Shoukry, PE, LEED AP, M ASME, M ASCE
Tel: (310)-634-9538 | Email: marks@twaenggroup.com
https://www.twaenggroup.com/ctw-international.html

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MADE IN USA

Introduction

Increasing the demand of energy with the limitations of current resources have become a pressing concern for scientists, driving them to seek innovative solutions for energy conservation. As a result, research agencies, engineering faculties, and major corporate laboratories have intensified their efforts to develop sustainable technologies that meet future needs.

It is well known that electrical devices operating on alternating current consume two types of power:

1. **Active Power (kW):** Measured in kilowatts, this represents the actual power consumed to perform work, such as running motors, lighting, or heating.
2. **Reactive Power (kVAR):** Measured in kilovolt-amperes reactive (kVAR), this is the energy required to maintain the magnetic field in inductive devices like motors and transformers, but it does not directly contribute to useful work.

The combination of these two types determines the **Apparent Power (kVA),** measured in kilovolt-amperes (kVA), which represents the total power flowing through an electrical circuit.

Therefore, our company is proud to introduce its unique market-leading product: **GESS – Global Energy Saving System,** an innovative system developed through more than 15 years of research and development in energy efficiency improvement.

The GESS features advanced technologies that help reduce electrical losses and improve power factor, leading to lower energy consumption costs and enhanced efficiency of electrical devices. It is the ideal solution for businesses and industries seeking energy sustainability and cost reduction.

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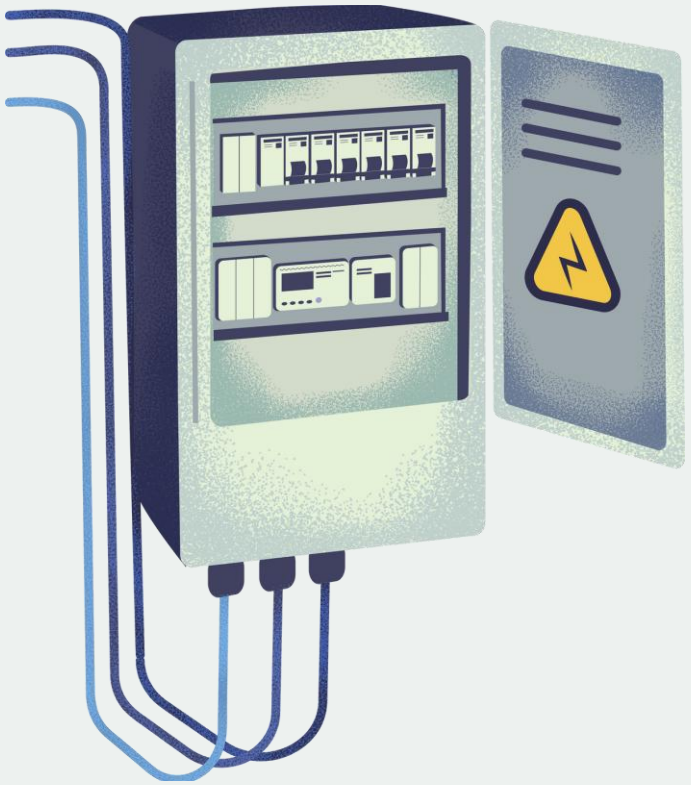
Operating Principle:



The **GESS unit**, processed ionically using a specialized combination of materials, functions as a negative resistance conductor, effectively acting as a current source within the electrical circuit.

Through this advanced technology, we have successfully added current to both the active and reactive power components, resulting in improved energy consumption efficiency and reduced wasted electrical power (in kW).

GESS enhances the performance of electrical systems, helping to lower energy costs and improve operational efficiency, making it the optimal solution for businesses and industries striving for energy sustainability.

Typical reduction of electrical power ranging form 20%-40% based on multiple third party verifications facilities

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Features of the GESS Energy-Saving Panel:

1. **Made in USA:** Fully designed and manufactured by an expert team specializing in power engineering.
2. **Electricity consumption reduction:** The panel achieves a reduction in electrical current consumption ranging from 20% to 40%, helping to lower electricity bills for users connected to various distribution networks.
3. **Fuel consumption reduction:** Reduces fuel consumption by 30% to 40% for users of electric power generators, leading to lower operating costs and increased generator efficiency.
4. **Power factor improvement:** Enhances the power factor efficiency to (0.98 - 0.99), helping customers avoid penalties resulting from low power factor while improving the overall performance of the electrical grid.
5. Reduction of 20% - 40% shall result directly in reducing carbon footprint significally.
6. Power Factor, volt stabilization, harmonic reductions as well as innovative ionization technology are the main factors working together to reduce 20% - 40%

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Additional Advantages of the GESS System:

1. **Customized Design Based on Facility Consumption:** Since energy consumption rates vary from one facility to another, **GESS** panels can be designed according to the required consumption capacity, ranging from **50 kVA to 2000 kVA** per unit.
2. **Flexible Installation for Large Facilities:** In large-scale establishments, multiple **GESS** panels can be installed for each power line to ensure maximum energy savings.
3. **Compact Design Without Structural Modifications: GESS** panels are designed to be compact and easy to install, eliminating the need for structural changes at the installation site.
4. **Operation Under Various Weather Conditions: GESS** is built to function efficiently under diverse environmental conditions, making it suitable for different operational locations.
5. **Reducing the Need for Network Expansion:** Installing **GESS** panels helps optimize available electrical capacity, reducing the need for network upgrades when adding new loads.
6. **Professional Periodic Maintenance:** We provide **monthly maintenance and inspection services** through specialized technical teams to ensure optimal performance and continued energy savings.
7. **Easy Assembly and Disassembly: GESS** is designed for quick and easy installation or removal by our expert technical team, ensuring fast implementation and maintenance.
8. **Fast Return on Investment (ROI):** The investment in **GESS** pays off within **12 to 18 months**, making it a **cost-effective** solution for any facility aiming to reduce energy expenses.

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Types of Electrical Power

Most electrical energy is **generated, transmitted, and consumed** on a large scale within an **AC (alternating current) network**. AC power systems produce and consume two main types of electrical power:

1. **Active Power (P) – Measured in Watts (W) or Kilowatts (kW):**
   - This is the **real power** that performs useful work, such as **lighting, heating, and running electrical devices**.
   - It represents the **active component** of electrical power that **directly contributes to work output**.
2. **Reactive Power (Q) – Measured in Volt-Amperes Reactive (VAR):**
   - This type of power **does not perform useful work** but is essential for maintaining **magnetic fields** in inductive loads like **motors and transformers**.
   - It impacts **energy transmission efficiency** and can cause **additional losses in the electrical system**.
3. **Apparent Power (S) – Measured in Volt-Amperes (VA) or Kilovolt-Amperes (kVA):**
   - It represents the **vector sum** of Active Power and Reactive Power.
   - It **indicates the total electrical power** flowing through an AC circuit.

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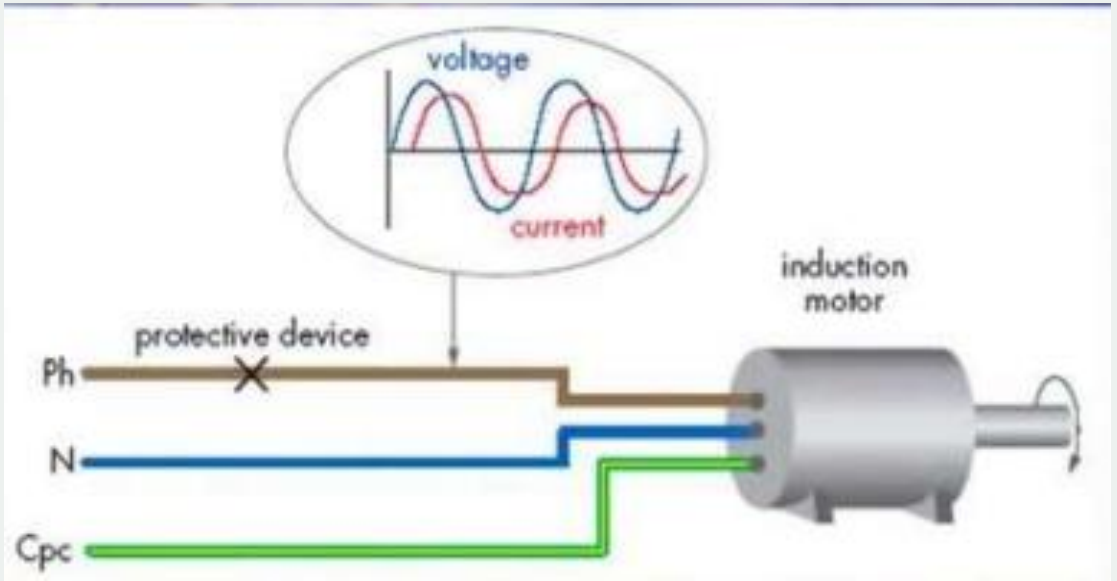
Power Factor

The relationship between these types of power is represented by the **Power Triangle Formula:**

$$S^2 = P^2 + Q^2$$

Where:

- **S (kVA):** Apparent Power
- **P (kW):** Active Power
- **Q (kVAR):** Reactive Power



A **high Power Factor (PF close to 1)** indicates **efficient energy usage**, while a **low Power Factor** means increased **reactive power**, leading to **higher energy costs and reduced operational efficiency**

Power Factor (PF)

The **Power Factor (PF)** is the **cosine of the phase angle (θ)** between the **voltage and current waveforms** in an **AC (Alternating Current) system**. It is expressed by the following equation:

$$PF = \cos \theta$$

Where:

- **θ** is the phase angle between the voltage and current waveforms.
- **PF** ranges between **0 and 1**, where a value close to **1** indicates **higher efficiency** in electrical energy consumption.

✅ **When PF = 1 (i.e., COS(0) = 1):**

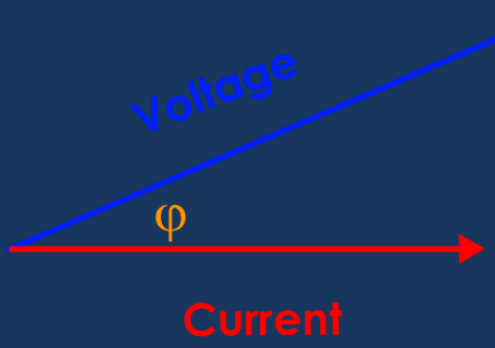
- Voltage and current are **perfectly in phase**, meaning the system **only consumes active power** with **no reactive power losses**.

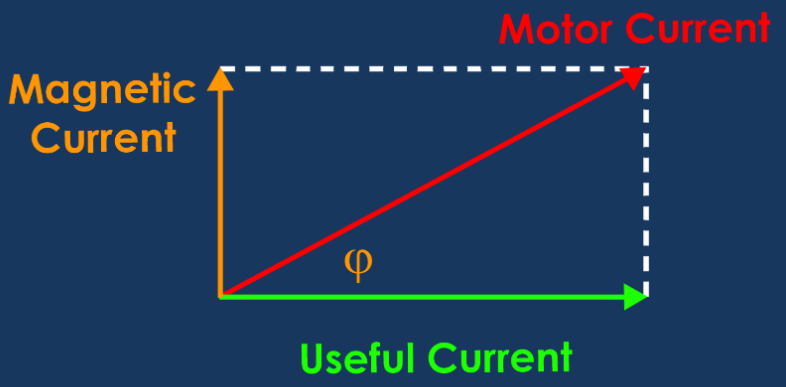
⚠️ **When PF is low (less than 1):**

- This indicates the presence of **Reactive Power**, leading to **energy losses and higher operational costs**.

Benefits of Power Factor Improvement:

✓ **Reduces electrical losses.**
✓ **Enhances overall power system efficiency.**
✓ **Lowers electricity bills by avoiding penalties for low PF.**
✓ **Increases the available system capacity** without requiring infrastructure expansion.





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Why Improve Power Factor?

Improving Power Factor (PF) provides numerous benefits, both in terms of energy efficiency and economic savings, in addition to environmental advantages. Here's why improving power factor is important:

Environmental Benefits

- **Reducing Energy Consumption:** When power factor is improved, energy is used more efficiently, leading to a reduction in overall electricity consumption.
- **Reducing Greenhouse Gas Emissions:** Lower energy consumption results in fewer emissions from power plants, helping to combat climate change.
- **Reducing Fossil Fuel Depletion:** Lower demand on power plants decreases fossil fuel usage, helping to preserve these natural resources.

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Economic and Operational Benefits

1. **Lower Electricity Bills**
   - By improving power factor, businesses can reduce electricity bills, as inefficient energy drawn from the grid is minimized, and penalties for low power factor imposed by utility companies are avoided.
2. **Increased KVA Capacity from the Existing Supply**
   - With power factor improvement, more active power (kW) can be drawn from the existing network without upgrading the infrastructure.
3. **Reduced IR Losses in Transformers and Distribution Equipment**
   - Power factor improvement reduces resistive losses (IR losses) in transformers and other electrical components, increasing system efficiency.
4. **Reduced Voltage Drop in Long Cables**
   - Power factor correction helps minimize voltage drop across transmission lines and long cables, ensuring a more stable and reliable power supply.
5. **Extended Equipment Lifespan**
   - Improving power factor reduces the electrical burden on cables and components, leading to less wear and tear and extending equipment lifespan.

Overall, power factor improvement provides environmental benefits, economic savings, and enhances system efficiency and equipment longevity.

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Power Factor Correction

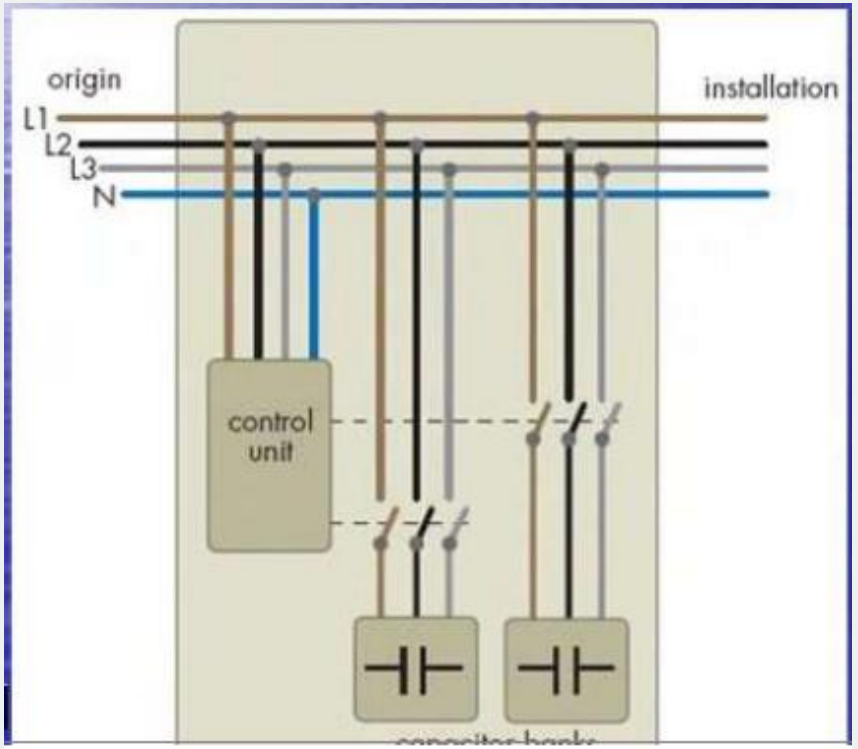
Power factor correction is achieved by adding capacitors in parallel with electrical circuits connected to loads such as motors or lighting circuits. This correction can be applied at various points as needed:

1. At the Equipment Level: Capacitors are installed directly on devices such as motors or lamps to reduce reactive power at the point of use.

2. At the Distribution Panel: Capacitors can be installed in the distribution panel to correct the power factor of all connected circuits.

3. At the Installation's Main Entry Point: Correction can be applied at the main distribution panel, ensuring power factor improvement across the entire network before energy is distributed to other systems.

Adding capacitors helps reduce reactive power, leading to improved power factor, reduced system losses, and increased energy efficiency.



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A system with power factor correction

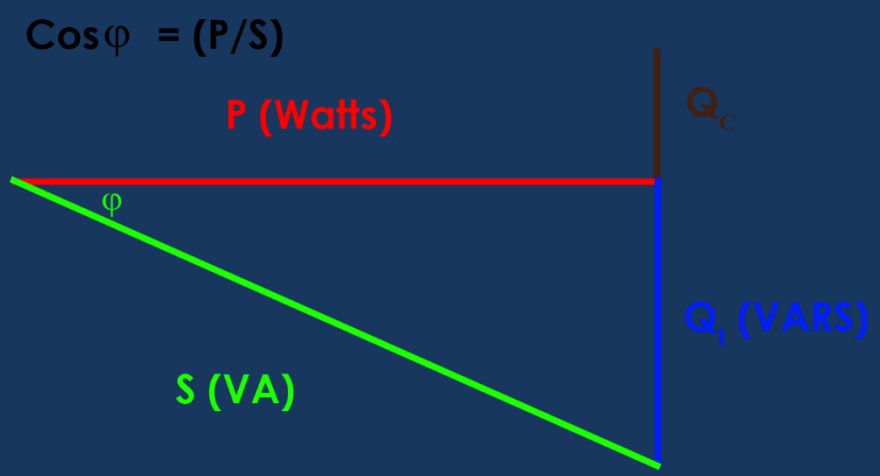
In a system with power factor correction, the relationship between real power P and apparent power S is as follows:

$$\frac{P}{S} = \text{Cos}\,\theta$$

But after applying power factor correction, **S** decreases because **Reactive Power** is reduced, making the system more energy efficient. The result is:

- An increase in **Cos(θ)**, bringing it closer to **1**, meaning that **P (Real Power**) approaches **S (Apparent Power).**
- Power factor correction reduces the loss of **Reactive Power**, thereby increasing efficiency and reducing system losses.

In the end, with power factor correction, **Cos(θ)** will be close to **1**, indicating efficient energy consumption and reduced electrical waste.



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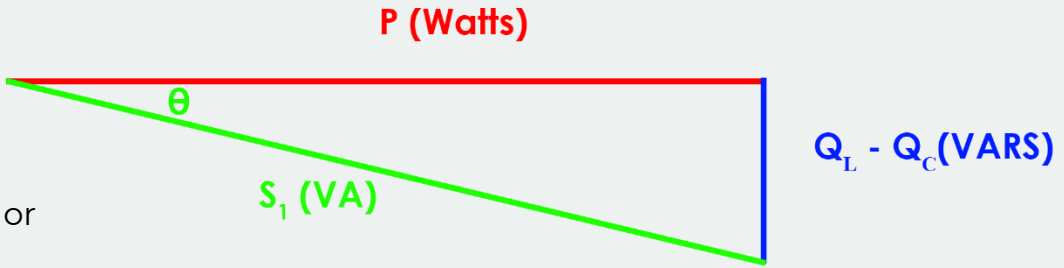
Or with power factor correction

When the power factor is corrected in the system, the relationship between Real Power (P) and Apparent Power after correction will be as follows:

$$\frac{P}{S1} = \text{Cos}\,0$$

$$\text{Cos}\theta = (P/S_1)$$



Where:
- **P** is the **Real Power**, measured in watts (W) or kilowatts (kW).
- **S_1** is the **Adjusted Apparent Power** after power factor correction, measured in volt-amperes (VA) or kilovolt-amperes (kVA).

Equation Explanation:
- The power factor after correction (**Cos θ'**) becomes close to **1**, meaning that **Real Power (P)** is very close to the **Adjusted Apparent Power (S_1)**.
- **Reactive Power** is reduced due to the addition of capacitors or other power factor correction techniques, making the system more energy efficient.

In a system with power factor correction, **Reactive Power** is minimized, leading to significant efficiency improvement and reduced electrical losses.

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Power Factor Correction

We can now say that power factor correction is achieved through the following points:

1. **Reducing the difference** between **Real Power (P)** and **Apparent Power (S)**, leading to an **increase in Power Factor (PF)**.
2. **Reducing Reactive Power (Q)**, which helps **lower or eliminate additional charges** caused by reactive power in electricity bills.

Power factor correction does not:

1. **Reduce Real Power (P)**—real power remains the same, but its efficiency is improved.

We proudly present our new product:

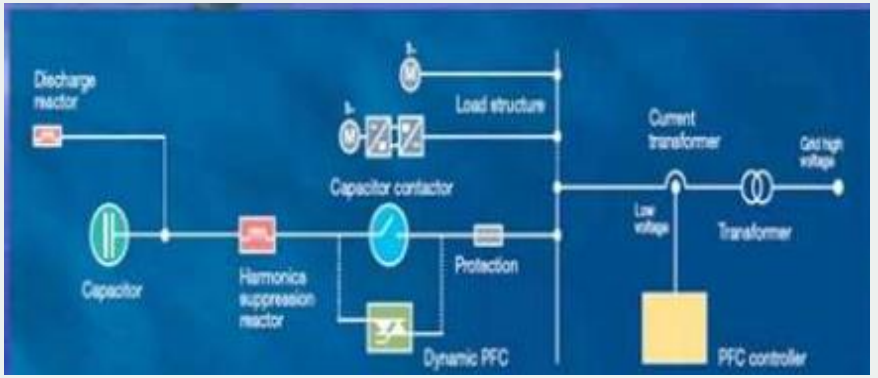
Global Energy Saving System(GESS)

A product developed to **enhance energy consumption efficiency** by reducing waste and improving the use of real power in electrical systems.

The **GESS system** is an **innovative solution** for improving efficiency and significantly reducing energy consumption, promoting energy savings across various industrial and commercial applications.

PF reduction is only part of four elements working together to reduce energy 20%-40%. the four elements are as follows:

1. PF correction close to 1
2. Stabilizing voltage.
3. Eliminating harmonics
4. Creating through innovative ionization process a negative resistance which results in reducing the source current while keeping the load current as is.



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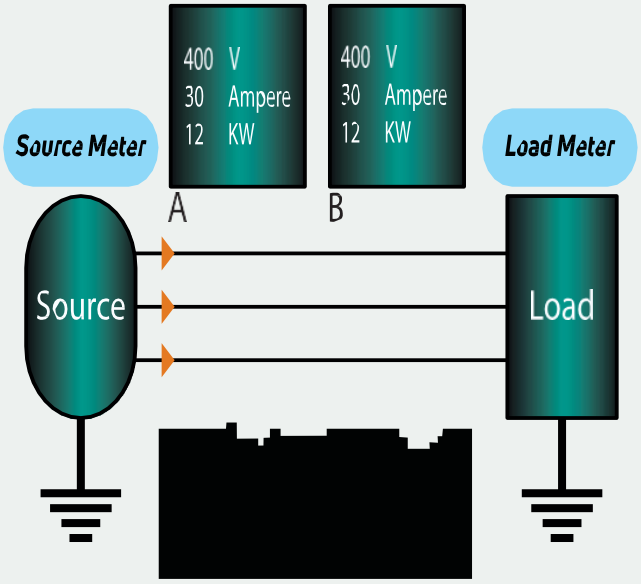
What happens when GESS is connected

Before Connecting

Source Active Power — ps → Load Active Power — pl

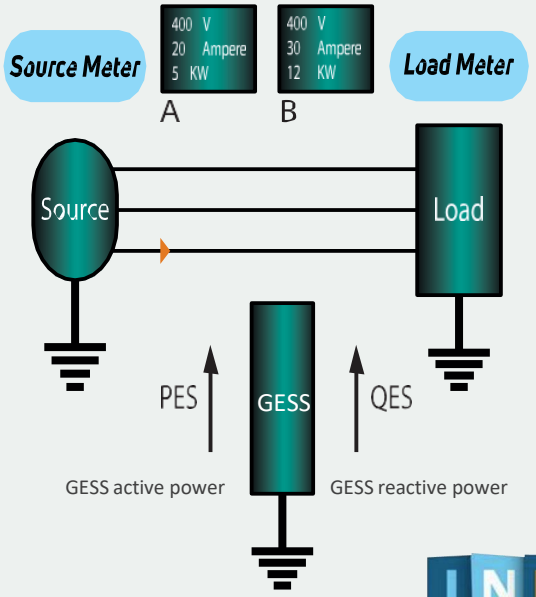
Source Active Power — Qs → Load Active Power — Ql



After Connecting

Source Active Power — ps → Load Active Power — pl

Source Active Power — Qs → Load Active Power — Ql



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Non APSS Capacitors

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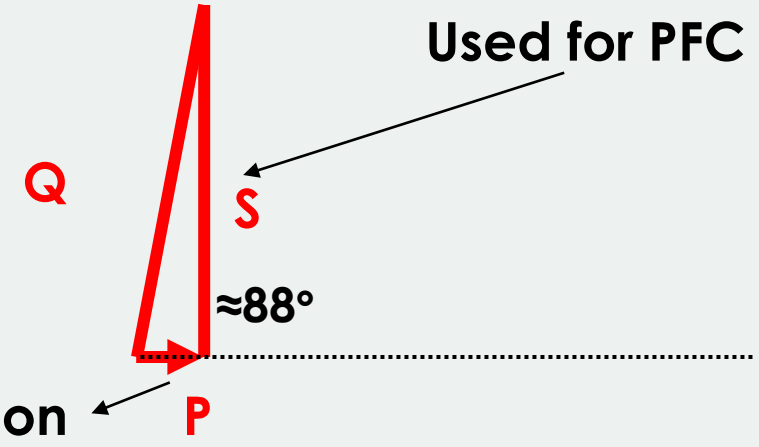
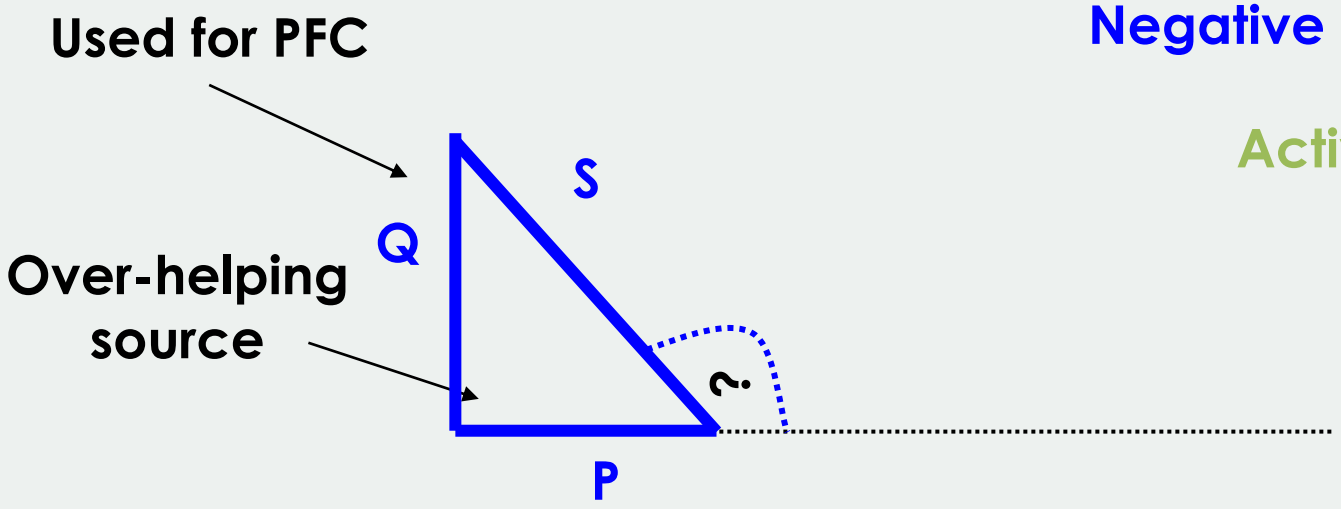


Positive Resistance

PFC

APSS Capacitors



Negative Resistance

Active Power S

PFC

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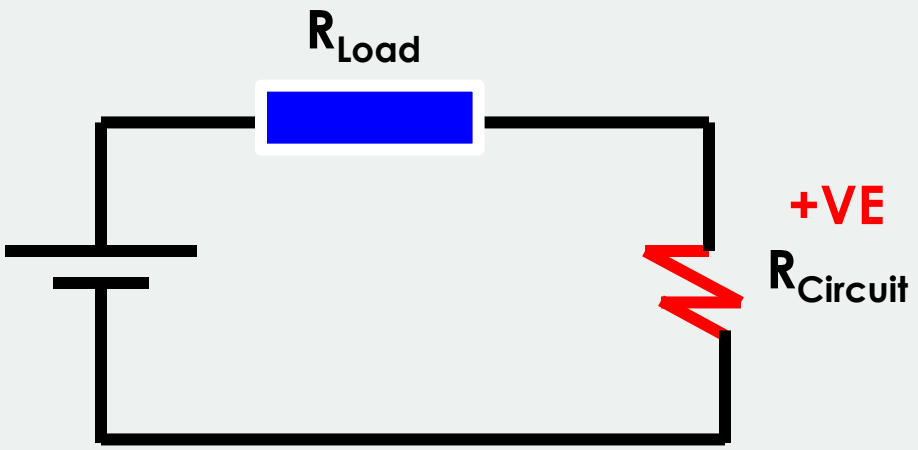

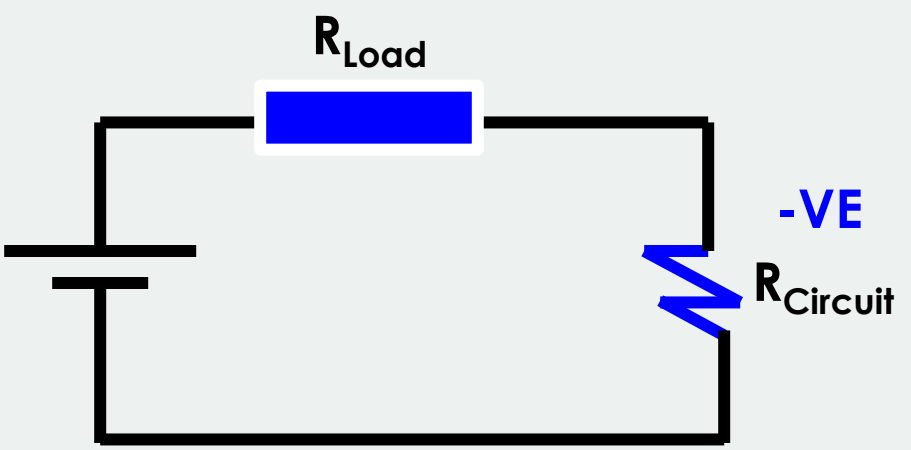

$R_{Circuit}$ = +1 ohm

R_{Load} = 9 ohm

I = 100 /(9+1) = 1

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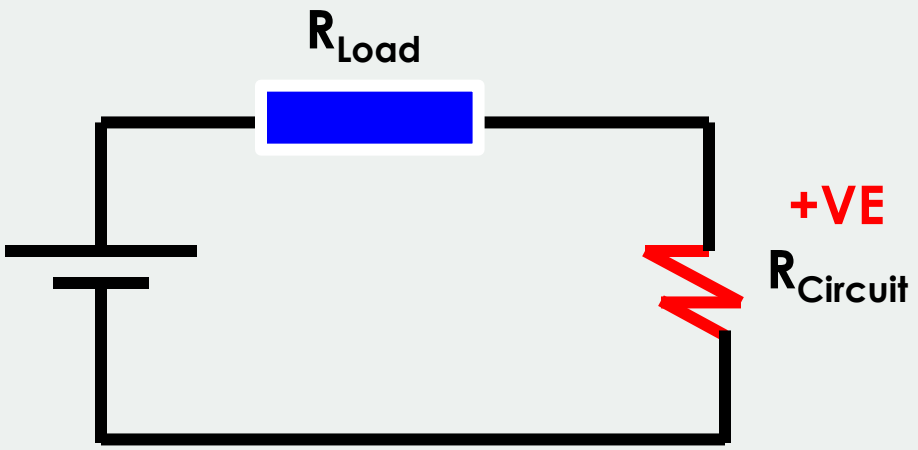


$R_{Circuit}$ = +1 ohm

R_{Load} = 9 ohm

I = 100 /(9+1) = 10 Amp.

P_{Load} = 10^2 x 9 = 900 watt

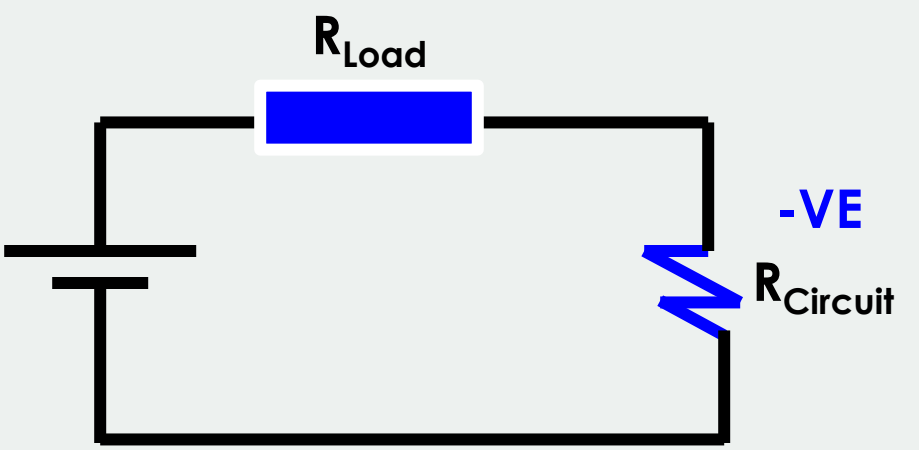
$P_{Circuit}$ = 10^2 x 1 = 100 watt

P_{Source} = V x I = 1000 watt

$P_{Source} = P_{Load} + P_{Circuit}$

Conclusion

$P_{Circuit}$ act as over impeading voltage source



$R_{Circuit}$ = -1 ohm

R_{Load} = 9 ohm

I = 100 /(9-1) = 12.5 Amp.

P_{Load} = 12.5^2 x 9 = 1406.25 watt

$P_{Circuit}$ = 12.5^2 x 1 = 156.25 watt

P_{Source} = V x I = 1556.5 watt

36% Reduction of Power

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Benefits of Using the GESS System

1. **Real Power Savings:**
   - When used with loads supplied by an electrical grid, the **GESS system** can save **20-40%** of real power. This results in reducing Carbon footprint.
2. **Fuel Savings:**
   - When used with loads powered by diesel generators, **GESS** can save **20-30%** of fuel consumption.
3. **Power Factor Improvement, Decrease Harmonics and Peak Demand:**
   - When used with inductive loads, **GESS** can safely **improve the power factor (PF)**, eliminating any additional charges for greater savings.
   - Stabilize Operation
   - Reduce harmonics and stabilize operation.
4. **Compact Design:**
   - The system has a **smaller size** compared to traditional power factor correction units, making it space-efficient.
5. **Simple Design & Low Maintenance:**
   - **GESS** features a **simple design** with minimal maintenance needs, reducing operational and maintenance costs.
6. **Increased Load Capacity:**
   - Customers no longer need to increase input power to accommodate more loads; they can **increase loads by 20-40%** without any changes to feeder lines.
7. **Long Warranty:**
   - **GESS** is backed by a **one-year product warranty** from **Basic Tech** and a **five-year warranty** for other components, ensuring long-term reliability and excellent performance.

The **GESS system** is an **effective solution** for **improving energy efficiency** and **reducing operational costs** across various applications.

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Thank you very much!

TEL: (858) 592-0348
CELL: (310) 634-9538
EMAIL: marks@fwaenggroop.com

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IN GOD WE TRUST!