Ash Development Association of Australia

COAL ASH matters

15 NOVEMBER

CCPs - *a valuable resource*

www.adaa.asn.au

THIS ISSUE - NOVEMBER 2015

Ash Development Association of Australia

Phone: 02 4228 1389

Fax: 02 4258 0169

Email: info@adaa.asn.au

Website: www.adaa.asn.au

Twitter: @adaa_info

Editorial

As 2015 draws to a close, the Ash Development Association of Australia (ADAA) continues its commitment to keeping its members, stakeholders and wider readership up to date with the latest industry developments, environmental issues and legislation changes affecting our industry. As the final publication of the year, this edition of Coal Ash Matters (CAM) sums up a very productive year in the Coal Combustion Products industry.

Launching this year, the bi-monthly eNewsletter "Coal Ash Flash", has been extremely successful in keeping our readers in touch with fly ash news between the release of each CAM publication. Coal Ash Flash success is highlighted by the over 2,000 active readers subscribing throughout the year. Being a news brief, the publication aims to keep our readers up to date with the current issues and urgent updates that occur before and after publication of each CAM such as the release of the FactBook. We are constantly working to improve these publications and welcome all feedback and suggestions our readers may have.

This edition of CAM contains a variety of articles, including an industry award for the 2nd Edition of the CCP Handbook presented at the Concrete Institute of Australia event - Concrete 2015 Melbourne and launch of the CCP FactBook now available online. The Factbook can be downloaded from the Apple iBook, Google Play and Amazon Store. The FactBook provides a quick reference to facts about CCP's right on your phone or tablet.

As promised, one year on, an update on the highly anticipated Barangaroo construction project with the first stage of the development (The Barangaroo Reserve) now completed and opened to the public. The next stage of the project involves using fly ash to remediate the earth where Australia's first Gasworks stood. Project updates on the new Foxground/Berry Bypass Upgrade on the far south coast of NSW. The project is now well underway and has created 500 jobs for the community.

Conference reports from across the globe, comprising a review of the 2015 World of Coal Ash Conference from Association member Dr. Jane Aiken, and a wrap up of Concrete 2015. Both events drew impressive numbers of delegates, and provided the Association with new connections and opportunities. Craig Mellick from BG&E Materials Technology attended the ADAA stand with the rest of the ADAA team to assist in promoting the Association. Craig is the subject of our Member Employee Profile for this edition and he discusses the work currently being undertaken by BG&E-MT and where he thinks the future of the technology is headed.

The results from our Annual Membership Survey are now in and collated, providing a very interesting snapshot of the industry. In 2014, Some 5.4 million tonnes or 49% of CCPs produced have been effectively utilised in various value-added products or to some beneficial end over the period, which is an increase of over 7% from 2012. Also, 67% of effectively utilised fly ash was used in high value-added applications such as cementitious binders, concrete manufacture or mineral fillers.

As highlighted by the recent membership survey the long-term trend for CCPs continues toward high value-added applications. Two articles on companies that are doing their best to find value added applications for CCPs are profiled in this edition. Associate members Latrobe Magnesium and a Canadian company, Orbite Aluminae Inc whose unique patented process aims to utilise chloride-based technology to recover all valuable materials including rare earth metals.

Finally, we would like to thank all contributors to CAM over the year who have so diligently supplied articles for this and all previous editions. We hope you enjoy this edition and as always feel free to share with your friends and colleagues to further promote the use of CCPs – a valuable resource.

From all of us at the ADAA, we would like to wish all of you a very Merry Christmas. Have a safe new year, and we look forward to working with you in 2016.

COAL ASH EDITORIAL TEAM

Chief Executive Officer: Craig Heidrich

Editorial Coordinator: Jake Latham

Contributors: Craig Heidrich, Lauren Hatton, Aiden Chilcott, Jane Aiken, David Wright, Arnaud Castel and Daksh Baweja.

Coal Ash Matters is a bi-annual publication

Editor: Aiden Chilcott

Design: 101 Design

Circulation: 2000

Membership

COMPANY MEMBERS

A primary role of the ADAA is to bring together producers and marketers of coal combustion products (CCPs). Our activities cover research and development into CCP usage, advocacy and technical assistance to CCP producers and users, as well as a forum for the exchange and publication of CCP information.

For more information on the Association, visit us at **www.adaa.asn.au**

- Adbri Resources
- Adbri Masonry
- BG&E - Materials Technology
- Boral Quarries & Recycling
- Bulk Flyash Grouts
- Classique Environment Solutions Pty Ltd
- CS Energy
- Delta Electricity
- Golden Bay Cement (New Zealand)
- Heeleys Consulting
- Hyrock (NSW)
- Intergen (Millmerran)
- Latrobe Magnesium
- LLIS Industrial (formerly Conneq Industrial Infrastructure)
- NRG Gladstone Power Station
- Origin Energy Eraring Power Station
- Roads and Maritime Services
- Stanwell Corporation
- Sunstate Cement
- Synergy (Verve Energy)
- Vecor Australia
- Wagners Cement

RECIPROCAL MEMBERSHIPS

- CSIRO www.cmit.csiro.au
- Association of Canadian Industries Recycling Coal Ash (CIRCA) www.circainfo.ca
- European Coal Combustion Products Association (ECOBA) www.ecoba.org
- UK Quality Ash Association www.ukqaa.org.uk
- American Coal Ash Association www.acaa-usa.org
- World Wide Coal Combustion Products Network (WWCCPN) www.wwccpn.org

Coal Combustion Product Handbook: **2nd Edition**

Each Concrete Conference, hosted by the Concrete Institute of Australia, recognizes outstanding achievements in concrete through their Awards for Excellence in Concrete. There are various categories for which the awards are presented, including Project, Technology, International and Sustainability. These categories are further divided into Building and Engineering projects within each state. The judging of these categories is determined by:

- Durability and Weathering
- Novelty and Innovation
- Research and Publications
- Excellence
- Design
- Construction and Construction Process
- Materials and Concrete Technology.

The ADAA Coal Combustion Product Handbook: Second Edition was nominated to receive an award for 'Research and Publications Award'. The National Awards were presented during the Gala Dinner held during the Conference in Melbourne from 30th August – 2nd September.

Nominated in the Technology Category for the 2015 Awards for Excellence. The Concrete Institute of Australia recognised and awarded the Handbook 'Highly Commended'. Craig Heidrich (CEO) accepted the award on behalf of all contributors.

The second edition of the Coal Combustion Products Handbook continues the strong relationship developed between researchers, industry experts and the energy industry that was established during the term of the Cooperative Research Centre for Coal in Sustainable Development (2001–2008). Over the last seven years, advances in the understanding of CCPs and their uses have led to this second edition of the Coal Combustion Products Handbook. The Second Edition has over thirty contributing authors and comprises of 482 pages of some of the most recent fly ash literature.

The second edition also includes two completely new chapters due to the increasing applications of fly ash.

Chapter 13: Characterisation, Impact and Use of Products from Other Technologies.

This chapter is based primarily on Research Report 89 (Riley et al. 2008), published by the Co-operative Research Centre for Coal in Sustainable Development (CCSD). It summarises the alternative technologies under consideration that may be introduced in the transition towards low-carbon power generating systems, especially the differences between the combustion products produced by transitional power generation technologies and the fly ash (and bottom ash) produced by conventional pulverised fuel power stations.

Chapter 14: Geopolymer Cement and Concrete.

This chapter describes aspects of the use of fly ash in geopolymer mixes. The word geopolymer was coined for the cement-like material produced by alkali activation of amorphous aluminosilicate feedstock (Davidovits 1991). Geopolymer is a cement/concrete material that has the potential to change the current image of CCPs as an industrial waste and a problem into a valuable resource for the production of useful materials.

The Coal Combustion Products Handbook is now available to be purchased on the ADAA website at http://www.adaa.asn.au/store

Image: Craig Heidrich receiving the Highly Commended award from CIA President, Douglas Jenkins.

CCP FactBook

Following on from the success of the Coal Combustion Products Handbook first published in 2007, and subsequent 2nd Edition in 2014 – there was considerable passionate debate with the Association as to continue with the printed format or migrate to e-book online platform. The consensus was – continue with the printed format, but create an accessible, easily understandable, affordable and simplified e-book version of the Handbook.

In May 2015 the ADAA 'FactBook' went live on Apple, Google and Amazon e-book store platforms. The FactBook offers readers a comprehensive understanding of the basics of CCPs. It employs a simple 'story telling' methodology to disseminate complex ideas in a simple manner. The eBook is available on mobile and tablet devices, meaning you will have all you need to know about CCPs right there in your pocket.

The e-book covers the essential beginners pack to understanding everything fly ash including:

- Coal formation
- Coal combustion product summaries
- The collection of coal combustion products
- The use of coal combustion products
- Market and industry information.

FREQUENTLY ASKED QUESTIONS

Q. What is a FactBook?
A. It is a proven, simple 'story telling' methodology to communicate complex ideas to a broad range of audiences.

Q. How can the FactBook improve my understanding of coal combustion products?
A. The FactBook improves your understanding as the highly technical nature of the CCP industry is simplified and in some cases shown in a visual representation. The FactBook allows newcomers to the industry to grasp key words and concepts involved in all fly ash processes and applications.

Q. Who is the FactBook targeted at?
A. Anyone who feels as though their knowledge around the basics of fly ash could be improved in an easy to understand, visual method.

The contents of the factbook include:

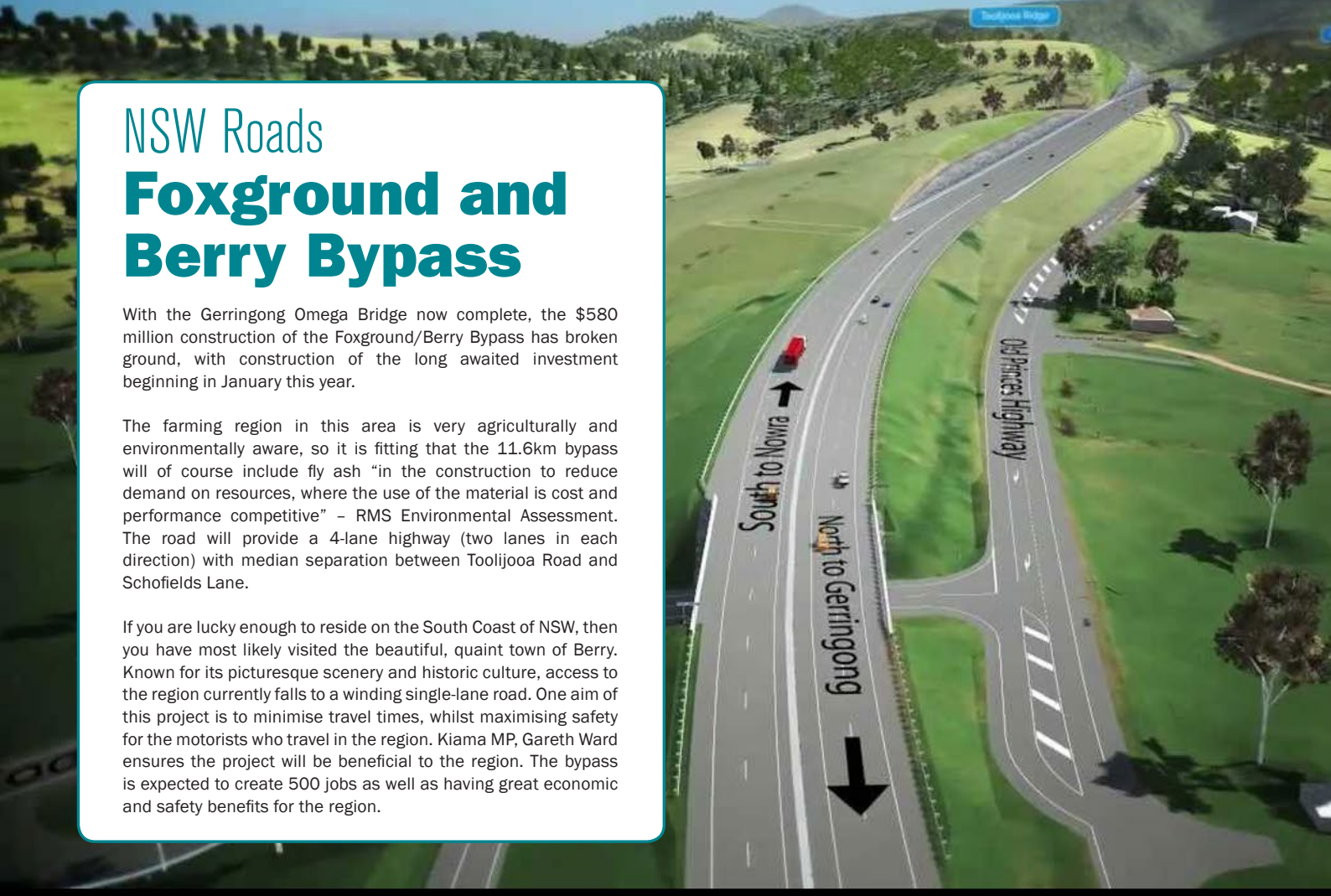
- **Coal Combustion Product Summary**
  "Australia produces approximately 13 million tonnes of coal combustion products annually. The majority of this material is not beneficially used despitea range of utilisation opportunities."

- **Coal Formation**
  "The quality, quantity and location of coal is not uniformly distributed and the nature of the mineral matter also varies significantly."

- **Coal Combustion Product Collection**
  "Fly ash constitutes up to 90% of the coal combustion products from a coal fired power station."

- **Coal Combustion Product Use**
  "There are mature industries which utilise coal combustion products - some require simple transformation, others more elaborate processing."

- **Coal Combustion Product Volumes**
  "Of the 780 million tonnes of coal combustion products generated world wide, some 49% was beneficially utilised in 2014."



NSW Roads
Foxground and Berry Bypass

With the Gerringong Omega Bridge now complete, the $580 million construction of the Foxground/Berry Bypass has broken ground, with construction of the long awaited investment beginning in January this year.

The farming region in this area is very agriculturally and environmentally aware, so it is fitting that the 11.6km bypass will of course include fly ash "in the construction to reduce demand on resources, where the use of the material is cost and performance competitive" – RMS Environmental Assessment. The road will provide a 4-lane highway (two lanes in each direction) with median separation between Toolijooa Road and Schofields Lane.

If you are lucky enough to reside on the South Coast of NSW, then you have most likely visited the beautiful, quaint town of Berry. Known for its picturesque scenery and historic culture, access to the region currently falls to a winding single-lane road. One aim of this project is to minimise travel times, whilst maximising safety for the motorists who travel in the region. Kiama MP, Gareth Ward ensures the project will be beneficial to the region. The bypass is expected to create 500 jobs as well as having great economic and safety benefits for the region.

Concrete 2015 Report
Research into Practice

The Concrete Institute of Australia's highly anticipated Biennial National Conference, Concrete 2015 was held at the Pullman Hotel, Albert Park, Melbourne from 30th August to 2nd September 2015.

The conference attracted over 600 delegates to the plenary session commencing at 9.30am on the first day of the event. Throughout the 3-day event the ADAA's stand was popular among attendees with steady interest across all of the break out sessions. Over the duration of the Conference many domestic and international delegates were keen to ask technical questions in regards to the end uses of the products displayed.

The exhibit included displays of generic samples of decapitalise fly ash, ADAA USB's and the all-important chocolate to attract delegates. An iPad was used to feature the Association's website and proved a useful tool in demonstrating to delegates how simple it was to find technical, product and statistical information on our website. The iPad was also used to feature the recently released CCP FactBook.

Conference highlights included

- 7 keynote speakers
- 600+ registrants networking, including 140+ international delegates
- 37 exhibiting companies, 18 sponsors
- 162 technical papers.

The theme of the Conference was "Research into Practice", covering materials, research, design, construction and innovation. The Conference provided a forum for the sharing of ideas and experience through formal presentations, industry displays and informal contact between delegates. It was the concrete industry's pre-eminent technical and social event in the Southern Hemisphere for 2015.

The technical program was of value to practicing Civil and Structural Engineers, Engineering Academics, Concrete Product Manufacturers, Civil and Building Contractors, Developers, Government Departments covering Transport, Roads, Railways and Public Works and Local Government Shires and Councils.

The Focus is on Fly Ash at **Barangaroo**

The more we hear about the Barangaroo upgrade the more we keep seeing the words 'fly ash' pop up. From extraction to remediation and concrete use, fly ash is becoming a key material in the construction market in Sydney's CBD.

Recently, the Barangaroo Reserve was officially opened to the public. The park area in the northwest of Sydney's CBD has not been accessible to the public for more than one hundred years. The opening of the Reserve is the first public reveal of the entire six billion-dollar Barangaroo Upgrade.

As the Barangaroo Reserve project closes, media focus now moves back to construction of the skyscrapers, said to be completed in 2023. The next step in the construction process is to remediate the earth below the old Millers Point Gas Works. The Gas Works produced Australia's first gas lamp back in 1841. The Works were de-commissioned in 1921, and all aboveground structures were removed in 1925 in an attempt to stop rats travelling to boats, carrying the bubonic plague. As the structure was no longer visible by anyone, the underground plant was forgotten, which included coal tar and 150,00 cubic meters of contaminated fill.

Being an identified contaminated site, legislation requires that this material must be removed and the site being remediated with concrete. This will be achieved with the assistance of fly ash as cement replacement within specific building elements. Specifically fly ash and ground granulated blast furnace slag. The majority of concrete is also being batched onsite or is Envisia Concrete to further reduce the carbon footprint of the project by minimizing emissions from the transportation to the work site.

The ADAA will keep its readers updated in future editions of Coal Ash Matters and Coal Ash Flash about the Barangaroo upgrade.

Member Article:
BG&E by Craig Mellick

Q. What is the work focus at BG&E Materials Technology?

A. BG&E Materials Technology with its knowledge, technical skills and experience, aims to provide the best possible advice and solutions for its clients, in Australia and overseas in engineering materials related issues on construction projects. Our services are relevant through the lifecycle of a project from materials selection and optimisation at the start of a project through to construction support to asset inspection and remediation. We aim to differentiate ourselves from others by striving to provide timely advice whilst maintaining high standards of investigation and reporting practices.

Q. Compared to other past employers, how goes BG&E Materials Technology hold up?

A. BG&E Materials Technology is very unlike other materials consulting firms I have been involved with in the past. The flat organizational structure adopted by BG&E Materials Technology allows efficient communication with all staff significantly contributing to the delivery of timely solutions to industry. The organisation is one that has chosen the areas in which it will specialise and believes its clients get the benefit of this technically innovative engineering.

Q. What are your roles and responsibilities at BG&E Materials Technology?

A. As a Principal Materials Technologist at BG&E Materials Technology my role is to continue to develop business opportunities, grow the business and nurture new and existing relationships. We also see a focus on ensuring the level of reporting and quality of content being sent out exceeds our clients' expectations.

Q. What is the next big step for BG&E Materials Technology?

A. The next big step for our group is the adoption of Unmanned Aerial Vehicles (also known as Drones) to carry out Inspections on Buildings and Infrastructure assets.

Q. Is there any new interesting projects BG&E Materials Technology has taken on recently and what do it involve?

A. There are numerous interesting projects BG&E Materials Tecnology has successfully undertaken across Australia, the Middle East and South East Asia, for example:

Over a 24 hour period, we inspected a 500,000 square metre pavement, in order to undertake a condition assessment and identify defects. This was completed using sophisticated GPS technology, which located the precise location of the defect, captured an image of the defect and populated an interactive Google Earth report.

Defects were then classified to allow for future capital works to be prioritised and a longitudinal record of defect degradation over time to be established. This type of reporting allows for a more comprehensive record of pavement condition to be maintained, and is unsurpassed as a means to provide information retrieval to the client.

Q. Is BG&E Materials Technology involved in any Industry or support groups?

A. BG&E Materials Technology is actively involved with a number of industry groups including;

- Ash Development Association of Australia
- Concrete Institute of Australia
- Engineers Australia
- Concrete Pipe Association of Australia
- Australian Shotcrete Society
- National Association of Testing Authorities, Australia.

BG&E Materials Technology

Results from the Membership Survey

Each year the ADAA conducts a survey of the key players in the industry with regards to the production and utilisation of CCPs.

The beneficial use of coal combustion products (CCPs) during 2014 resulted in 5.9 million tonnes or 48% being effectively utilised, resulting in the conservation of energy, finite natural resources, the reduction of greenhouse gas emissions and recovery of mineral by-product resources that would otherwise be placed into long term storage.

The survey results for CCP production and categorised end uses for the period January to December 2014 are shown in the table below. From the 12.3 million tonnes of all CCPs produced some 48% of were effectively utilised within various civil and construction applications throughout Australasia. This compares well, given the uncertainty during 2013 with the withdrawal Carbon Tax impost, wide ranging environmental reforms and government privatisation agenda during 2014. The previous periods of 2009, 2010, 2011, 2012 and 2013 with effective utilisation being 34%, 41%, 48%, 42% and 52% respectively.

Annual members and non-members were surveyed for CCPs generated, stored and sold during the reported period, which provides results for the calendar year, January to December 2014. Information provided by members and non-members was collated, compared with other data sources for verification purposes and then combined into a set of national results. The import and export of CCPs was included, however sources and destinations are not identified.

Key results

The survey results include all generators, marketers and users for the total production and resulting sales by each end use. Where required, data was supplemented with importation data and other secondary data sources for accuracy purposes.

- Approximately 12.4 Mt (million tonnes) of CCPs were produced within Australasia. On a per capita basis, this equates to about 536 kg/person.
- Some 5.4 Mt or 49% of CCPs produced have been effectively utilised in various value-added products or to some beneficial end over the period. On a per capita basis, this equates to about 248 kg/person recycled or reused.
- Approximately 1.8 Mt or 67% of effectively utilised coal ash was used in high value-added applications such as cementitious binders, concrete manufacture or mineral fillers.
- About 0.90 Mt or 34% of effectively utilised coal ash was used in non-cementitious applications such as flowable fills, structural fills, road bases, coarse/fine aggregates and mine site remediation.
- Some 2.2 Mt or 18% was used in projects offering some beneficial use (e.g. onsite remediation, local haul roads etc.). These uses typically generate no economic return, that is, cost avoidance or recovery only.
- Surplus CCPs of 8.6 Mt are typically placed into onsite storage ponds awaiting some future opportunity for economic reuse.
- More than 43 Mt of CCPs have been used in cementitious applications or concrete manufacture from 1975 to 2014 (38 years).

In summary, the recovery and reuse of CCPs provides positive and significant environmental impacts, including resource conservation and in this case, the reduction of Greenhouse Gas emissions from the processing of virgin resources, resulting in the reduction of almost 1.3 million tonnes of greenhouse gases.

The following table provides more detail for individual category sales of CCPs for the 2014 calendar year.

Membership Survey 2014
CCP Production & Use Survey

SECTION A. Fuel or Coal Used	Tonnes Consumed	Avg % Ash Content	Ash (Auto-Calc)	Ash (Manual-Calc)										
A1: Bituminous (Black Coal)	44,977,142	23.43%	10,536,778											
A2: Sub-bituminous	5,257,289	7.53%	395,627											
A3: Lignite (Brown Coal)	55,821,752	3.19%	1,778,830											
Total Coal Burned (Auto-calc)	106,056,183	11.99%	12,711,235											
SECTION B. CCPs Beneficial Use Calculations (Tonnes)	**Fly Ash**	**Furnace Bottom Ash**	**Cenospheres**	**Combined 2014**		**Combined 2013**		**Combined 2012**		**Combined 2011**		**Combined 2010**		
B1. Total Produced (Jan-Dec)	10,966,495	1,409,620	8,026	12,384,140		12,264,395		12,797,331		13,680,219		14,076,233		
B2. Total not used [Stored]	7,739,517	891,141	7,190	8,637,847		8,276,419		9,755,479		9,421,266		10,365,700		
Total Production Used (Auto-Calc)	3,226,978	518,479	836	3,746,293		3,987,975		3,041,852		4,258,953		3,710,533		
B3. Amounts removed or dirverted from storage	2,187,408	0	0	2,187,408	18%	2,365,284		2,343,291		2,368,626		2,101,983		
Total of All Used (Auto-Calc)*	5,414,386	518,479	836	5,933,701	48%	6,353,259	52%	5,385,143	42%	6,627,579	48%	5,812,516		
SECTION C. CCP Use (Tonnes)	**Fly Ash**	**Furnace Bottom Ash**	**Cenospheres**	**Combined (Auto-Calc)**		**Combined (Auto-Calc)**		**Combined (Auto-Calc)**		**Combined (Auto-Calc)**		**Combined (Auto-Calc)**		
C1. Cement/Concrete Products /Grout	1,718,624	17,784	2,182	1,738,590		1,647,317		1,893,613		2,029,563		1,889,991		
C1. Cement/ Raw Feed for Clinker	10,000	0	0	10,000		10,000		0		61,174		0		
C1. Mineral Fillers	0	50,000	20,000	70,000		25,000		10,000		35,879		0		
Category 1	1,728,624	67,784	22,182	1,818,590	67%	1,682,317	66%	1,903,613	79%	2,126,616	73%	1,889,991		
C2. Flowable Fill CLSM	0	9,000	0	9,000		0		0		180,715		35,000		
C2. Structural Fills/Embankments	92,108	37,000	0	129,108		135,813		123,108		95,515		103,505		
C2. Road Base/Sub-base	58,718	130,000	0	188,718		229,615		115,300		295,899		320,334		
C2. Soil Modification/Stabilization	0	0	0	0		31,000		41,000		0		11,725		
C2. Mineral Filler in Asphalt	0	20,000	0	20,000		0		0		0		8,787		
C2. Agriculture	0	76,117	0	76,117		1,259		600		600		0		
C2. Aggregate	0	224,000	0	224,000		181,000		123,000		20,000		5,708		
Category 2	150,826	496,117	0	646,943	24%	578,687	23%	403,008	17%	592,729	20%	485,059		
C3. Mining Applications (e.g. Backfill)	153,615	0	0	153,615		166,979		81,000		166,775		83,000		
C3. Waste Stabilization/Solidification	106,000	0	0	106,000		106,500		34,500		15,913		6,446		
C3. Miscellaneous/Other	1,500	0	0	1,500		1,500		2,000		0		1,500		
Category 3	261,115	0	0	261,115	10%	274,979	11%	117,500	5%	182,688	6%	90,946		
Total Use (C1, C2, C3)*(Auto-calc)	2,140,565	563,901	22,182	2,726,648		2,535,983		2,424,121		2,902,033		2,465,996		
SECTION D. Summary Results	**Fly Ash**	**Furnace Bottom Ash**	**Cenospheres**	**Combined (Auto-Calc)**		**Combined (Auto-Calc)**		**Combined (Auto-Calc)**		**Combined (Auto-Calc)**		**Combined (Auto-Calc)**		
7. Total of All Sold (Auto-Calc)*	2,140,565	563,901	22,182	2,726,648		2,535,983		2,424,121		2,184,018		2,184,018		
6. Total of All Benefically Used (Auto-Calc)*	5,414,386	518,479	836	5,933,701		6,353,259		5,385,143		6,627,579		5,812,516		

Company Update:
Latrobe Magnesium

Principal Activity
The principal activity of Latrobe Magnesium Limited (LMG) is the development of the Latrobe Magnesium Project in the Latrobe Valley. The Project involves the extraction of magnesium and the production of a supplementary cementitious material (SCM) from the brown coal fly ash, which is currently a by-product from the Latrobe Valley Power Stations, being members of the Association. This world first patented extraction process will be used to reprocess and rehabilitate the local fly ash storage ponds.

The project aims to reduce raw material disposal costs, earn new revenue from by-products, divert recoverable resources away from landfills, reduce carbon emissions and create new business opportunities.

In 2015 test work at Wu Long in China confirmed all previous test work and allowed project planning to begin. In the coming years, LMG plans to conduct more test work; complete feasibility studies and commences construction.

Main Products and Markets
From the brown coal in the Latrobe Valley, the fly ash has two major end use products, which can be used in a variety of markets. Some 90% of the fly ash can be converted into 10% magnesium and 80% SCM.

Magnesium
Magnesium has the best strength to weight ratio of all common structural metals. It is one-third the weight of steel and is 33% lighter than aluminium. It has been historically used for desulfurization of steel and in aluminium for strengthening cans. It is increasingly used in the car business to lightweight cars allowing them to go further, faster and emit less CO_2.

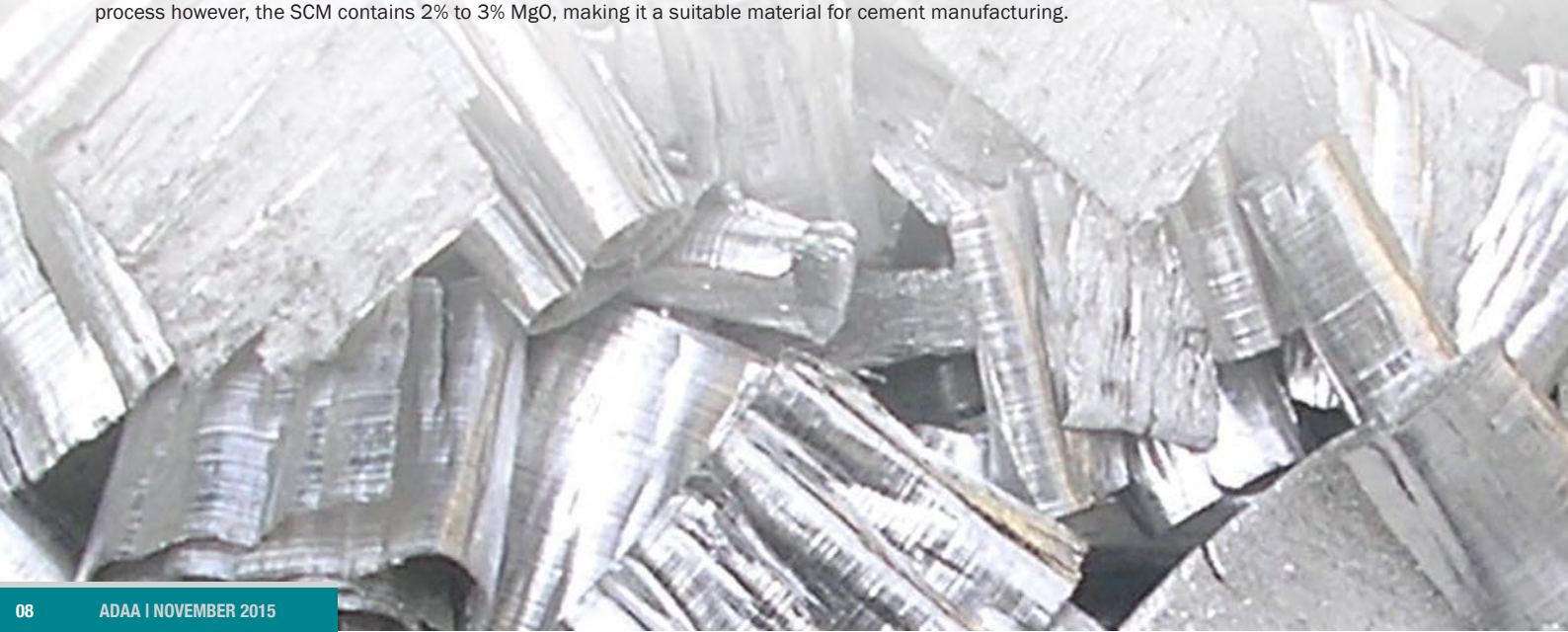
The magnesium market is expected to grow at 6 to 7% per annum over the next ten years. This mirrors historical growth. This growth will result in it doubling from its current 800,000 tonnes per annum ("TPA") production to 1,700,000 TPA in the year 2024.

One of the principal objectives of the Project has always been that its operating costs need to be competitive with China in order for the business to be sustainable in the long term. The high MgO content in the beneficiated fly ash when compared to Chinese dolomite and LMG's higher magnesium recovery rates together with its SCM means that LMG has a competitive advantage over the Chinese.

However, LMG's operating costs based upon the sale of magnesium alone would not be competitive with China's costs. The Project's additional production of SCM in its integrated process is the basis for an economically profitable operation.

The Company expects to finalise magnesium off take agreements with two large companies from the above countries by the end of 2015.

SCM Cement Manufacturing
Recently a cement manufacturing company began importing fly ash from overseas to remain competitive in the Australian market. Victorian brown coal could not be used as it contains between 15% and 20% magnesium oxide (MgO). An MgO content over 4% is not permissible under Australian Standards as may expand over time and cause the concrete to crack or oxidize reinforcing steel when poured. After processing the brown coal through the LMG process however, the SCM contains 2% to 3% MgO, making it a suitable material for cement manufacturing.



WOCA 2015 Report

Monday the 4th of May marked the beginning of the World of Coal Ash Conference 2015 (WOCA15). Held in Nashville, Tennessee, the theme of the Conference was once again 'Science, Applications and Sustainability of Fly Ash', which explored the changing business environment of fly ash across the world. Australian representatives (Dr. Jane Aiken, Melissa Cuturich and Craig Heidrich) presented a series of papers during the Conference. Papers highlighted the need to harmonise systems nationwide and to do this within a commercial context. The American Coal Ash Association (ACAA) in conjunction with The University of Kentucky Center for Applied Energy Research (CAER) hosted the Conference for the construction materials industry.

Craig Heidrich represented the ADAA during the Conference where interested parties took advantage of valuable opportunities to meet with suppliers, peers, customers and friends to solve problems both locally and globally.

The Conference started with a welcome breakfast and registration sign in. Bump in also commenced on the 4th allowing a full day for exhibitors to familiarise themselves with the venue. Tuesday the 5th May 2015 kicked off with a welcome and plenary presentation. Attendance was very high during the Conference with some 900+ registered parties attending. The Association, moreover Australia, was well represented with many presentations.

The first paper (Aiken & Heidrich, 2015) provided a consolidation of research knowledge developed through ADAA research and development. Highlighting that disparities still exist between research and practical uptake it was an opportunity to confirm that fly ash producers are not adequately communicating with potential markets. With field trials demonstrating soil management opportunities still required for fly ash use in Australian agriculture, the 2015 WOCA Conference was the forum of review for market opportunities.

The second paper (Aiken & Cuturich, 2015) demonstrated a process chart to conceptualise the commercial cycle for fly ash supply, product specification, distribution to farm site production and final consumers. Discussions signalled the importance of achieving a national supply chain at a commercial level. This could be achieved within a model nominated as 'CREATE, an innovation representing the Commercial, Risk, Environmental, Agriculture, Technology, Entrepreneurial aspects of a fly ash enterprise all within an integrated ash utilisation program.

The Conference highlights included:

- 192 presentations over 15 topics
- 900+ delegates networking, listening and learning from the best in the field
- 35 Sponsors
- 100 presentations about Waste Management, Cement & Concrete and Pond Management.

The technical program theme of "Science, Applications and Sustainability of Fly Ash" was of value to Civil and structural engineers, academics, manufacturers, contractors, developers, Government departments and councils. Whether it was efficiencies in processes, improved offerings to customers, or support tools and business systems for frontline services, every aspect of business was challenged.

WOCA 2015 once again provided a platform to showcase the Association and connect with many leading industry specialists further educate industry personnel and to increase our current database of contacts. The Association involvement is an important plank in maintaining strong international relations.

Orbite Receives Notice of Allowance for Canadian Fly Ash Monetization Patent

"Our technology, which transforms liabilities into assets, makes remediation profitable for the waste owner, dramatically changing the decision-making process."

About Orbite

Orbite Aluminae Inc. is an innovative 'cleantech' company whose developments are predicted to produce alumina and other high-value commodities, such as rare earth metals, with the lowest environmental impacts and costs in the industry. Their portfolio includes fifteen (15) patents and ninety eight (98) pending patent applications in eleven (11) different countries and regions.

Recent News

With over five hundred and fifty million (550,000,000) tonnes of fly ash (FA) being produced on an annual basis, it is crucial that the by-product is utilised in the most effective way, to reduce waste, environmental impact and direct and indirect costs associated with the storage and holding of FA.

Their most recent patent to be approved by the Canadian Intellectual Property Office (CIPO) is patent number 2,862,307, which allows Orbite to develop their unique process for treating fly ash. Because of this, the company has paid the patent fees, which will result in the issuance of a successful patent in approximately three months. The patent covers the recovery and selective extraction of valuable earth materials from the ash left over from the coal combustion process. Orbites unique patented process utilises chloride-based technology. The technology, recovers ALL valuable materials including rare metals, alumina, magnesium oxide and titanium dioxide, scandium, gallium and other rare earth materials.

CEO of Orbite, Glenn Kelly said, "Fly ash monetization represents a significant opportunity that we intend to seize and exploit as a key element of our global growth strategy. We have requested and received approval for accelerated patent application examination and issuance processes following a positive International Preliminary Report on Patentability, and consequently anticipate patents to be granted in additional jurisdictions for our fly ash monetization technology." An update about Orbite will be provided in coming editions of CAM.

Changing Times, Changing Faces

2015 was a year of great achievement and change for the Ash Development Association of Australia. We said goodbye to Olivia Yeatman after almost 3 years with HBM Group (Association Managers). We wish Olivia luck as she pursues her interest's in Law, which she is currently studying at University of Wollongong. *"When one door closes another opens"* and we welcomed Lauren Hatton. Lauren is currently in her 3rd year of study in a Law/Commerce Degree at the University of Wollongong. Lauren has already been instrumental in projects such as the CCP Factbook, Membership Survey and this Publication! Please join us in welcoming Lauren to the Association.

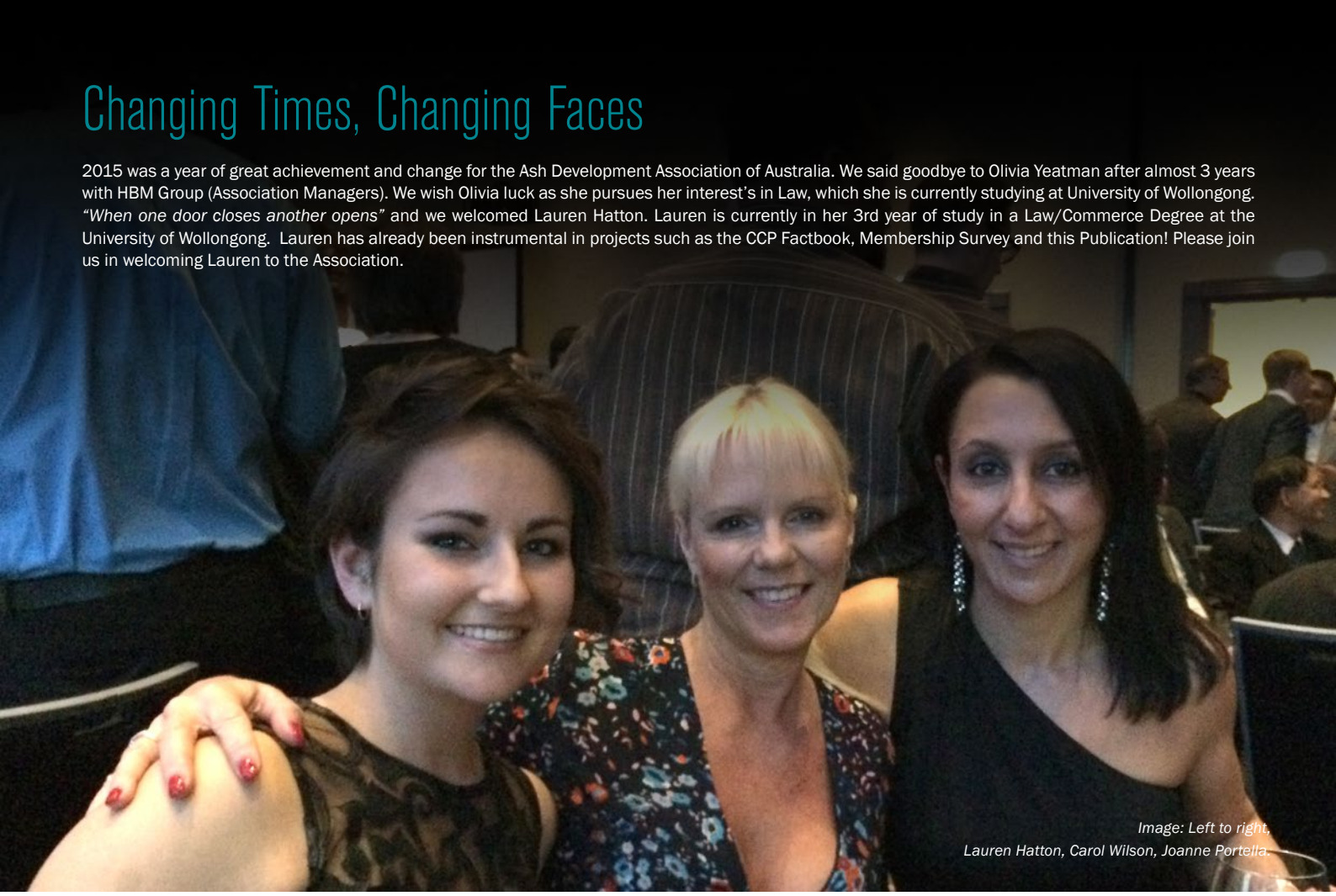


Image: Left to right, Lauren Hatton, Carol Wilson, Joanne Portella.

Got a bright idea for an ADAArticle?

CAM is published biannually and circulated with a reach of approximately 2000 people, including our members, and other industry professionals. We welcome any feedback, and encourage member contributions. If you have any content you would like included in a future edition of CAM, contact our Editors Aiden Chilcott & Lauren Hatton at research@hbmgroup.com.au

The kinds of content that would be preferable are:

- **Any new projects related to the ADAA and the industry;**
- **Recent developments and innovations in the use of fly ash products;**
- **Recent appointments/key people of interest.**

We also have a Member Profile section which is open to all member companies for contributions on behalf of the business in general or a specific employee.

SUBSCRIBE TO

COAL ASH matters

www.adaa.asn.au