

## How Does Voltage Optimisation (VO) and the VPhase Save Energy?

First of all some introductory comments. The VPhase is a product that's owned by a listed UK entity. It's had millions of pounds of R&D go into it; it's patented in more than a dozen countries around the world; it's been widely awarded by companies such as Shell and General Electric after extensive testing.

Moreover, VO itself has been around for a long time. Many large industrial and commercial companies spend tens of millions of dollars on it. A large supermarket chain in Australia just made a huge (\$60m) commitment to a VO solution (not ours!) after extensive testing. The same has happened in the UK. These are hard-nosed business people, not easily taken in.

It's simply not rational to regard VO as a scam. There are scams in the power-saving area (I will mention some below, though not by name) but VO in general is not a scam and neither is the VPhase product.

Nor is it magic. Neither VO in general (nor the VPhase in particular) is magic. How it works is simple and clear. It's basic physics. It works well in some situations and doesn't work in others. It's not a silver bullet.

For a start, no VO solution will help with a thermostatically-controlled resistive load. Not the VPhase - not any VO product. If you supply lower volts to your electric stove it will just take longer to heat, and use the same power. And, in fact, for the main thermostatically-controlled resistive loads (electric hot water and electric ovens, or cookers as they call them in the UK) we don't even connect those circuits to the VPhase.

Switched-mode power supplies don't benefit from VO. If you reduce the voltage to your laptop, the laptop "brick" will just draw more current. No win there.

Having said the above, there's more to it than that. Going back to thermostatically-controlled resistive loads, there are situations where the thermostats aren't used properly. Many people, for instance, think that a thermostat should be turned up on cold days and down on warmer ones. Some people will just wind a thermostat up to the highest/lowest temperature - you may as well not have a thermostat! So there are some situations - corner cases - where a VO product can help even a thermostatically-controlled load. But we don't really promote that.

More importantly, there are a lot of resistive loads that are not thermostatically controlled. Clothes-dryers, hair-dryers, heated towel-rails, radiators, electric blankets, etc - these are all good examples. And on straight ohmic loads, a drop in voltage of 12% from 250V to 220V will yield a drop in power of just over 22.5%. That's Ohm's law.

And on the subject of switched-mode power supplies, most switched-mode power supplies are for low-power items like laptops. On a personal note, my house has four laptops (each one

drawing about a light-bulb's worth of power) and 83 light bulbs. It's clear which is more important when it comes to the power bill!

Which leads to an important point: in the real world, houses aren't filled with just one sort of load. There's lighting, ceiling fans, exhaust fans, TVs, radios, pool pumps, new fridges, old fridges, dishwashers, washing machines, and so on. Some are new and highly efficient. But many of us have an old beer fridge in the garage, and even some incandescent globes!

VPhase in the UK has had an independent consulting firm carry out tests on many different appliances, and the savings varied from -2% (yep - a negative!) to 21%. The report is attached. The reality is that houses have a mixture of loads, and the exact blend will differ from home to home. Most of our customers get between 8% and 12% over their whole power bill.

Those with a house full of efficient LED lights and laptops and with an electric stove and hot water will get a relatively small saving. A VPhase may not make sense for them. Those (like myself) with a lot of older lighting, two fridges (one quite old), gas stove and gas hot water, a pool pump, clothes-dryer, and so on will enjoy a much higher saving. It's horses for courses.

If this is a negative thing, then it's a negative thing for every other power-saving and CO2-saving technology in existence. The saving from shower-heads, for example, varies from house to house as the number and duration of showers changes. We have three bathrooms at our house: the only water-saving shower-head was a give-away and is installed in the guest bathroom: it's been used a half-dozen times in the last two years.

In-home displays are another item for which the saving will vary dramatically from house to house, according to whether they're used, what appliances they're used on, and how often they're used.

This uncertainty is an unavoidable part of the territory. It's neither unique to VO, nor a negative reflection on the VPhase. In fact, it's the reverse. The VPhase, because it's wired in and can't be turned off by a user, offers more certainty of saving than other technologies.

At 8-12% savings, many people will pay for their system in two to five years. Why the variation? It depends on the appliance mix, the cost of power, what you predict will happen to power bills, and how much power you use.

Allow me to address other reports that have been quoted.

It's important to remember that independent doesn't mean professional (one of the papers quoted has at least three grammatical errors and two spelling errors in it, and while that doesn't necessarily reflect badly on the content, it does reflect on quality control). Also, independence doesn't mean that trials have carried out using a sensible methodology.

The "Which?" report done in the UK claimed to assess the ability of various devices to save power, but damned the VPhase because the manufacturing process of the product emitted too

much CO2 (even though they didn't actually have a figure for how much!) They also said that the VPhase would "take a long time to pay for itself". Hopefully it's clear from the previous discussion that how long it takes to pay for the unit can't be determined quite that simply! But then they also paid out on a shower-head because it would be easier to turn the tap down, and because one user who had inadequate water pressure complained! We think that speaks for itself.

I've addressed the "Hood Report" from the University of Ballarat before. To reiterate, it says that with 5% higher voltage:

- Thermostatically-controlled resistive loads won't benefit;
- Switched-mode power supplies won't benefit;
- Non-thermostatically controlled heaters would use 10% more power and "add significantly to energy cost";
- Refrigeration and reverse cycle air-conditioning would be cost neutral (although air-conditioning wasn't tested);
- Other appliances using motors would have a 10% increase in energy cost;
- Lighting would cost 8% more.

That's with 5% higher voltages. With 12% lower voltages, the "no change"s remain "no change". The rest change proportionally: 10% more power becomes around 25% less and the 8% more becomes around 20% less. And, as I've said before, that is pretty much what we see in real life.

It's also worth bearing in mind that it's an eight-year-old report, and since then, there have been two dramatic changes to most domestic power users in Australia. Firstly, power costs (and therefore the chance for savings) have risen dramatically. Secondly, voltages have risen, too, driven by the widespread installation of solar, to the point where it's becoming a real problem for power companies. Both of these changes make VO more attractive.

Unfortunately, there are a number of scams out there. Broadly, anything capacitor-based, or anything that claims to improve power factor is a scam in the residential context for a simple reason: residential customers don't pay for power factor: it's irrelevant to them!

It goes without saying that anything that plugs into any power point and claims to reduce your whole power bill is a scam - it's like putting something on a tap and expecting to cut your entire household water usage.

## **Conclusion**

VO is not a scam. It's simple physics. It's been around a long time and in the commercial and industrial world it's well accepted. Hard-nosed people like those running some of the largest companies in the world don't pay real money for VO if it doesn't work.

The VPhase is not a scam either. But it's not magic. Please don't discount careful, independent engineering reports that explain their methodology and layout the facts clearly. And remember, the real results vary from house to house - that's just reality.

A final comment. A VO solution is paid for only once, but power bills keep coming in. And keep going up. As this happens, the savings from VO just continue to rise.