Dairy Plant Energy Audit Field Pack

Connect production, refrigeration, pasteurization, CIP and heat recovery as one energy boundary.

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Version	1.1
Updated	2026-07-15
Use	Pre-audit field collection and technical review
Decision boundary	Replace representative values with site-specific data before investment use.

Before site work

1	Identify product-contact and non-product-contact loops.
2	Record validated CIP temperatures, times and recipes.
3	Map simultaneous heat sources and acceptable heat sinks.
4	Align production, CIP, refrigeration and utility timestamps.

Sampling note

Preferred resolutions in this pack are kWhScan screening recommendations, not mandatory standards. The site team must set representative periods for its operating modes, production schedule, safety requirements and decision risk.

Dairy Plant Energy Audit Field Pack - field checklist

Yellow columns are intended for site entry. Preserve timestamps and evidence provenance.

Section	Field	Unit / format	Preferred resolution	Evidence source	Site value	Level	Owner	Status	Notes
Production	Throughput, product mix, run hours and changeovers	Site-defined	Batch or shift plus 12 monthly totals	Production record					
Utilities	Electricity, demand, fuel, steam and water	kWh, kW, fuel and water	15-minute where available plus 12 bills	Utility and submeter records					
Refrigeration	Compressor/auxiliary power, pressure levels and defrost	kW, pressure, temperature and state	1-5 minute for 14 representative days	Power meters and controller					
Pasteurization	Product flow, inlet/outlet and utility temperatures	Flow, temperature and state	Batch or 1-minute process trend	Process historian					
CIP	Recipe, volume, temperatures, flow, duration and count	Volume, flow, temperature and time	Every cycle for 14 representative days	CIP controller export					
Boiler/hot water	Fuel, output, condensate, storage and loop temperatures	Fuel, flow, temperature and percent	15-minute plus latest test records	Meter and test report					
Compressed air	Station power, flow, pressure and major end uses	kW, flow and pressure	1-minute for 7 representative days	Power, flow and pressure meters					
Heat source	Condenser, compressor, pasteurizer or effluent heat	Flow and temperature	Aligned with sink demand	Trend or measured test					
Heat sink	CIP make-up, boiler feed or process-water demand	Volume, flow and temperatures	By demand event	Trend or batch record					
Constraints	HACCP, validated recipe, segregation and quality limits	Text	Current approved procedure	Site quality and operating documents					
M&V	Post-change production, CIP, energy and quality guardrails	Site-defined	Same boundary as baseline	Verified records					

Dairy Plant Energy Audit Field Pack - overlap control and M&V

Count each physical effect once and preserve the approved operating boundary.

Measures	Overlap mechanism	Aggregation rule
Pasteurizer regeneration + heat recovery	Regeneration reduces residual heating and cooling	Calculate regeneration before residual recovery
Condenser heat + compressor heat	Both may target the same hot-water demand	Allocate one sink by temperature and timing
CIP optimization + heat recovery	Lower cycle demand reduces recoverable demand	Reduce validated CIP demand before sizing recovery
Refrigeration optimization + condenser heat	Lower refrigeration load changes available heat	Recalculate source heat after refrigeration measures
Boiler efficiency + heat recovery	Both reduce fuel against delivered heat	Use the post-efficiency boiler baseline

Minimum M&V record

Track production, product mix, CIP count and recipe, relevant temperatures and flows, refrigeration power, boiler fuel and recovered-heat operation. Preserve food-safety, product-temperature and quality guardrails. Site approval governs all hygiene and exchanger-isolation decisions.

Sources and version

Source	URL
ENERGY STAR/LBNL - Dairy Processing Energy Guide	https://www.energystar.gov/sites/default/files/buildings/tools/Dairy_Guide_Final_With_LBNL_Number.pdf
DOE Better Plants - Industrial Refrigeration	https://betterbuildingssolutioncenter.energy.gov/better-plants/refrigeration
kWhScan methodology	https://kwhscan.com/methodology/
Maintainer	Carl Li
Version	1.1
Review status	Founder-reviewed; no independent reviewer claimed
Public method	https://kwhscan.com/methodology/