

Attaining a financial grant from one of the government-run environmental programs might seem a difficult task for many small-to-medium manufacturers. But a dairy processor in northern New South Wales is proof positive that the emerging green economy can be accessed without the help of external consultants. Sean McGowan reports.

# THE NEW AGE OF DAIRY: CLEAN, NATURAL AND EFFICIENT



*Richmond Dairies in Casino, northern NSW, has updated its ammonia kit.*

The Clean Technology Investment Program (CTIP) is part of the Australian government's Clean Energy Future package announced last year alongside the introduction of the carbon price.

The \$800 million merit-based grants program is designed to support Australian manufacturers to maintain competitiveness in a carbon-constrained economy. It provides grants for investments in energy-efficient capital equipment and low-emission technologies, processes and products.

Notwithstanding the impact a change of government might have later this year, the program will provide funding over a seven-year period from 2011–12 to

2017–18. Although the minimum grant amount is \$25,000, there is no maximum.

To be eligible, the applicant must be an Australian registered business that has met one of the three following prescribed energy or emissions thresholds in the 12-month period immediately prior to applying. It must have used at least 300MWh of electricity, used at least 5TJ of natural gas, or used a mix of fuels that results in the emission of at least 0.27kt (kilotonnes) of carbon dioxide equivalent (CO<sub>2</sub>e).

Those businesses directly liable under the carbon price can also apply.

Eligible projects must involve capital expenditure and activities that put in place one or more energy-efficiency or emissions-reduction measures.

As it relates to the HVAC&R industry, such activities might include the replacement of an existing refrigeration plant with a new energy-efficient one. Others might include upgrades to high-efficiency motors, installation of variable speed drives (VSDs), retrofitting to enable waste heat recovery, or changing energy sources.

All eligible applications are then assessed against three criteria: the extent of the reduction in carbon emissions, the capacity and capability of the applicant



The upgrade was assisted by Clean Technology Investment Program (CTIP) funding.

to undertake the project, and the extent to which the project maintains or improves the competitiveness of the applicant's business.

For those seeking a grant in excess of \$1.5 million, a fourth criterion is added that takes into account the project's contribution to a competitive, low-carbon Australian manufacturing industry.

Although meeting these criteria might intimidate some small and medium plant operators, the application process is structured so that most people can work through it.

This, however, has not discouraged a new industry of specialist consultants emerging to not only oversee such applications, but take their cut too.

## THE RICHMOND DAIRIES EXPERIENCE

Fast Freeze International and its trading company Richmond Dairies, is a large dairy processor located in the New South Wales northern rivers town of Casino.

Manufacturing quality dairy products and specialising in frozen products predominantly for export markets, the facility processes about 90 million litres of milk every year.

Over a number of years, the company identified the replacement of its two freezer rooms as an important investment to guarantee product quality and efficiency into the future.

Not only were the existing storage facilities both old and inefficient, but reliability was becoming a problem. The panelling used to insulate the rooms was likely to have accumulated water over the years, thereby further reducing insulation properties and their efficiency.

Additionally, the refrigeration systems serving one room were using the ozone-depleting and high-global-warming-potential (GWP) refrigerant HCFC R-22.

"As we deal in frozen products, an efficient, reliable refrigeration plant is critical to our operations," says Nick Pierce, chief engineer with Fast Freeze International at the Casino facility.

In response to both increasing electricity prices and impending refrigerant supply constraints arising from the phase-out of R-22 imports, the need to upgrade its freezers became more urgent.

The company was in the process of exploring its options when it was approached by a number of specialist consultants offering to conduct energy audits and make funding submissions on its behalf.

"All approaches were unsolicited, and some approaches were quite negative regarding the chances of receiving any funding," says Pierce.

## The funding application

As well as demonstrating that substantial energy-efficiency improvements can be made through equipment upgrades, the Fast Freeze project also shows that obtaining funding for such projects doesn't need to be complicated.

"Don't be led to believe that it is necessary to engage specialist consultants for the purposes of processing the CTIP application," says Nils Lundmark, technical director with Scantec, the refrigeration contractor for the project.

"We understand that some applications may need the assistance of specialist consultants, but there are also many other instances, like that at Fast Freeze, where the information provided by a competent refrigeration contractor is sufficient for a successful outcome."

Although the application process has been designed by AusIndustry to be user-friendly, he says the most critical item required to complete the application is energy – use data. But with rising energy costs over the past few years, most businesses should be monitoring this already.

The assistance of an accountant or auditor providing regular accounting services may

also be required for certain elements of the application.

For an application to be successful, meeting benchmarks in relation to investment per tonne of CO<sub>2</sub>e abatement is said to be important. AusIndustry, the specialist program delivery division within the Department of Industry, Innovation, Science, Research and Tertiary Education, will provide information in relation to these benchmarks at the time of application.

"It is important to conduct preliminary and high-level assessments to ensure that the CTIP application at least has a chance of meeting the benchmark for success. To this end, preliminary cost and energy-saving budgets from the refrigeration contractor are usually all that is required," says Lundmark.

"Many more opportunities exist for other end users to follow Fast Freeze's footsteps and take advantage of further CTIP funding rounds to achieve a seamless delivery of economically competitive and environmentally sound facilities."

More information about the Clean Technology Investment Program can be found at [www.ausindustry.gov.au](http://www.ausindustry.gov.au)



Compressors inside the plant room at Richmond Dairies, Casino.

"They quoted figures such as '86 per cent of applicants were unsuccessful in similar schemes', then continued on to say that all of the applications they assisted with were successful."

His curiosity piqued, Pierce explored the grants being made available under the new Clean Technology Investment Program.

Looking through the application process, it was quickly evident that Fast Freeze would be able to prepare an application in-house, supported only by the advice of its refrigeration contractor, Scantec Refrigeration Technologies.

"The biggest challenge I saw in relation to the grant was the technical assessment of the refrigeration systems," says Pierce. "But in previous dealings with Scantec I was confident they had the technical skills to undertake the evaluation."

Additionally, he says it was apparent that a specialist consultant would not be required to prepare the application.

"The applications were going to be objectively assessed based on the carbon emissions reductions, not on how well the report was written," says Pierce. "And I knew that we were going to reduce our carbon emissions intensity significantly."

"I just didn't see how involving an external consultant to prepare the application was going to make our application any more competitive."

Having already considered the project for some time, Fast Freeze was able to quickly assemble a brief for Scantec. It included building a new, energy-efficient ammonia refrigeration system to service one new, large freezer warehouse to be constructed by Spaceframe Buildings.

This would replace the two smaller, aging rooms.

After deciding to progress with the project (and application), Pierce then asked Scantec to review the specification in line with efficiency best practice.

"The two key requirements that I had for the plant were to make it as efficient as practically possible, and ensure reliability and maintainability," he says.

Initially unaware this was going to form part of a CTIP application, Scantec treated the project as any other by first supplying a technical evaluation of the existing plant's energy use.

It then went on to recommend the best available replacement system – a dual-stage compression ammonia refrigeration plant – and provide an estimate of the anticipated energy savings.

"Being a new ammonia system for a smaller size freezer, we recommended VSD-operated reciprocating compressors in combination with a two-stage ammonia plant," explains Nils Lundmark, technical director with Scantec.

He says this not only provided a low-cost solution, but the use of VSD-operated compressors would achieve the superior energy efficiency Fast Freeze was seeking.

In preparing the CTIP application, Pierce says he spent around 40 hours over two or three weeks analysing and collating production and energy-use data.

The company was fortunate to have nine months of energy-use data for the freezer room connected to the direct expansion R22 system. The other 975m<sup>3</sup> freezer



Condensors on the roof of the new fit-out.

room connected to the central ammonia system had to be analysed by Scantec and energy-use estimates made.

## SUCCESS

In November last year, Fast Freeze International was awarded a grant of \$225,418 towards a total project cost of just under \$800,000 to construct a new, larger and much more efficient and reliable freezer warehouse.

Works commenced a few weeks later, with commissioning continuing as this article went to print.

Central to the new state-of-the-art refrigeration system is a roof-mounted, containerised two-stage ammonia refrigeration plant using reciprocating compressors on VSD operation.

This low-temperature system operates on pumped-liquid recirculation, and the chilled spaces use direct-expansion refrigerant feed.

Despite being larger than both original rooms, Lundmark says reduced operating costs are delivered by the compressor design, which dramatically lowers power consumption, especially when operating at part-load.

Also contributing to this improvement are the new cold room panels featuring PIR insulation, which compares well to the older, expanded polystyrene type.

"Going for two-stage ammonia with VSDs fitted to compressors, condensers and air coolers is very energy efficient, as refrigeration plants are normally designed for the peak heat load – although most plants operate for the majority of times only partly loaded," Lundmark says.

"A conventional refrigeration plant is typically less efficient during part-load operation, but this design actually improves the efficiency at part-load."

Special design features of the ammonia compressors ensure low noise and low vibration levels, with safe environmentally friendly operation and minimal leakage. To this end, monitoring and alarm systems have been installed in the rooftop plant room to ensure early warning in the event of a malfunction.

That the site was already familiar with ammonia, having previously used it for process cooling, was also an advantage. The use of ammonia also ensures Fast Freeze is not exposed to the rising costs and carbon price impact on HFC refrigerants.

The project is expected to reduce the electricity consumption and carbon emissions intensity of the site's refrigeration system by approximately 65 per cent. This will deliver electricity cost savings of approximately \$27,000 annually.

"We are continually looking to improve the environmental impact of our operations and reduce our energy use. The amount of energy that can be saved with a well-designed refrigeration plant is very impressive," says Pierce.

In addition to achieving an outcome that has been financially beneficial for Fast Freeze International and Richmond Dairies, the project is also expected to lead to improvements in product quality. ▲

## PROJECT AT A GLANCE

### The professionals

**Client:**

Fast Freeze International (Richmond Dairies)

**Design and construct Builder:**

Spaceframe Buildings

**Refrigeration contractor:**

Scantec Refrigeration Technologies

### Equipment

**Air coolers:** Cabero

**Ammonia Plant:**

Scantec Refrigeration Technologies Pty Ltd

**Cold room panels:** Spaceframe Buildings

**Compressors:** Sabroe CMO 38

**Condensers:** B.A.C.

**Monitoring and Alarms:**

Scantec SCADA System

**Variable speed drives:** Allen Bradley

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