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| Gas Efficiency and Substitution Solutions for Business |
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Energy is a significant cost for many businesses regardless of size or industry and for those that use natural gas the environmental impacts and price volatility of this fuel may be leaving many looking for alternatives.

Gas is commonly used for heating – heating space (like in an office building) or heating water for domestic or industrial processes. Natural gas can be consumed from reticulated mains (i.e. networks of pipes) or in the form of LPG stored in tanks.

Natural gas was once considered a lower emission, efficient and cheap form of energy but unlike electricity it cannot currently be readily created renewably at scale (although in the future, hydrogen and biomethane are likely to present renewable alternatives). In its current fossil-based form, natural gas results in the emission of greenhouse gases when used. In addition, scarcity of supply and world events are leading to price volatility. If your business is looking to secure its energy supply, reduce costs now and into the future or cut your greenhouse gas emissions, gas efficiency and/or substitution technologies are a great place to start.

## What is gas efficiency?

Gas efficiency means continuing to use gas, but either:

* reducing the amount of gas you use, whilst maintaining or increasing your output, or
* increasing your output, whilst maintaining or reducing the amount of gas you use.

Gas efficiency projects can include things like boiler upgrades, updating/refining controls and thermostats, improving insulation, replacing large or inefficient equipment (like heaters) with smaller, more efficient alternatives.

Many gas efficiency projects can pay for themselves within a relatively short period of time (e.g. less than three years). Routine maintenance (such as leak detection and repair) can also improve gas efficiency.

## What is gas substitution?

Gas substitution is the removal of equipment and processes that consume natural gas and replace it with alternatives. It can include:

* Electrification – that is replacing equipment that uses gas, with equipment that uses electricity. This can be done with heaters and hot water units for example. Some of this electricity equipment is much higher efficiency than the existing gas equipment – meaning both efficiency and substitution is achieved.
* Gas alternatives such as biogas or other biofuel, or hydrogen.

Gas substitution projects present the best value for money when they are undertaken at the end-of-life of the existing gas equipment. This is because items like boilers and hot water heaters can have high capital costs. Installing a new electric unit instead of a new gas unit, may have higher capital costs, but if done close to when replacement is due, the upgrade can pay for itself over a short timeframe.

Gas efficiency and substitution projects require planning and detailed design. If designed well, they can achieve strong investment returns and can also demonstrate a strong organisational commitment to reducing greenhouse gas emissions, energy costs and innovation.

## What can your business do?

| **Where are you and where do you want to be?** | **What you can do** | **Example** |
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| We don’t use any gas | Great! Although gas has been seen as a cheap and efficient fuel in the past, costs have and will continue to increase. Gas is also a less preferable fuel than electricity as gas cannot currently be ‘renewably’ sourced and therefore the associated greenhouse emissions cannot be avoided.Avoid installing gas equipment in the future. Although electrical equipment may have greater upfront costs, you are likely to save more money over the lifespan of the equipment. |  |
| We use gas but we’re not sure what we can do to reduce our use or implement alternatives | It sounds like you need an energy audit! Energy audits involve a systematic review of your energy use, equipment and business operations to identify where and how energy is being used and how it can be reduced.Energy audits can be beneficial to businesses of any size in any sector. Energy audits are rated from level 1 to level 3. A level 1 audit is cheaper but less accurate. A level 1 audit would be more suited to smaller businesses that consume less energy. A level 2 energy audit is suitable for most businesses and will provide you a moderately detailed list of initiatives to be implemented to save energy.A level 3 energy audit is very detailed and more expensive. This level of audit would be best suited to large businesses and energy users.You can find a list of energy auditors [here](https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/in-a-business/find-an-energy-auditor). Start by calling some auditors in your area to identify how they can help you. If you engage an energy auditor be sure to specify that you want:* both gas and electricity included in the assessment
* gas substitution opportunities considered, and
* a list of costed initiatives that you can implement to reduce energy use.
 | **Case Study: Commercial Office Buildings**As part of the Victorian Government’s Business Recovery Energy Efficiency Fund (BREEF), a number of commercial office buildings were provided grants to complete Level 2 Energy Audits. These audits typically cost less than $10,000 and all identified substantial energy (gas and electricity) and financial savings.For the short-term measures identified, financial savings ranged from $30,000 per year to over $100,000, with the combined payback period for each site typically less than three years.Common short-term gas projects identified at the sites included upgrades to hot water, lighting, heating and cooling controls.**Case Study: Greenham Gippsland**Greenham Gippsland is a meat processor located in Gippsland, and in 2021 they received a grant from the Victorian Government under the BREEF.The grant funded the completion of an energy audit and development of an Energy Management System for the site. The audit identified a range of initiatives that combined would save the business 30% on their energy (gas and electricity) costs.Gas saving initiatives identified included boiler upgrades (economiser and exhaust gas analyser) and heat recovery projects – all which had a payback period of less than three years. |
| We’re building a new site / extending the existing one | When you are building a new site, expanding an existing one or introducing a new process, you have the opportunity to incorporate best practice energy management into your design. You may be able to save money by:* Not connecting / extending gas to the new site. This could save you in construction costs, but also ongoing by avoiding high gas energy costs and supply charges
* Choosing efficient electrical equipment over gas – these may be more expensive upfront, but will save you money over their lifetime due to their higher efficiency
* Installing solar, and potentially a battery, at construction will reduce your electricity use from the grid and further help to offset costs associated with the use of electrical equipment
* If your site produces significant organic waste, biogas generated from this waste may be a viable option
* Choose energy efficient equipment (electric or gas) – again, these may have higher upfront costs, but it will save you money on energy bills over time
* If you have to use gas equipment, consider if there are ways you could make it ‘hydrogen ready’
* Regardless of whether you are purchasing gas or electrical equipment, choose the smallest size that meets your needs. If you want to ‘plan for expansion’ consider if there are ‘modular’ options that allow you to expand as required.
* If you are using gas for space heating, make sure you consider insulation, draught sealing and options for zoning to minimise the gas you do use.
 | **Case Study: Fulton Hogan**Fulton Hogan is a major Australian construction company with over 7,000 employees. With a commitment to improving sustainability performance, Fulton Hogan identified an opportunity to increase the number of recycled materials used in their asphalt production by installing a specially designed Reclaimed Asphalt Pavement (RAP) Warming Dryer Drum.To improve the sustainability outcomes of this project, Fulton Hogan determined that for every 1% increase in aggregate moisture content, a 9% increase in gas use would result.To reduce the moisture content and gas use, the project scope was expanded with funding from the BREEF to roof the site’s aggregate bays and keep the feedstock dry.The project has not only improved efficiency but enabled Fulton Hogan to supply a more sustainable product to their local customers. |
| Our gas equipment is not at the end of its life cycle, so we are not able to move away from gas | If you are ‘locked into’ existing gas equipment due to long lifetimes and high capital costs, energy efficiency may be the most effective way for you to adapt to higher gas prices.Some common gas efficiency projects for businesses include:* Upgrades to existing boilers, heating and cooling equipment – this may include adjusting controls (e.g. timing, temperature) or installing economisers
* Replacing large or inefficient equipment, with smaller, efficient equipment (although when replacing equipment consider if electrification is an option)
* Installing heat recovery units in industrial processes
* Improving insulation either of a building or hot water equipment/pipework.

In addition to the above, start planning now for the consideration of electric alternatives in your business case for the next replacement project. For example, if your boiler is due to be replaced three to five years from now, consider updating your asset management plan to allow for consideration of an electric unit. | **Case Study: Burra Foods**Burra Foods is a dairy processor located in Korumburra in South Gippsland. Burra had a level 2 energy audit completed in 2018 that found gas accounts for over 80% of the site’s energy use and identified a number of energy saving initiatives.The audit found that the three on-site steam boilers were operating at full capacity, but inefficiently. To address this, Burra delivered a project partly funded by the BREEF. The project involved several mechanical, metering and control upgrades to improve boiler efficiency that contributed to a nearly 10% improvement in gas use per tonne of product. |
| Our major gas equipment is nearing end of life | If your gas equipment (boilers, heaters, hot water units) are approaching the end of their life and are due for replacement now is the ideal time to consider electrification.You will need to approach an appropriate and reputable consultant or contractor to discuss your needs and identify electrification options. If your usual contractor doesn’t have something on offer – ask around, it could save you money in the long run.You (and whoever your partner with) will need to:* Identify equipment that suits your needs (for both gas and electric options)
* Complete detailed design if required
* Estimate the capital and operational costs for both the new gas and electric options
* Develop a business case comparing the costs and benefits of electrification against a “like for like” gas replacement.
 | **Case Study: Monash University**Monash University is committed to achieving net zero emissions by 2030. A key pillar of their strategy to do this is to eliminate their reliance on natural gas by electrifying all thermal energy sources.In 2022, Monash University completed a project to electrify existing end of life natural gas boilers used to provide domestic hot water to three buildings at their Clayton Campus and one building at their Frankston Campus. The boilers were replaced with high efficiency heat pump technology.For the selected hot water services, the project has reduced energy and maintenance costs by nearly half and achieved a 100% reduction in greenhouse gas emissions (Monash purchases 100% GreenPower).Based on the feasibility of hot water pumps for domestic hot water in commercial buildings, Monash University is progressing with further upgrades.**Case Study: St. John of God, Ballarat**St. John of God (SJOG) Ballarat is a regional private hospital with nearly 200 beds providing a range of medical services. SJOG recognised that the two, 43-year-old, 2,500 kW steam boilers were approaching their end of life and no longer adequately or efficiently met the hospital’s needs.With funding from the BREEF, SJOG replaced these boilers with two, 400 kW steam boilers. Additionally, the project saw the hospital replace the existing energy inefficient ovens with a number of smaller units.The new boilers and ovens are better suited to the site’s needs and allow usage to be scaled to match demand. The project is estimated to have saved approximately 13 MWh/year in electricity use and 10 TJ/year of gas resulting in financial savings of over $130,000/year. |
| We want to be leaders in energy management and climate change | If your organisation is committed to demonstrating leadership in climate change and innovation, then opportunities to transition away from gas provide a big opportunity.An approach you could take (if you haven’t already) is to develop a strategy to decarbonise your energy use – this means reducing all energy use (electricity, gas, transport fuels), moving away from gas where possible, adopting flexible demand, generating your own power and more.To demonstrate leadership, your organisation will need to proactively identify and implement opportunities to reduce energy use and move away from gas. | **Case Study: Bega Cheese Limited**In 2021, before the acquisition of Bega Dairy and Drinks, Bega Cheese produced their first Energy Productivity & Emissions Reduction Roadmap with support from the Victorian Government’s Business Recovery Energy Efficiency Fund (BREEF).Bega took a top-down approach by: * Reviewing what needs to be done to avoid the most significant impacts of climate change and setting greenhouse gas reduction targets for scope 1 and 2 as:
	+ 50% reduction in emissions intensity by 2030
	+ 40% reduction in absolute emissions by 2030, and
	+ Net Zero emissions by 2050
* And identifying initiatives that could be implemented by Bega to reach these targets.

In relation to gas use, the roadmap identified 18 energy efficiency initiatives across four Victorian sites that combined could save over 180 TJ of gas each year and over $1 million in energy costs, with an overall payback period of 3.7 years.Bega also identified electrification of hot water as an effective mechanism to reduce emissions for process heating. Bega identified one site to trial the electrification of hot water heating and if implemented, this could be used as proof of technology for further roll out to other sites.Other gas initiatives identified include commencement of detailed designs for projects to align with end-of-life refrigeration system replacement.**Case Study: Furphy Foundry**Located in Shepparton, Furphy Foundry is a regional manufacturer with a commitment to sustainability. Demonstrating this commitment, Furphy Foundry installed a 110 kW solar system on site, and with funding from the BREEF replaced their gas furnace with an electric unit.The installation of the electric furnace has eliminated the use of gas at the site, with all energy now coming from renewable sources.The project has eliminated 1 TJ/year in gas and improved manufacturing efficiency cutting operational costs. The new equipment also provides a safer and more comfortable work environment for staff. |