

June 2014

snowyhydro

NEWS

Ground-breaking weather research

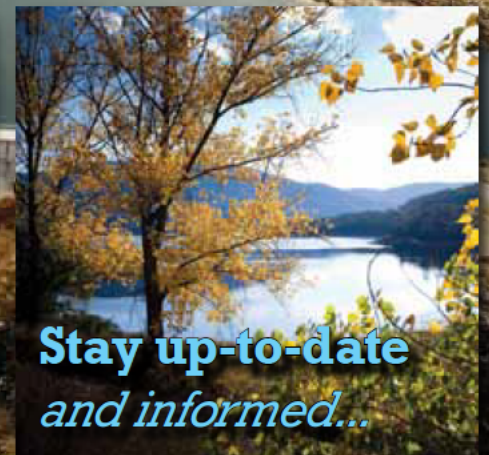
Also in this edition:



**Using technology
to work smarter**



**Cutting edge
climate science**



**Stay up-to-date
and informed...**

ISSUE 25



Using new technology at Snowy Hydro to stay competitive and work smarter...

2014 Consumerisation of IT in the Enterprise Conference, San Francisco



As an advocate for technology, **CEO, Paul Broad**, explains some of the technological advances being implemented at Snowy Hydro to empower our employees to work smarter and more efficiently...

As you all know, Snowy Hydro operates in a dynamic and highly competitive market. The National Electricity Market is always evolving, in both the generation and retail sectors. To make sure Snowy Hydro is ready and able to respond to the ongoing market changes and remain competitive, we need to be agile, efficient and innovative across everything we do, every day.

Ask anyone at Snowy Hydro - I have long been an advocate for technology as a way of helping us work smarter and faster. Cloud computing, mobile technology and smart devices can really change the way we work at Snowy Hydro, and for the better. It will help us become more flexible and empower our people to get their work done in new and different ways.

This year, we are really stepping it up a level by investing in new and innovative technology to help us stay competitive. There are a number of exciting initiatives currently underway and we are planning more.

In April, a group of four employees from across the business visited the United States of America, with the aim of experiencing and learning from companies who are focused on innovation, employee engagement and new technology.

They spent most of their time in San Francisco and Silicon Valley, including time at Google Headquarters, getting to know first-hand the positive impact technology can have on communication, flexibility and productivity.

This year, we are really stepping it up a level by investing in new and innovative technology to help us stay competitive....

There is so much potential to put their learnings into practice at Snowy Hydro, and we have started to do just that.

I have also commenced the rollout of smartphones to employees at Snowy Hydro. This means that wherever there is mobile coverage or a Wi-Fi network, employees will be able to make calls, access their emails, look up work-related information and connect to the internet. Having this mobility and connectivity means that we will work more efficiently. It also means that we are saying goodbye to most of our desk phones!

And it doesn't stop with smartphones. Our information technology team are working on the implementation of a cloud-based Google platform across the entire company.

As Snowy Hydro is a geographically diverse workforce, Google applications (such as gmail, Google Docs and Google Drive) will help employees connect and collaborate more effectively in real time and support information and knowledge sharing right across our business.

Being cloud-based also means that employees will be able to access documents regardless of their location, as long as they have an internet connection (we have an extensive Wi-Fi network across Snowy sites). This will be a big change, but definitely a positive one!

You will have read about the Unmanned Underwater Vehicle we are using for tunnel inspections in a previous edition of this newsletter. Now, we are taking to the skies! In May, we trialled Unmanned Aerial Vehicles (UAVs) to test their ability to perform asset inspections in remote locations, with promising results. From a safety perspective, UAVs would reduce the need for employees to physically access difficult to reach areas. Instead, they can analyse and interpret

the images and data collected by the UAV to determine maintenance requirements.

These are exciting times at Snowy Hydro. I personally believe that technology will change the way we work for the better.

As we investigate and adopt new and innovative technology to improve the way we do things, as a business we will become more agile, more efficient and we will continue to remain competitive in the National Electricity Market.



Snowy Hydro has an extensive Wi-Fi network across our sites.

CUTTING EDGE CLIMATE SCIENCE

Can understanding the past help us predict the future?



In the last newsletter we mentioned an exciting research venture, building our knowledge on historical climate variability. **Snowy Hydro's Atmospheric Scientist, Dr Johanna Speirs** tells us more...

How often can we expect floods like in March 2012? Was the prolonged 'Millennium Drought' between 1999 and 2009 the driest period the Snowy Mountains has ever seen? Has the local climate changed in the last 50 years? To answer these questions we need to understand the long-term climate of the Snowy Mountains. Weather records in Australia started around 100 years ago, but to answer the tough climate questions with a degree of confidence, we need records of 100's, 1000's or even 10 000's of years.

Our team of scientists at Snowy Hydro are working with leading researchers from the University of Queensland and the University of Western Australia to develop a high-resolution, long-term record of historical precipitation and inflow.

Previous study...

You may remember an article back in 2011 on earlier research which reconstructed a drought history for south-eastern Australia spanning 6,500 years from sediment cores in the alpine bogs of the Snowy Mountains. These sediment cores preserved long records of dust deposits that were transported to the region during dry periods. Using special techniques including geo-chemistry and radio-isotope dating methods, this work identified the principal causes of severe and prolonged drought sequences in south-eastern Australia.

Significant variation in climate can be identified from the sediment core record. Variability was closely associated with natural climate patterns



including the 3-7 year cycle of the El Niño Southern Oscillation (ENSO) and a longer cycle known as the Pacific Decadal Oscillation (PDO), which has a cycle of approximately 25-40 years. This decadal pattern interacts with the shorter term El Niño pattern and is believed to enhance or suppress the effects of El Niño (dry) and La Niña (wet) periods. This drought reconstruction found the most recent drought from 2000-2009 was the most severe over the last 500 years, and was associated with enhanced El Niño conditions from the Pacific Decadal Oscillation.

Current research...

Now, we're deepening our knowledge on historical weather and climate in the Snowy Mountains. To answer more questions we're turning to the Yarrangobilly Caves within the Kosciuszko National Park. Mineral deposits contained in the caves known as stalagmites (growing upwards) and stalactites (growing downwards) or collectively 'speleothems' can provide powerful, high-resolution records of precipitation variability spanning tens of thousands of years. With support from the NSW National Parks and Wildlife Service, researchers have successfully sampled speleothems from the Yarrangobilly Caves for paleoclimate analysis.

Speleothems are formed in the caves when water drips through the rock, leaving a mineral deposit of calcium carbonate (e.g. limestone) and a chemical 'isotopic' signature from the water drip. Variation of the climate and environment cause variation in the growth of the speleothems and visible bands – similar to a tree ring.

Researchers are using cutting-edge technology to interpret the signatures in the speleothem and develop a record of historical precipitation.

To aid in interpreting the speleothem records, the research program includes comprehensive field campaigns collecting precipitation (snow and rainfall), snowpack, lake and stream water samples throughout the Snowy Mountains to understand how the isotopic signature changes as water droplets work their way from the atmosphere, to the streams, lake reservoirs and into the cave systems. This water sampling allows us to build a more detailed understanding of the Scheme hydrology on a range of timescales.

The current project will run until 2016 and is equipped with an expert team of researchers including two PhD students. Reconstructing the climate record from the speleothems will identify the state of the climate in the Snowy Mountains over a period of thousands of years at a high resolution to better understand the effect of multiple climate drivers, such as ENSO and the PDO on hydrology in the Snowy Mountains. This in turn, will help us predict longer term patterns in the future, and aid in more efficient water management of the Snowy Mountains Scheme, particularly in extreme dry/wet years. The findings of this work are expected to be ground-breaking and are already being recognised for outstanding scientific merit with an initial study recently published in an international scientific journal (Journal of Geophysical Research). A lot of exciting climate research to look forward to!

The 2014 Cloud Seeding season is ready to begin! Now we're waiting for the right weather...

To cloud seed effectively we need:

- **Westerly winds** – so the seeding agent dispersed from ground-based generators located to the west of the Snowy Mountains is transported to the targeted area.
- **Cold temperatures** – the atmosphere must be cold enough that snowflakes fall to at least 1400m
- **Sufficient cloud** – there must be at least 400m of cloud above the -5°C temperature level, and the top of the cloud must be warmer than -35°C and cooler than -7°C.
- **Inefficient cloud** – there must be excess super-cooled liquid water droplets within the cloud.
- **Precipitation** – seeding cannot commence until precipitation has already occurred in the area.
- **Lasting conditions** – the weather forecaster expects the event to last for at least 5 hours.

More information on how cloud seeding works and Snowy Hydro's Cloud Seeding Program can be found on our website. We will also be releasing our 2013 Cloud Seeding Operations Report soon, so stay tuned!



Coming soon: Water & Environment Report 2013-14



Each year Snowy Hydro publishes a Water Report outlining how we met our requirements under the Snowy Water Licence. This year, the report will also include our environmental performance. Manager, Water, Environment and Lands, **Andrew Nolan**, explains more...

In August this year Snowy Hydro will be releasing our annual Water Report. As with previous reports, there will be a number of facts to further improve community understanding of our water operations and such things as water ownership. This year we will include more information around the Snowy Hydro water catchment area and further explain how much water is moved from east to west, and natural inflows vs diversions.

However, in a first for 2013-14, this report will also outline our commitment to protecting the environment from harm when we carry out our work, and how well we are performing.

Snowy Hydro operates in many environments from urban industrial areas, to tourist destinations and remote sites in national parks. We are committed to avoiding environmental harm when planning and carrying out work wherever we are, because it is worthwhile for business, community and ecological reasons.

As well as wanting to avoid harm to the environment when we carry out work, there are laws we must comply with to ensure we protect the environment.

This report will include our Environmental Protection Licence (EPL) monitoring data which will show how well we are complying. As with the water section, we will also include a few environmental initiatives and highlights.

The report will be independently audited and verified by the leading third party auditing, assurance and certification organisation, BSI.

So keep an eye out in late August for Snowy Hydro's Water & Environment Report. You will be able to get a copy of the report from one of the following:

- go to www.snowyhydro.com.au to download a copy; or

Collect a copy from:

- the Snowy Hydro Discovery Centre in Cooma;
- Murray 1 Visitors Centre near Khancoban;
- Cabramurra Visitors Centre & General Store;
- your nearest lake side operator; or
- one of the regional visitors centres.

To join Snowy Hydro's Water & Environment Report mailing list please email your postal details to:

✉ communityfeedback@snowyhydro.com.au

This report will also outline our commitment to protecting the environment from harm...



Supporting our local communities



How does Snowy Hydro support our local communities? **David Hogan**, answers the question...

Supporting the communities around the Snowy Scheme is part of the DNA of our company, we don't have to do it, but we want to. We want to make a genuine and meaningful difference to the communities around us.

Snowy Hydro is committed to supporting our local communities; after all, this region is where our employees and their families live - over half our workforce lives in the towns of Cooma, Jindabyne, Talbingo, Khancoban, and Cabramurra. We have long history in supporting and working with communities to make a positive impact where we live.

We focus our support on initiatives and activities that have a wide reach across the community, are accessible to all and offer maximum benefit for the people of the region. We don't provide donations (we haven't for many years) and instead enter into long standing partnerships; this is the best way to make real positive change. We work with communities and organisations who value our support and are committed to improving our local communities.

Each year we sit down and plan the initiatives we can support, which reflect broad community appeal. We cannot do it all, we need to be fair and equitable. It's the primary reason we can't get involved with supporting every local sport team or small events - if we were to do it in Cooma, for example, then we need to do it in all other towns as well and that's just not possible. So, we look at those things that the community can get the best benefit from, obviously starting with the Snowy Hydro SouthCare Rescue Helicopter.

Snowy Hydro SouthCare Aero-medical Rescue Helicopter

The Snowy Hydro SouthCare Rescue Helicopter service operates throughout the south-east area of NSW and ACT, providing aero medical and search and rescue services. The operational area covers east to the NSW coast, south to the Victorian border, west to Hay and north almost to Sydney.

As Snowy Hydro SouthCare completes nearly two missions every day of the year, it is clear that this life-saving service is an important part of our community. Since the service's inception in 1998, more than 5,600 lives have been saved. Snowy Hydro has been the major and naming rights sponsor of the rescue helicopter service for 14 years and the company's commitment to Snowy Hydro SouthCare stems from our objective of promoting health and safety to both staff and our local communities.

In 2011, Snowy Hydro announced the continuation of our sponsorship for another five years with our support increasing to \$2.5 million over that period. This will extend our commitment to 2016 with another 5 year option after that.





cooma UNIVERSITIES CENTRE

In March 2013, Snowy Hydro in conjunction with the Cooma Monaro Shire Council established the Cooma Universities Centre (CUC), an initiative to provide university education opportunities for students in our region. Any student can study any distance education course through any university and base themselves at the Cooma Universities Centre.

Since opening, the Cooma Universities Centre has:

- over 80 registrations,
- 20 different Australian universities represented by the student population,
- students studying 31 different undergraduate degrees (bachelor, associate degree, university bridging course),
- students studying 18 postgraduate degrees (graduate certificate, graduate diploma, masters, PhD),
- over 90 university examinations held at the CUC; and
- three 12 week university pathways courses held to help students gain access to university.

The need for the CUC is evident, and the aim for 2015 is to have supported learning held at the Centre.



Snowy Hydro Young Driver Training Program

The Snowy Hydro Young Driver Training Program offers L and P-plate drivers in year 12 at every local high school in the Snowy Mountains the opportunity to gain practical experience in driving, focusing on driver attitudes and behaviours rather than just passing a test.

It is a well-controlled professional program integrated with local high schools where the students undertake both theory and practical sessions outlining key focus areas such as their attitude and driving behaviours. Included in the program is an understanding of the unique road conditions of the Snowy Mountains, such as snow and ice.

Snowy Hydro fully funds the program and utilises a specially prepared car and skid frame combination. This program is highly valued by both high schools and the local community and is aimed at making a meaningful difference to safety of all drivers on our roads, especially new drivers. In 2014, over 270 students from across the Snowy Mountains communities completed the program.

Supporting Cancer Research - Snowy Ride

Snowy Hydro has been a major sponsor of the annual Snowy Ride since its inception 14 years ago. In 2013 we sponsored the event to the amount of \$100,000, extending the existing partnership with the Steven Walter Foundation and Snowy Ride. This agreement provides \$50,000 per annum to the Steven Walter Foundation for ongoing childhood cancer research and another \$50,000 per annum for the Snowy Ride's 'Family Weekend in the Mountains' Program, a four-day mountain escape for children who are battling cancer and their families.

More than 3000 riders participate annually in the event with monies raised from riders' entry fees, donations and raffles. In 2013 in excess of \$280,000 was raised from the Snowy Ride, bringing the total raised for children's cancer research over the last 13 years to \$5 million.



Local Festivals & Events

Snowy Hydro actively supports the major event in each of our regional centres. Support from the company includes Tumut Festival of the Falling Leaf, Corryong Man from Snowy River Festival, Lake Jindabyne Flowing Festival, Tumut Business Awards, Upper Murray Challenge and the Cooma P&A Show. These events showcase regional communities, celebrate our regional lifestyle and attract visitors to the region providing significant benefit to local economies.

Using drones to inspect remote assets...



Following on from our successful tunnel inspections, we are now trialling the use of unmanned aerial vehicles. **Snowy Hydro's Geographic Information Systems expert, Andrew Jeffrey, explains more...**

Our Snowy Scheme assets require visual inspections to determine their condition and assist in maintenance decision making. At times these inspections can be difficult to perform given the remote location of our assets, and therefore considerable planning, risk management and time is required.

At Snowy Hydro, we are always looking for new and innovative technology to improve the way we work. Recently we investigated the use of drones, also known as UAVs (Unmanned Aerial Vehicles). Our goals were to assess this technology for remote asset inspections and identify any potential safety benefits at remote or difficult to access sites.

During May, Snowy Hydro, in conjunction with Australian UAV, tested two UAVs – a fixed wing plane called the “Sensfly eBee” and an octocopter called the “Cinestar 8”, as potential alternatives to physical asset inspections in remote locations. The UAVs were tested at several remote and difficult to access sites to determine what data and imagery they are able to provide in terms of asset inspections. This included video and aerial photography as well as collecting sample data for analysis.

We trialled the two UAVs over two days – the Sensfly eBee is a very small plane designed to fly over a small area (approximately 30 hectares) and collect a series of aerial photos which can be pieced together to produce a high resolution view of the asset sight. The Cinestar 8 Octocopter is designed to fly around an asset taking video, still photography and providing a live video feed to a crew on the ground.

Both UAVs showed some great promise for the data they could provide and some of the limitations such as flight times, image anomalies, and distortion are all things that will improve as the technology evolves. The Civil Aviation Authority have also enforced some strict regulations around the commercial use of UAVs. However, the commercial use of UAVs in Australia is still in its formative years and we believe that some of the limitations identified will become less significant as the technology matures.

At Snowy Hydro we are excited to see how UAVs can help us work and we will be keeping a close eye on how this technology evolves into the future.



The Sensfly eBee is launched to inspect Snowy Scheme assets.

*One of the high resolution images of Murray 1 Pipelines from the octocopter.
Inset: the octocopter UAV.*



How to stay up-to-date and informed...



Snowy Hydro is always looking to improve communication with our community and stakeholders. Manager, Corporate Communications, **Danielle Venables**, outlines all the ways you can keep updated and informed...

We know from our biennial community survey that our local communities highly value being kept informed on what is happening at Snowy Hydro, and we are committed to doing just that. We are always looking for new and innovative ways to communicate with our audiences, some of which are much wider than the Snowy Mountains.

We know the Snowy Hydro NEWS quarterly newsletter is highly valued in the community. We always aim to include new and exciting articles from right across our business further educating our communities on the business and the operations of the Scheme.

Our other publications are also important - such as our upcoming Water & Environment Report, which

includes detailed information on our water operations as well as a number of short facts to further improve community understanding around water.

Recently we have grown our use of social media tools to communicate externally, joining up to Twitter, Facebook and even YouTube. We are steadily growing our audience through these tools and they are a great way to communicate real-time information.

So to keep up to date and informed on all that is happening at Snowy Hydro, see opposite for all the ways to find out how!



snowhydro.com.au

Visit our website to learn more about our business. There is a wealth of information on the site from lake levels, to snow depths, to previous copies of our Water Report and this newsletter. It is regularly updated with news so jump online and have a look!



[@snowhydro](https://twitter.com/snowhydro)

Follow us on Twitter to get regular feeds on what is happening at Snowy Hydro! We regularly post happenings around our business on Twitter and have an ever increasing audience that is much wider than the Snowy Mountains. Search for Snowy Hydro and follow us now!



Snowy Hydro Visitor Centres

Why not pop into one of our visitor centres throughout the Snowy Mountains and talk to our friendly customer service staff? Our team are always up to speed with everything at Snowy Hydro and are more than happy to talk to you. Call in now to one of our centres, all the details including opening hours is outlined on page 15 of this edition of Snowy Hydro NEWS!



Snowy Hydro Visitor Centres Facebook Page

'Like' our Snowy Hydro Visitor Centres Facebook Page. Here we regularly post information tailored to the visitor market on what you can see and do when visiting the Snowies. We also post regular updates such as road and weather reports in Winter for those travelling to the snow.



Snowy Hydro YouTube Channel

Snowy Hydro has recently developed a YouTube Channel. We are regularly uploading short videos on some of the exciting things happening in our business. Visit our channel now to see and learn more about Snowy Hydro today.



Email us at communityfeedback@snowhydro.com.au

Snowy Hydro has a dedicated email address for those in the Snowy Mountains wanting to contact us directly. You may have a question that you would like answered, a request for one of our publications or even some feedback; we welcome it all so email us today!



Give us a call! 1800 623 776

If you do not have email or access to the internet, we still have our free call 1800 623 776 phone. One of our customer service staff will answer your call and assist wherever they can.

Coming soon - Snowy Hydro Water App!

Snowy Hydro is currently developing a Snowy Hydro Water App that will be available for both iOS and android phones and tablets! The app will include information on lake levels, water releases, public access areas and more. Keep an eye out in future editions of Snowy Hydro NEWS for when the app is launched!

Experience Australia's Highest Town



At 1488 metres above sea level, Cabramurra is Australia's highest town. Owned and operated by Snowy Hydro, the town has a number of activities to experience. **Manager, Visitor Centres, Heath Woolley, explains what is on offer...**

If you have family or friends visiting for the winter ski season, why not take a day trip to Australia's highest town, Cabramurra!

The Cabramurra Visitor Centre and Store has recently been upgraded and offers a range of services including information on Snowy Hydro, a coffee shop serving a range of light refreshments and espresso coffee, an Australia Post outlet, newsagency, fuel station, souvenirs & merchandise and a viewing gallery offering amazing pictures of this unique town.

The Cabramurra Store is open seven days, 9.00am to 5.00pm Monday to Friday and 10.00am to 3.00pm Saturday, Sunday and Public Holidays.

Bistro 1488 is open! This amazing bistro has been completely renovated and offers a unique and modern space to enjoy lunch or dinner.

Open to the public, Bistro 1488 offers meals and refreshments seven days a week. Lunch is available from 10.00am to 2.00pm and dinner from 5.00pm to 9.00pm.

Make sure you take a drive to the Cabramurra Lookout which provides one of the best views in the Kosciuszko National Park. There are free BBQ facilities so why not stop for lunch while enjoying the amazing view.

As Cabramurra is a Snowy Hydro town, no overnight accommodation is available. Motorists are advised to take caution and drive to the weather and road conditions. For more information call the Cabramurra Visitor Centre and Store on 6453 8837.



Cabramurra Visitors Centre & General Store



Discover the Snowy Scheme!

Have you got friends or family visiting over winter and want to show them the best our region has to offer? We encourage you to visit the Snowy Scheme!

Snowy Hydro Discovery Centre, Cooma

Open 7 days: 8:00am - 5:00pm Monday to Friday
9:00am - 2:00pm Saturday, Sunday & Public Holidays
Closed: Christmas Day & Anzac Day



Murray 1 Visitors Centre, Khancoban

Alpine Way, 10kms east of Khancoban

Open 7 days: October to April, 9:00am - 4:00pm Monday to Friday
10:00am - 4:00pm Saturday, Sunday & Public Holidays
Open 5 days: May to September, 9:00am - 4:00pm Monday to Friday
Closed: Christmas Day, Anzac Day & winter weekends
Power Station Inspections 11am and 2pm daily

Cabramurra Visitors Centre & General Store

Open 7 days: 9:00am - 5:00pm Monday to Friday
10:00am - 3:00pm Saturday, Sunday & Public Holidays
Closed: Christmas Day



Talbingo Visitor Display Centre

Talbingo Shopping Centre, Whitty Street, Talbingo
Open 7 days: 8:00am - 4:00pm

1800 623 776
www.snowyhydro.com.au





RED IS GREEN & GOLD



Red Energy gives New South Wales, the power to choose an electricity retailer that is 100% Australian.

Not only are we 100% owned by the mighty Snowy Hydro, we're based right here in Australia.

That means the community and economy benefit from keeping Aussie jobs here, and our customers benefit by having locally based, award-winning service and great value electricity.

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