Real energy solutions

Profitability in sustainability

As documented in the Garnaut Climate Change Report, the overwhelming weight of scientific evidence indicates that Australia faces significant risks with climate change.

The Australian wine sector is particularly vulnerable to these risks, which come at a time of volatile energy costs; increasing global competition; heightened consumer awareness of environmental issues; the uncertainty of future emissions trading; and binding targets for greenhouse gas emissions.

However, a world 'beyond carbon' is not a lost cause and progress can be achieved if we change our behaviours and adopt different courses of action. What is needed is a new approach to the challenges of climate change and sustainability that encourages long-term solutions. Where economics and sustainability go hand in hand; gone is the assumption that 'going green' always loses money.

But what does all this mean in practice? What is required for the grape and wine sector to become sustainable *and* profitable at the same time? What opportunities and developments do we need to look to in the near future? And what can we do now?

Initiatives for immediate deployment

Environmental and sustainability pressures are affecting business activities now, so efficient, low-cost solutions are needed for immediate deployment. Fortunately, there are relevant proven solutions for industrial process improvement that can be implemented relatively quickly and, in many cases, with favourable economic return on investment.

Energy efficiency improvements, for example, can be obtained in many winery engineering process areas. Potential areas where significant high impact and/or low cost improvements might be found right now include refrigeration and air conditioning; hot water generation and waste heat recovery; air compressor performance; and wastewater treatment. For improved water efficiency, potential improvements may include water recycling; capture and reuse of cleaning chemicals; and transfer line 'pigging'

Emerging long term solutions

Looking beyond the short-term, a number of potential opportunities also exist for the Australian grape and wine sector to adapt emerging smart technologies for improved energy security and environmental sustainability. Biomass energy from grape marc is an exciting new opportunity which the AWRI is actively pursuing with other research partners in biochemical engineering and energy technology.

Ligno-cellulosic methods that produce bioethanol offer a number of potential advantages for the Australian wine industry. For example, biomass fermentation and downstream bioproduct processing may be possible using existing winery plant infrastructure, reducing upfront capital costs. Wine producers and research providers such as the AWRI, already possess technical and scientific expertise in managing and optimising fermentation. Finally, ethanol derived from biomass is a renewable fuel for which demand is rapidly growing, especially from 'second generation' materials such as grape marc and grape stalks, which do not compete with food crops.

Alternatively, thermal biomass process methods like gasification and pyrolysis can be used to produce renewable electricity, which can be used directly on-site at a winery, or fed back into the local electricity grid. These thermal process methods also produce substantial heat as a by-product, which could be used within a winery setting to generate additional process heating and absorption refrigeration capacity for further efficiency gains.

As peak energy demand in a winery occurs at the same time as peak refrigeration demand, tri-generation may offer a significant reduction in winery electricity requirements, with a corresponding carbon footprint improvement. Solar thermal energy systems, which utilise solar troughs, dishes or Fresnel mirror systems for process heating, could also be incorporated into a co-generation or tri-generation setup for further grid-energy savings, particularly in wine regions with significant solar resources (such as the Riverland, Sunraysia and Riverina).

Key points at a glance

- Emerging technologies – Biomass energy, solar thermal.
- Wine sector generates substantial quantities of biomass waste streams (such as grape marc) which could be utilised for renewable energy.
- Grape marc is a Second Generation Biofuel – does not impact negatively on resources for food production and supply; no land encroachment or biodiversity risks.
- Biomass energy – thermal processes (gasification, pyrolysis), ligno-cellulosic bioethanol, biogas via anaerobic digestion.
- Possible products – renewable electricity, liquid fuels and high value specialty chemicals, biochar.

Where can I find out more?

For further information visit the AWRI Environment Portal. Here you can search the AWRI's dedicated database of environmental articles; use the Environment Search Engine to search across multiple relevant websites in one place; or browse a range of specially-selected links clustered by topic.
http://www.awri.com.au/industry_support/environment/

Additional resources:
Commonwealth of Australia (2008) The Garnaut Climate Change Review: Final Report, Cambridge University Press, Melbourne
Commonwealth of Australia (2003) A guide to energy efficiency innovation in Australian wineries: Energy Efficiency Best Practice. Department of Industry, Tourism and Resources
AWRI publication #1112. Muhlack, R. (2008) Necessity the mother of invention: being smarter with energy and water. Aust. N.Z. Wine Ind. J. 23(6): 58-59.
AWRI publication # 1162. Muhlack, R.A.; Smith, P.A.; Wells, S.; Pender, D.; Pretorius, I.S. (2009) The climate is right for change. WBM, August 60-62.

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