

RaaS Explainer

The ins and outs of Refrigeration as a Service

Project Code
2022 - 1071

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Date Submitted
9/11/2021

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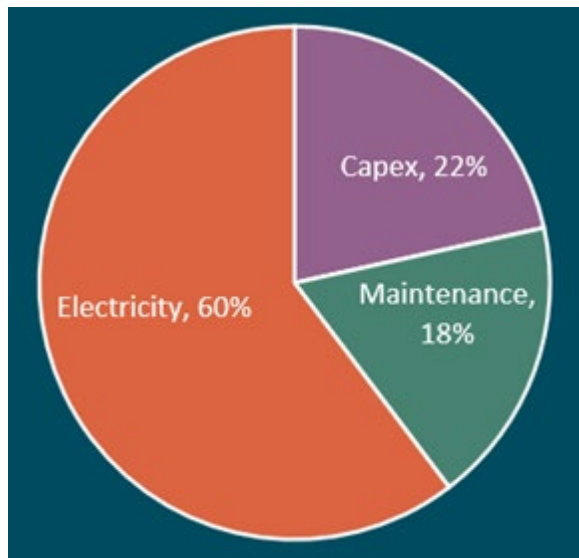
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1.0 Refrigeration at meat processors - intro

Refrigeration systems are an integral and critical part of every meat processing facility and are the single largest consumer of electrical energy on all sites (50-80% of site power). They also reject vast amounts of usable heat to the environment, whilst simultaneously fuels are burned to generate hot water and steam for site heating use.



Refrigeration systems also represent a major capital outlay and one of the largest maintenance cost expenses on each processor site.

Achieving efficient and low-maintenance refrigeration systems that also displace or reduce heating fuel use is a major opportunity at every processing site to reduce running costs and carbon footprint.

All refrigeration systems have a few things in common:

- a) They require a lot of capital to purchase and/or to install, and
- b) They consume a lot of energy throughout their service life, and
- c) They require regular inspection, service, repairs and maintenance

There is a trade-off between these things:

Better refrigeration systems that use less energy or require less maintenance generally cost more up front. Whilst spending more up front (Capex) does not guarantee lower running costs (Opex) the principle of “you pay for what you get” does hold.

Modern ammonia systems also outperform traditional liquid overfeed ammonia systems, especially when (as is common in the meat industry) the ammonia system has been allowed to degrade over time in the quest to minimize maintenance costs. Annual maintenance costs for modern ammonia or CO₂ systems can also be much lower, especially where automated oil management, remote monitoring and predictive fault detection techniques are used.

Very few meat processors have optimized refrigeration systems running at nett lowest cost to the business. Period.

2.0 Business as Usual Refrigeration – the challenges

Meat processor sites run a lean operation and staff resources are generally at a premium. This applies to engineering and finance as well as to production. The business must strike a balance between personnel costs and the level and amount of on-site or in-company skills. This is normal business practice, but creates a trade-off between staff and external cost, and complicates the management of incentives towards minimizing the cost of business.

2.1 Personnel resource limitations

Engineering/maintenance managers and refrigeration plant operators at meat processor sites are responsible for a lot of diverse equipment and are good at keeping the plant running but are not necessarily specialists in the design and energy optimisation of refrigeration systems.

This is compounded by the often-remote location of many meat processor sites. Attracting skilled and competent staff to work at such locations is difficult and expensive. It makes little business sense to have experts in everything on every site or even within the enterprise, assuming such skills are available.

Financial decisions both in relation to initial investment into new plant and on ongoing repairs are mainly based on up-front cost, often guided by advice from the incumbent refrigeration servicing contractor. The resources and often the time to conduct detailed life-cycle-cost analyses are just not available or affordable in many cases.

2.2 Incentivisation of external contractors

Site personnel resource constraints force the site to rely on external contractors and suppliers. However, these external resources are businesses in their own right and must make a profit. What is good for their business is not necessarily good for the meat processor's bottom line.

Managing these diverging incentives is a difficult responsibility for site management:

- The refrigeration equipment supplier/contractor does NOT pay for the energy consumed, the site does – there is no incentive (other than to increase equipment sales volume) to the supplier/contractor to reduce site energy use.
- The refrigeration equipment supplier's and service contractor's business relies on the sale and ongoing service of equipment. It is cheaper to grow more sales volume with each established client, than to win new clients.
- The refrigeration service supplier benefits from locking in ongoing service work – there is little incentive to “design out” such service needs, except as sales/marketing tool.
- The site wears the full risk and cost of equipment breakdown. Even if equipment is under warranty, the consequential losses due to breakdowns are still on the site, as are the labour costs associated with breakdowns.

2.3 Non-aligned incentives and nett minimum costs

Most business owners know or at least suspect that they are probably not operating the refrigeration and energy services at nett minimum cost but accept the current arrangement as it ensures business continuity.

3.0 What is RaaS?

Refrigeration as a Service (RaaS) is a modern form of outsourcing that addresses many of the shortcomings of other financial and service models used to date.

Refrigeration as a Service (RaaS) seeks to resolve the perennial incentives challenge by putting the ownership of the refrigeration system into the hands of a refrigeration specialist, who is incentivised to keep the nett ownership costs low in his own commercial interest.

The RaaS operator makes a profit by investing into a good refrigeration system, keeping energy and maintenance costs down, whilst selling refrigeration to the end user at a lower rate than the end user would otherwise be paying if he owned the system himself. A big chunk of management responsibility and time (and hence cost) is removed with a properly set-up RaaS contract.

Both sides win as incentives are aligned, and both the operator and end-user can focus on what they are good at.

4.0 How does RaaS work?

The basic tenets of RaaS are:

- a) The RaaS operator owns the refrigeration system. The exact extent of ownership is specific to each contract, but ideally should include all the functional and energy consuming components of the system. The end-user can buy back the refrigeration system *at any time* at an agreed depreciated price and exit the contract.
- b) The RaaS operator pays for the power used by the refrigeration system. In most cases, the power usage will be metered and the costs refunded to the end-user who pays the total site energy bill. Hence, if the refrigeration system runs inefficiently, the RaaS operator loses money.
- c) The End-User pays the operator a FIXED monthly fee to cover finance costs and maintenance. If there is a major equipment failure, or significant maintenance work is required, the costs are borne by the RaaS operator. Hence the RaaS operator is incentivised to keep the plant running at lowest maintenance costs and prevent equipment failure.
- d) The End-User pays the operator for actual metered refrigeration (and hot water) used, at a contractually agreed rate. The rate is adjusted annually (up or down) in accordance with an agreed escalation rate (typically CPI) and to correct for changes in site operation or changes in power costs. Higher usage and lower energy costs (which are external to the RaaS contract) will cause the rates to decrease, or vice-versa. Also, the end-user pays for wasteful use of refrigeration and is incentivised to use cooling sparingly.
- e) The RaaS operator guarantees the availability of the refrigeration system. If the refrigeration fails, the RaaS operator will become liable for penalty clauses and does not get to sell any refrigeration whilst the plant is down. Hence the RaaS operator is incentivised to install a plant with suitable redundancy and keep the plant in good running order.

In effect, a RaaS contract is quite similar to a Power Purchase Agreement for solar PV, where the service provider installs, owns and maintains the panels, and charges the site for energy consumed for a fixed contract period.

5.0 The key benefits of RaaS for meat processors

A RaaS arrangement has seven key benefits to the meat processor site:

1. Capital becomes available for core functions
2. Management time now available for core functions
3. Uptime of cooling now outsourced and guaranteed with consequences to the supplier when out of spec
4. Energy costs are predictable and guaranteed
5. Maintenance costs are predictable and guaranteed
6. Return on capital deployed is now higher due to refrigeration being off-balance sheet
7. Environmentally responsible solutions can be employed due to focus on life cycle cost, reducing CO₂ emissions

6.0 How does RaaS compare to other financial/service models?

RaaS is a modern and innovative finance and service model, that differs distinctly from both traditional and other more modern models, as summarized in the tables below.

6.1 Traditional finance / service models

	Operating Lease	Hire purchase	Equipment loan finance	Capital lease finance
<i>Who owns the equipment?</i>	Financier	Financier	Processor	Financier
<i>Who pays for maintenance & repairs?</i>	Financier	Processor	Processor	Processor
<i>Who pays for energy used?</i>	Processor	Processor	Processor	Processor
<i>Balance sheet</i>	On	On	On	On
<i>Who provides finance?</i>	Bank	Bank	Bank (& processor)	Bank
<i>Performance guarantee?</i>	No	No	No	No
<i>Energy efficiency guarantee?</i>	No	No	No	No

6.2 Innovative finance/service models

	Energy Services Agreement <i>or</i> Energy Performance Contract	Environmental Upgrade Agreement	Refrigeration as a Service (RaaS)
<i>Who owns the equipment?</i>	Processor	Processor	RaaS operator
<i>Who pays for maintenance & repairs?</i>	Provider (1 st 12 months), then processor	Processor	RaaS operator
<i>Who pays for energy used?</i>	Processor	Processor	RaaS operator
<i>Balance sheet</i>	On	On	OFF
<i>Who provides finance?</i>	Processor	Council	RaaS operator
<i>Performance guarantee?</i>	Depends on contract	No	Yes
<i>Energy efficiency guarantee?</i>	Depends on contract	No	Yes
<i>Uptime guarantee</i>	Depends on contract	No	Yes

6.3 Comparison table

	Operating lease	Hire purchase	Equipment loan finance	Capital lease	Energy services contract	Environmental upgrade agreement	Refrigeration as a Service
Makes capital available	✓	✓	✗	✓	✗	✓	✓
Free's up management time?	✓	✗	✗	✗	✓ (1 st 12 months)	✗	✓ ✓
Uptime guarantee	✗	✗	✗	✗	✓	✗	✓
Predictable energy cost	✗	✗	✗	✗	✓	✗	✓
Predictable maintenance cost	✓	✗	✗	✗	✗	✗	✓
ROI increase	✗	✗	✗	✗	✗	✗	✓
Environmental	✗	✗	✗	✗	✓	✓	✓

7.0 What is needed to develop a good RaaS deal?

The key unknowns in determining the rates in a RaaS deal are:

- a) The capital cost and expected utilisation of the refrigeration system, and
- b) The expected maintenance costs, and
- c) The expected energy costs.

In every case, determining the above can provide their own set of challenges.

In addition, the RaaS deal must cover the “soft” aspects to work effectively and harmoniously:

- What happens to current site maintenance and operating staff? Retrenched? Re-employed? Reporting to whom?
- How to ensure that site management remains empowered and informed?
- How is refrigeration knowledge retained on site on contract exit?

8.0 Common FAQs regarding RaaS

8.1 How long is a RaaS agreement?

The RaaS contract is for an agreed upon initial duration (typically 15 years). At any point the end-user can cancel the contract and buy the refrigeration plant back at an agreed upon price, (the depreciated value, which is calculated up front and forms part of the overall agreement).

The end-user can optionally extend the contract at the end of the term.

8.2 What does RaaS cost?

The RaaS operator charges a monthly fee for use of the refrigeration consisting of two parts:

- a fixed availability charge which covers all equipment, service and maintenance cost, and
- a variable cooling fee, which is based on the amount of refrigeration (kWhR) that is used.

The RaaS operator charges a fixed amount per kWh of refrigeration (kWhR) delivered (and kWh of heating (kWhH), if hot water provision is included in the contract), which means that the operator guarantees the energy efficiency of the plant and assumes all risk in the event that the plant is not operating efficiently. The operator installs a refrigeration (and heating) meter to measure the kWhR/H consumed and reimburses the end-user for the cost of the electricity consumed by the plant.

As with any long-term contract, there are escalations built into the contract to account for price increases due to inflation, and for price increases in the cost of electricity. If the end-user uses substantially less cooling than the contracted amount, the RaaS operator has the right to adjust the price per kWhR/H according to a predetermined and agreed upon rate schedule.

8.3 Is performance guaranteed?

Yes.

The RaaS operator guarantees the continuity of refrigeration provided to the end-user by means of a service level guarantee. This defines the permissible deviation of agreed key criteria (for example, the saturated suction temperature provided to the site evaporators deviates by no more than 3 °C from the specified value for an agreed length of time). This can include room temperatures, hot water temperatures, flow rates, etc. to suit the scope of the specific plant.

If the measured parameter deviates by more than the guaranteed amount, the RaaS operator will be considered in default, and the end user has the right to several courses of action as defined in the contract, such as x % per day reduction of the monthly fee, the termination of the agreement, and the appointment of an alternate operator.

The RaaS operator undertakes to properly maintain the system at the operator's cost. As part of these maintenance obligations the operator may repair or replace any part of the system as may be required to ensure proper and efficient operation.

8.4 What happens if the business or site is sold?

If the end-user decides to sell the premises, or the business, the end-user undertakes to either

- assist to transfer the RaaS contract to the new owner of the premises or business, or
- buy the refrigeration system back from the operator at the previously agreed price as recorded in the contract.

As the new owner may not be acceptable to the RaaS Operator after due diligence, the choice above resides with the RaaS operator.

8.5 How does insurance work?

The RaaS operator ensures against plant failure, effectively giving the end-user a 15-year plant warranty.

The end-user must insure against all other standard risks - e.g., Fire, Theft, Stock Loss, Acts of God etc.

8.6 What happens to site staff?

The RaaS operator will develop a resource plan for each site. Depending on the location and size of the facility and on the availability of local resources, the operator may:

- Re-hire refrigeration plant operators currently employed by the site.
- Use the existing site maintenance staff on an hourly-paid basis as needed or fixed-monthly.
- Hire new staff to operate and maintain the plant.

8.7 How does the end-user retain knowledge of site refrigeration?

There are several options open to the end-user to retain continuity of refrigeration knowledge on site that can be written into the RaaS contract, including:

- Nominate technical staff to work alongside RaaS operator staff.
- Require regular (daily/weekly) toolbox meetings with site staff
- Full observer access to RaaS monitoring and SCADA systems.
- Retain selected operator privileges
- Retention of detailed plant documentation including O&M manuals on site

9.0 Conclusions

Refrigeration as a Service is a modern outsourcing model that allows an end-user (meat processor) to access low cost and reliable refrigeration and heating without tying up capital and without the hassles of having to retain internal resources to maintain the equipment to ensure availability and low operating cost. This allows the end-user to focus capital and time on core business, rather than having to manage their refrigeration systems.

Some good recent examples of RaaS implementations can be found here:

Dr Oetker, South Africa: <https://www.caas-initiative.org/casestudies/caas-south-africa-2/>

Lynca Meats, South Africa: <https://energypartners.co.za/projects/lynca-meats/>