Ira Pant, Tarac Project Manager (Environment and Sustainability) with Steve Summer, Production Planning Engineer

Case Study

UPCLOSE

Zero Waste SA Industry Program

tarac

Turning a waste problem into an environmental solution

For the past 80 years Tarac Technologies has been taking winegrape residuals from wineries and transforming them into products such as grape alcohol and tartaric acid.

For any business it is the ultimate in environmental sustainability: it removes a serious disposal problem and creates new revenue streams. But to remain viable in a world of changing consumer tastes and economic uncertainty, Tarac has had to embrace innovation across its operation.

It now has new products and export markets, and a cutting-edge environmental program that covers waste, water and energy.

The slogan in the foyer of Tarac's headquarters in the Barossa Valley sums up the company's approach to business – rethink, recycle, reformulate, revalue.

This has been its principal driver since it was founded by CSIRO scientist Alfred Allen in 1929 to recover grape alcohol, grapeseed oil and tartrates from local winery by-products. Back then Australia's wine industry was small but marc and other residuals were an emerging environmental issue.

As the wine industry grew – and the problem of residuals disposal increased – so did Tarac's partnership with the sector. Today the company has four plants strategically positioned in major wine regions: two at Nuriootpa in the Barossa Valley, one at Berri in the Riverland and another at Griffith, New South Wales.

> **"Tarac must continue to evolve and focus on being the lowest cost solutions provider to the wine industry."**
>
> **Chris Zajac**
> Chief Executive Officer
> Tarac

Together the plants process about 70% of the solid and liquid residuals produced by the Australian wine industry. That equates to about 130,000 tonnes of grape marc, more than 55 million litres of distillation wine lees and 7000 tonnes of filter cake every year.

Government of South Australia
Zero Waste SA

AVOID • REDUCE • REUSE • RECYCLE

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> **During production we use large amounts of natural gas to generate steam. While using gas enables us to keep our carbon footprint down, energy is still a significant cost for us.**

Chris Zajac
Chief Executive Officer
Tarac

GREEN PROGRAM CONTINUES IN-HOUSE

While Tarac's success has been built on delivering sustainability for the wine industry, it has also focused on lowering its own environmental footprint. In October 2007 the company joined Zero Waste SA's Industry Program to critically examine its manufacturing processes.

An Energetics sustainability diagnostic first assessed Tarac's production methods and identified priority areas for improvement. As expected, Tarac scored highly for water and waste management but energy consumption was identified as an issue.

The sustainability diagnostic came up with a list of ideas to cut energy usage and Tarac is currently targeting two proposals likely to have the greatest impact. Both relate to boiler efficiency, including an innovative scheme with another of the company's green programs – wastewater treatment.

Sustainability objectives

After building an export business from recycling waste, Tarac Technologies is embracing environmental sustainability throughout its manufacturing operation.

Identified opportunities

- wine industry sustainability
- wastewater recycling
- energy efficiency
- employee training
- green supply chain

Annual savings

Energy reduction – 20%

Water savings – 20 megalitres

Gas substitution – $85,000

Waste minimisation – 130,000 tonnes grape marc, 55 million litres of distillation wine lees and 7000 tonnes of winery filter cake

Outcomes

- processing 70% of Australian wine industry residuals
- removing waste streams and adding value
- developing new export markets
- turning methane into an energy resource
- increasing boiler efficiency
- treating wine industry effluent
- recycling industry wastewater for vineyard irrigation
- treating plant wastewater for reuse
- ISO 14001 environmental management system

Zero Waste SA support

- Industry Program
- sustainability diagnostic (a software-based tool for assessing, benchmarking and managing sustainability within organisations)
- sustainability action plan
- development of a case study

Evolution of new product streams

Sustainability has been Tarac's goal since its inception, and it has used innovation to establish new products and markets for both environmental and business sustainability.

"We've built our business by taking residuals that could have potentially huge environmental impacts for the wine industry and dealt with them in a sustainable business manner," says Chief Executive Officer Chris Zajac.

"But to remain viable we've had to evolve with the changing environment. Over the years, potential sustainability issues have increased which means we've had to invest significant resources into developing new markets and product streams."

Tarac has been highly creative in its use of winery residuals, using a closed loop process to create a range of value-added products and creating new by-products to minimise its own waste.

Grape alcohol

Tarac's production of grape alcohol to make brandy and fortified wines such as sherry and port accounts for about 75% of revenue. The decline in popularity of these products over the past 20 to 30 years has presented Tarac with a challenge. The change in consumer tastes has coincided with a major expansion of the Australian wine sector, and more residuals. To remain sustainable, Tarac has turned to overseas markets, and now exports about 80% of its grape alcohol to Europe, South Africa and North America. Grape spirit is mainly used in brandy but it is also ideal for European-style drinks such as schnapps and limoncello. Tarac also supplies fortifying and neutral spirit used in food and beverage production.

Tartaric acid

Calcium tartrate is extracted from the residuals by Tarac and converted into tartaric acid in a highly specialised process in Europe. Tarac then ships this back to Australia for sale to the wine industry.

Another value-add product for wineries, not offered by other suppliers, is liquid tartaric acid. This removes a manufacturing step for winemakers, reduces packaging and wastage, and eliminates occupation health and safety risks. Tartaric acid from Tarac is also suitable for use in baking, confectionery, soft drinks and pharmaceuticals.

Grape tannins

Many wine components, such as tannins left behind in the skins and seeds after the fermentation process, could end up as part of the waste cycle. These tannins are removed from the grape skin and seed residuals and sold back to wineries as GrapEX™. This natural grape by-product is used by winemakers to enhance the structure and complexity of red wines.

Antioxidants

Grape skin and seed extracts are a rich source of polyphenol antioxidants which Tarac sells as Vinlife®, a natural additive used in food and beverage production that is marketed for its health benefits.

Agriculture

Once Tarac has extracted the alcohol, calcium tartrate, tannins and other substances from the grape residuals, it is left with spent marc. However that is not the end of the value-add process. The by-product is used for soil conditioning and stock-feed in agriculture and horticulture.

Again Tarac has been creative in meeting market needs. Buyers were more readily available while production was close to feedlots, such as in Griffith, but in the Barossa Valley freight costs for transporting wet marc were prohibitive.

Without buyers, the spent marc was stored offsite. Tarac has invested in a new facility that dries the marc from about 50% moisture content to 10% so that the product can be pelletised for easy storage and transport.

Although the plant is still being commissioned, it has already attracted international interest with three containers of pellets a month being exported to Taiwan. The pellets have quickly found favour with the meat industry because of the nutritional value and their assistance in retaining good flesh colour.

Increasing boiler efficiency

Together, the six boilers operating in the manufacturing process use more than 100 terajoules of gas each year. Because they are such a critical part of the Tarac operation, the energy efficiency program will initially target just one 10 megawatt boiler.

"This is part of our risk management strategy in the event of any unforseen issues," says Environment and Sustainability Project Manager Ira Pant. "Once the improvements are bedded down, we will evaluate and target other steps in the production process."

The Australian Government is providing $25,000 towards the project through the Re-tooling for Climate Change* program.

Tarac is also introducing other energy initiatives:

- installing steam flow meters and sub-meters to monitor consumption across different production lines
- identifying the relationship between energy use and key production indicators
- improving the power factor at Tarac's distilleries.

Wastewater treatment

Since 1975 Tarac has been part of a joint venture in the Barossa Valley to treat wastewater effluent generated by the local wine industry.

The North Para Environment Control (NPEC) Wastewater Treatment Plant was created on a 73 hectare property near Nuriootpa after odour generated by Tarac and three local wineries became a community issue.

Over the years the operation has been extended and expanded and now comprises two separate plants:

- a high biological oxygen demand (BOD) facility owned by Tarac to treat its own high-strength waste
- a low BOD facility for treating wastewater from nearby wineries.

** The Australian Government's Re-tooling for Climate Change program is designed to help small and medium sized manufacturers reduce their environmental footprint by improving energy and water efficiency. Grants of between $10,000 and $500,000 are available for up to a maximum of half the cost of each project.*

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Treating waste water and saving energy

During its production process, Tarac generates wastewater with high BOD, which indicates a high level of organic content. At NPEC this water undergoes anaerobic digestion and reverse osmosis so that it can be reused at Tarac.

One of the by-products of the wastewater treatment is methane, a biogas that has a global warming potential more than 20 times higher than carbon dioxide. The almost 3200 cubic metres of methane produced on average each day of operation had been captured and flared to comply with environmental regulations.

The sustainability diagnostic suggested a more sustainable solution – using the methane to replace some of the natural gas used in the company's steam boilers.

When Tarac had investigated methods to deal with the wasted biogas in the past, two issues made it unviable:

- methane production is not uniform throughout the year
- the gas composition was considered too corrosive for reuse.

Several advances now make gas substitution viable. Tarac estimates that by reusing a previously wasted renewable energy resource, it can cut natural gas usage during periods of peak manufacturing. The project is the first phase in the company's plan to enhance its energy security while reducing its environmental footprint. The Australian Government is providing $157,600 under its Re-tooling for Climate Change program towards the estimated $500,000 cost.

Irrigation solution for vineyards

The winery effluent problem for wineries has increased with the industry's rapid expansion. Drought and severe water restrictions pose another major test for the sector with vineyard irrigation a constant challenge.

In 2007 NPEC expanded its low BOD treatment plant to help resolve both issues after research found the treated water was a viable alternative for vineyard irrigation. As part of a project funded under the Australian Government's Community Water Grant, the pipeline infrastructure was extended from the treatment site to seven neighbouring vineyards.

During 2008–09 the plant supplied 120 megalitres of treated effluent; a replacement for water that had been pumped from the River Murray. But with a treatment capacity of 650 megalitres and storage of 250 megalitres, NPEC is now exploring other opportunities and encouraging other vineyards to join the scheme.

Thinkers in Residence program

Tarac's central position in wine industry sustainability was recognised in 2008 when it was invited to take part in a case study for South Australia's Thinker-in-Residence program. Headed by British food industry researcher Dr Andrew Fearne, the project focused on achieving sustainable value chain management to meet consumer preferences in the UK, one of South Australia's most important export markets. Dr Fearne's final report *Sustainable Food and Wine Value Chains* can be found at www.pir.sa.gov.au/valuechains

Yalumba Wine Company also took part in the project which aimed to demonstrate the benefits of value chain analysis as a catalyst for change. "Tarac recognised that such an assessment should comprise the full chain inclusive of the 'back end' or dealing with waste residuals within the industry," says Environment and Sustainability Project Manager Ira Pant. "This service is often unseen and substantially undervalued by most of the chain, particularly the consumer.

"Further, collaboration with Yalumba and other supply chain partners has provided Tarac with tangible evidence of the benefits of moving beyond the traditional economic models of value chain analysis."

Workplace environmental initiatives

Tarac achieved ISO 14001 environmental management system accreditation in 2007 and continues to pursue sustainability improvements across its business. Environmental sustainability is now routinely on the agenda of management and operational meetings and is a consideration when updating preferred suppliers. Tarac's environmental systems are regularly reviewed and a new performance management system introduced at the end of 2008 identified key personnel as 'environmental officers'.

Special training programs are being held for these officers while all staff undergo general environmental awareness training to remind them of the correct recycling bins, to turn off lights, and other workplace initiatives. Environmental issues are also included in every issue of Tarac's internal monthly magazine *On the Marc* and awareness posters are being placed across all Tarac sites.

A green supply chain

Identifying suppliers with the same environmental mindset as Tarac is a goal of Purchasing Officer Anthony Westbrook. "We are focusing on greening our supply chain by progressively replacing inventory with products that have a lower carbon footprint," says Anthony.

The various initiatives include:

- adding more local companies to the preferred supplier list to minimise transportation
- signing a contract with a new stationery supplier willing to collect print cartridges for recycling (cartridges are remanufactured with unused parts and made into items such as outdoor furniture and fence posts)
- sending obsolete computer equipment to recycling depots
- using multi-trip bags for exporting calcium tartrate, which will halve the amount going to landfill.

Chris Zajac
Chief Executive Officer
Tarac Technologies
8568 6583
chrisz@tarac.com.au

Aubrey Thomas
Senior Adviser, Industry Sustainability
8204 9046
aubrey.thomas@zerowaste.sa.gov.au

John Blumson
Manager, Industry Sustainability
8204 2043
john.blumson@zerowaste.sa.gov.au

www.zerowaste.sa.gov.au
Level 8, Statewide House
99 Gawler Place
Adelaide SA 5001

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Tarac

Tarac Technologies has four manufacturing plants in Australia which transform winery residuals such as grape marc into commercially viable products. The company has annual revenues in excess of $25 million and exports about 80% of its product. Tarac employs 60 permanent staff plus 20 full-time casuals during vintage.

www.tarac.com.au

Zero Waste SA

A South Australian Government agency that advances improved waste management policies and the development of resource recovery and recycling. The Zero Waste SA Industry Program advises and supports companies to achieve sustainability goals in waste, water and energy.

www.zerowaste.sa.gov.au

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