



Benbow Environmental

News Update

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ABOUT BENBOW ENVIRONMENTAL

Benbow Environmental is a 100% Australian-owned professional environmental consultancy firm, specialising in environmental engineering, occupational health and greenhouse gas management. We work with small, medium and large organisations in Australia, New Zealand and South-east Asia providing specialist technical expertise and delivering complete cost-effective solutions.

BE continually demonstrates environmental commitment to its industry partners through quality assurance. Our programme follows ISO 9002 methods to bring clients valuable and timely recommendations, guidance and action.

Benbow Environmental works with all clients, regardless of size as partners, and warrants that all of its services are conducted with thorough and professional competence.

We are committed to customer service excellence and employ highly qualified and experienced consultants who work closely with clients to understand their requirements and deliver the best outcomes.

From Junkyard to Resource Recovery Kingdom

Isn't it funny how people's perceptions of waste have changed over time? My parents used to save everything: leftover food would be stored in the fridge to be eaten the following day; old clothes would be re-sewn into blankets and quilts. Even today, they keep a bucket in the kitchen and laundry to save that extra drop of water for the garden. Nothing would go to waste. Then we came along. The X and Y generations. The generations of plenty! So much so that any leftover food went straight into the bin, old clothes were thrown away or given to charity and we used water like it was going out of fashion!

With so much waste being thoughtlessly discarded, we obviously needed somewhere to put it. Most of us just threw it in a bin that was taken away by the Council garbage truck and never thought of again. Then our landfills started filling up and we needed more room for our unwanted 'stuff'. Recycling began and we now have a red lidded bin for 'garbage' and a yellow lidded bin for 'recyclables'.

The same thing happened in industry. With landfills filling up, the cost to dump things climbed. 'Junkyards' took waste, used any good parts and discarded the rest as 'junk'. Hasn't the old junkyard come a long way? Now there are new regulatory requirements that prohibit junkyards in many zones across Sydney and junkyard operators have either gone out of business or have had to step up and develop new ways of dealing with 'junk'. But is it junk? Or is it a valuable resource?

No longer will we see stockpiles of scrap cars and other valuable resources going to waste. Now operators are cleaning up their sites using visually pleasing landscaping to buffer their operations and are undertaking processing

activities, reducing the smell, noise, dust and the unsightly mess that was once a feature of the old junkyard.

In my role at Benbow Environmental, I have witnessed the development of new technologies for resource recovery, mainly in the metal and glass recycling sectors. Whole car bodies and whitegoods can be processed into materials suitable for use in other industries. Even waste resulting from this processing has the potential to be reused as a fuel in certain industries.

A report that we prepared for a glass recovery facility described technologically advanced optical sensors fitted to a signal processor to remove impurities and colour sort the glass. A diagrammatic representation is shown in Figure 1. This technology is so sensitive that it is essential for the incoming glass materials to be free of contaminants that could hinder the sorting process – a far cry from the old junkyard!

Research is increasingly being undertaken into new technologies to improve recycling and recovery processes. Benbow Environmental is excited to be a part of this research and look forward to sharing our experiences in future articles.

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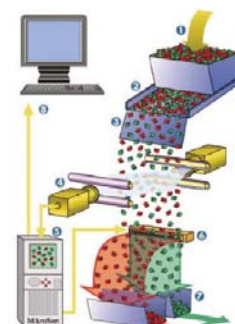


Figure 1: The sorting of crushed collected glass (Source: "Glass Recycling with Mogensen Sorting and Screening Systems" (2005))

Use of by-products as alternative fuel in the Cement Industry

A metal resource recovery facility proposed for South West Sydney was designed using best practice technologies in shredding and sorting equipment to accept whole car bodies, whitegoods and other scrap metal to process and separate them into raw materials suitable for use in foundries and other non-ferrous metals that can be sold and reused in other industries. Despite recovering scrap material, the process would still generate 30% waste in the form of “automotive shredder residue” or “ASR”.



Figure 1:
Automotive shredder
residue

ASR consists of dust, glass, fibre, automotive liquids, plastics, dirt and the reject pieces of material that are too hard to be ground in the shredder. This waste is generated from the de-dusting, separation, discharging and sieving processes.

There is potential to use ASR from the metal recycling process as an alternative fuel in the cement manufacturing industry. The burning of non-hazardous waste fuels such as tyres became well established and accepted in the industry in the late 80's and early 90's⁴. Some examples include Castle Cement in the UK, Lafarge in France and Obourg Cement in Belgium.

Hazardous waste was first burned in a cement kiln at General Portland Cement Plant in Ohio in the USA in the early 1980's. The waste was manifested to the cement plant where it was blended and stored on site. At a similar time, PCB containing wastes were being burnt in Norcem, a cement plant in Norway.⁴

Many cement plants in the US currently use alternative fuels to meet 20-70% of their energy requirements. The alternative fuels used are often consumer or industry by-products. Recovering the energy value from these alternative sources of fuel in a cement kiln is a safe and proven form of recycling¹. Tyres are a good source of hydrocarbons and using tyres for combustion in a cement kiln produces 25% more energy than coal and can also result in lower emissions¹. In fact, the Portland Cement Association claim that “any material with a high carbon content could be used as a fuel”¹. The extremely high temperatures within a cement kiln (>1650°C) would enable these materials to burn quickly and extremely efficiently.



Figure 2:
A cement kiln with tyres in
the foreground – a potential
alternative fuel

Further trials are being undertaken at a number of cement manufacturing facilities around the world on alternative fuel sources to operate cement kilns. Cemex Construction Materials located in Florida USA are testing a list of alternate products including plastic agricultural film, agricultural waste such as animal bedding, citrus peels and rice hulls; carpet-derived fuel, woody biomass; roofing shingles; paper; and tyre-derived fuel.³ Besides reducing fossil fuel use, other benefits that these alternative fuels would bring include promoting a more diverse energy supply, using locally generated resources, promoting recycling which creates jobs and reducing greenhouse emissions.

Another UK based cement manufacturer, Castle Cement has tested a variety of alternative fuels including organic waste streams, together with residues from the solvent recycling industry, spent tyres, waste paper, packaging and plastics. In the 1990's, Castle found that use of liquid waste streams as alternative fuels could be a successful partial replacement for coal, with no harm to cement quality and no net adverse environmental impact.² Castle now use a new fuel “cemfuel” containing methanol, ethanol and acetone. Cemfuel is injected directly into the kiln flame and is rapidly and completely consumed. “Regular monitoring of emissions demonstrates that burning Cemfuel as a partial replacement to coal significantly reduces emissions of oxides of nitrogen with no appreciable changes in other emissions, such as dust, metals, dioxins, furans and total organic carbon”.²

According to the Portland Cement Association, burning alternative fuels in cement kilns offers several environmental benefits including:

- Conserving fossil fuels;
- Safely destroying wastes that would otherwise be sent to landfill; and
- Waste oil, scrap tyres, solvents, unrecyclable plastics and other materials could be used as alternative fuels.

Trialling alternative fuels in cement kilns has proven to be beneficial in a number of cement manufacturing facilities in the US and Europe. One study undertaken in Australia focussed on alternative fuels used at Blue Circle Southern Cement's plant at Berrima. However, the outcome of this usage is not clear at this stage.⁵

Considering the close proximity of the proposed development to several cement manufacturing facilities within the Sydney area, and the substantial research already undertaken, use of ASR as an alternative fuel appears to be a real possibility. Significant research would be required for an idea of this nature to be turned into a reality. There are a number of matters that would need to be considered. Investigation into the use of any alternative fuel would require the following:

Analysis of the Cement Plant

This would provide insight into the restrictions and potential opportunities the cement operation has to burn certain alternative fuels. Analysing the plant would involve examining current clinker and cement chemistry, raw material chemistry,

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Keeping the Experts honest ...

Benbow Environmental were recently commissioned by landholders adjoining the proposed extension of the Xstrata Mangoola (Hunter Valley) open cut coal mine to conduct a peer review of the proponent's expert consultants' reports that were being relied upon in the Environmental Assessment to support the project. Surprisingly, BE were able to identify a number of inconsistencies, omissions and technical errors particularly in the areas of BE's specific expertise – noise, blasting and air emission impacts. Our findings raise serious questions as to the overall rigour of the proponent's application.



Figure 1:
Study area

It is recognised that the coal mining industry in Australia is of vital importance both in providing royalties to Government and the massive use of infrastructure and employment that secures the financial viability of many of the community. However, notwithstanding the significance of this industry, the cumulative impacts from numerous open cut coal mines are causing significant concerns to other competing rural industries, adjoining landholders and the public in general. The perception amongst these greatly concerned stakeholders is that adverse environmental impacts resulting from the continued expansion of the coal mining industry are occurring which may be understated. In relation to the important neighbouring agricultural land uses it seems likely that impacts on these industries may have been glossed over or even ignored completely.

An additional concern is the very real impacts the coal industry can have upon surrounding property values. The presence of an open cut mine adjoining the property of one of the clients of the report resulted in the inability of the owner to obtain mortgage financing from their bank. The Owners attempted to sell their property on a number of occasions only to have each purchaser pull out due to the Bank's refusal to finance the purchase due to its proximity to Mangoola Mine. This matter was not considered by the proponent in any of the reports we were able to examine.

The property owners who have commissioned our report are rightly concerned about a number of inconsistencies between their real life experiences with current operations of the Mangoola Mine and the monitoring report undertaken on behalf of Mine Management. There is considerable alarm at the proposed expansion of this mine from 10,500,000 tpa to 13,500,000 tpa ROM coal and some consternation at the veracity of the specialist reports that support what is a significant 33% increase in production.

In summary the following are the main areas of concern:

- Recently approved land subdivisions and new building sites were not considered in the lists of receiver locations for noise, blasting and air emissions assessment. Thus

reliance may be placed on the contour plots of noise and dust rather than on the discrete receptors being included in the modelling. For noise specifically there usually is an important difference of 2-4dB(A) between a noise contour plot and the modelling at discrete receptors.

- A property owner reported that he was advised during the consultation programme that the operational noise levels were expected to **increase** as a result of the expansion of the coal mining activities. However the noise assessment report shows a significant **reduction** in operational noise levels. This inconsistency has caused the property owners to question the accuracy of the noise modelling.
- At least 25 inconsistencies were identified that could directly result in over optimistic noise predictions. Unnecessarily complicating an objective assessment was the proponent's use of a different noise model to that model used in earlier assessments. Compounding this is a failure to calibrate the noise model being used. Given that the mine is actually in operation, this is somewhat surprising. We also noted that earlier versions of the model gave overly optimistic noise reductions due to topography; this led to corrections being made to the noise model with the direct result that the version used in the assessment is now outdated.
- The Annual EMP for the period 1 Jan 2012 to 31 Dec 2012 states that attended noise monitoring is not undertaken at 71 receivers but only at those receivers agreed to with OEH (now NSW EPA) and can be 'inferred' using a calibrated noise compliance model. In our view it is not acceptable to make an 'inference' in these circumstances but that the results claimed should be demonstrated.
- The published noise monitoring data shows no exceedances, yet there were 386 complaints formally registered relating to noise. Given that noise prediction model for the mine extension was not calibrated this is a significant deficiency in the report.
- Also missing is any comment on compliance with rail noise impacts resulting from the proposed 33% increased production.
- DGRs relating to transport noise and rail movements including the cumulative impacts of other mines in the area were omitted entirely.
- The blast prediction assessment relied upon generalised 'motherhood' statements to make assumptions rather than findings supported by monitoring data.
- The DGR relating to blasting required that the impacts on livestock and property also needed to be considered besides the effects on people. Whereas the air impact assessment has given consideration to blast fumes upon people it has not considered the impact of oxides of nitrogen within the plume and health implications to the important Equine and Vineyards Industries for which the Hunter Region is notable.
- The environmental reporting does not attempt to establish the contribution of the dust that occurs from the coal mining activities. Water tanks on three affected properties were regularly de-sludged by the coal mine however this fact was omitted from the reports. The levels of the dust deposition measured at the gauges and predicted in the model would not be expected to require desludging of these tanks used for drinking water.

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current fuel chemistry, both recycled and “wasted” cement kiln dust and emissions from the plant. The analysis would identify any potential limits relating to product quality issues and regulatory obligations. It should also examine the physical configuration of the kiln system to identify areas to process, stage and feed alternative fuels.⁴

Investigate Local Markets

This would involve identifying what alternative fuels are available and where they can be sourced from. Also, transportation, processing and storage issues would need to be explored.

Overall Plant Improvement

The alternative fuel options should yield a better return for the plant. The cost of the alternative fuel versus traditional fuel as well as transportation costs, processing costs, landfill savings and possible GHG revenue for emission reductions need to be considered.

Air Emission Requirements

Satisfying air emission requirements in the Protection of the Environment Operations (Clean Air) Regulation 2010 would be a significant issue to be addressed and many prevent early adoption of this opportunity. A further alternative that is in its infancy is the use of components of ASR as a feed stock in the pyrolysis process.

In examining alternative fuels, other considerations might be community relations, quality control and ensuring the alternative fuel programme is suitable to the plant relative to market, technical and regulatory issues.

References

1. Portland Cement Association – www.cement.org/manufacture/man-fuels.asp
2. Castle Cement 2004 – http://www.castlecement.co.uk/env_alt.htm
3. “Cemex seeks state permission to test burn alternative fuels at Brooksville” - <http://www.aggregateresearch.com>
4. “Alternative Fuel and Economic Downturn”, David Gossman, Gossman Consulting Inc., USA, Mar 2009 – http://www.gcisolutions.com/WCT_mar09_75-80.pdf
5. Alternative Fuels at Berrima Cement Works (Blue Circle Southern Cement), J.D Court and Associates Pty Ltd (2005)

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Figure 2:
Aerial photo of part of
the area involved

- The effects of lower ground vibration from blasting upon an adjoining historic building was not considered in the blast impact assessment.
- The sensitivity of the predicted levels to error has not been addressed in the report. Given the importance of dust to the community especially those engaged in sensitive agricultural activities, a sensitivity analysis would be considered essential. We note that other air impact assessments undertaken for other coal mining intensification projects also fail in this regard.

Our review of the documentation provided by the Mangoola mine and their experts has found a number inconsistencies, errors and omissions in the consultants’ reports relating to environmental issues that would seem to support the concerns of the public. This has, unfortunately, created a level of uncertainty and reinforces the community’s opinion that their concerns are not weighted equally due to the significance of the coal mining industry to the economy.

The mining industry is too important to the Australian economy to continue to operate in an atmosphere of confrontation with the community and environmental advocates. However this does not necessarily have to be the de facto position adopted by the respective parties.

It is apparent that the interests of both the proponents of mining activities and the affected community would greatly benefit from a rigorous and objective peer review process that is undertaken prior to these applications proceeding and not retrospectively during the assessment stage. In our opinion this would be best undertaken by an independent expert as part of the Community Consultation process. This would have a twofold effect of reducing errors and omissions in the proponents’ reports whilst also building trust between the parties that the process is indeed objective and transparent.

Link to the full BE report:

https://majorprojects.affinitylive.com/public/aa8729e02cb9032d5acce281740d0826/Submission_%20Upper%20Hunter%20Holdings.pdf

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