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hygiene, cosmetic, personal care and specialty products

Accord Members' Electrification Handbook

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Electrification Handbook – Overview

This handbook provides practical guidance to support manufacturers in assessing, planning and implementing the electrification of process heat. It is designed to help businesses navigate the transition away from fossil fuel-based systems toward low-emissions alternatives, in line with decarbonisation objectives and evolving energy markets.

The document outlines how thermal energy is used across common manufacturing processes and explains how key factors—such as temperature requirements and heat purpose—shape the selection of suitable electrification technologies. It highlights commercially available solutions, including heat pumps, electrode boilers and electric thermal energy storage, and identifies where each is most applicable.

In addition, the handbook addresses common challenges such as capital costs, site constraints and energy supply considerations, while pointing to potential enablers including policy support, financing mechanisms and operational benefits.

Overall, it serves as a decision-support tool, equipping manufacturers with the insights needed to evaluate opportunities, reduce emissions and make informed investment decisions in industrial electrification.

Ultimately, the key message is that electrification is a journey rather than a single step change. While long-term transformation may require significant planning, progress often begins with incremental decisions. In many cases, the most important step is simply getting started: electrification can begin with the next equipment purchase or upgrade, setting the foundation for broader transition over time.

Section A: The Sector at a Glance

For Accord Australasia members, the shift toward electrification is shaped by a combination of push and pull forces across operational, technical and commercial dimensions. A range of barriers can slow adoption, while at the same time several strong drivers are increasing momentum toward low-emissions alternatives across the sector.

Barriers to Electrification

This section outlines the key factors that can limit or slow electrification, including cost pressures, internal capability and electrical capacity constraints, process complexity, data limitations, and uncertainty associated with changing from established operating practices. It also highlights practical strategies to help address these challenges.

Drivers for Electrification

This section explores the main enablers accelerating electrification, including decarbonisation commitments, potential cost savings, government incentives, available electrical capacity and evolving customer and market expectations. These drivers are helping strengthen the business case and increase adoption across the sector.

**Numbers for comparison only*

Introduction

Australia's hygiene, cosmetic, personal care and specialty products sector—represented by Accord Australasia—plays a critical role in the everyday life of households and business. Its members manufacture and supply products across the cosmetics, personal care, home care, and commercial, industrial and institutional cleaning, hygiene and specialty formulation sectors, operating across a diverse base of small, medium and large-scale facilities.

These manufacturing activities can be energy-intensive, relying on a range of thermal and electrical processes to produce consistent, high-quality products. Common operations such as mixing, heating, drying and packaging all require reliable and precisely controlled energy inputs, particularly for chemical formulation and production processes.

Like much of the manufacturing sector, Accord members currently rely heavily on fossil fuels, particularly natural gas, to provide process heat and support certain chemical transformations. This reliance reflects both the technical requirements of production (e.g., controlled heating, high temperatures and continuous or batch processing) and the historical availability of low-cost gas infrastructure.

As Australia transitions toward a lower-emissions economy, this dependence on fossil fuels presents both a challenge and an opportunity. Electrification (replacing fossil fuel-based systems with electric alternatives such as heat pumps, electrode boilers and electric thermal energy storage (eTES)) offers a pathway to reduce emissions while maintaining product performance and quality. However, for many Accord members, particularly small and medium-sized manufacturers, the shift will require careful consideration of technical feasibility and financial viability.

Against this backdrop, understanding what will enable or hinder this transition is critical. A range of interrelated barriers, including capital constraints, infrastructure limitations and operational risks, may slow the uptake of electrification. At the same time, emerging drivers such as commitments, rising energy costs and policy incentives have the potential to accelerate change. The following section examines these key barriers and drivers in detail, highlighting the factors most likely to influence the pace and scale of electrification across the sector.

So, what's holding electrification back – and what's pushing it forward? The next section breaks down the key barriers and drivers shaping uptake across the sector.

Industry Electrification Barriers & Drivers

For Accord members, the transition to electrified processes is influenced by a range of operational, financial and technical considerations. Given the sector's diversity and the need to maintain product quality and safety, uptake will vary across facilities. This section outlines the key barriers that may limit electrification and how to address them, alongside the main drivers that could support and accelerate adoption.

ELECTRIFICATION BARRIERS

COSTS

High upfront costs and, in some cases, higher operating costs can make electrification difficult to justify.

HOW TO MANAGE

- Focus on whole-of-life costs
- First improve energy use efficiency
- Stage investments
- Use grants, incentives, or financing to assist
- Consider lower operating cost technologies (e.g., heat pumps)

OUTCOME

Stronger business cases & better long-term cost performance

INITIAL CAPACITY

Internal capability and site electrical capacity can delay even small projects.

HOW TO MANAGE

- Right people, right experience
- Bring in external specialists
- Assess electrical capacity early
- Engage network providers up-front

OUTCOME

Quick eligibility assessment & faster project delivery

DATA LIMITATIONS

Poor or incomplete data limits the ability to assess loads, identify opportunities and build robust business cases.

HOW TO MANAGE

- Map energy & material flows
- Install targeted sub-metering (key processes, electrical loads, waste heat, etc.)
- Capture accurate, condition-based energy data

OUTCOME

Better understanding of energy flows, lowers risk & enables evidence-based decisions

ELECTRIFICATION BARRIERS

PROCESS COMPLEXITIES

Process & site constraints can make electrification harder to implement.

HOW TO MANAGE

- Map processes to understand requirements and remove ambiguity
- Target partial or staged electrification
- Use thermal storage for batch processes
- Engage specialists early

OUTCOME

Target electrification options that will have a high operating efficiency

BAU PRACTICES & UNCERTAINTY

Reliance on proven practices can slow progress.

HOW TO MANAGE

- Develop clear roadmaps and targets
- Initially focus on low-risk projects
- Learn from peers and case studies
- Align leadership and strategy early
- Start with pilots and document the learnings

OUTCOME

Gradual, manageable transition to grow momentum

ELECTRIFICATION DRIVERS

DECARBONISATION COMMITMENTS

Clear, leadership-backed decarbonisation commitments drive electrification by making it a priority.

HOW TO USE

- Integrate electrification into procurement
- Set clear targets & staff KPIs
- Visible leadership support
- Track and report progress

OUTCOME

Increased motivation and capability with measurable progress

ELECTRIFICATION DRIVERS

COST SAVINGS

Electrification can reduce costs beyond fuel switching through higher efficiency, lower maintenance and simpler operations.

HOW TO USE

- Include whole-of-life costs in business cases
- Target high-efficiency technology
- Use load shifting
- Streamline operations and reduce fuel logistics

OUTCOME

Lower total cost of ownership with simpler systems

GOVERNMENT INCENTIVES & SUPPORT

Government funding can accelerate electrification by reducing costs.

HOW TO USE

- Identify eligible state and federal programs
- Include incentives in early business cases
- Have opportunities ready for grant submission
- Track funding opportunities

OUTCOME

Lower upfront costs with improved financial metrics and lower financial risk; helps to accelerate progress

AVAILABLE ELECTRICAL CAPACITY

Existing spare electrical capacity enables faster, lower-cost electrification.

HOW TO USE

- Assess current electrical capacity
- Prioritise projects that fit within existing electrical constraints
- Combine with efficiency measures to reduce demand
- Use load shifting

OUTCOME

Faster, cheaper project delivery, allowing a more streamlined path to electrification

MARKET POSITIONING & CUSTOMER EXPECTATIONS

Emissions reductions are increasingly expected.

HOW TO USE

- Align with sustainability requirements
- Embed emissions reduction in brand strategy
- Use progress in tenders and evaluations

OUTCOME

Enhanced reputation & better alignment with investor expectations

Section B: Electrification Technology Pathways

This section explores the following topics:

- Getting Started with Electrification
- Is Electrification Right for You?
- A Key Misconception
- Electrification Sequence
- Heat Recovery: Stop Paying Twice for Heat
- Hygiene, Cosmetic, Personal Care and Specialty Products Manufacturing Thermal Requirements
- Industry Electrification Technologies
- Case Studies: Heat Pump Adoption in Australian Industry

Getting Started with Electrification

Electrification is picking up pace with the global transition to a low carbon economy, and sites that aren't prepared risk being left behind as technology and funding opportunities move quickly. The best place to start is simple: understand how your site uses energy and identify the next step you need to take. That means improving metering, identifying where and when heat is used across your processes and conducting feasibility studies.

These steps don't need to be complex, but they are important. Many grants are available to support early planning—and when larger implementation funding becomes available, it often requires this groundwork to already be done. Additionally, small moves in the energy markets may shift the balance towards electrification becoming a "no brainer" for certain processes. If you're not prepared you may be left paying high gas bills for longer than needed.

The key message is simple: just start. Build a clear picture of your energy use now so you're ready to act when the right opportunity comes.

Is Electrification Right for You?

Electrification can significantly reduce operating costs and emissions in manufacturing, but suitability depends on a few key technical factors. Before assessing specific technologies, start by considering the following questions.

What are the thermal requirements of your processes?

Key Considerations:

- Temperature requirements (low / medium / high)
- Heat purpose (drying, space heating, melting, reactions, etc.)

These factors determine suitable technologies:

- Low-temp (<90°C): Heat Pumps (e.g., space heating, low-temperature washing/drying)
- Medium-temp (<250°C): Electrode Boilers, eTES (e.g., process heating, moderate drying, reactions)
- High-temp (250+°C): eTES or other (e.g., drying, high-temperature reactions, kilns)

What electrical capacity and infrastructure is available at your site?

Electrification depends on whether your site can support the additional electrical load. Assess:

- Grid connection capacity
- Internal electrical distribution
- Feasibility/timeline of upgrades

Often the constraint is not the technology, but available electrical supply.

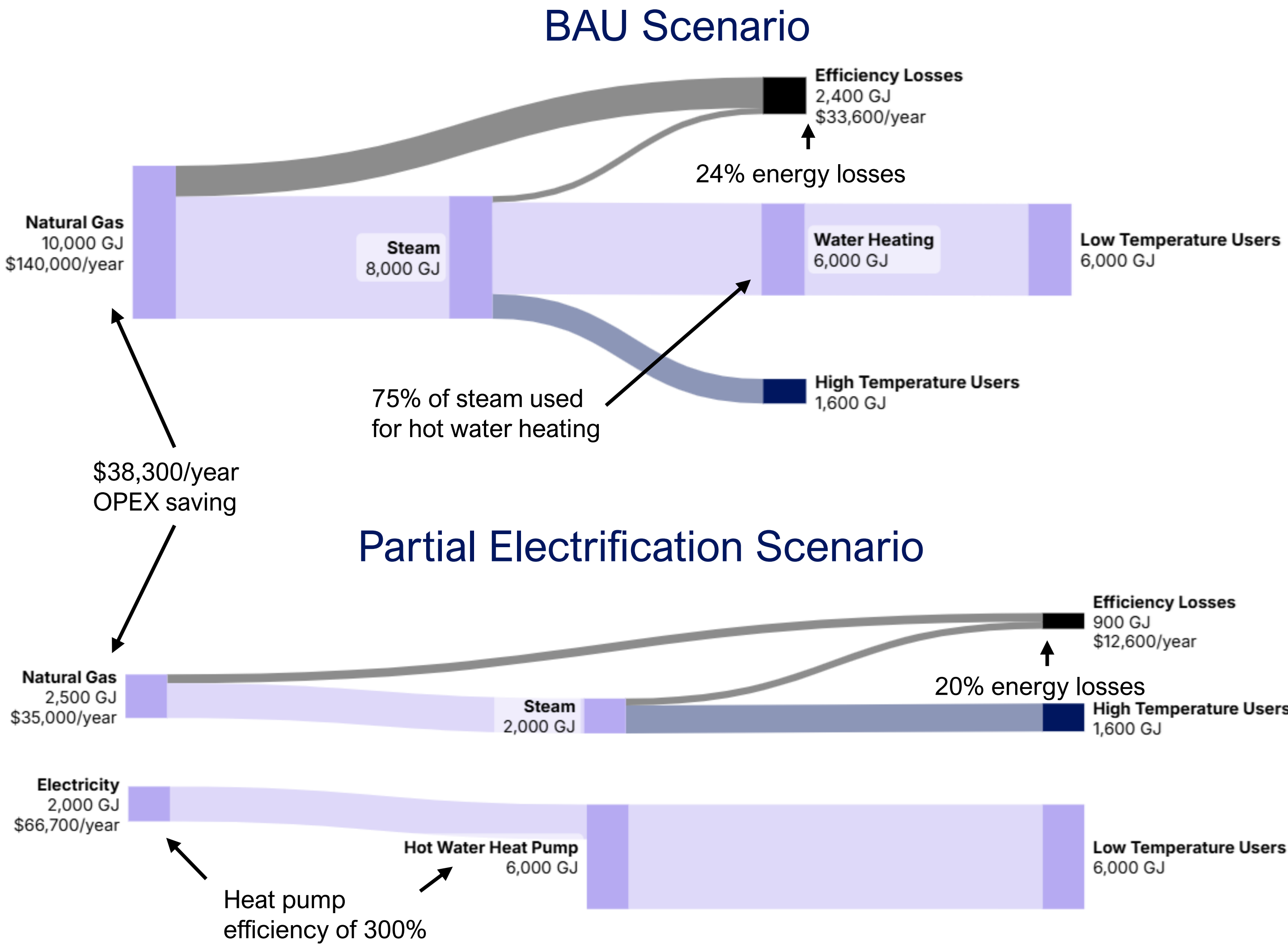
A Key Misconception

When assessing electrification options, focus on the **final** heat requirement, not the existing heat system. Many sites default to thinking in terms of steam or other intermediaries, which can hide what is actually needed. A common example is rejecting heat pumps as viable because "we use steam", when in reality most of that steam could be for generating hot water.

The key question is not how heat is currently delivered, but what temperature and function is ultimately required.

Where steam is genuinely required for specific uses (such as sterilisation, direct injection, or certain process reactions), that does not rule out electrification. It usually just means retaining a much smaller, purpose-built electrode boiler (or other technology) to meet those niche demands, while the bulk of the heat load is shifted to more efficient electric technologies.

Below are simplified energy flows delivering the same heat outcomes in a 'Business as Usual' (BAU) and in an electrified scenario. The end processes use direct steam (25%) and hot water (75%). The electrified scenario uses estimated wholesale natural gas and electricity costs.



Electrification Sequence

For Accord members, electrification should be approached as a clear sequence of actions, rather than a one-step technology swap. Following this electrification sequence ensures that investments are targeted to be the most efficient and return the shortest paybacks.

1

ENGAGE THE RIGHT PEOPLE

Align critical team members across operations, engineering, finance and leadership to establish the business's goals and strategies around electrification. Establishing this buy-in early and across all functions of the business is essential when implementing electrification opportunities. Many projects can fall over because only one function within the business has bought into electrification as a concept.

2

MEASURE AND BENCHMARK

Conduct an energy and mass balance to understand where and how energy is used. This could be integrated with a broader site energy audit that will simultaneously identify opportunities for energy efficiency.

This work should identify opportunities for electrification. These areas should then be assessed for appropriate metering, and a plan set in place to fill any gaps.

Metering is important to enable benchmarking, future feasibility studies, business case development and potential certificate generation in the future. Without this data, decision-makers often flag electrification projects as too high-risk.

3

APPLY THE MITIGATION HIERARCHY

Your business should apply the mitigation hierarchy before spending significant time on exploring electrification options. Doing so will set you up for success. If you only electrify useful heat, you will lower CAPEX and the electrical infrastructure required to support the investment, increasing the overall feasibility of the opportunity.

Avoid – Eliminate unnecessary energy use through process optimisation.

Reduce – Improve efficiency by upgrading equipment, reducing losses through insulation and recovering waste heat streams (see next page for further information).

Electrify/Fuel Switch – With all losses reduced as far as reasonable, now explore transitional technologies such as electric alternatives.

Heat Recovery – Stop Paying Twice for Heat

Many industrial processes—especially batch operations—follow a familiar pattern:

Heat → Hold → Cool → Clean (with hot water)

That sequence hides a major inefficiency: you're often throwing away heat, then buying it back again minutes later.

The Opportunity

When hot product or equipment is cooled, valuable thermal energy that you've paid for is rejected—typically to water, air, or refrigeration systems. Shortly after, the same process often demands heat again (e.g., for hot wash cycles or the next batch start-up). Heat recovery captures that "waste" heat and reuses it on-site.

Where It Shows Up

- Cooling hot product after reaction or blending
- Chilling vessels before discharge or packaging
- Cleaning-in-place (CIP) with hot water or caustic
- Tank and line pre-heating for the next batch

These steps often occur within the same asset, same shift, or same plant area – making them ideal for heat recovery.

What Good Heat Recovery Looks Like

- Recover heat from cooling streams (product, jackets, condensers)
- Store or directly transfer that heat to:
    - CIP water heating
    - Incoming product pre-heat
    - Boiler feedwater preheating
    - The next batch
- Match timing and temperature levels wherever possible
- Even partial recovery can deliver strong returns

Why It Matters for Electrification

Electrification (e.g., heat pumps, electrode boilers, resistive heating) works best when demand is minimised and stabilised.

Heat recovery provides the following benefits to an electrification project:

✓ Cuts total energy demand (often 10–40% in batch processes)

✓ Reduces peak electrical load, lowering infrastructure costs

✓ Improves heat pump efficiency by upgrading low-grade waste heat

✓ Shrinks operating costs and emissions simultaneously

Hygiene, Cosmetic, Personal Care and Specialty Products Manufacturing Thermal Requirements

Many hygiene, cosmetic, personal care and specialty product manufacturing processes rely on thermal energy for critical functions such as heating, cleaning, drying and formulation. This creates demand for hot water, steam, thermal oil, or direct heating across a wide range of processes. However, the nature and intensity of these thermal requirements can vary significantly between subsectors. Based on these differences, Accord Members' three manufacturing categories can be used to group typical thermal loads and identify where electrification technologies are most readily applied. The following section summarises these three categories, their typical thermal requirements, and outlines the key considerations for electrification within each.

RAW CHEMICAL & INGREDIENT MANUFACTURING

Surfactants, solvents, fragrances, polymers, specialty chemical ingredients, etc.

This subsector underpins a wide range of downstream industries, producing both commodity and high-value specialty chemicals. Operations are typically energy-intensive and highly sensitive to process conditions, with thermal energy playing a central role in reaction control, separation and product finishing. Facilities range from small, flexible batch plants to large, continuous processing sites.

Thermal Profile:

Thermal demand spans a broad temperature range and varies significantly by product and process stage. Typical examples include:

- Low temperature (40–90°C): Blending, dissolution, pre-heating of feedstocks, tank heating, CIP, etc.
- Medium temperature (100–250°C): Evaporation, distillation (light fractions), concentration, drying, etc.
- High temperature (300°C+): Chemical synthesis, cracking, high-temperature distillation, thermal reactions, etc.

Key System Characteristics:

- Typically steam or thermal oil systems
- Mix of batch, semi-batch and continuous operations
- Generally stable baseload with batch-driven peaks
- Tight temperature control critical for product quality and safety
- Frequent cooling loads from condensers and exothermic processes

Electrification Opportunities:

- Low-temperature processes are well-suited to heat pump integration
- Significant cooling demand can be utilised as a source of waste heat recovery and temperature upgrading
- Process type is important: batch and semi-batch systems enable modular electrification, while continuous processes are often better suited to centralised or system-level solutions

CONSUMER, COSMETIC & PERSONAL CARE PRODUCT MANUFACTURING

Skincare, hair & body care, colour cosmetics, soaps, detergents, perfumes, wet wipes, oral care, sunscreens, etc.

This subsector encompasses the formulation, blending and packaging of a wide range of consumer-facing products, typically produced in relatively small batches with high product differentiation. Facilities are often designed for flexibility rather than continuous throughput, enabling rapid switching between product lines (e.g., fragrances, formulations, or packaging formats). Compared to upstream chemical manufacturing, energy demand is typically lower in intensity but more variable and process-specific, with a strong emphasis on cleanliness, product integrity and compliance with health and safety standards.

Thermal Profile:

Thermal demand sits predominantly in the low–medium temperature range for most typical processes:

- Low temperature (40–90°C): tank heating, melting, temperature conditioning
- Medium temperature (100–150°C): drying, sterilisation, evaporation

Key System Characteristics:

- Mostly batch-based production with frequent changeovers
- Cyclical demand: heating, cooling and cleaning (CIP) phases
- Significant standby and idle periods between production runs
- High requirements for precision, hygiene and temperature control
- Packaging & finishing
    - Includes filling, sealing, labelling, shrink wrapping and secondary packaging processes
    - Localised thermal loads (e.g.. heat sealing, shrink tunnels, hot melt adhesives)

Electrification Notes:

- Strong fit for heat pumps due to relatively low temperature requirements
- Batch nature can enable modular and staged electrification, allowing incremental upgrades with minimal disruption
- Packaging and finishing well-suited to infrared (IR) and radiant electric heating for fast, targeted application
- Opportunity to replace baseload heat with electric systems (e.g., heat pumps for hot water, electrode boilers, etc.), while retaining limited steam capacity where strictly necessary
- Idle periods enable thermal or hot water storage systems to recharge between batches, supporting demand management

COMMERCIAL & INDUSTRIAL CLEANING, HYGIENE & SPECIALTY PRODUCT MANUFACTURING

Industrial cleaners, disinfectants, polishes, deodorisers, building maintenance products, enzyme-based formulations etc.

This subsector focuses on the production of performance-oriented chemical formulations used across commercial, institutional and industrial settings. Products are typically designed for efficacy, stability and regulatory compliance rather than consumer aesthetics, resulting in a wider range of active ingredients and functional additives. Manufacturing is characterised by flexible, multi-purpose plants capable of handling diverse formulations – from simple diluted cleaners to more complex enzyme-based or reactive systems. Compared to consumer product manufacturing, processes may involve slightly higher temperatures or more chemically active steps, though still well below heavy chemical industry requirements.

Thermal Profile:

Thermal demand is typically at low to medium temperatures.

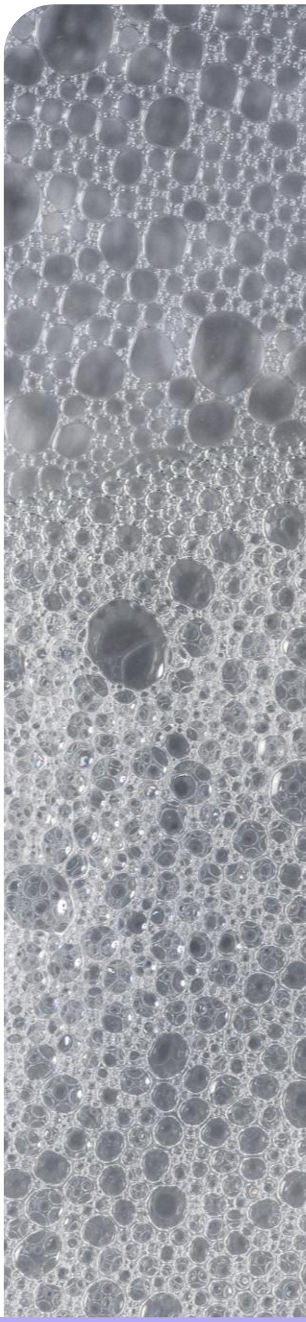
- Low temperature (40–90°C): mixing, dissolution and blending
- Medium temperature (100–180°C): evaporation, concentration, activation of ingredients, or accelerated reaction steps

Key System Characteristics:

- Predominantly batch and semi-continuous production
- Use of reactors, mixing vessels and storage tanks with integrated heating/cooling systems
- High formulation variability and frequent changeovers
- Cyclical operation: heat → react/mix → cool → clean (CIP) cycles, often repeated multiple times per day
- Limited steady baseload operations
- Some formulations (e.g., enzyme-based or bio-active products) require tightly controlled temperature ranges to preserve activity
- CIP and sanitation processes contribute a recurring thermal demand, typically via hot water or low-pressure steam
- Overall low- to medium-grade heat demand, with limited reliance on high-temperature process heat
- Thermal loads are often variable and dependent on formulation type and batch size

Electrification Notes:

- Strong fit for heat pumps due to relatively low temperature requirements
- Batch and semi-continuous production can support modular, staged electrification
- Cyclical demand favours electrified systems and integration with thermal storage due to high efficiency at low output, unlike gas-fired systems
- Opportunity to replace baseload heating while retaining minimal steam systems for use where necessary
- Idle periods enable storage recharge and improved load management



Industry Electrification Technologies

A range of proven electric technologies are available today that can meet most industrial thermal energy requirements, from low-temperature heating through to high-temperature steam and process heat.

Each technology has a specific operating range where it performs most efficiently and most cost-effectively. Understanding these nuances is key to selecting the right solution (or combination of solutions) for your site.

This section provides a high-level overview of the main options:

- **Heat Pumps** – Highly efficient low temperature (<90°C) heat supply by upgrading waste heat or ambient energy
- **Electric Thermal Energy Storage (eTES)** – Stores low-cost electricity as heat for flexible, time-shifted energy use
- **Electrode Boilers** – Direct electric steam generation for rapid response and high-capacity industrial steam demand
- **Infrared (IR) Heating** – Fast, localised radiant heating ideal for drying, curing and packaging processes
- **Mechanical Vapour Recompression (MVR)** – Energy recovery from vapour streams to significantly reduce evaporation energy demand

Each plays a distinct role in an electrified thermal system. In many cases, the best outcomes come from combining multiple technologies.

For site-specific applications or edge cases, engaging a specialist is recommended to ensure optimal design, performance and economics.

Refer to Appendix A for a 'Decision-making Matrix' to assist you in finding the correct technology for your requirements.

Industry Electrification Technologies

HEAT PUMPS

Efficient Heating

Heat pumps don't burn fuel to make heat—they move it. By extracting thermal energy from air, water, or waste streams and upgrading it electrically, they deliver useful industrial heat at a fraction of the energy input of gas. Think of them as a heat amplifier, not a heat generator.

2 – 6x more energy delivered per unit of electricity vs direct heating

<90°C Typical output range – hot water to process

Strengths

- 200 to 600% efficient at converting electrical energy into useful thermal energy
- Cuts energy costs and emissions significantly
- Can recover waste heat that would otherwise be lost

Watch out for

- Deployed technology has a temperature ceiling of ~90°C, limiting applicability for steam processes; new technologies are now achieving up to 120°C, but are not deployed locally
- High upfront capital—payback depends heavily on high run hours
- Performance degrades with very low ambient or source temperatures
- Heat pumps respond slowly, making them ideal for steady base loads or use with thermal storage

Potential Savings Snapshot*

~$89,000/yr
Energy cost savings

>1,000 tCO_2-e
Emissions reduction per year using renewable electricity

**Based on a site using 20,000 GJ of gas per year at $14/GJ switching to a heat pump at $120/MWh electricity. Individual results will vary with site conditions, prices and COP.*

Is a heat pump right for your site?

- Do you have hot water demand at temperatures <90°C?
- Is there spare electrical capacity available on site?
- Are there any waste heat streams, cooling systems, or ambient air available as heat source?
- Is there any excess renewable energy onsite?

When the economics work

- Electricity is cost-competitive vs fossil fuels and thermal efficiency (COP; coefficient of performance) is high
- Where there is a continuous thermal demand as this increases runtime, enabling OPEX savings to overcome high upfront CAPEX
- Continuous operation can be achieved using thermal storage, which also assists with reducing total electricity demand
- With onsite power generation, low-cost power purchase agreements (PPAs), or access to wholesale electricity prices

	Efficiency
Heat Pump (COP 3.5) — *3.5 units of heat per unit electricity*	350%
Gas Boiler — *Combustion losses are unavoidable*	85%
Electrode Boiler — *Efficient but COP is limited to 1*	99%

Industry Electrification Technologies

eTES

Direct Electric Heat

Electric thermal energy storage (eTES) converts surplus or cheap electricity into stored heat—held in various materials with favourable thermal properties—then releases it as steam or thermal oil exactly when the process needs it. It is the bridge between variable renewables and consistent industrial heat.

100–1,000+ °C Widest application & temperature range of electrification technology

90–98% Round-trip efficiency

Strengths

- Decouples electricity use from heat demand, unlocking flexible energy purchasing
- Enables efficient use of intermittent renewables at scale
- Can supply very high temperature heat, which is rare among electrification options
- Can integrate with multiple process heating systems: steam, hot water and thermal oil

Watch out for

- High upfront capital costs
- Heat losses over time require careful design and monitoring
- Large footprint and struggle for economic viability at smaller scales (<2 MW)
- Integration complexity with existing process piping and controls

Where it fits best

- Sites that generate low-cost energy, can access low-cost renewables, or are happy to engage with the wholesale power market
- High-temperature processes that can flex their heat timing
- Sites pairing solar or wind with dispatchable stored heat
- Heat demand that is cyclical, peaky, or varies significantly by time of day

When the economics work

- Using excess renewables and/or electricity wholesale market pricing when below a favourable buy price
- Continuous or long-duration heat demand justifies storage capacity
- Minimal system redesign required to integrate
- Set up for modular expansions

Potential Savings Snapshot*

~$113,000/yr
Energy cost savings

>600 tCO_2-e
Emissions reduced per year when using renewable electricity

**Based on a site using 20,000 GJ of gas per year at $14/GJ switching to eTES purchasing electricity at a strike price of $30/MWh. Individual results will vary with site conditions and prices.*

Electricity to Thermal Storage Pathways

Indirect (electrode boiler + storage)
Electrode boiler produces steam, stored as heat in the eTES medium

Direct (embedded heating elements)
Elements inside eTES storage medium generate and store heat in a single step

Hybrid (eTES + heat pump or gas)
Combines sources for maximum flexibility and reliability

Industry Electrification Technologies

ELECTRODE BOILERS & THERMAL OIL HEATERS

Direct Electric Heat

No combustion, gas lines, or burners. Electrode boilers pass electric current directly through water to generate steam almost instantly. Thermal oil heaters use immersed elements to deliver precise, high-temperature heat in a closed loop. Together they represent the most direct path from electrons to industrial process heat.

~99% Electrical-to-heat conversion efficiency – virtually no energy wasted

Up to 20 bar steam pressure achievable – suitable for most industrial process applications

Up to 350°C thermal oil temperature achievable

Strengths

- Near-instant steam on demand: minutes from cold start
- ~99% electrical-to-heat conversion, meaning almost no energy is wasted
- Compact footprint with minimal infrastructure: no flues, gas trains, or burners
- Ideal renewable balancing tool—absorbs excess renewable in real time

Watch out for

- Operating costs can rise sharply if energy procurement isn't managed
- High electrical demand may require grid upgrades or a dedicated supply connection
- Water quality management is critical
- Less suited to very large-scale, continuous baseload steam

Potential Savings Snapshot*

~$390,000/yr
Energy cost **increase**

>1,000 tCO_2-e
Emissions reduced per year when using renewable electricity

**Based on a site using 20,000 GJ of gas per year at $14/GJ switching to purchasing electricity at $120/MWh. Individual results will vary with site conditions and prices.*

Where it fits best

- Sites with high or variable steam demand, particularly where rapid response matters
- Locations with low-cost, surplus, or wholesale electricity access
- Industrial processes requiring thermal oil for high-temperature indirect heating applications
- Backup or peak-load cover where gas is unavailable or too costly
- Decentralised steam generation close to point of use – reducing distribution losses

When the economics work

The following can be options to help bring energy price parity with gas:

- Excess renewables or wholesale tariffs available—flexibility to shift load to low-cost periods
- Paired with on-site solar, wind, or a battery energy storage system (BESS)
- Steam or thermal oil demand is peaky or highly variable
- Sites with high carbon pricing exposure or emissions constraints, where avoided carbon costs materially improve the operating case versus gas

Similar Options

Electric (resistive) boilers are simple and reliable, but compared to electrode boilers they are slower, less suited to variable large loads and generally have shorter service life due to element wear.

Industry Electrification Technologies

INFRARED & RADIANT HEATING

Direct Electric Heat

Most heating systems warm the air around a product and wait for heat to conduct inward. IR heating skips that entirely – delivering electromagnetic energy directly to the surface of a product at the speed of light. The result is faster, more targeted and more controllable heat with significantly less energy wasted to the surroundings.

150–400+°C Effective surface temperature range

Seconds Startup and shutdown time – ideal for intermittent or on-demand processes

Strengths

- Heat goes directly to the product—not the air—dramatically reducing energy waste
- Near-instant on/off response suits intermittent processes and reduces standby energy
- Uniform surface heating improves product quality—less scorching, more even drying
- Compact, ducting-free design enables point-of-use installation close to the process

Watch out for

- Limited heat penetration—IR heats surfaces, not bulk material; unsuitable for thick products
- Direct heating needs careful process control to prevent burning
- Not suitable for large-volume convective or low-temperature applications

Potential Savings Snapshot*

~$190,000/yr
Energy cost **increase**

>500 tCO_2-e
Emissions reduced per year when not using renewable electricity

**Based on a site using 10,000 GJ of gas per year at $14/GJ switching to IR and purchasing electricity at $120/MWh electricity. Individual results will vary with site conditions and prices.*

Where it fits best

- Surface-focused processes—drying, curing, coating, sealing and heat treatment
- Packaging lines needing fast, localised heat: shrink wrapping, labelling, sealing
- Applications requiring rapid start/stop—intermittent or high-throughput lines benefit the most
- Thin layer or surface treatments where heat needs to reach the surface, not penetrate deeply
- Constrained spaces where compact, ducting-free heating solution is needed

When the economics work

The following can be options to help bring energy price parity with gas:

- Replacing inefficient gas-fired convective systems where significant heat is lost to air
- When speed of heating directly improves throughput, quality, or yield
- High surface area—more surface area means more IR absorption
- Integrated with on-site power generation or BESS to lower operating costs

Industry Electrification Technologies

MECHANICAL VAPOUR RECOMPRESSION

Efficient Heating

Most drying, evaporation and concentration processes release low-pressure water vapour as waste. Mechanical Vapour Recompression (MVR) captures this vapour, compresses it using electric drives to raise its temperature and pressure, and reuses it as steam – replacing most or all external energy input. It's not just electrification; it's a more efficient way to run thermally intensive processes.

Up to 10 units of heat recovered per unit of electricity consumed

1–8 Bar Upgraded steam output—suitable for most industrial evaporation and drying processes

Strengths

- Exceptional energy efficiency—recovers and reuses heat that would otherwise be wasted
- COP of 5-10 results in dramatic reductions in energy consumption vs conventional steam generation
- Can integrate with existing steam systems—doesn't require full process redesign

Watch out for

- Only works with clean, non-condensable-free vapour; fouled or contaminated streams reduce efficiency significantly
- High capital cost for compressors and associated retrofits
- Intermittent or small-scale processes rarely achieve utilisation levels that justify investment

Potential Savings Snapshot*

~$213,000/yr
Energy cost saving

>1,000 tCO_2-e
Emissions reduced per year when using renewable electricity

**Based on a site using 20,000 GJ of gas per year at $14/GJ switching to MVR purchasing electricity at $120/MWh electricity. Individual results will vary with site conditions and prices.*

Where it fits best

- Processes with steady, consistent, clean vapour streams, such as evaporation, concentration, distillation
- Drying processes with continuous, recoverable moisture output
- Replacing boiler steam in evaporation or separation processes where vapour quality is high
- Sites with large, continuous steam demand – where every unit recovered directly offsets gas consumption

When the economics work

- When replacing high-cost fossil fuel-fired heating systems
- Sufficient recoverable vapour volume exists to justify compressor capital cost
- High, continuous heat demand—low utilisation significantly extends payback period

Pharmaceutical & Industrial Examples Where MVR May be Considered

- Solvent recovery
- Crystallisation
- Concentration (e.g. aqueous or solvent-based streams)
- Drying
- Distillation and evaporation systems
- Effluent and wastewater volume reduction

Case Studies – Heat Pump Adoption in Australian Industry

Real-world examples of businesses transitioning from gas-fired systems to high-efficiency heat pump technologies, achieving measurable emissions and cost reductions.

AstraZeneca

Multiple Funding Sources

SYDNEY, NSW – PHARMACEUTICAL

AstraZeneca installed a heat pump targeting HVAC hot water loads for their pharmaceutical site. The company leveraged the NSW Heat Pump Feasibility Grant (up to 75% of project costs, capped at $30,000) to assess thermal loads across the site and identify the highest-impact installation point.

Under grant funding, they assessed the feasibility of installing heat pumps to provide indirect support to boiler systems (e.g., preheating or load reduction) which provides high temperature, high pressure steam for processing water and their autoclave. They also explored integrating a heat pump with heat exchangers for HVAC. The study uncovered that HVAC hot water was an ideal, moderate-temperature application for heat pump integration. Data gathered in the study also helped the site understand their heat loads, energy consumption profiles and temperature requirements. Additional capital was recovered through the NSW Energy Security Safeguard incentive, achieving a payback period of under five years. For more information, click here.

46%
GAS CONSUMPTION REDUCTION

<5 years
PAYBACK PERIOD

Opella Consumer Healthcare

$1.94M ARENA Funding

VIRGINIA, QLD – PHARMACEUTICAL

Opella operates under strict process conditions, including precise temperature and humidity controls. The site is replacing their gas-fired HVAC dehumidification units with electric alternatives integrated with CO_2 hot water heat pumps. Gas-fired boilers are being replaced with heat pumps and hot water storage vessels providing both primary heating capacity and backup supply. For more information, click here.

$4.03M
TOTAL PROJECT COST

1,200+ tCO_2-e
SCOPE 1 EMISSIONS REDUCTION P.A.

Blackmores

$724k ARENA Funding

BRAESIDE, VIC – HEALTH SUPPLEMENTS

Blackmores upgraded their process hot water system by installing an 800kW heat pump drawing on refrigeration condensate water as a heat source, paired with 10kL of thermal storage. The system is supplied by renewable energy through a PPA and is projected to displace ~25% of annual natural gas consumption. For more information, click here.

$1.4M
TOTAL PROJECT COST

9,990 GJ
GAS DISPLACED P.A.

512 tCO_2-e
SCOPE 1 EMISSIONS REDUCTION P.A.

Section C: Electrification Economics

Developing a strong electrification business case is essential to clearly demonstrating the economic, operational and environmental advantages of transitioning from fossil fuels to electric technologies. It enables decision-makers to identify potential cost savings, select the most effective technologies and reduce investment risks, while also leveraging available incentives and long-term financial benefits. The following section outlines key considerations to help your business build a well-rounded business case.

Technology-Specific Cost Savings

This section outlines methods to estimate cost and emissions savings depending on your electrification technology choice.

Additional Financial Tools

This section provides an overview of practical financial mechanisms that can improve the economic feasibility of electrification.

How to Put Together an Electrification Business Case

This section provides a step-by-step guide on how to create an electrification business case, and some key considerations along the way.

Technology-Specific Cost Savings

How much can electrification save your business?

You'll need:

- Your current annual gas consumption (GJ)
- Electricity price ($/MWh)
- Gas price ($/GJ)

Step 1: Calculate Usable Heat from Your Current Gas System

$$\text{Usable Heat (GJ)} = \text{Gas Consumption (GJ)} \times \text{ Boiler efficiency}^{1}$$

[1]If unknown, you can assume a typical boiler efficiency of 80%.

Step 2: Choose your electrification technology & find your key variable:

High Efficiency

Heat Pumps and MVR

Key Variable: Breakeven Coefficient of Performance (COP)

$$\textbf{Breakeven COP} = \frac{\textbf{Electricity Price}\left(\frac{\$}{\textbf{MWh}}\right) \times \textbf{0.2778}}{\textbf{Gas Price (\$/GJ)}} \times \textbf{80\%}$$

Example @ $120/MWh electricity, $14/GJ gas:

$$\text{Breakeven COP} = \frac{120 \times 0.2778}{14} \times 80\% = 1.9$$

So a heat pump with COP above 1.9 delivers cost savings at these hypothetical rates. Most industrial heat pumps operate well above this threshold. Note that a higher COP = greater savings.

Direct Electric Heating

Electrode Boilers, eTES, IR Heating

Key Variable: Breakeven electricity price

$$\textbf{Break−even Electricity Price (\$/MWh)} = \frac{\textbf{Gas Cost (\$/GJ)} \times \textbf{3.6}}{\textbf{Boiler Efficiency}}$$

Example @ $14/GJ gas:

$$\text{Break−even Price} = \frac{14 \times 3.6}{80\%} = \$63/\text{MWh}$$

Electricity rates below $63/MWh will mean that your direct electric heating is delivering energy cost savings.

Step 3: Calculate New Electricity Consumption

$$\text{Electricity Required (GJ)} = \text{Usable Heat (GJ)} \div \text{COP}$$

Heat pump COP ≈ 3–5 | Direct electric heating COP = 1.0

Where unsure of an estimated heat pump COP, you can use tools such as the A2EP Heat Pump Estimator to estimate the size needed for your site.

Step 4: Calculate Annual Cost Savings

$$\text{Cost Savings} = (\text{Gas Consumption (GJ)} \times \text{Gas Price (\$/GJ)}) - (\text{Electricity Required (MWh)} \times \text{Electricity Price (\$/MWh)})$$

A positive result means electrification costs less than your current gas system.

Technology-Specific Cost Savings (cont'd)

It can be difficult to put forward a business case for direct electric heating technologies because they have similar efficiencies as fuel-combusting assets, which can lead to higher operating costs due to the cost of natural gas vs electricity. However, there are still opportunities to improve the economics by accessing lower-cost electricity rates.

How to access electricity rates under the break-even price:

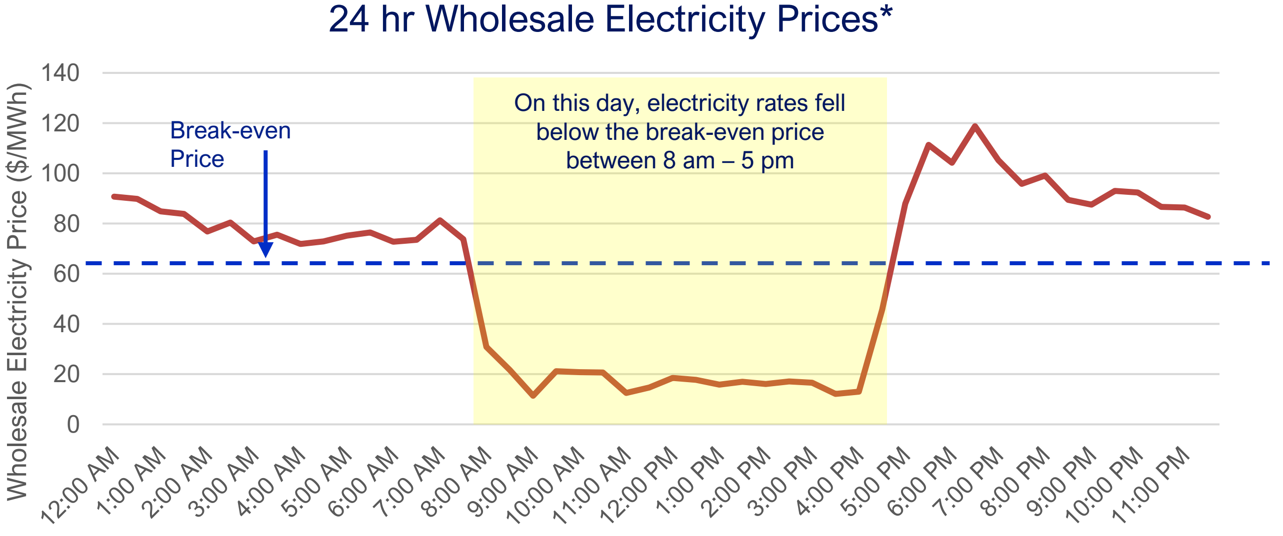
- **Onsite Solar:** Provides low-cost energy during the day that should fall below the break-even price for your project.
- **Wholesale Electricity:** Prices will frequently dip below your break-even price during daylight hours. Sites with wholesale market exposure or can expose the technology under a child meter to the wholesale market, can set a strike price below the break-even threshold.
- **Time-of-use (ToU) Tariff Structures:** some electricity providers are starting to offer new discounted tariffs to incentivise these technologies to draw power at certain times of the day.

The above options are best utilised through load shifting. Load shifting is the concept of shifting your electricity consumption to times of the day when electricity pricing is more favourable.

The graph below highlights typical hours of the day when electricity prices are lower because the grid has an oversupply of renewable energy sources, predominately driven by solar.

For some businesses, it will be possible to shift batch operations to these cheaper times of the day. Other businesses can use eTES and other thermal storage devices to shift load to these times of the day.

The example below shows a nine-hour window where the electricity market price was below the equivalent cost of gas for a direct electric heating technology



**NEM wholesale prices on 18/4/26*

Additional Financial Tools

Electrification and energy upgrades can require significant investment. To support decarbonisation strategies, there are numerous opportunities to help overcome financial barriers.

Energy and carbon certificates

Across Australia, environmental markets and certificate schemes exist to reward projects for achieving emission reductions. They exist on federal and state levels and are currently strongly supporting decarbonisation of industry, making them highly relevant to Accord members.

When registered under a scheme, emission reduction and avoidance projects earn certificates that can be traded and sold in carbon and energy markets. These certificates provide additional revenue sources that can improve project returns and be leveraged to support a business case.

The schemes include:

ESCs
NSW: Energy Saving Certificates

VEECs
VIC: Victorian Energy Efficiency Certificates

REPS
SA: Retailer Energy Productivity Scheme

ACCUs
Nationwide: Australian Carbon Credit Units

Potential Revenue Case Study*:

Consider a heat pump installed to deliver hot water to a warming tank. It provides 4,500 tCO_2-e of emissions reductions per year.

Natural Gas Reduction: 50,000 GJ | Power Increase: 3,700 MWh

Without certificates, the project has a 7-year simple payback based on improving system efficiency and reducing fuel costs.

The table below shows the certificate revenue if the project was undertaken in NSW, South Australia or Victoria. For Victoria, the table compares the outcomes under the new implified heat pump method and the traditional Project-Based Activities (PBA) method.

Incentive Type	ESC (NSW)	REPS (SA)	VEEC (VIC) Simplified PBA Method	VEEC (VIC) Traditional Method
Certificates Generated	24,700 ESCs†	37,000 REPS†	8,800 VEECs†	12,400 VEECs†
Gross Value*	$650,000	$410,000	$765,000	$1,075,000
Payback with Certificates	5.7 Years	6.2 Years	5.5 Years	4.8 Years

**Based on early 2026 certificate spot prices. Prices are indicative and for comparison only.*
†Certificate quantities represent the potential total volume of certificates eligible for upfront generation after the typical 12-months of measurement and verification. Noting each project has its own characteristics, which will vary the outcome.

Energy and carbon certificate schemes are often misunderstood and overlooked by businesses. These schemes can be favourable for heat pump and MVR projects due to the high COPs. However, these schemes do not have a positive result for direct electric heating technology. The Victorian program is aware of this and is currently undergoing consultation to determine how to incentivise direct electric heating technologies.

Below are some high-level calculations you can use to estimate the potential opportunity from these schemes. The actual volumes require detailed engineering and various scheme rules to be applied. Additionally, each scheme has its own eligibility criteria. Hence, these calculations are here only to enable an internal “go/no-go” on further exploration of participating. So, reach out to an energy consultant who will be able to assist.

VEEC	Victorian Energy Efficiency Certificates - Value ($)

$$= \left(\text{Natural Gas (GJ)} \times 0.05523\left(\frac{tCO_2e}{GJ}\right)\right) - \left(\text{Electricity (MWh)} \times 0.393\left(\frac{tCO_2e}{MWh}\right)\right) \times 9\text{ (years)} \times \text{VEEC Spot Price}$$

ESC	Energy Savings Certificates - Value ($)

$$= \text{Natural Gas (MWh)} \times 0.47\text{ (natural gas conversion factor)} - \text{Electricity (MWh)} \times 1.06\text{ (electricity conversion factor)} \times \sim 9\text{ (years)} \times \text{ESC Spot Price}$$

ACCU	Australian Carbon Credit Units - Value ($ per annum for 7 years)

$$= \left(\text{Natural Gas (GJ)} \times 0.05153\left(\frac{tCO_2e}{GJ}\right) - \text{Electricity (MWh)} \times 0.64\left(\frac{tCO_2e}{MWh}\right)\right) \times \text{ACCU Spot Price}$$

Alternate Financing Mechanisms

Grant Programs: Government grant programs are frequently released to align with national and state decarbonisation goals. These often offer a 50% co-funded grant.

Sustainability-linked Loans (SLLs): Interest rates are coupled with sustainability targets including emission reductions, energy reduction, or electrification milestones. Accord members with formal targets and transition plans may be able to access these financial products.

Power Purchase Agreements (PPAs) and On-Site Renewable PPAs: PPAs are long-term contracts to purchase renewable electricity at fixed or variable rates through a third-party provider. Moving the costs from a CAPEX to an OPEX.

Certificate Financing: Future energy savings or certificate revenue can be leveraged to secure upfront capital that is repaid through certificate sales.

Energy as a Service (EaaS): Under an EaaS model, a third-party provider installs, owns, operates and maintains equipment such as thermal boilers or heat pumps while the site pays for the energy it consumes. This model reduces the need for upfront capital expenditure and technical risk.

Equipment and Technology Finance: Rather than funding upgrades entirely upfront, businesses can finance new equipment. Some providers offer better financing terms for using green technology, such as offering lower interest rates.

*Based on late-2025 certificate spot prices

How to Put Together an Electrification Business Case

1 Define the Need

Frame the project with clear operational or strategic reasoning (e.g., ageing assets due for replacement, corporate emissions commitments, rising energy costs, need for redundancy, etc.). A strong rationale will build the foundation for generating buy-in across the business and with decision makers.

Energy Market Context for Building the Energy Cost Rationale:

Australian wholesale electricity and gas prices have both been volatile, but the longer-term trajectory favours electrification. Renewables drive electricity costs down while gas supply constraints keep upward pressure on gas prices. There are significant volatility risks with continued fossil fuel (gas/diesel/LPG reliance), leading to potential cost uncertainties. The table below shows recent, average historical wholesale electricity and natural gas rates:

	Australian Electricity Wholesale Price ($/MWh)*	Australian Gas Wholesale Price ($/GJ)*
2021/22	128.2	16.3
2022/23	139	16.6
2023/24	93.4	11.8
2024/25	127.6	12.9
2025/26 YTD	96.8	12.6

*Prices are indicative and for comparison only. Source: Australian Energy Regulator. Members should obtain current tariff information from their retailer and network operator when building a site-specific business case.

2 Quantify the Baseline

Estimate your business's current annual BAU costs as a reference point for future comparisons. This may include:

- Fuel use, electricity use, costs and energy performance indicators, e.g., X GJ/ X litres of product
- Equipment efficiencies and equipment costs
- Maintenance, labour, downtime and compliance costs

3 Estimate Annual Operating Costs for the Electrification Option

Estimate the annual running costs of the electric alternatives. Account for your electricity rate, demand charges and any efficiency gains from the technology (e.g., heat pump COP).

To lower operating costs, particularly to improve the business case for direct electric heating technologies:

- Shift thermal loads (CIP, water heating) to lower-cost times of use electricity charges
- Add thermal storage to flatten peaks and shift loads
- Lock in tariffs, hedges, or long-term contracts where possible to provide price stability and reduce exposure to energy market volatility.

4 Normalise to a Common Output Metric

Convert current and proposed electric system to common metrics for comparison, such as $/kg of product output, $/CIP cycle, $/GJ of useful heat delivered.

Presenting production-related metrics to decision-makers can quickly highlight electrification impacts.

5 Calculate Capital Expenditure (CAPEX)

Build a picture of total upfront investment, including (as required):
- Equipment, installation, electrical upgrades, engineering
- Downtime during installation, maintenance and labour savings
- Additional equipment (e.g., thermal storage, control systems, metering)
- Contingencies for integration complexity

Electric technologies often cost more upfront than fossil-consumption assets.

Strategies to manage upfront costs include:
- Stage investments to spread the cost and target higher returns
- Combine projects (e.g., refrigeration upgrade + heat recovery) to reduce shutdown periods
- Conduct early electrical capacity assessments to better understand and plan any necessary upgrades – also integrate with other site upgrades to spread cost
- Use heat recovery and efficiency improvement measures to minimise your site's electrical load
- Consider hybrid/partial electrification to start the journey sooner

Sites may require electrical infrastructure upgrades to transformers, switchboards, or wiring that can add significant time and cost. Proactive site assessments are one of the highest-value early steps any site can take.

6 Apply Incentives, Rebates, Financing Options

Check for government grants (ARENA, state programs), eligible certificate schemes, utility rebates and applicability to other financing tools. Incentives can significantly shift the financial payback.

Use leasing or Energy-as-a-Service (EaaS) models, where available, to access electrification technologies without heavy upfront investment.

Some grants require early site preparation such as metering and monitoring installations. Start preparing for electrification through electrical capacity assessments, feasibility studies, electrification options assessments and/or appropriate metering and monitoring, to prepare for implementation grants.

7 Model Cash Flows Over the Asset Life

Generate a year-by-year cash flow model building in:
- Annual OPEX savings (avoided maintenance costs, reduced labour, reduce energy costs, etc.)
- Energy and carbon certificate revenue streams
- Fuel and electricity price trends (seasonal peaks, market volatility)

Running sensitivity analyses can help the business understand future financial risks, support informed decision-making and/or prepare for when energy prices make the project financially feasible.

8 Calculate Financial Metrics

Present the results using standard investment indicators: payback period, Net Present Value (NPV), Internal Rate of Return (IRR) and Levelised Cost of Energy (LCoE).

These variables will act as indicators of financial attractiveness and can be compared against internal thresholds, hurdle rates and/or BAU.

Handbook Summary

Electrification is a journey, not a single step. For Accord members, progress begins with understanding your site, your processes and the options available. The six themes below capture the key messages from this handbook.

The Sector and the Stakes

Many of Accord's manufacturing members use energy-intensive processes and rely heavily on natural gas for process heat. As gas prices rise and the grid decarbonises, the financial and environmental case for electrification grows stronger.

Barriers and Drivers

The main barriers are high upfront costs, electrical capacity limits, process complexity and poor data. Decarbonisation commitments, government incentives and rising gas costs are the key drivers.

Technology Pathways

Heat pumps, electrode boilers, eTES, infrared heaters and MVR suit different temperature ranges and operational specifics. Select technology based on actual process needs, not to replicate existing equipment output.

Start with Efficiency

Before replacing equipment, prioritise waste heat recovery. Capturing heat from economisers, refrigeration systems and other sources can reduce gas consumption immediately and lower future electrical demand ahead of electrification.

Build the Business Case

Cover baseline OPEX, full CAPEX and available incentives (ARENA grants, certificates, EaaS). Model rising gas and falling electricity costs—the case typically strengthens over the asset life.

The Most Important Step: Get Started

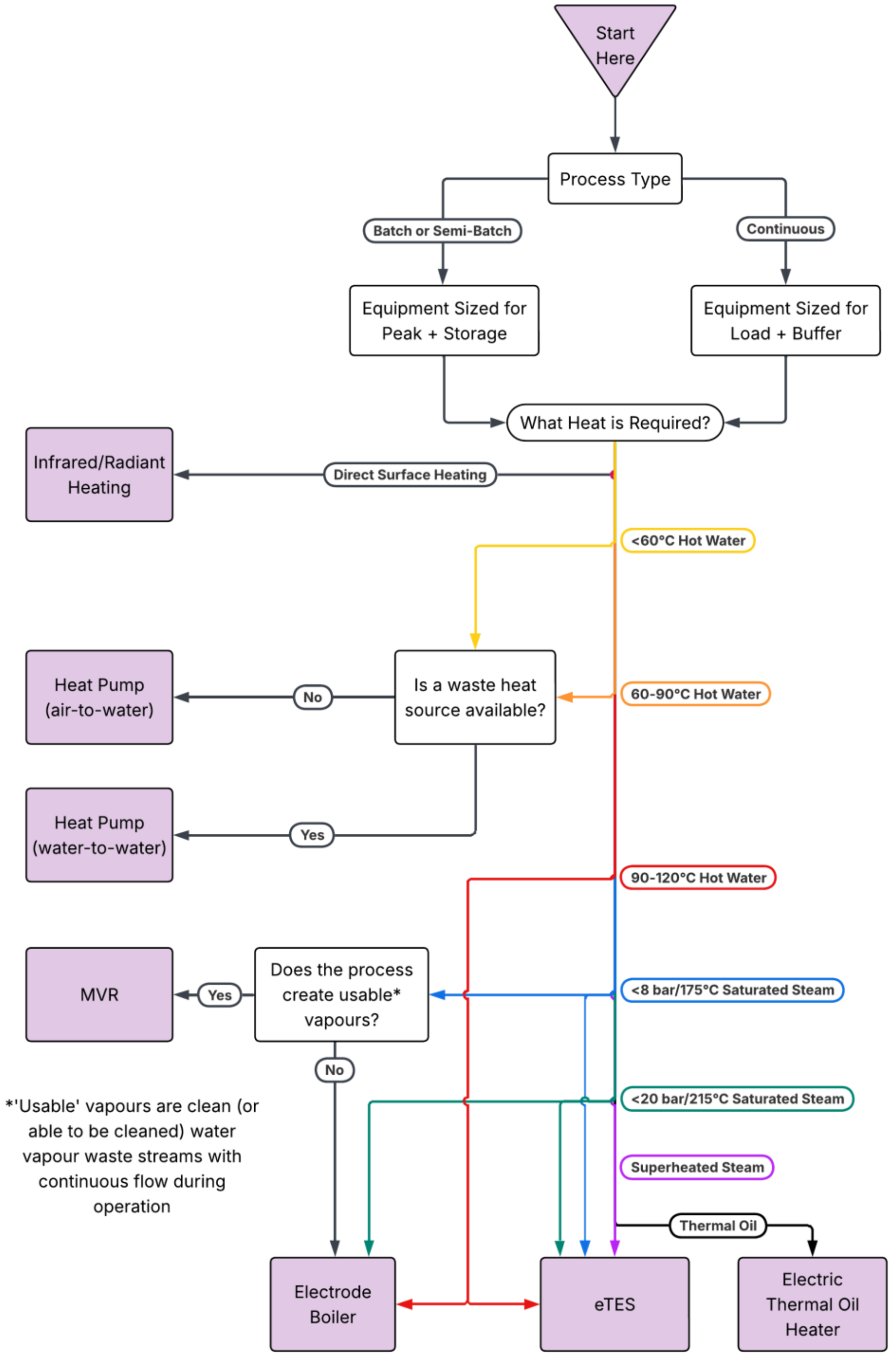
Start with an electrical capacity assessment and sub-metering. Integrate electrification into the next equipment replacement. Early action builds capability and keeps future options open.

Electrification is a journey. The next equipment decision is where it begins.

Appendix A

Decision-making Matrix

Use the following decision-making matrix to assess what technologies may suit your processing requirements. Note that the process type shapes how systems are applied: batch operations favour storage to meet intermittent demand, while continuous processes benefit from buffering to manage variability.



Appendix B

General Options for Heat Recovery or Efficiency Gain

Many Accord member facilities can reduce energy consumption by improving the efficiency of existing thermal systems. The options below are well-established and low-cost.

Economisers Recovering Heat from Boiler Flue Gases	Economisers capture heat from boiler flue gases and use it to pre-heat boiler feedwater. This redirection of waste heat energy reduces the energy required to generate hot water or steam in the boiler. *Standard Economiser:* Cools flue gases from ~250°C to ~120°C, heating feedwater up to 110°C. Compatible with any fuel type and has an expected efficiency gain of ~5%. *Condensing Economiser:* Heats water up to 70°C where a low-temperature heat sink (<70°C) is available. Cools flue gases below their dew point (~55°C). Is best suited to natural gas or LPG-fired boilers. Typical efficiency gain of ~10%.
Utilising Refrigeration Waste Heat	Facilities operating refrigeration systems can capture waste heat (e.g., from compressors oil, return lines) to pre-heat process water or supply low-grade heating elsewhere. This also reduces loads on chiller and freezer plants.
Pre-Heating Combustion Air	Combustion air can be pre-heated using almost any on-site waste heat stream. This reduces the energy required for combustion and improves overall boiler efficiency.
General Good Practice Insulation, maintenance, system optimisation	• Insulate steam, hot water, condensate and flue piping • Return steam condensate and maintain steam traps • Fit Variable Speed Drives (VSDs) to pumps, fans and compressors to match motor speed with actual load requirements • Optimise equipment settings and controls (e.g., temperature and pressure set points, air-fuel ratios) • Hire a qualified technician to optimise boilers, tuning combustion across all firing levels.

Contact

For more information about this Handbook or electrification in the context of your business, please reach out to:

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