

EECA

TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Energy Efficiency Checklist

Packhouse and cool stores

Cost-saving measures, productivity
enhancements, and optimisation
opportunities

October 2024

This checklist is a practical guide to help packhouse and cool store operators establish both low and medium cost opportunities to save energy.

There are four sections within the checklist focusing on:

1. Energy measurement
2. Operational opportunities
3. Equipment upgrades
4. Fuel switch

TASK	DETAIL	COMPLETE?
ENERGY MEASUREMENT		
Energy & energy emissions benchmark	Calculate the energy required, and associated emissions, per kg of produce leaving site. This will highlight opportunities for cost reduction by improved energy efficiency.	
	a. Get relevant energy bills and product throughput to determine totals for the desired 12-month period.	
	b. Input the data into the EECA energy intensity calculator	
	c. Refer to benchmarking metrics for the industry to identify how the site compares to the wider industry. <i>Note: if available.</i>	
Refrigerant emissions benchmark	Calculate refrigerant losses, and associated emissions, per kg of produce leaving site. This will highlight opportunities for cost and emissions reduction by reducing leaks or changing to refrigerants with lower Global Warming Potential (GWP).	
	a. Review records of refrigerant leaks or refrigerant refills, and product throughput, to determine totals for the desired 12-month period. <i>Note: All leaks or refills of refrigerants that have significant GWPs should be recorded for this purpose. Your refrigeration contractor may already be recording this information.</i>	
	b. Multiply the leaked or refilled kg of each refrigerant by its respective emissions factor GWP to determine emissions in kgCO ₂ e/y for each refrigerant type. <i>Note: The GWP for refrigerants can be found on MFE emissions factors webpage or your refrigeration contractor should know.</i>	
	c. Divide kgCO ₂ e/y values by kg/y of produce leaving site to obtain benchmark values for each refrigerant type.	
	d. Refer to benchmarking metrics for the industry to identify how the site compares to the wider industry. <i>Note: if available.</i>	
Staff engagement	Educate staff about the importance of being as energy efficient as possible, managing hot water use and turning off equipment when not in use. <ul style="list-style-type: none"> Run an introductory session to update staff about why it's important to save energy. You can also integrate information about your energy programme into your site's induction training. Create a mechanism for contractors and staff to share their suggestions with you. Make sure you respond to comments and act on recommendations when feasible. You may even consider offering a prize for the best energy-saving ideas. 	
Energy management & maintenance	Choose the best power tariff that suits the electricity load profiles in the plant. Similarly, reduce peak electricity loads by rescheduling processes so that they do not coincide with peak times.	
	Turn off lights, heaters, conveyors, and other electrical equipment when not in use. Put time switches on lighting and heating.	
	Implement appropriate scheduling to regularly perform basic energy maintenance by a qualified technician.	
	Check for leaking utilities (refrigerant/air). Use equipment monitoring and manual inspections for early failure detection and preventative maintenance.	

TASK	DETAIL	COMPLETE?
	Check lights are clean and free from dust.	
	Maintain and service motors used for air conditioners, refrigeration, pumps, and conveyors to save energy and reduce wear and tear.	
	Reduce heat losses. Lag all refrigerant lines and where possible avoid long pipe runs.	
	Ensure good door discipline by keeping doors on cold stores shut when not in use for loading.	
	Minimise air flow into cool store by maintaining seals around room doors.	
	Allocate budget for preventative maintenance to save energy and prevent disruptions from breakdowns and unscheduled maintenance.	
Asset register	Develop asset register capturing key details, such as: <ul style="list-style-type: none"> • Make • Model • Type of unit (i.e., screw or reciprocating) • Age/ year of install • Power rating • Efficiency • Operating temperatures 	
	Implement an asset replacement strategy focusing on energy efficient replacements.	
OPERATIONAL OPPORTUNITIES		
Cool stores	Review if fans have variable speed capability and if so, reduce fan speed for static cooling.	
	Optimise bin and pallet placements in cool stores to improve air distribution and reduce temperature stratification.	
Refrigeration system	Explore if refrigerant condensing pressure set point can vary seasonally (i.e. reduce condensing pressure setpoint during winter to reduce compressor power draw).	
	Explore if load shifting is possible. This involves turning off refrigeration systems during peak grid electricity demand/cost periods.	
	If a secondary refrigerant system of glycol is used explore if modifying controls to allow glycol supply setpoint temperature to increase during periods of low demand if feasible.	
	Optimise glycol pump operation to turn off additional pumps when not needed.	
	With multiple compressors ensure the control philosophy uses a sequencing procedure.	
EQUIPMENT UPGRADES		
Cool stores	Upgrade to defrost on demand to reduce defrost frequency.	
	Replace fixed speed evaporator fan motors with two-speed or EC motors and run at lower speed for static cooling	
	Install rapid roll doors to minimise air exchange and atmospheric heat gain.	

TASK	DETAIL	COMPLETE?
Lights	Install automatic sensors for lights to operate only when areas are occupied.	
	Separate lighting circuit for manual screening stations if they do not have their own light switches.	
	Replace lights with LED to reduce power use in high occupancy areas.	
	Install timers on main lighting circuits.	
	Where skylights or large windows are present, install automated dimming or switching systems on indoor lighting.	
Refrigeration system	Install leak detection and automatic pump down of refrigerant to minimise leaks.	
	Install high- efficiency motors [new MEPS (Minimum Energy Performance Standard) motors are typically 2% - 3% more efficient than older motors over a wide range of operating loads].	
	If a site uses refrigerants with a high GWP: <ul style="list-style-type: none"> replace with low GWP refrigerants (depending on the system and refrigerants this may require certain refrigeration system components are upgraded). replace with localised system using a refrigerant that has both a low GWP and zero Ozone Depleting Potential (ODP). replace with centralised systems using a natural refrigerant (these systems are less cost effective at small scale so would typically only be considered for supplying groups of cool stores with total refrigeration load >1MW). 	
FUEL SWITCH		
Solar	Engage a third party to assess site for potential to install a solar PV system, with electricity generated sold to the site via a Power Purchase Agreement (PPA) or similar.	
Forklifts and off-road equipment	Explore replacing with electric alternatives.	
Company Fleet	Replace with battery electric (or plug-in hybrid) vehicles.	

NOTES

General Notes:

1. Opportunities that modify refrigeration systems must carefully consider potential impact on temperature of fruit and humidity in cool stores, to ensure product quality is protected.
2. Different opportunities will have differing levels of impact on energy use and emissions on different sites depending on the specific details of that site. In many cases the decarbonisation opportunities that tend to have the greatest impact (for example, replacing old refrigeration equipment) also tend to have some of the longest paybacks of the opportunities noted.