A Guide to Voltage Optimisation (VO)

Is it right for you, what can you save, how can it be paid for?

Installed VO normally saves 8-12% of electricity costs per building

www.utility-alliance.com
Voltage optimisation is a highly proven and reliable energy saving technology that is used to regulate, cleanse and condition the grid incoming power supply in order to reduce the site voltage to the level needed for optimum operation of on-site electrical equipment.

Voltage reduction leads to kVA, kW, kWh and cost reduction.

The concept behind voltage optimisation is simple. Power from the National Grid is supplied at a higher voltage than necessary due to the aging electrical distribution network which was designed to operate at higher voltage levels than needed today. Also, electricity providers are required to ensure all buildings regardless of distance from the power station are supplied voltage within set parameters. If a building is being supplied at a higher voltage than necessary it normally results in wasted energy, excessive levels of carbon emissions, and higher than necessary electricity bills. Additionally, excess voltage leads to power quality issues, including increased wear and reduced lifespan of electrical equipment.

Voltage reduction leads to kVA, kW, kWh and cost reduction.

Suppliers of different voltage optimisation technologies often quote energy savings attributable to their product. However, the ability of your site to achieve energy savings from voltage optimisation technologies can vary widely depending on your voltage supply and the type of equipment powered in your building(s).

For a site where a large proportion of equipment is considered to be sensitive to changes in voltage, it is possible to achieve anywhere up to 12% energy cost and carbon savings. Some sites have observed savings above this figure, while others have on occasion seen lower energy savings – it really is site specific.

What does VO Save?
Reduce the Voltage, reduce the kWh’s

If the sites electrical characteristics are suitable VO can provide payback within 1-2 years, typically 8-12% savings of site electricity costs by reducing kW/kWh’s.

1. Tried and tested method for ensuring only the optimal voltage levels are being delivered to your electrical equipment.

2. Energy savings of 16% on appliances, 14% on chillers, 15% on certain types of lighting and 4% on direct motors can be made through the effective use of voltage optimisation.

What happens to the supply voltage after VO installation?

Showing effect of VO, before and after installation

Voltage Optimiser Fitted

Energy efficiency zone

SAVE

kVA Capacity charges and kWh tariff costs

PROTECT

Equipment life is extended and maintenance costs reduced

REDUCE

Financial Risk, increase bottom line & cut capital replacement costs

CUT

Carbon Footprint
Utility Alliance provides a variety of flexible finance options to enable clients to select the right package to meet their needs. “VO as a Service” via payment through your energy bills (Opex) is our favoured method.

Starting with a simple 32A single phase unit right through to 4350A three phase, the Voltage Optimiser range grows from a simple 3 level step-down through to a Smart verifiable 5 step-down unit.

Since 1993 all electrical equipment designed for the European market must carry a CE mark. This mark shows that the item will work across the harmonised range 207V - 253V. In the UK electricity is supplied at an average of 242V; a supply which can often be as high as 253V. Critically electrical equipment works most efficiently at 220V.

Which product suits your building(s)?

SME
- 8-10% Savings
- Small wall mount
- Single Phase
- 63A/15KVA to 100A/24KVA

Suitable for:
- Homes
- Restaurants
- Pubs
- Office / Retail
- Healthcare / Beauty

Mid-range
- 8-12% Savings
- Wall mount
- 3-Phase
- 32A/23KVA to 100A/72KVA

Suitable for:
- Hotels
- Restaurants
- Office / Retail
- Light Industrial

Heavy Duty
- 8-14% Savings
- Floormount
- 3-Phase
- 100A/72KVA to 2000A/1500KVA

Suitable for:
- Large offices
- Hotels
- Supermarkets
- Leisure sites
- Industrial

Funding VO
Savings will always exceed Opex Costs… Guaranteed!

Utility Alliance provides a variety of flexible finance options to enable clients to select the right package to meet their needs. “VO as a Service” via payment through your energy bills (Opex) is our favoured method.

Under the “VO as a Service” agreement, the customer would pay for the equipment via an uplift to the kWh costs. Monthly savings are always calculated to exceed monthly uplifted costs, this means that Net cash flow remains positive throughout the energy supply contract period. Once the payback is achieved it generates savings for the customer.

One other funding option is “VO via Shared Savings”. As the name suggests, VO is installed on the clients site, an agreed savings verification method is used, Utility Alliance will invoice monthly for the agreed % of savings, no capital or operating outlay to the client … just savings.

All the above funding options start with an analysis of the current business operations, energy usage and site examination. Feasibility calculations are carried out including costs, savings, financing preference and payback period.

A clear and concise agreement is created and approved with the client, detailing a relationship between savings and payments. The project is undertaken with the installation carried out as agreed. Ongoing savings monitoring and verification are provided to monitor performance.

VO-as-a-Service is a Utility Alliance funded service, i.e. no Capex to client

VO Savings Example, paid over the terms of the energy contract


Overall kWh rate uplift / return, if opex | e.g 0.6p/kWh invested | 1.40p/kWh saved
---|---|
VO-as-a-Service Overall Cost, if capex | £47,500, including installation
VO-as-a-Service Net Savings, at 10 years | £47,700, after pay back
Why do we need Voltage Optimisation?

Voltage Optimisation works like a control valve to reduce energy consumption in voltage dependent loads by reducing or controlling voltage levels to within European Harmonised voltage limits to return an energy saving from over-voltage supply.

**What is the typical supply voltage in the UK?**

This varies widely (which is why a site survey is so desirable) but typically, although the official nominal supply voltage is 230V, the actual supply voltage fluctuates around an average of 242V.

**Why is my grid voltage higher than it needs to be?**

From 1995, the statutory specification for grid voltage within the UK was 400V/230V +10/-6%. Whilst the technology can be used in both 3-phase and 1-phase environments, this means that single phase voltage in the UK can be as low as 216V to as high as 253V. This means that in the UK, equipment designed for use in the European market place (220V nominal) is often supplied at a higher voltage than the equipment was made for. As a result the equipment may consume more energy than necessary.

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**How easy is it to install a Voltage Optimiser & how long does installation take?**

The installation of a Voltage Optimiser requires thorough planning and co-ordination. The process itself is (relatively) straight forward but qualified and experienced companies and suppliers should install.

Each site has specific requirements and so each individual installation is looked at separately. Most installation works will be completed prior to switch over to limit equipment downtime.

**Will my building(s) have power during the installation and/or switch over period?**

It is possible to use ‘portable’ generators to maintain power to your building during the implementation of any device that sits in series with your incoming power supply. To do so, two short power outages would be required – the first to disconnect mains electricity and connect the generator and the second to return the site to its original state – but with the new device installed. All Utility Alliance approved installers are used to working outside of normal hours to minimise disruption as far as possible. This is the more common approach and would require one, longer outage – usually done overnight.

**How long will the power be out for during installation?**

About 2 to 6 hours. To fit in with your working day Utility Alliance can install it at weekends and out of hours to best suit you.

**How much does it cost?**

As every site have unique consumption/demand profiles Utility Alliance will give a bespoke costed proposal, either Capex or Opex (via a kWh unit rate uplift) for each site. Utility Alliance will arrange a full site survey and price it from there.

**Are there any payment options?**

Yes, Utility Alliance can offer Capex, leasing packages with flexible repayments, or Opex payment via your electricity bill (typically less than a 1p add-on). After site survey savings are guaranteed to exceed the kWh add-on cost. We also offer a Shared Savings package with no outlay at all, again subject to site survey.

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Frequently asked questions and some kind words...

**How does Voltage Optimisation work?**

Voltage optimisation has been a major part of our comprehensive energy efficiency programme. It is perhaps the simplest and most effective and reliable way to instantly save energy and therefore we would highly recommend it.

Mark Orpin, Head of energy management | ASDA Supermarkets
Guarantees & Warranties...

All systems are backed by a 5 or 15-year warranty* and a customer’s savings are always 100% guaranteed to provide added peace of mind and reassurance (assuming consumption does not reduce).

*15-year warranty applied for non-Smart models, for Smart models a 5-year warranty applies. Warranty includes parts and labour but excludes damage due to overloading of the system.

Although the VO range of is maintenance free, inspections including voltage, current and thermal imaging surveys are recommended to be carried out annually to ensure optimal running conditions.

This can be provided to customers in the form of a performance inspection survey which is available on both HV (6kV or 11kV) and LV (415V or 230V) VO equipment.

Utility Alliance team of approved engineers are all qualified to the 17th Edition of the BS7671 Wiring Regulations and can inspect all types of voltage optimisation equipment, regardless of its manufacturer.

We have experienced no issues or problems with the VO equipment we have had fitted. The kit is robustly manufactured and electrically sound.

Peter Gardiner, M&E Manager
Lincolnshire co-operative

“We would highly recommend voltage optimisation systems. Voltage optimisation has shown that significant savings can be achieved without compromising the operations of the hospital.”

Mark O’Grady, Managing Director
Mitie Engineering (North) Ltd