



# Energy and water efficiency in food manufacturing

Compressed Air | HVAC | Water Leakage | Lighting |  
Refrigeration | Metering | Energy Cost Reduction



**Websters Group**  
Financing Energy Efficiency

## A Practical Guide

In 2019, Websters Group reached an important milestone, \$10,000,000 in identified energy, water and gas savings for our clients.

With energy prices remaining a top concern for business, our aim through this guide is to share the deep learnings from these upgrades further.

In developing this guide, we have reviewed these previous projects and have tried to condense thousands of hours of engineering effort on each saving measure into a simple format. We wanted to provide a snapshot of the 'best of the best' in terms of industrial energy efficiency opportunities we have developed and have worked well in the field.

The most suitable format, given the competing demands of site staff, seemed to be to prepare this work as a Practical Guide.

With climate change a critical concern and over \$2.1B in energy efficiency upgrades with a less than two year payback available within the Australian manufacturing sector, now is an important time for industrial efficiency.

We hope you enjoy our Practical Guide and this assists in brainstorming new and innovative approaches to reducing costs within your site(s).



**Ryan Dillon**  
Managing Director



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# About This Guide

The purpose of this guide is to:

- Assist in developing a practical energy and water management plan
- Provide an overview of general energy and water saving measures
- Outline practices to assist in reviewing site opportunities

For a site that does not have a detailed Energy and Water Management Plan (EWMP) we have provided instructions in this guide to help with the initial stages of development.

A summary of the suggested steps dealt with in each section of this guide is outlined below:





# Self-Assessment

An Energy and Water Management Plan (EWMP) need not be overly complex. There are several simple actions that can be completed in-house to develop a framework to reduce energy and water costs. The following section covers important initial actions when getting started.

## Review Annual Energy Costs

Understanding annual utilities costs is an essential first step in any EWMP. Capturing 12 months of energy, gas and water costs assists in creating a baseline to measure improvements against.

Websters Group can work with your utility provider to generate a 12-month summary of site consumption within an Excel format to complete this step.

## Understanding Your Billing Structure

Understanding the structure of your energy bill is key to determining what types of upgrades will be commercially viable. Your utility provider will typically have instructional guides to explain how rates are calculated and the structure of your energy bill. Websters Group will be able to forward the relevant guide based on your location on request or explain this further as required.

National Metering Identifier (NMI)

Breakdown of Peak and Off-Peak consumption

Demand Charges apply to consumers using more than 100,000 kWh per year within QLD in most cases

NMI: 1234567890

Address: 14 Main St, Brisbane, QLD 4000

Period: 12/02/2019 – 12/03/2019

Supply Problems: 13 62 62

Emergencies: 13 19 62

Network Provider: Energex

Pricing Details

| Charges                  | Usage           | Unit Price         | Loss Factor | Total Price (excl GST) |
|--------------------------|-----------------|--------------------|-------------|------------------------|
| Retail Charges           |                 |                    |             |                        |
| QLD Peak                 | 77,362.400 kWh  | 12.3137 c/kWh      | 1.06065     | \$10,103.94            |
| QLD Off Peak             | 58,591.400 kWh  | 7.1531 c/kWh       | 1.06065     | \$4,445.29             |
| Environmental Schemes    |                 |                    |             |                        |
| LRECs                    | 135,953.800 kWh | 1.2379 c/kWh       | 1.05600     | \$1,777.22             |
| SRECs                    | 135,953.800 kWh | 0.2299 c/kWh       | 1.05600     | \$330.06               |
| Network Charges          |                 |                    |             |                        |
| 8100 - Usage             | 135,953.800 kWh | 0.6370 c/kWh       |             | \$866.03               |
| 8100 - Demand            | 345.400 kVA     | 17.4770 \$/kVA/Mth |             | \$6,036.56             |
| 8100 - Supply Charge     | 30 Days         | 33.1280 \$/Day     |             | \$993.84               |
| Market Operator Charges  |                 |                    |             |                        |
| AEMO Ancillary Fee       | 135,953.800 kWh | 0.0680 c/kWh       | 1.05600     | \$97.63                |
| AEMO Market Fee          | 135,953.800 kWh | 0.0374 c/kWh       | 1.05600     | \$53.69                |
| Metering Charges         |                 |                    |             |                        |
| Meter Charge             |                 | 1,200.00 \$/mtr/pa |             | \$98.63                |
| GST                      |                 |                    |             | \$2,480.28             |
| Total (excl GST)         |                 |                    |             | \$24,802.89            |
| TOTAL for NMI 3120124867 |                 |                    |             | \$27,283.17            |

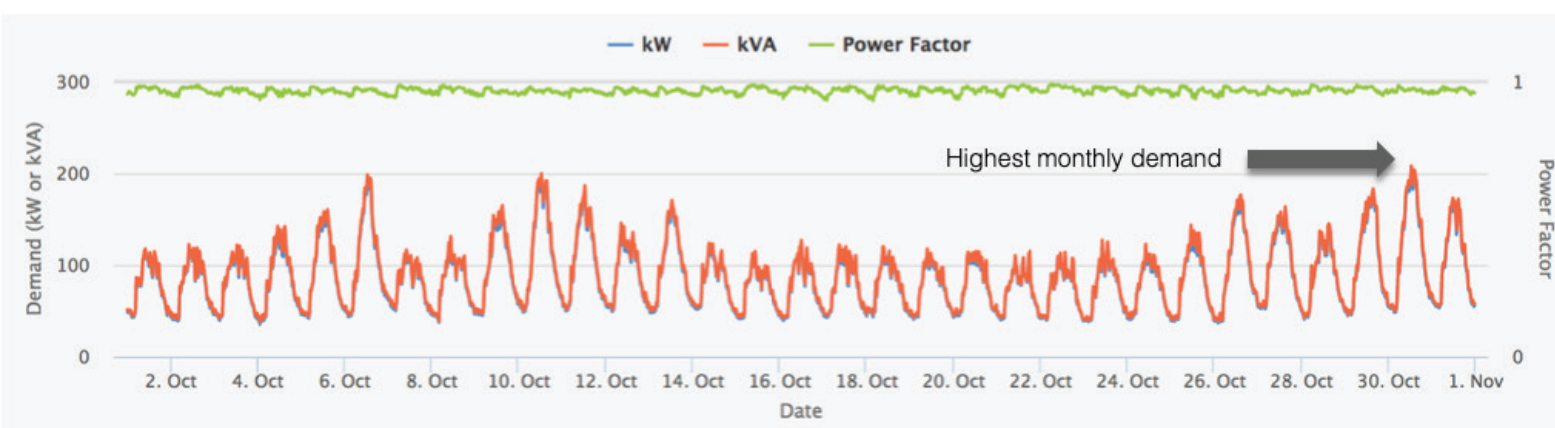
An often-overlooked area of cost savings is through bill verification, i.e. are you being charged the correct amount on your bill?

Any site with costs higher than \$7,500 per month should undertake a billing verification (if not already).

**Contact Websters Group to organise a Free Review**

## Understanding Demand Charges

The chart below represents one month of energy usage at a large food processing facility. Daily peaks are attributed to production processes, staff hours and refrigeration loads. The highest demand measured in the month is indicated by the arrow below. Demand charges are based on your monthly highest demand within any 30-minute period within the Energex network. This is measured in kilovolt amperes (kVA).



It is important to carefully review the potential impact of demand charges if you are consuming 75,000–99,000 kWh per year as you may be at risk of increasing usage above 100,000 kWh per year. Above this threshold you will be automatically transferred to a demand-based tariff and charged a fee for demand (kVA charge).

**Please note: A 300 kVA demand charge costs approx. \$64,800 per year.**

A further risk is that if you install measures to reduce site usage below 100,000 kWh per year

**after you have automatically been transferred to a demand tariff** you may have to wait a minimum period of 12 months before you can change the tariff back again. This means in the example above you will be charged \$64,800 for demand.

Websters Group are able to determine peak demand at your site with a portable data logging before your site is automatically transferred to a demand tariff.

**This simple review has saved customers tens of thousands of dollars.** Contact us to perform this important review.

## Identify Areas of High Consumption

Reviewing areas of high consumption will assist in understanding where to start when reviewing opportunities on site. This can be as simple as reviewing two to three key areas of interest such as compressed air, refrigeration or lighting.

For a more structured approach, create an asset list based on information available on site. Within distribution boards on site there should be a detailed schedule of what is connected to each circuit breaker, for example.

Preparing a single line diagram based on this list of circuits can assist in identifying areas of higher energy use associated with key equipment. If distribution board schedules are not clear, refer to the breaker size of each circuit to assist in identifying larger electrical loads.

As a final step, once priority areas are identified, connect portable data logging to identify consumption patterns associated with key circuits.

Websters Group are able to provide rental data logging equipment for this assessment and assist in gathering, reviewing and prioritising areas of investigation.

**Savings identified through this simple step often significantly outweigh the small assessment costs incurred on a ratio of 4 to 1.**

Contact us for assistance in preparing for and conducting this important step.

## Frame Potential Benefits

Once costs and high energy use areas are established, start by identifying what a 10–15% reduction in annual costs could mean for the business financially. If your site energy bill is \$350,000 per year, a 15% reduction in usage is equivalent to \$52,500 per year in savings. Over the effective life of capital upgrades (in many cases 10 years) total savings could be in the order of \$525,000 (exclusive of utilities price increases and CPI).

Framing the potential savings at the start of the process assists in determining potential benefits and asking the question, “Why is it essential we complete an energy and water management plan?” If the potential savings significant and worth the effort, move forward.

If you have trouble allocating capital or funding projects with a payback of less than five years, Websters Group can provide certain guarantees of savings performance on a case-by-case basis. This means certain financial risk / returns of the project are absorbed by our company (not the client) through our signature **Energy Efficiency Partnership (EEP)** offering. Here we fully fund projects and use delivered savings as equipment repayment.

Why pay hundreds of thousands of dollars in energy costs when for the same price **guaranteed** we use energy cost savings to pay for valuable upgrades instead, with little, or in certain cases \$0 upfront (at our expense and risk).

### At a glance:

- **\$250,000–\$1.5M in energy, water and gas cost savings**
- **Websters Group fully fund equipment upgrades**
- **\$0 upfront options, with energy and water savings as repayment**
- **We guarantee performance of trusted third-party suppliers, using energy and water cost savings as repayment**

- **Guaranteed not to cost more than business-as-usual energy costs (energy savings as repayment only, at our risk)**

**See the funding section on our website for more information :**  
**[www.webstersgroup.com.au/funding](http://www.webstersgroup.com.au/funding)**



Prior to reviewing efficiency upgrades on site, it is important your site has considered your current retail contact(s) and is satisfied with electricity and gas costs. Reviewing the market and having the lowest cost contract is an important but often overlooked step before reviewing site upgrades.

Reviewing energy procurement ensures return on investment calculations are accurate and not distorted by high energy costs if the business has not negotiated the lowest energy cost in the market first. There are two parts to this process: reviewing rates associated with your energy retailer compared to other competitors; and ensuring you are on the correct energy tariff.

## Retail Contracts (Annual Use Below 100,000 kWh)

If your usage is below 100,000 kWh per year, review possible retailers on the Energy Made Easy comparison website ([www.energymadeeasy.gov.au](http://www.energymadeeasy.gov.au)). To give an indicative example, the small business below consuming 85,000 kWh per year saved \$3,376 per year based on changing providers.

|  |                      |                       |
|--|----------------------|-----------------------|
| <b>Average Daily Energy Usage (kWh/day)</b>                        | <b>232.88</b>        |                       |
| <b>Assumed Annual Energy Use Based on Daily Average (kWh/year)</b> | <b>85,001.20</b>     |                       |
| <b>ORIGIN ENERGY - (CURRENT)</b>                                   | <b>Rate (\$/day)</b> | <b>Cost (\$/year)</b> |
| Current Bill Usage Charge  | 0.27                 | \$ 22,627.32          |
| Current Bill Supply Charge   | 1.23                 | \$ 448.60             |
| Solar Metering Charge  | 0.07                 | \$ 25.46              |
| <b>Total Cost</b>  | -                    | <b>\$ 23,101.37</b>   |
| <b>POWERSHOP - SMALL BUSINESS</b>                                  | <b>Rate (\$/day)</b> | <b>Cost (\$/year)</b> |
| Usage Charge   | 0.27                 | \$ 22,652.82          |
| Supply Charge  | 1.52                 | \$ 553.27             |
| Solar Metering Charge  | -                    | \$ -                  |
| <b>Total Cost</b>  | -                    | <b>\$ 23,206.09</b>   |
| <b>Mega Pack Discount (Applies when Mega Pack is purchased)</b>    | <b>15%</b>           | <b>\$ 19,725.17</b>   |
| <b>ALINTA ENERGY - SMALL BUSINESS</b>                              | <b>Rate (\$/day)</b> | <b>Cost (\$/year)</b> |
| Usage Charge   | 0.30                 | \$ 25,189.26          |
| Supply Charge  | 1.42                 | \$ 517.94             |
| Solar Metering Charge  | 0.07                 | \$ 25.82              |
| <b>Total Cost</b>  | -                    | <b>\$ 25,733.01</b>   |
| <b>Pay on Time Discount (Applies to First 12 Months ONLY)</b>      | <b>20%</b>           | <b>\$ 20,586.41</b>   |
| <b>AGL - SMALL BUSINESS (24 Month Contract)</b>                    | <b>Rate (\$/day)</b> | <b>Cost (\$/year)</b> |
| Usage Charge   | 0.23                 | \$ 19,754.28          |
| Supply Charge  | 1.24                 | \$ 453.70             |
| Solar Metering Charge  | 0.08                 | \$ 28.11              |
| <b>Total Cost</b>  | -                    | <b>\$ 20,236.08</b>   |
| <b>ORIGIN ENERGY - SMALL BUSINESS</b>                              | <b>Rate (\$/day)</b> | <b>Cost (\$/year)</b> |
| Usage Charge   | 0.30                 | \$ 25,834.41          |
| Supply Charge  | 1.47                 | \$ 535.96             |
| Solar Metering Charge  | 0.08                 | \$ 28.40              |
| <b>Total Cost</b>  | -                    | <b>\$ 26,398.78</b>   |
| <b>12 Month Contract Discount</b>                                  | <b>16%</b>           | <b>\$ 22,174.97</b>   |
| <b>CLICK ENERGY - SMALL BUSINESS</b>                               | <b>Rate (\$/day)</b> | <b>Cost (\$/year)</b> |
| Usage Charge   | 0.37                 | \$ 31,733.50          |
| Supply Charge  | 1.95                 | \$ 711.44             |
| Solar Metering Charge  | -                    | \$ -                  |
| <b>Total Cost</b>  | -                    | <b>\$ 32,444.94</b>   |

Please review suppliers and make your own assessment; for information purposes only

## Retail Contracts (Annual Use Above 100,000 kWh)

If your energy usage is greater than 100,000kWh per year you are considered a Large Business (for energy tariff purposes). If you are a Large Business or you have multiple sites you will need to contact suppliers directly to obtain a quotation to identify rate differences and potential savings. Pay attention to the net contribution of network, retail and other environmental charges when making comparisons.

### Energy Tariff Review

If you are satisfied with your current contract, it is still important to ensure you are on the correct energy tariff. A tariff comparison can reveal tens of thousands in savings due to simply being on an incorrect tariff. If you consume more than **\$5,500 per month** contact Websters Group to discuss performing a **free tariff assessment** (conditions may apply).

**This simple, free assessment has saved a previous customer \$64,000 per year. On our website, click on the button below for your free consultation.**

**Go to [www.webstersgroup.com.au](http://www.webstersgroup.com.au)**

## Websters Group

Financing Energy Efficiency

Websters Group have delivered \$10M in savings through some of Australia's most innovative sustainability upgrades.

Energy Tariff Consultation (Free)

◀ **CLICK HERE**

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# ✧ Identifying Efficiency Improvements

Once energy procurement steps have identified the cheapest cost for energy, efficiency upgrades will be able to be reviewed. The following outlines areas of investigation and design consideration by upgrade. While not an exhaustive list, the intent is to stimulate discussion and provide key points.

## Use of Icons:



**Major Energy Saving**



**Moderate Energy Saving**



**Priority Area of Investigation**



**Area of Investigation**







## Lighting Design (AS/NZS 1680)

If you are 'like-for-like' replacing older fittings or lighting a new space, it is important to produce a lighting design.

Many installations simply replace existing fittings with LED fittings using the same layout. A lighting design can assist in targeting relevant Australian Standards through intelligent lighting placement to avoid poorly designed and obviously overlit spaces. Producing a design will also assist in meeting the Australian Standards (AN/NZS 1680) for lighting levels. This is an important yet often overlooked compliance and OH&S requirement.

When preparing your design, a qualified lighting designer should also adjust for depreciation of the LED fittings over the expected life of the installation so it is fit for purpose long term.

Websters Group have subject matter experts in lighting to prepare design documentation.

## LED Driver Wattage

Energy consumption associated with LED drivers needs to be accounted for within supplier energy savings calculations. Including these gives a more reliable estimate of wattage before and after upgrade. This is an important item to check within supplier savings assessments.



## High-Quality LED Drivers

The main failure point within an LED fitting is typically the driver. Only select high-quality LED drivers within new fittings. Consider reputable OSRAM, Cree and Philips drivers and avoid LED suppliers who self-manufacture their own drivers.

Websters Group also have performance guarantees associated with LED drivers if required through an Energy Efficiency Partnership (EEP).



## LED Warranty Terms

Lighting installed in hard-to-access areas can require hire of an elevated platform to replace fittings. Modern high-quality LED highbay fittings can maintain a 50,000-hour life, therefore requiring lower maintenance cost where elevated platform hire is required for replacement of bulbs in old fittings.

Websters Group can provide industry-leading warranty inclusions to cover elevated platform hire in warranty documents (manufacturers fault) and ensure you are not charged for replacement costs if any LED units fail before the 50,000-hour warranty period. This is helpful for hard-to-access areas to ensure you are covered.



## Pneumatic and Digital Timers

Stairwells, storage and general areas not commonly accessed can benefit from time-based pneumatic or digital timers. Such fittings can remain on for 5 to 30 minutes as per inbuilt settings. This ensures lighting is provided for a smaller number of hours per day.

This can also be useful where lights are remaining on due to staff behaviour. Installing pneumatic timers within cold storage rooms can also assist if lights are being left on after hours. Lighting has a double penalty in cold storage rooms in that heat is generated through lighting and increases cooling energy demand.

## Delamping and Task Lighting

Task-specific lighting such as lamps for work stations can also be used as alternatives, resulting in lower energy costs where lights can either be dimmed or replaced altogether.

## Occupancy Sensors

Areas that are not occupied for long periods (less than four hours per day), such as bathrooms or meeting rooms, can benefit from occupancy sensors. This ensures lights are used as required, therefore lowering energy consumption.

**As a general rule, five (5) or more fittings are required per sensor to have a suitable payback on the sensor and labour costs (assuming \$150–\$200 installation cost per sensor).**

## Outdoor Lighting Timers

Adjusting outdoor lighting timers seasonally by one hour between seasons can assist in reducing costs and can be included in scheduled maintenance.

## Operational Hours

Reduce the number of hours lighting is required through dimming or incorporating more daylight within the facility (skylights and other design features).

When incorporating daylighting into a lighting design, savings are only achieved to the extent that energy consumption from lighting is offset. Window tinting and shading are a consideration in this case. This is to ensure that there is not an excessive energy penalty from generated heat associated with daylighting and associated HVAC loads.

Building performance simulations can be provided by Websters Group to review these

options pre-install. These engineering and design costs can also be funded through a \$0 upfront Energy Efficiency Partnership (EEP) for complex projects where the client wishes to guarantee performance of the project(s).



## Group Relamping

LED light output **depreciates** over time. This means you need to consider the system as a whole and replace all LED units at the same time as opposed to individually (Group relamping). This is different to replacing fluorescent fittings that burn out or fail individually.

Installation of LED fittings in a structured approach across key areas at once, as opposed to using maintenance budget to replace old fittings as they fail, is often more cost effective.

Group relamping has several benefits including lower labour costs, bulk procurement savings and less lighting warehousing onsite. By scheduling even years ahead, expected maintenance and downtime can also be better managed.

## Lumens Per Watt (Efficacy)

High-quality LED modules are capable of producing higher output (lumens) relative to power usage (watts) compared to traditional fittings. This is measured as a ratio of lumens per watt (Lumens/Watt), also referred to as the 'efficacy' of the fitting.

While longer-lasting fittings may be more expensive, a higher efficacy could mean a lower number of fittings are required for replacement over the life of the installation, therefore reducing costs.



## Positive Payback Rebates

LED upgrade rebates exist in certain areas of Queensland through Energex as well as in other network providers throughout Australia.

If you are located in Queensland, go to the Energex website to review eligibility <https://www.energex.com.au/home/control-your-energy/positive-payback-program/positive-payback-for-business>.

**Websters Group can also assist by co-funding the remaining balance of this funding through an Energy Efficiency Partnership (EEP).**

## Thermal Requirements

LED driver lifetime and luminous output decrease proportional to the fitting's exposure to heat. Cleaning of fittings to remove dust assists in reducing operating temperatures and therefore improves long-term performance.





Major areas of wastage within compressed air systems are attributed to leakage, excessive pressure and inadequate control systems. You could also argue that wastage can be attributed to situations where compressed air can be replaced altogether with a different or simpler system.

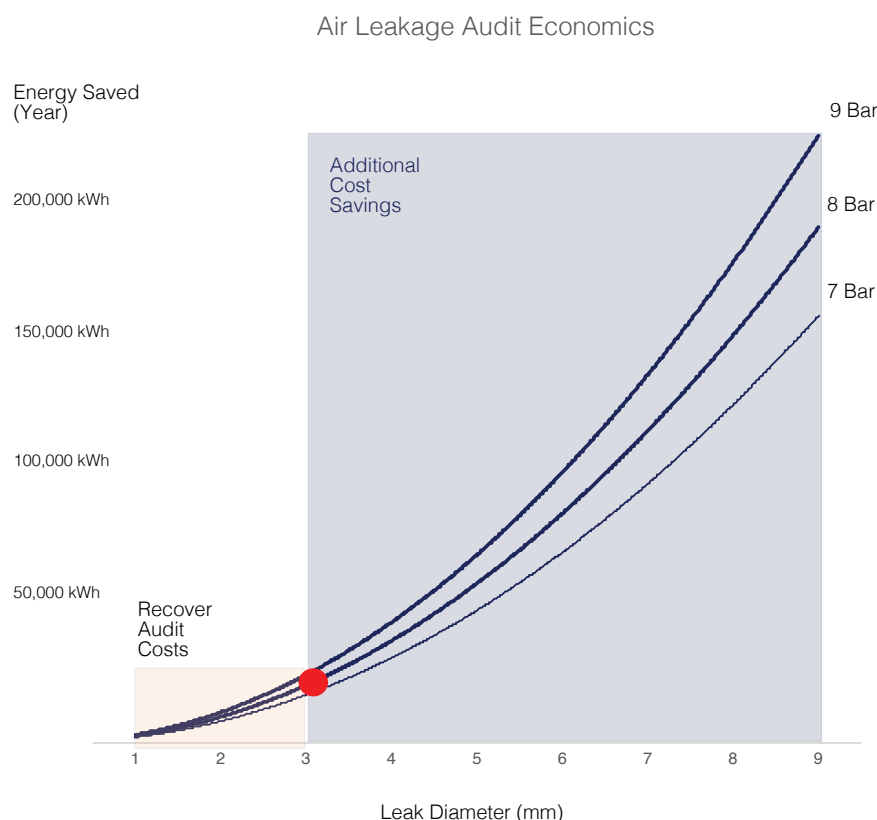


## Air Leakage Audits

Compressed air leakage audits often pay for audit costs many times over based on identified leakage. Leaks can often form in odd-shaped cracks close to connections and valves that can be hard to visually see. Within a 24-hour production environment some leaks are not always audible and thus identified in scheduled maintenance. Ultrasonic leak detection can assist in this regard in identifying smaller leaks.

**Websters Group also have a 'No Leak, No Fee' guarantee for compressed air audits included within an Energy Efficiency Partnership (EEP) agreement.**

Fixing a 3mm leak at 9 bar is all that is required to recover average leakage audit costs.





## Sizing Compressors

A common strategy is to size a compressor for base load and have another one to two compressors come online at times of peak demand. This can have dramatic effects on energy consumption. As a rule of thumb, a 14 kPa pressure reduction results in 1% reduction in energy consumption.



## Pressure Reduction

Often if a system is overdesigned, it is possible to simply reduce pressure resulting in significant savings at no expense to the optimal function of system(s).

## Filter Cleaning

Ensure that filter cleaning is included in maintenance at the right frequency.

**Pressure drop attributed to dirty filters can increase energy costs by 2% which in some cases costs five times (5x) more than a new filter.**



## Distribution Pipework

Correct sizing of the distribution pipework reduces long-term energy costs. If the facility has increased historical compressed air demands, new pipework and receivers (storage devices) can smooth demand on the compressor with significant savings. If there are significant pressure drops and this is being compensated for, it is possible to loop pipework, install receivers or even fix leakage losses.

Design, engineering and installation of distribution

pipework upgrades can be covered under an Energy Efficiency Partnership (EEP) agreement.



## Liquid Aeration

Can mixing, agitation or aeration of liquids be replaced by motors? In some instances, completely removing compressed air and associated costs is possible.



## Ambient Air Temperature

Reduce the ambient air temperature around air compressors by relocating the unit if necessary. Hotter air has a lower density and requires more work to compress.

**Reducing ambient temperature around the compressor from 32 to 21 degrees can result in approximately 3.8% in energy savings.**

## Design Thinking

Engineered air nozzles can use up to 33% less air to perform the same blowing task.





## Moving Forward

If you are unsure where to start with compressed air, contact Websters Group to book in an initial site assessment and consultation.

Design, engineering and installation of compressed air upgrades can be covered under an Energy Efficiency Partnership (EEP) agreement.

Websters Group also have a '**No Leak, No Fee**' guarantee for compressed air audits included within an Energy Efficiency Partnership (EEP) agreement.







## Temperature Settings

Some control units have Night Set Back mode. This can adjust temperature after hours when lower refrigeration loads are reasonably expected and there is less infiltration due to staff not accessing the space.

Adjustment to safe maximum temperature settings can save 2–4% of total energy use for every one-degree change. Overcooling product at night has also been used as an off-peak energy strategy.



## Equipment Location

The physical location of refrigeration equipment on the exterior of the building can influence energy use due to exposure to excessive solar radiation. Ensure units are shaded with appropriate air flow.



## Insulation

Insulation on refrigerant pipework, valves, cold store wall and roof areas is essential. Use of a thermal camera to identify hot spots or areas where insulation has degraded can assist in maintaining system integrity and improving savings performance.

As part of an Energy Efficiency Partnership (EEP), Websters Group are able to periodically rent (once per year) a thermal camera so you can self-assess for free at your site(s).



## Electronic Expansion Values

Correct use of electronic expansion values on smaller units can increase efficiency by up to 20%.

## Variable Flow Refrigerant

Systems that can be converted from constant to variable flow can significantly reduce energy costs.

**5–20% energy savings within the chiller may be possible.**



## Pipework

Retrofitting from smaller to larger diameter pipework can reduce pressure drop and friction within refrigerant pipes. Pipe friction also increases with length, number of bends, sharp constrictions and number of valves. Saving opportunities exist where pipework can be made simpler.

## Axial Fans

Air-cooled and evaporative condensers using centrifugal fans can replace axial fans. Savings can be in the order of 50% of condenser fan energy use.

## Coolant Distribution

If coolant distribution pumps are used for more than 2000 hours per year with a 30% variance in load, consider installing variable speed drives (VSD).

## Peak Demand

Scheduling of equipment can assist in reduction of peak demand. If defrost cycles within refrigeration are performed within the peak demand window on site (12:30–1:00 p.m. daily, for example), this may be able to be shifted to reduce site demand.



## Partial Load Performance

Utilisation of multiple compressors or VSD units can assist in the number of hours compressors run at partial load. Correct controls for automatic sequencing can assist in managing this. Consider using magnetic-bearing, high-speed VSD centrifugal compressors.



## Door Seals and Curtain Strips

Maintain rubber door seals and curtain strips. Significant energy use is incurred through air infiltration in poorly maintained systems. Given this also increases load on compressors, this can be an important deferred maintenance item.



## Energy Efficiency Maintenance

Identify measures that relate to energy efficiency and include in recurrent maintenance. Maintenance checklists can be updated to include if condensers and evaporators are clean, defrost systems are working, temperature sensors are calibrated and so forth.

Websters Group are able to provide a competitively priced review of current maintenance practices in line with industry best practice. Cost savings achieved through this action alone can be 8–10 times the small initial consulting cost.

**Energy consumption can increase by up to 10% associated with poorly maintained door seals.<sup>1</sup>**

## Refrigerated Trucks

Consider three-phase timers for electric refrigerated trucks. If trucks are left on charge all night, it is possible to schedule the units to be off from 4:00– 10:00 p.m. to take advantage of off-peak rates in precooling truck refrigerant.

## Lighting

Lighting has a double penalty in cold storage rooms in that heat generated through lighting increases cooling energy demands. While appropriate temperature-rated LED fittings for cold rooms can come at higher costs, increased savings can also be expected.

## Storage Requirements

Keeping the room at the optimum capacity reduces cycling and improves energy efficiency.

**An industry recommended optimum capacity is 66% for cool rooms and 75% for freezers.<sup>1</sup>**

## Door Alarms

Door alarms for when staff leave doors open for an extended period can help drive culture change and compliance. Various models exist and can be quite cost effective.

<sup>1</sup> ARIAH Factsheet—Do you own or operate a cool room or freezer room in your business? Available online at <https://tinyurl.com/y5rm7dda>

## Airflow

Manage airflow throughout the room and ensure goods do not block evaporators. The location of temperature sensors can also be relevant depending on where doors are located and resulting airflow throughout the room.

## Product Handling

Keeping goods that are regularly accessed close to the door can reduce door opening and handling time. Maintaining an efficient process for loading goods will also reduce energy required to recool product.

Blast freezers to cool product before going into storage can assist in reducing the net energy used for refrigeration depending on the efficiency of each system.



## Complete Replacement

Complete replacement of the current refrigeration system can be financially viable. Replacement of compressors and evaporators can be examined incrementally also. Do not rule out the opportunity for complete replacement if the current system is 10–15 years old.

Websters Group are able to provide detailed advice on the viability of commercial refrigeration upgrades. If your site has significant energy costs and older refrigeration systems, this is often important to review with potential long-term benefits.





# Power Factor Correction



Significant savings can be available through power factor correction. Understanding power factor on site is important for energy users above 100,000 kWh per year given this is the threshold for demand charges by Energex in Queensland.

## System Maintenance

Power factor capacitors are susceptible to heat-based degradation. Ensure that regular maintenance is being conducted and a recurrent maintenance contract is in place right from the installation and commissioning phase.

## Solar PV and Power Factor

Solar PV only marginally changes site power factor depending on reactive power supplied by the inverter (if any at all). Consider the design and relationship of power factor correction units if solar PV systems are also integrated within your site. Pay careful attention to the current transformer (CT) locations associated with the power factor unit and inputs from new solar installations.



## Performance Guarantee

Websters Group provides a **direct cash refund** should an agreed performance threshold be exceeded when power factor correction equipment is installed through an Energy Efficiency Partnership (EEP) (for example, if power factor is less than 0.97 month to month).

**This Savings Insurance is available for a number of years after installation in order to provide financial certainty and a guaranteed return on investment to our valued clients.**

# HVAC and Building Envelope

## HVAC Recommissioning

Understanding the design vs. current performance of your building's HVAC system is essential. Through benchmarking and a network of rental data loggers strategically located on site, Websters Group may be able to review HVAC performance to ensure your site is generally to standard.

**Given the amount of energy used in building heating and cooling for larger facilities, this review can generate savings in the order of \$50,000 per year.**

## Alternate Heat Sources

Compressors can be a useful source of heating given 85–90% of energy used is lost as heat. Depending on the location of compressors this could be used for space heating in winter.

## Building Envelope

From a systems perspective consider the inputs heating the space including lighting, radiative gains through windows, conductive gains from walls and windows, air exchange between the internal and external environment and so forth. Glazing on key window areas can reduce solar radiation and conductive gains from windows. Insulation within the building also prevents conductive gains.

It pays to identify the quick wins regarding the building envelope itself. Websters Group are able to perform a building envelope assessment to review upgrade opportunities.



## Air Exchange / Infiltration

Air exchange through doors, unsealed exhaust fans, poorly designed loading docks and even building cracks all increase turnover of air and potential building cooling and heating demands. Identifying and fixing such issues is a practical and ongoing task.

**Websters Group are able to periodically rent (once per year) a thermal camera so you can self-assess for free as part of an Energy Efficiency Partnership (EEP).**

## Pump Design Review

Pumps used in water circulation in HVAC systems are generally replaced like-for-like at end of life. Maintaining an asset register and identifying more efficient pump models before replacement is a proactive approach to increasing efficiency. Reviewing and maintaining this schedule assists in having the right documentation ready for when budget or funding is available.

If you do require funding for such upgrades, consider an Energy Efficiency Partnership (EEP) agreement. Websters Group can assist through an EPIC implementation model (Engineering, Procurement, Installation and Commissioning) with engineering and infrastructure funded by Websters Group using delivered savings of the upgrades themselves as repayment (at our risk).



### Throttling Pumps

Throttling of oversized pumps can consume a significant amount of energy. Removing or opening the valve and installing a variable speed drive can assist in dramatically reducing costs and increasing the life of pumping equipment.



### Fans

Energy savings from installation of variable speed drives and adjustment of damper controls in air handling units can be significant. Commissioning new flow rates, reviewing unused ductwork and unnecessary restrictions can all improve system efficiency.

Significant savings are available through managing fans. Keep in mind that 100 kg of air is significantly more expensive to move than 100 kg of water.

## Afterhours Set Point

Adjust afterhours set points within storage rooms or general areas. The set point may be too low, especially if there is less infiltration, door opening and general access within afterhours periods.



### Office Areas (Split System HVAC Units)

Handheld controllers for split system air conditioners are available with programmable locked set points. These can also include a placebo effect whereby the stated set point on the controller displays 18 degrees, for example, although the rooms are actually 20 degrees. This can result in reduced wear and tear on HVAC systems and significant cost savings long term.

Perspex tamper-proof covers are also available for wall-mounted controllers. Having a small hole in the front of a locked Perspex box allows for the unit to be turned on / off only, so temperature settings and not tampered with.

Websters Group can provide sample models of these options should a client be interested in reviewing this opportunity.



## Cooling Towers

Within a well-maintained cooling tower, the following ratios apply—Evaporation (88%): Drift and Splash (7%): Bleed: (5%).<sup>2</sup> Maintaining cycles of concentration is not only important for legionella control and associated compliance but also water conservation and associated costs. Setting up sub-water metering of inlet and outlet lines with smart metering attached is justified in this case from a savings perspective.

Websters Group can provide cost-effective rental smart water metering to review this exact issue.

<sup>2</sup> Guide to Best Practice Maintenance & Operation of HVAC Systems for Energy Efficiency. Jan 2012. Accessed online at <https://tinyurl.com/y5h7vqwb>



## Measurement and Verification (M&V) of Savings

Smart metering is a useful tool when Measurement and Verification (M&V) is required to benchmark annual performance and continuous improvement targets.

The key is to define the level of complexity required relative to the monitoring cost itself (installation plus ongoing monthly communication costs and further maintenance). While monitoring each circuit in each distribution board may be costly, 20–30% of major circuits may add value when monitored. Identifying major users through use of distribution board schedules could assist in identifying what to monitor and, more importantly, what not to monitor.

## Available Data

The simplest way to gather detailed data is to utilise commonly available 30-minute interval data associated with main energy meter(s). In most instances a utility smart meter is already installed to monitor the main meter for billing purposes. Simply reviewing consumption data associated with this meter is in most cases free.

For a more detailed review, Websters Group are able to provide rental smart meters to monitor distribution boards and individual circuits with high energy loads.

## Rental Units

If you have gathered currently available main meter data, identified 10 to 15 major users through review of distribution board schedules, **why not rent a portable smart meter as the next step?**

This can be an alternative to a \$35,000–\$50,000 smart metering system monitoring multiple circuits.

Renting a portable smart meter assists in that you can rotate the unit between key circuits over several weeks. Quite often this is all that is needed to identify the majority of savings on site without the significant cost associated with a permanent installation.

## Smart Water Metering

Smart metering also applies to water use within production facilities. The cost of installing a 25mm–50mm water meter that is smart meter enabled can be very cheap per monitoring point (\$800 including labour).

Creating a network of 10 to 15 sub-meters to measure potable water usage can greatly assist in benchmarking, preventative maintenance, and project measurement and verification (M&V) for industrial water efficiency upgrades.

If sub-meters are pulse enabled, it is possible to keep costs low and rotate one smart water meter between each sub-meter for periods when needed as opposed to building a permanent network.

**Websters Group maintain a fleet of rental smart water meters at a very cost-effective rental price per week.**

## Afterhours Usage

An argument for smart metering can be monitoring shutdown procedures for large equipment.

An alternative monitoring strategy could also be installing a simple energy meter within the distribution board for the specific circuit, with inbuilt time of use metering.

Some simple calculations and the correct time of use metering can assist in observing out-of-hours practices for a fraction of the cost compared to smart metering. Websters Group can assist in the selection and installation of simple metering to achieve these outcomes.

# Water Leakage Detection



## Overnight Flow Rate Check

Before purchasing a smart water meter, spot check the main meter(s) to identify if leakage is suspected. Attempt to review a period from 7:00 p.m. to 5:00 a.m. (10 hours) and divide consumption over that period to find an approximate flow rate per minute. If there is no production within this timeframe this may be a suitable check by itself.

Within 24-hour production facilities, use Easter or Christmas periods when shutdown occurs to review water meters as part of routine maintenance procedures.

Consider rental of a smart water meter given this can observe continual water usage 24 hours a day. Within one week this will typically identify if leakage is present given the data resolution available.



## Main Meter

Most new utility meters produce a magnetic 'pulse' every 1, 10 or 1000 litres. These 'pulse enabled' meters are able to connect to rental smart water meters through use of various types of probes.



### Elster Meter

Pulse probe attached to dial face

Upfront Probe Cost: \$150–\$200 installed

Smart Meter Cost: \$3800 upfront + \$30 month

#### Smart Meter Rental:

**\$250 per week—probe(s) included**



### ARAD Meter

Brass ring removed and dial face replaced

Upfront Probe Cost: \$200–\$250 installed

Smart Meter Cost: \$3800 upfront + \$30 month

#### Smart Meter Rental:

**\$250 per week—probe(s) included**



# Measurement and Verification (M&V)

Once you have gathered a list of priority energy efficiency projects it is important to understand how to measure delivered savings accurately. Accounting of energy savings financially after an upgrade is as important as design and engineering of the upgrades themselves.

A simple analogy can be seen in the proverb ‘What is the sound of a tree falling in the woods if no one is there to hear it’. Converting this analogy to a measurement and verification strategy means sub-metering, reviewing billing and creating an understanding of how ‘success’ is measured.

Sub-meters can be installed within distribution boards for upgrades associated with specific circuits. This can provide a simple before-and-after benchmark, at a cost of less than \$500 for many single or three-phase applications. Sub-metering of water can also be cost effective with 25mm–40mm meters costing less than \$800 installed for priority areas of high-water usage.

**Best practice specifies that at least 2–3% of an efficiency projects budget is invested in M&V.**

M&V is included within every Energy Efficiency Partnership (EEP) agreement Websters Group provides funding for.



Energy efficiency need not be overly complex. By understanding annual costs, obtaining the cheapest rate and negotiating the correct tariffs many no-cost savings are often identified.

Understanding areas of highest use within the facility and then using this guide to investigate two to three priority measures often reveals quick wins that pay for themselves.

If you have trouble allocating capital or funding projects with a payback of less than five years, Websters Group can provide funding and even guarantees of savings performance on a case-by-case basis.

This means the financial risk of the project can be absorbed by our company (not the client) through our signature **Energy Efficiency Partnership (EEP)** offering. Here we fund projects and use delivered savings as equipment repayment.

Why pay hundreds of thousands of dollars in energy costs, when for the same price **guaranteed** you can use energy cost savings to pay for valuable upgrades instead with \$0 upfront (at our expense and risk)

At a glance:

- \$250,000–\$1.5M in long-term energy, water and gas cost savings
- Websters Group fully fund equipment upgrades
- \$0 upfront options, with energy and water savings as repayment
- We guarantee performance of trusted third-party suppliers, using energy and water cost savings as repayment
- **Guaranteed not to cost more than business-as-usual energy costs (energy savings as repayment only, at our risk)**

See the funding section on our website for more information

[www.webstersgroup.com.au/funding](http://www.webstersgroup.com.au/funding)



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