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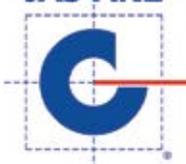
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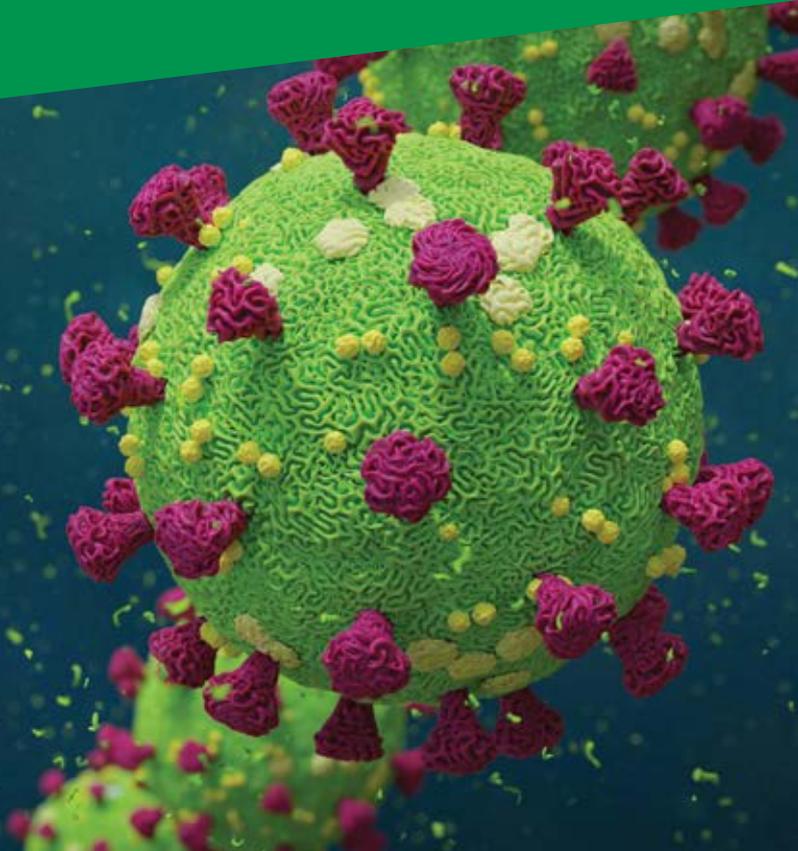


About the Cover

Leading Australian bin manufacturer MASTEC has rolled out some of Victoria's first residential glass recycling bins for Hobsons Bay City Council in Melbourne's inner south-west. MASTEC delivered over 38,300 of the new distinctive purple-lidded glass recycling bins, together with new 120L FOGO bins and MASTEC® KO Kitchen Caddy Bins to residences across the City for its new *Recycling 2.0* services.

► Turn to **Page 10** for the full story.

Doing business in a 'post COVID-19' world



Dear Readers,

To say that we, both globally - and especially, as a Nation - have been dragged into 'unchartered territory' by the emergence of COVID-19 would be an understatement of the highest magnitude. Although the planet has previously experienced the threat of global pandemics, for the modern world, this is clearly (to coin a phrase) 'next level'.

While COVID-19 continues to wreak havoc on the planet (at the time of writing the 'official' toll - courtesy of the Johns Hopkins University - is in excess of 140,000 dead and 2.1 million reported cases across 185 countries) and has resulted in what is perhaps one of the most rapid and wide-spread changes to the daily lives of most of the human race, we must also consider how we will meet the challenges of rebuilding businesses, industries and economies in a 'post COVID-19 world'.

Before I continue, I would like to make it absolutely clear that I am NOT attempting play down the seriousness of the COVID-19 pandemic, or suggest in any way that the responses of Governments across Australia or around the world are too extreme or somehow unwarranted; quite the contrary. Indeed, I feel certain that I am with the majority in sincerely hoping that these measures are able to stem the global impact of this highly virulent and extremely serious disease – a disease which not only continues to have a tragic human cost, but one which has also brought the global economy to its knees and entire countries to a grinding halt.

While there can be no doubt that COVID-19 will continue to wreak havoc globally for some time to come - indeed, we here in Australia are still only at the 'front-end' of the crisis - it is also important to remember that despite the tragic cost, all is not lost.

For instance, on current figures, over 500,000 of the globally reported cases have recovered from COVID-19. And while that is, no doubt, of no comfort whatsoever to the tens of thousands of families who have lost loved ones, or who's loved ones continue to suffer, it does offer some hope in terms of our ability to move beyond the current crisis and rebuild.

And therein lies the key: *we will need to rebuild – small businesses, large businesses, entire economies.* What's more, we're going to have to rethink the way we go about things... especially in the short term.

For all intents, as it currently stands, we look as if we're set to 'lose' at least 6 (and more likely 9-12) months of normal economic activity across all sectors globally. And it's not just a small loss. In many instances, there will be periods where there is total cessation of activity across a wide range of industry sectors.

For example, the past couple of weeks have seen a massive influx of emails alerting me to cancellations and rescheduling of conferences and trade shows across the globe – not just for the next couple of months, but for 2020 in its entirety. Needless to say, the flow-on effects of these cancellations and changes - not only to the conference / expo industry and the hospitality industry, but also to manufacturers, equipment suppliers and service providers - is massive. And that's just one industry sector.

That said, I do believe we have the ability to rebuild, but it will take a concerted effort from all – governments, industry and individuals. Throwing our hands up in despair and 'walking away' is not an option.

Once we come out of the 'severe' containment phase, Governments will need to get projects fast-tracked and industry will have to respond accordingly... and we'll all have to do our part to support small businesses – especially in the hospitality, retail and service sectors who will all be 'doing it extremely tough'.

The good news (for Australia at least), and the thing that gives me hope for a bright future post-COVID-19, is that as Australians, we're used to standing together in the face of adversity. In fact, we're renowned for it! Whether it's bushfires, floods, cyclones, or other natural disaster, we ALWAYS stand together and get through. The COVID-19 crisis should be no different.

Anthony T Schmidt
Managing Editor

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Moreland acts on vision for a zero carbon and waste free community by 2040

Moreland City Council in inner-suburban Melbourne, recently adopted its Zero Carbon Moreland - Climate Emergency Action Plan. The plan sets out how it will be supporting residents, businesses and schools to act together in response to the climate emergency.

The five-year action plan maps a pathway towards three key outcomes for 2040, namely:

- efficient and 100% renewably powered energy;
- active or zero emissions transport; and
- a circular economy with zero waste.

Mayor of Moreland, Cr Lambros Tapinos highlighted the urgent need for Council and the Moreland community to think global, act local.

“Council is leading by example in our own operations. Through a combination of energy efficiency and renewable energy, we expect Council’s greenhouse gas emissions will soon be around 70% less than 2011 levels,” Cr Tapinos said. “We know that climate change is a global challenge. Communities like Moreland can lead the way by taking local action together for a safe climate.”

Over the next five years Council will support residents, businesses and organisations to rapidly reduce their climate pollution through initiatives like kerbside collection of food and garden organics waste.

Other initiatives include the construction of five kilometres of new shared paths to make cycling and walking more accessible, supporting local recycling and reuse-focused initiatives (like toy libraries and repair cafes) and installing more electric vehicle charging stations for public use.

Council’s *Cooling Communities* initiative will continue to ensure low-income households can access support to upgrade their homes to stay protected from extreme weather.

The action plan includes targets to double the amount of solar power capacity installed across the municipality and reduce average residential energy use by around 16% by 2025.

Moreland Council will continue acting to reduce its own emissions, by transitioning its car fleet to zero emissions vehicles and shifting away from fossil gas use in its facilities.

For further information, please visit: www.morelandzerocarbon.org.au/actions

Clear air: Monash research to reduce carbon footprint of asthma inhalers

Researchers are conducting a series of experiments using X-ray scattering and computer modelling in order to find a low-global warming replacement propellant for asthma inhalers.

By 2030, the propellant tetrafluoroethane (HFC-134a) will be banned from use in pressurised metered-dose inhalers (pMDIs), leaving the world’s 339 million asthma sufferers (2.7 million Australians) without a solution and short of breath – literally.

In 2019, the Kigali amendment to the Montreal Protocol mandated the beginning of a 10-year phase-out of HFC-134a – a potent greenhouse gas. Just 1kg of HFC-134a is equivalent to 1,430 kg of carbon emissions.

Unfortunately, this chemical is also essential to the operation of asthma inhalers. The pharmaceutical industry is now in a race to transition to more environmentally-friendly solutions.

The problem is that most potential replacements are highly flammable and unsuitable for human consumption. Dry powder inhalers are not yet suitable for all drugs, leaving many respiratory disease sufferers without an option.

But a ground-breaking international research investigation, led by Monash University, is looking to #CHANGEIT.

Dr Daniel Duke, a Senior Lecturer in Monash University’s Department of Mechanical & Aerospace Engineering, is working with colleagues at the Woolcock Institute of Medical Research (Sydney) and Argonne National Laboratory (Illinois, USA), as well as a major drug company, to reduce the carbon footprint of inhalers using state-of-the-art synchrotron X-ray technology and advanced computer models.

This technology allows researchers to see what happens to the spray particles inside the inhaler, and measure the density and quantity of the drug that various propellants can deliver asthma sufferers in order to identify the most promising replacements. The

research is being led out of the *Laboratory for Turbulence Research in Aerospace and Combustion* at Monash University in Melbourne.

Dr Duke has received an *Australian Research Council Discovery Project* grant of \$185,000 to continue his fundamental work in helping asthma sufferers in the future.

“What we’re trying to do is find out whether there are alternative propellants, which behave properly, from the options that are safe. HFC-134a was previously found in our air conditioners and fridges before it was banned due to its high emission of greenhouse gases,” Dr Duke said.

“Pharmaceutical companies have stuck with HFC-134a because it works very well; and, most importantly, it’s safe for human consumption. One problem is all the environmentally-friendly options that have gone into your air conditioner and fridge are flammable or toxic, and we don’t know if they’re safe for the human body if ingested.

“Another issue is some chemicals have lower pressures and lesser densities which means they carry less of the drug into the airway. That means we’ll also need to look at redesigning pMDIs to maximise performance.

“Essentially we’re doing all the groundwork to give the drug companies the confidence to go to clinical trials knowing that all the engineering, chemistry and physics problems have been put to bed, and all they have to do is make sure that it’s effective and safe for patients.”

Asthma affects as many as 339 million people worldwide and around 2.7 million Australians. In 2015, the estimated cost of asthma in Australia was \$28 billion. Roughly 40,000 Australians are hospitalised with asthma each year.

The research team comprises Dr Daniel Duke and Professor Damon Honnery (Monash University); Brandon Sforzo and Alan Kastengren (Argonne National Laboratory); Professor Paul Young (University of Sydney) and Professor David Schmidt (University of Massachusetts-Amherst).

UNISA expert calls for 'fire-line' to future-proof homes against bushfire disaster

With damages costs in the billions, the recent bushfires across Australia saw more than 12.6 million hectares burnt, thousands of homes and buildings destroyed, and most tragically, resulted in the deaths of 34 people.

Such immense devastation means policymakers are under pressure to identify strategies that will future-proof communities as they start rebuilding beyond the 2020 bushfires.

UniSA sustainability expert, Dr Sukhbir Sandhu says Australia should consider the establishment of a 'fire-line' – a bushfire demarcation line to identify high-risk areas not recommended human habitation.

In the same vein as Goyder's Line of rainfall (created in South Australia 1865 to map areas liable to drought and therefore unsuitable for planting crops), Dr Sandhu says a fire-line would help people clearly recognise areas that are suitable, or not suitable, for living.

"The frequency and intensity of bushfires in Australia have changed dramatically over the past decade – our fire season is longer, the fires are more brutal, and the fallout is extensive," Dr Sandhu says.

"Accordingly, Australia's responses to the fires must change too.

"As people look to rebuild their homes, schools and communities, we need to be asking the question – is it really safe to do so in these areas?"

"The current bushfires have destroyed the livelihoods of far too many people to be remedied by standard recovery and rebuilding strategies. And, as fires continue to burn into residential areas, governments must consider something more ground-breaking in recovery.

"It's time for policymakers to take a strong stand where it is safe for communities to rebuild, and a fire demarcation line could help achieve this."

Dr Sandhu says that policymakers have the basic tools to start such an initiative which, in conjunction with CFS aerial footage, satellite imagery, and well-developed insurance company models (that not only identify areas susceptible to bushfires, but coastal flooding as a result of rising sea levels) would provide clear information for a new fire-line.

She says that areas adjacent to fire-lines should also be built to compulsory bushfire-resilient construction guidelines.

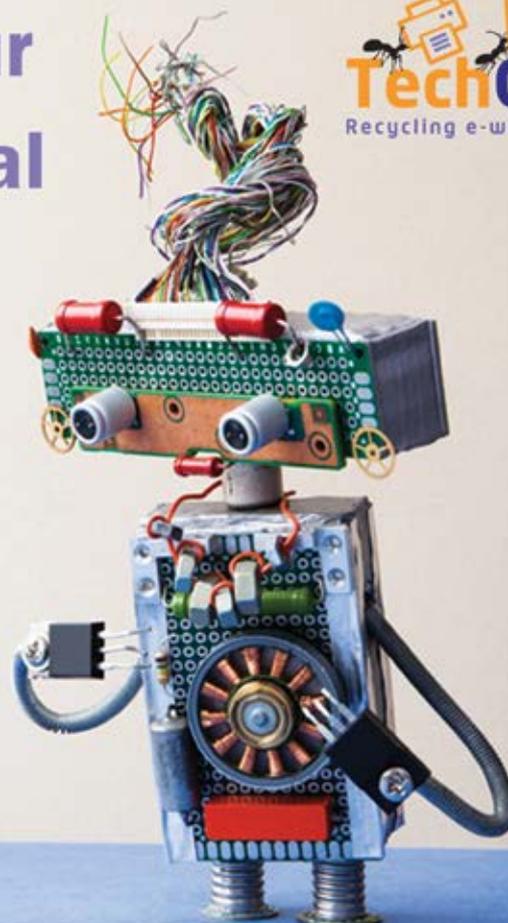
"We have the technology to create homes with bushfire resistant materials, and to enable houses with certain structural properties to serve as fire bunkers. But to date, there are no clear policies that support or promote these technologies for use in vulnerable areas," Dr Sandhu says.

"This is not about quick fixes; we need long-term, sustainable strategies to address the undeniable effects of climate change."

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Start of WA's *Containers for Change* program deferred due to COVID-19



The Western Australian Government has deferred the launch of State's container deposit scheme *Containers for Change*.

Originally planned for launch on June 2, 2020, the decision to delay the scheme is due to the unprecedented impact of COVID-19 and its expected disruption to refund points. The scheme's postponement is in accordance with advice from the scheme co-ordinator, *WA Return Recycle Renew Ltd* (WARRRL).

The State Government has also responded to calls from community, local government and businesses for the scheme launch to be postponed. The Government will review the situation in August 2020 to determine whether the scheme's new start date will be November 2020 or June 2021.

Delaying the scheme until after the major impacts of COVID-19 are felt will eliminate the public health concerns such as potential risk of infection from handling containers, as well as over-the-counter refund points contravening social distancing.

A delayed launch would also avoid starting the scheme during a period which may be the potential peak of the pandemic.

The scheme focuses on employing people with disability, older people and Aboriginal people. These community groups are generally more vulnerable and their involvement in the scheme may place them at greater risk of infection.

Closures of pubs, clubs and many other venues, as well as schools, would have also impacted on the volume of containers.

WA Return Recycle Renew Limited, the Department of Water and Environmental Regulation (DWER) and the State Government will continue to work closely on developing a revised timeline for the launch of the scheme.

Speaking about the delay, Western Australian Environment Minister Stephen Dawson, commented: "COVID-19 has resulted in significant global, national and State impacts and there has been disruption across the board for Government initiatives and services."

"The McGowan Government, in close consultation with WARRRL and DWER, determined that under the COVID-19 environment we are all faced with, there are too many potential health risks and logistical difficulties to start the scheme on June 2, 2020."

"The Government has also responded to calls from community, local government and businesses for the scheme launch to be postponed," the Minister added. "Starting the scheme on June 2 would put the scheme's success at risk and place refund point operators under significant pressure."

"While it is disappointing to be deferring the scheme, we remain committed to delivering the most diverse and accessible scheme in Australia."

"We will continue to work together and update the community, operators and suppliers throughout this period of uncertainty," Minister Dawson concluded.

Recycling of critical minerals is not the only solution, says GlobalData

A recent report from the UK Office of Science and Technology states that while the UK is dependent on imported critical minerals for a number of sectors, there is no specific strategy for their supply - a worrying thought considering the implications of recent trade wars.

Critical minerals are used to create products of strategic importance for many UK sectors, but the UK has no specific critical minerals strategy and no single department has responsibility for policy regarding these important materials.

According to the UK Office of Science and Technology, the variety of materials used in products is increasing, with microchips containing around 60 metals rather than the 20 they needed in the 1990s. This has caused the rate of metal usage to rise in recent years, with more than 80% of the total global production of rare earth elements, indium, gallium and platinum group metals occurring since 1980.

GlobalData's mining technology writer Umar Ali says: "Recycling is a solution but it's not the only solution. Recovering critical minerals from recycled materials reduces the need for extraction and the energy demands associated with mining - for example, recovering cobalt from scrap only requires 7-14% of the energy needed to extract it from ore."

"However, recovering materials from waste electrical and electronic equipment is challenging due to the low concentrations of these critical minerals in said equipment, the report states that recovering one tonne of indium would require 3.85 million LCD TVs," Umar Ali says.

"Recovered materials are also often of lower quality than mined materials, which limits the effectiveness of recycling as an alternative to mines or imports. For some critical minerals, such as germanium and gallium, there is no technology available to recover them."



The report suggests a "...circular economy" approach to recycling, recovering resources at their highest quality to keep them in circulation for longer, as a way of solving the problems with recycling.

This approach includes practices that consider product disposal by avoiding complex metal mixtures, as well as developing methods to effectively separate critical minerals and introducing schemes to make manufacturers responsible for the entire product life-cycle."



Dedicated fund to restore SA wildlife habitats launched

The South Australian Government has joined forces with Nature Foundation SA to launch a special fund to re-establish habitat for wildlife in the state's bushfire-ravaged regions.

The *Wildlife Recovery Fund* is a collaborative project between the National Parks and Wildlife Service SA and the not-for-profit Nature Foundation to assist with the recovery and restoration of flora and fauna in fire-damaged regions across South Australia.

South Australian Minister for Environment and Water David Speirs said there have been significant impacts to wildlife and habitat across several parts of South Australia, particularly around Cudlee Creek and on Kangaroo Island.

"While many community groups have mobilised to care for injured wildlife, the Wildlife Recovery Fund will be used to re-establish habitat, particularly for the most endangered and vulnerable species," said Minister Speirs.

"While it's going to take time to establish a full picture of the damage, we believe a significant number of Kangaroo Island's koalas have perished, and considerable areas of Glossy Black Cockatoo habitat, including nests, have been destroyed.

"We are also very concerned for the future of the Kangaroo Island Dunnart – one of the species thought to be most at risk, due to habitat loss. The immediate challenge will be to ensure that surviving animals have sufficient habitat in which to find food and avoid predation.

"Our National Parks and Wildlife Service will work collaboratively with the Nature Foundation to ensure we use sound planning, good science and local advice to ensure funds are spent wisely.

"The community response to the bushfires has been incredible and I encourage those who can, to give generously.

Nature Foundation Chair Jan Ferguson OAM said the state has experienced catastrophic loss and there is a need to work together on recovery.

"We need to harness good science and advice to ensure funds raised are put to use in the most important places and achieve the best possible outcomes for threatened and vulnerable plants and animals," said Ms Ferguson.

"Donations will go to local landholders and community groups in fire-affected regions to urgently assist natural regeneration through weed and feral animal control, and fencing. This will give both threatened animal and plant life the best chance of recovery.

"Nature Foundation is proud to be continuing a 40-year tradition by partnering with South Australian farmers, communities and the National Parks and Wildlife Service SA on this new Wildlife Recovery Fund."

To donate visit: www.naturefoundation.org.au/support-us/wildlife-recovery-fund

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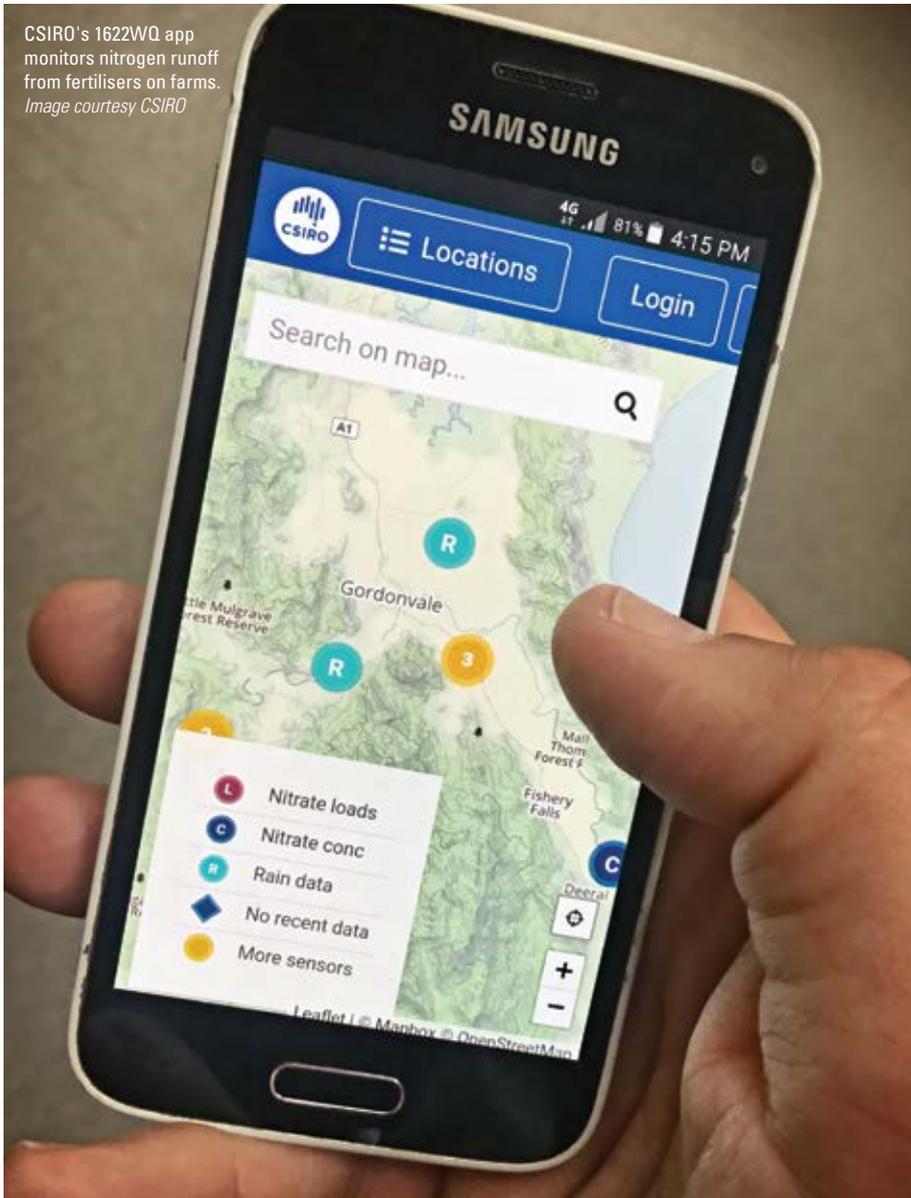
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New tool for sugarcane farmers to help the Great Barrier Reef

CSIRO's 1622WQ app monitors nitrogen runoff from fertilisers on farms. Image courtesy CSIRO



In a world first, sugarcane farmers in far north Queensland have a new app, developed by Australia's national science agency, CSIRO, that will help them manage fertiliser use and reduce nitrogen runoff onto the Great Barrier Reef.

Currently there's no way sugarcane growers can tell whether fertiliser has runoff from their farm but the free app, named *1622WQ*, shows the concentration of nitrogen in local waterways in real time. It means that, for the first time, they will have easy access to water quality information and can relate their management practices to water quality

in local waterways, for example immediately after it's rained.

When rainfall washes nitrogen fertiliser into waterways, it both wastes farmers' money and becomes a major threat to the health of Great Barrier Reef ecosystems. CSIRO agricultural scientist and 1622WQ project leader Dr Peter Thorburn said the new app was co-designed with farmers to meet their needs.

"Sugarcane growers told us they wanted quick and easy access to water quality information, so they could find out what's going on with their crops and make better decisions," Dr Thorburn said.

"Although an app can appear simple, the smarts behind it are anything but. The chain of information between the water quality sensors in local waterways and what you see on your phone is complex and requires substantial innovation along the way."

The app shows data on nitrate concentrations from high frequency automatic sensors deployed in selected coastal catchments.

It uses CSIRO's advanced data analytics and state-of-the-art deep learning not available in other data delivery systems. It also shows rainfall so farmers easily see how the weather is affecting local water quality.

Stephen Calcagno is a sugarcane grower and Chairman in the Cairns Region of the peak body, CANEGROWERS. He's started using the app.

"This will be a great tool for farmers to see the impact of their farm management and help them improve their practises and the environment," Mr Calcagno said. "I look forward to seeing what happens over the coming wet season."

CSIRO Chief Scientist Dr Cathy Foley said the app brought together decades of agricultural expertise and close industry relationships with advanced digital technologies.

"We've paired our deep domain expertise in agriculture with digital technology to provide a solution for farmers who want to remain efficient and competitive while also reducing their impact on the environment," Dr Foley said.

"Solving complex challenges like protecting the Great Barrier Reef require deep innovation, but it's also important that the end result is a simple and intuitive product like this app, that farmers can seamlessly integrate into their business."

New ways to predict water quality in the days or weeks ahead based on artificial intelligence, something that's never been done before, are in the pipeline. CSIRO is also building other aspects of importance to sugarcane growers into a suite of 1622 apps, such as fine-tuning which parts of a crop might need more or less fertiliser, and comparing different fertiliser application rates on crop performance and environmental impact before they even plant.

The name 1622 comes from the height of Queensland's tallest mountain, which is in the area where the initial app development work took place. WQ is for water quality.

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RECYCLING 2.0

MASTEC rolls out new bins for Hobson Bay City Council's new 4-bin residential collection service





Following the Victorian Government's recent mandate for the introduction of a new 4-bin residential recycling and waste collection service for households across the state, leading Australian bin manufacturer MASTEC has rolled out some of the first new residential glass recycling bins for Hobsons Bay City Council in Melbourne's inner south-western suburbs. As well as rolling out over 38,300 of the new distinctive purple-lidded glass recycling bins, MASTEC also delivered an additional 17,000 new 120 litre FOGO (Food Organics Garden Organics) bins, together with over 38,300 MASTEC® KO Kitchen Organics Caddy Bins to residences across the City as part of the Council's new Recycling 2.0 initiative.



Hobsons Bay City Council is one of the first Victorian councils to adopt the new 4-bin residential collection system, which is a key component of the Victorian State Government's \$300 million 10-year *Recycling Victoria* package. Developed in the wake of the SKM recycling crisis, which impacted some 33 councils across Victoria, the *Recycling Victoria* package includes some \$129 million of initiatives aimed at totally reforming kerbside recycling throughout the state.

The cornerstone of these reforms involves a move to expanded residential kerbside services featuring four colour-coded bins. By improving sorting and separation of waste, recyclables and organics at the source, the new 4-bin system will help simplify and streamline processing of each of the material streams. This, in turn, is expected to play a major role in helping to minimise contamination within the processed recyclables streams.

Although it is likely that individual bin capacities and collection schedules will vary between councils to meet the needs of specific communities, the four bins will feature 'standardised' lid colours for easy identifications, namely:

- Purple Lid – Glass Recycling
- Light Green Lid – FOGO (Food Organics & Garden Organics)
- Yellow Lid – Plastic, Metal and Paper Recycling
- Red Lid – Household Waste

Most importantly, the new 4-bin system is not only expected to play a significant role in helping to reduce the amount of waste being sent to landfill across Victoria by an estimated 80% over the next 10 years, it will also provide a major catalyst



for the expansion of Victoria's circular economy. Together with the obvious environmental benefits, this growth in the circular economy is expected create an additional 3,900 jobs in the sector over the next 10 years.



From left: Mayor of Hobsons Bay, Councillor Colleen Gates; Hobsons Bay City Council CEO Aaron van Egmond; **(on right)** Deputy Mayor of Hobsons Bay, Councillor Sandra Wilson; and Hobsons Bay City Council Director of Sustainable Communities, Pene Winslade; join representatives from Veolia, Cleanaway, Australian Paper Recovery (APR) and MASTEC to celebrate the launch of the city's new Recycling 2.0 4-bin residential collection service.

have been supplied in the standard, neutral, 'light bisque' colour, enabling them to blend with the widest possible range of kitchen styles and colours.

In addition, approximately 17,000 households across the city that didn't already have a green waste bin, were also provided with a new MASTEC® 120 litre FOGO bin with a lime green lid.

Bins for the roll-out were transported in bulk from MASTEC's manufacturing facility in Adelaide to a temporary warehouse/storage yard which had been established in Altona, where the bins were fitted with lids, ready for delivery to the households. Every household also received an information pack with an easy-to-follow explanation of the new service and instructions on the correct use of each of the bins.



HOT-STAMPED INSTRUCTIONS ALWAYS WITH THE BIN

To further assist residents with the correct use of the new Glass Recycling and FOGO bins (including the MASTEC® KO kitchen caddy), the bin lids have been 'hot-stamped' with clear graphic instructions as to what can and can't be placed in each of the bins. As well as providing clear and concise instructions, the fact that the information is 'hot-stamped' into the lid means that unlike stickers which can fade, get damaged or come off the bin or lid, the usage information will always remain with the bin.



RECYCLING 2.0 – CHANGING THE FACE OF RESIDENTIAL COLLECTIONS

Driven by last year's recycling crisis, Hobsons Bay City Council accelerated the plans outlined in Council's *Waste and Litter Strategy 2025* to find a local, sustainable solution to meet its needs. The result is *Recycling 2.0* - an innovative and sustainable waste and recycling service that has forever changed the face of residential recycling across the City.

The *Recycling 2.0* service, which commenced on February 1 this year, focuses on maximising the recovery and local reuse of recycled kerbside materials. The new service separates food organics from general waste, combining them with garden organics in the new FOGO bin which is collected weekly. The introduction of a FOGO service is expected to reduce the volume of waste Hobsons Bay residents send to landfill by at least 20 per cent (approximately 8,000 tonnes per year).

With four bins per household, glass will also be taken out of the commingled yellow bin and placed into a dedicated glass recycling bin which is collected every four weeks. Without shards of broken glass in the paper, cardboard, metals and plastic bin, much better recycling outcomes can be achieved for all the comingled recycling products, including glass.

The residents' existing yellow-lidded recycling bins will continue to be collected fortnightly, while their general rubbish bins (red lid), will change to a fortnightly collection.

Speaking about the new *Recycling 2.0* services, Hobsons Bay Mayor, Councillor Colleen Gates, said that while the new system represents some changes in the city's residential collection services - including an additional 4-weekly collection for recyclable glass and a reduction in the household waste collection from weekly to fortnightly - sorting waste and recyclables into four bins would be easy.

"We are committed to supporting our community in doing whatever we can to keep recyclable materials including glass and food waste out of landfill. Introducing a fourth bin is a practical way to do this," the Mayor said.

"This innovative program recycles glass, paper, cardboard, plastic, metal, garden and food waste to create useful products, maximising the recovery and local reuse of materials and diverting them from landfill where they create harmful greenhouse gases," Mayor Gates added.

ROLLING-OUT FOR A NEW SERVICE

The new bins for Hobsons Bay City Council's *Recycling 2.0* services were rolled-out by MASTEC's specialist Assembly & Delivery (A&D) teams in January. The roll-out saw some 38,300 households across the city provided with a new MASTEC® 120 litre Glass Recycling MGB (wheelie bin) with a distinctive purple lid, as well as a compact MASTEC® KO® kitchen caddy to assist with collection of food waste/kitchen scraps for the new FOGO service. The MASTEC® KO® Bins

AUSTRALIAN MADE QUALITY

As with all MASTEC® bins, the bins for Hobsons Bay City Council's new *Recycling 2.0* services are all manufactured in Australia at MASTEC's state-of-the-art manufacturing facility in Adelaide.

Specifically designed for harsh Australian conditions, their robust, UV stabilised construction plays a major role in ensuring that the bins are able to keep performing and looking good for many years. What's more, their 'standardised' design utilises a number of identical components across the bin range (hinge pins, axles, wheels), thereby significantly reducing spare parts inventories and cost.



MASTEC® MASTrac HIGH-TECH BIN DELIVERY SYSTEM

As anyone who has ever been involved with rolling out a new residential waste or recycling service will attest, it is a complex and often onerous task – especially when it involves the introduction of an additional bin. Registering bin serial numbers with property data, ensuring every household has the correct combination of bins and, importantly, making sure that the task is completed in time for the commencement of the new collection service(s), are all critical factors in the A&D process.

Put simply, failure in any of these areas can spell disaster for the council and collection contractor alike.

As well as being highly regarded for its high-tech manufacturing capabilities and the outstanding quality of its Australian made bins and lids, MASTEC has also gained an enviable reputation across Australia and beyond as an innovator and leader in the field of bin Assembly & Distribution (A&D) services.

The high-tech MASTEC® MASTrac bin delivery system utilises state-of-the-art hand-held scanners, together with a specially developed proprietary software package, to provide an extremely accurate and easy-to-use method of registering and tracking bin serial numbers and RFID tag numbers to individual properties. The purpose-designed system provides accurate, real-

time information as to the status of every delivery, with the GSM-enabled scanners providing a constantly updated 'live data stream' during the rollout process.

As part of the bin manufacturing process, each MASTEC bin is also 'hot-stamped' with a unique serial number and fitted with a matching barcode sticker. At the time of delivery to the individual households, the bins are fitted with a second barcode sticker which is generated by the MASTEC® MASTrac software as part of the delivery route sheet preparation process. This second barcode reflects delivery address, property ID number and the type and size of the bin.

With all of the relevant data now 'physically attached' to the bins by means of two barcode stickers, all that remains is for the delivery crews to scan the two barcodes and the RFID tag with the lightweight hand-held scanner/transmitter. This is a quick and simple process that generally takes no longer than 10 seconds per bin to complete. The scanned data is then automatically transmitted (together with date/time stamp info) to MASTEC's central database as a 'combined' record containing all of the relevant data for the bin.

Importantly, the fact that the data is scanned rather than written manually, helps to eliminate problems or issues relating to incorrect information being written down and/or illegible run sheets – further improving data integrity.

HIGHLY ACCURATE DATA

As well as helping to provide a fast, efficient and streamlined Assembly & Distribution service, the MASTEC® MASTrac system has also proven itself to be an extremely effective method of verifying the accuracy of existing GIS rate / property data.

For example, in instances where there may be a discrepancy in the GIS / property data provided for the rollout (e.g. no house at location, incorrect address or, more commonly, additional dwellings on sub-divided lots that have not been updated into the property database) the A&D operator is able to enter an exception code that provides a clear explanation as to why bins could not be delivered to the address, or conversely, why additional bins will be required at a specific address.

In practical terms, once the rollout is finished, the completed MASTEC® MASTrac database not only provides a detailed database of the location of every bin asset, it also provides a highly detailed and extremely accurate property database – one in which every property has been physically located and identified, and any exceptions have been noted.

For further information on the full range of MASTEC products and services please phone: 1300 MASTEC (1300 627 832) or visit: www.mastec.com.au

Cleaning Public Spaces ... Keeping it Legal

As our cities and towns grow, local government faces continued pressure to provide a safe and pleasant environment for the public. High pressure steam cleaning of pavements, plazas, even graffiti removal can create breaches of EPA regulations.

By definition, the EPA act prohibits, "... introducing any matter into waters which changes the physical, chemical or biological condition of the water." In other words, any contaminated wastewater that enters storm water drains is a breach. Analysis of breaches indicates that some local government bodies or their contractors have been forced to pay substantial fines for illegal disposal of the contaminated wastewater from high-pressure cleaning operations into the water catchment.

The help overcome these issues, Sydney-based company, Australian Pump Industries, has developed a machine designed to allow high pressure steam cleaning of streetscapes to be carried out, without allowing the run-off to enter the stormwater system.

Known as the Aussie Hydro-Loop, the new machine uses 'clean & capture' technology that captures the wastewater generated during pressure cleaning of flat or vertical surfaces – vacuuming it into the machine, where it is then filtered and reused. *The Aussie Hydro-Loop* allows cityscapes including plazas and outdoor eating areas to be cleaned easily and efficiently using high pressure steam, without any contaminated wastewater run-off.

Available as either a trailer or truck-mounted system, the new machine incorporates a minimum 1,000 litre capacity water tank. The steam cleaner itself and an integrated



The Aussie Hydro-Loop from Australian Pump Industries features "clean and capture" technology which allows wastewater run-off generated during cleaning operations to be vacuumed back into the machine, filtered and recycled.

vacuum system becomes a mobile cleaning station that reuses its own captured water to carry out the cleaning tasks.

The main drive for the system is a water-cooled Kubota diesel engine. A top quality 'Big Bert' Bertolini triplex high-pressure pump, providing 4,000 psi and 20 lpm flow, is at the heart of the system.

The best news for Councils is that even under the new Australian standards for high pressure water blaster safety, operators of the "loop" do not require RTO certification.

"We've designed this machine with Councils and government departments in mind," said Aussie Pumps' Chief Engineer, John Hales.

"Contractors use the unit because of its unique loop system that leaves the job completely clean without polluting the environment."

The strength of the system is not only its high pressure, but the fact that the unit can operate with water temperatures of up to 120 degrees Celsius, providing the operator with the flexibility to select the temperature required for the job.

"When temperature is applied with pressure to graffiti it just peels off the wall," Hales added. "Other jobs like sanitising amenity areas and sports facilities, or removing oil stains from Council operated car parks or streetscapes are also easy due to the machine's high steam capabilities."

Easy to use and maintain, the unit's clean and capture filters can be changed out in the field in a matter of minutes if they become blocked half way through a job.

LOW NOISE OPERATION

Specifically designed for inner-urban and CBD use, the latest version of the Aussie Hydro-Loop high pressure cleaning system operates at 75 dbA. Chores like cleaning of the Sydney Opera House forecourt or the back alleys around night-clubs in the CBD, can all be carried out without disturbing residents, even at night.

Importantly, silencing is not achieved by the machine being cased in a large soundproof box. Rather, a high-tech engineering approach has been used to develop stainless steel panels that absorb the noise without creating a danger of overheating.

"The real benefit of the Hydro-Hush system is that we can provide low noise levels, while at the same time not run the risk of breakdowns caused by a lack of airflow in and around the machine," said Hales.

The Aussie Hydro-Loop not only operates quietly but, it also enables the work to be carried out quickly, thoroughly, and without leaving streaks. Where vertical cleaning is concerned, a supplied berm is used to dam the wastewater. It then is vacuumed up into the filtration system and reused.

"The Aussie Hydro-Loop is a revolution," said Hales.

"It provides huge labour savings but also, more importantly, enables local government bodies and their contractors to comply with the EPA's strict requirements," he added.

Further information, including a comprehensive info pack on the *Aussie Hydro-Loop* is available from the Australian Pump Industries website: www.aussiepumps.com.au

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Outstanding Debut

NEW FAUN VIAJET 6 SWEEPER WINS HIGH PRAISE FOR ITS PERFORMANCE IN THE FIELD

Following on from its eagerly anticipated arrival in Australia earlier in the year, the new state-of-the-art FAUN VIAJET 6 sweeper has been earning high praise from councils and contractors alike, thanks to its outstanding performance in numerous in-field demo trails.

While the old adage ‘the proof of the pudding is in the eating’ can be applied to many situations, when it comes to sweepers, ‘*the proof of performance is out on the road*’ is not only more appropriate, it’s absolutely true. Glen Fuller, Sales Manager – Sweepers with Superior Pak, the exclusive distributor of FAUN products throughout Australia & New Zealand, explained:

“When it comes to sweeping equipment, versatility and performance are paramount.”

“Even sweeping routes that cover a relatively small geographic area tend to present a range of different sweeping conditions.”

“What’s more, these conditions can, and often do change from week-to-week, due to things including weather events, traffic loadings, seasonal conditions, or any other number of factors.”

“Needless to say, when it comes to choosing a sweeper to meet your needs, you need to be sure that it has the capacity to cope with an array of variables, including different pavement types and terrains, a range of debris types and loadings, wet and dry conditions, etc.,” Glen added. “And the best way to do that, is to use the machine, in real-world conditions, on your roads, in your area. It really is the best way to ensure that the unit can cope with your specific sweeping needs.”

OUTSTANDING PERFORMANCE IN A WIDE VARIETY OF CONDITIONS

With that in mind, since the first FAUN VIAJET 6 arrived in Australia in January, Glen and the team from Superior Pak have been busy demonstrating the new unit to numerous councils and contractors across New South Wales – and the response has been extremely positive to say the least.

“We’ve had a good positive response to the unit across the board, particularly from the operators, which can often be the biggest challenge,” Glen Fuller said.

“In fact, we even had one operator - who was initially completely against even trying the FAUN - hop out of the cabin after operating the unit on his regular sweeping route and announce: ‘I love it – I want one’. If that’s not a vote of confidence in a machine, I don’t know what is!” he added.

The in-field trials took in a wide variety of sweeping conditions, from major CBD areas and inner-city streets, through to metropolitan arterials, suburban streets and rural roads – many of which had extremely high leaf and debris loadings. In every instance, the FAUN VIAJET 6 delivered the goods – collecting the debris and fines, leaving a clean, debris-free pavement.

“Together with the comfortable cab, ease of operation and, of course, its outstanding sweeping capabilities, two other things that proved to be extremely popular with all of the operators were the 1,900 litre capacity water tank (which helps to improve productivity by reducing the number of times they had to stop sweeping to refill the tank) and how easy the unit is to empty and clean at the end of a shift,” Glen said.

“They were also all really impressed with how easy and efficient the suction boom is to use for cleaning out gully traps and side-entry pits,” Glen added. “In fact, the unit got excellent feedback from all of the operators who trialled it.”

SPECIFICALLY DEVELOPED FOR AUSTRALIAN CONDITIONS

Specifically developed to meet the demands of harsh Australian operating conditions, the FAUN VIAJET 6 delivers the ideal combination of features, capacity and manoeuvrability to suit a wide range of applications. From suburban streets and roads, through to major arterials, rural roads and transport hardstand areas, the VIAJET 6's size, features and capacity make it an ideal choice for councils, contractors and road authorities alike.

Mounted on an Isuzu dual control FSR 140 260 4x2 cab chassis, the FAUN VIAJET 6 features a 6m³ capacity collection hopper with high angle tipping for efficient emptying and easy cleaning. To provide greater stability during emptying, the unit's 1,900 litre high capacity water tank is completely separate from the collection hopper. The location and arrangement of the tanks, auxiliary engine and other components have been specifically designed to lower the centre of gravity and optimise weight distribution, thereby providing maximum stability during sweeping and emptying.

The VIAJET 6 comes standard with a high performance Deutz TCD 2.9l 4-cylinder auxiliary engine, which transfers power to the sweeper and blower units exclusively via hydraulics rather than through mechanical components which can be more susceptible to wear and tear.

PATENTED AIR CIRCULATION SYSTEM

The key to the VIAJET 6's outstanding sweeping performance lies with its patented air circulation system which delivers the combined benefits of regenerative air sweeping with traditional vacuum sweeping. This system not only delivers outstanding sweeping performance across a wide range of surfaces, it also results in a significant reduction in fine dust emissions from the sweeper.

The FAUN air circulation system continuously transports the extracted air from the debris container to the blowing nozzle behind the suction nozzle. When loaded with new debris, the already moistened and heated air is once again sucked into the suction nozzle and recirculated. The quantity of recirculating air can be variably adjusted between 30 and 70% depending on the application.

Only the relatively small proportion of air which is not recirculated flows out smoothly under the machine. Fine dust emissions from the FAUN road sweeper with the air circulation system are approximately 50% lower than for pure suction road sweepers.

Importantly, this unique design means that the VIAJET 6 does not blow dust around. Clean exhaust air is expelled behind the sweeper units on the portion of the road which is already clean.

Adding water to the blast air also enables the road to be cleaned in the working area of the suction nozzle.

Both the suction and blast tubes are fitted with quick release fittings to enable easy change over and cleaning.

For further information or to enquire about a demo of the new FAUN VIAJET 6, contact Superior Pak on: 1800 013 232 or visit: www.superiorpak.com.au

Bottom: The quantity of recirculating air can be variably adjusted between 30 and 70% depending on the application. Fine dust emissions from the FAUN road sweeper with the air circulation system are approximately 50% lower than for pure suction road sweepers.

Below: The FAUN air circulation system recirculates air to the blowing nozzle behind the suction nozzle. When loaded with new debris, the already moistened and heated air is once again sucked into the suction nozzle and recirculated.





Steps to follow for a hygienic and safe potable water installation

Press-fit pipe connection systems specialists SANHA highlight some of the issues surrounding lead and other contaminants in potable water supply pipes in buildings and residences.

Water is the most important foodstuff of all and is generally protected: It must be hygienically impeccable and without any harmful effects on health. Therefore, adverse effects of all sorts and particularly its contamination with lead must be avoided.

The hygiene of potable water and its compliance with generally prescribed limits are sensitive and complex issues that must be taken into account in construction projects. In order to achieve a satisfactory and reliable result, it is necessary to set the course already during the planning phase. This is because the contractor, or the building owner and planner will bear the responsibility and can be called to account if problems or hazards arise.

There are many reasons that can lead to quality losses, including the type of pipeline installation, the use of unsuitable materials, stagnation in less or unused pipeline sections, or inadmissible heating. By neglecting these factors in a potable water installation may lead to the growth of bacteria that may cause infections. A key point is the lead content of the water - in this case it is important to look closely at the limit value.

The following data on potable water quality contributes to the achievement of a high-quality facility designed for safety and sustainability. After all, it must meet the functional requirements for a calculated service life of 50 years.

IT MAY BE NEW, BUT IS IT LEAD-FREE?

Newly constructed buildings may easily give the impression that the systems installed for drinking water are lead-free. According to leading press-fit pipe connection systems specialists SANHA, that's simply not the case.

It is known that too much lead leads to health hazards, especially in unborn children, infants, and toddlers. In order to guarantee the quality of potable water, the lead content has therefore been limited to 0.01 mg/l by the Drinking Water Directive. Half of this quantity - i.e. a maximum of 0.005 mg/l - may be discharged by the water supplier. The second part could be entered by the domestic installation in purely mathematical terms. The limit value of 0.01 mg/l thus refers to the sum of the total lead input.

This contribution is non negligible: all components in contact with water after transfer to the building - from fittings and pipe connections to water meters, as well as the composition of the water can affect the lead content. The United Kingdom of Great Britain and Northern Ireland, France, the Netherlands and Germany have agreed in 2011 to harmonise the tests for the hygienic suitability of products and materials in contact with drinking water. This 4MS cooperation is now called the "4MS Initiative" (4MSI) with a view to expansion. The metallic materials on the 4MSI list form the basis for the products that will eventually be installed in buildings. According to the current status, the acceptable list also includes materials

that contain a minimum amount of lead, for example as an alloy component or as an unavoidably accompanying element.

DRASTIC CONSEQUENCES

This results in the following: even if only products manufactured from the approved materials are installed, the limit value of 0.01 mg/l may still be exceeded. This could be due to the sum of the installed components, for example. In such a case, the water must no longer be used for drinking and food preparation and the search for the causes and the remedy will then follow - a complex and possibly costly process.



A tightening of the limit value is currently being discussed. This would have the effect of further reducing the amount of lead that can be introduced by all components. If half of this amount were to continue to be accounted for by domestic installations, the lead problem could become more acute.

THE SOLUTION: LEAD-FREE

This problem can be avoided by choosing lead-free components from the point of transfer of the water supplier to the domestic installation. Many system fittings made of lead-free silicon bronze (CuSi) in different series are available today. As they do not contain the undesirable element, they do not release any into the drinking water. This is proven by the numerous certifications of the quality manufacturer such as SANHA. The high-quality stainless steel components are also suitable for lead-free installations.

In addition to the "lead-free" aspect, the material quality also plays a role. Silicon bronze is extremely resistant to dezincification and stress corrosion cracking. Thanks to its extremely pure surface and resistance to dezincification, the PURAPRESS fitting series from SANHA, for example, represents a very hygienic premium solution. The high material density also means there is no casting porosity. If the components are professionally installed, the result is a high-quality potable water system. There are other important aspects to consider during the planning stage.



MINIMISE STAGNATION TIMES

A demand-based design ensures that a sufficient change of the water in the system can already take place during normal operation. The content of a drinking water system should ideally be exchanged after a maximum period of 72 hours.

The prerequisite for this is an exact pipe network calculation, whereby the actual individual resistances and a simultaneity adapted to the user behaviour must be taken into account. Instead of a T-installation, the tapping points are now connected in loops. Regularly used tapping points can be arranged at the end of this loop installation.

Alternatively, an entire floor line can be designed as a ring line. Both installation methods ensure excellent water distribution in the floor pipes by means of a flexible and low-connection pipe installation. For low pressure loss installation, flow-optimised elbows, T-pieces and threaded connection parts, wall angles or wall discs as well as double wall discs made of silicon bronze and stainless steel are available.

SPACING AND INSULATION

The temperatures of cold and hot water pipes must be limited by proper installation and insulation to prevent bacterial growth. Important measures are: sufficient distance between the cold water pipes and heat-carrying installations, no penetrations through heating screeds and separate shafts for risers. This guarantees that cold water is heated up to a maximum of 25 °C and hot water not below 55 °C. These values apply to all parts of the system.

CLEAN PRODUCTS - CLEAN PROCESSING

In addition to the material, the handling of the products has an effect. Thus, quality-oriented companies ensure that the parts in contact with water are carefully protected after production.

The pipes are fitted with sealing caps and the fittings are packed hygienically in protective bags. The caps and the fittings are only removed from the protective bags directly before installation. The contractor inspects all components for cleanliness before installation.

In case of interruptions during installation, open pipe ends must be securely closed. This is to limit the quantity of dirt particles and moisture that may penetrate the installation as much as possible.



The former could form a breeding ground for micro-organisms, while moisture in combination with oxygen may lead to corrosion in base metals.

LEAK TEST AND PROPER TRANSFER

A leak test must be carried out before insulating the pipes and closing the cut-outs.

Last but not least, contractors and installers are obliged to hand over the drinking water installation to the user and to familiarise him with all hygiene and safety-relevant operations of the system.

Then the drinking water system can be permanently operated as safely as it was planned, installed and tested.



Multi-disciplinary centre for water, wastewater and energy technologies opened in Singapore

Xylem, a leading global water technology company dedicated to solving the world's most challenging water issues, recently launched a new multi-disciplinary centre for water, wastewater and energy technologies at the company's regional headquarters in Singapore.

Located at ICON@IBP, the expanded headquarters brings the company's regional R&D capability into a new Xylem Technology Hub Singapore (XTHS), alongside its regional leadership and personnel. The XTHS represents Xylem's continued investment in sustainable water technologies, and research at the new centre will focus on developing breakthrough technologies in water distribution and water and wastewater treatment.

One of the first projects Xylem is pursuing at the centre is a collaboration with A*STAR's *Institute of High Performance Computing* (IHPC). Xylem will combine its world-leading expertise in water technologies with IHPC's expertise in computer modelling and simulations. Together, they will evaluate

fluid-structure interaction in pipe flow to develop a new computational fluid dynamics model tailored for Xylem's applications such as SmartBall and PipeDiver. The model will then be applied to the design and testing of other advanced products and solutions to be deployed in treatment plants and water distribution networks.

"This new multi-disciplinary centre will create ample opportunities to innovate and collaborate with our customers, as we work with them to tackle the region's greatest water challenges, including water scarcity, affordability and infrastructure resilience," said Mr Patrick Decker, president and CEO of Xylem.

"Bringing research and development capability into our regional headquarters in Singapore puts all of Xylem's market-leading technology capability in one location, focused on the region's water technology and infrastructure solutions."

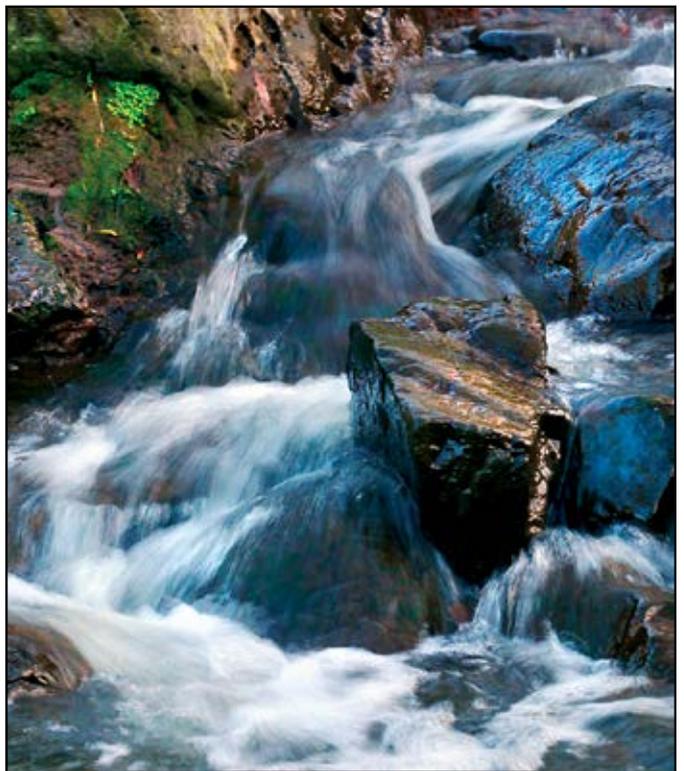
Dr Lim Keng Hui, executive director of IHPC, said, "We are glad that Xylem has decided to set up its regional headquarters

in Singapore, to be plugged into the robust R&D ecosystem here. A*STAR is happy to contribute its deep capabilities in modelling and simulation for sustainable water technologies, that will lead to good societal outcomes for Singapore and the region."

In addition to the research and development Hub, Xylem's new office will feature a customer experience centre and a training centre, bringing together all of Xylem's sales, customer support and technical capabilities for Southeast Asia.

"We're excited about the energy and innovation that's possible when we focus our resources, talent and technologies in one centre like this," continued Mr Decker. "This new integrated facility will offer our customers and partners an immersive technology experience, as well as a state-of-the-art training centre. Singapore's water sector continues to grow and innovate, so this is a great location to work together on solving the region's water challenges."

Work at the centre will also be supported by Xylem's ongoing partnership with PUB,



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Singapore's National Water Agency, to address challenges brought about by climate change and increasing water demand. Xylem continues to work with PUB on the development and implementation of technologies in common areas of interest, such as high-precision leak detection and condition assessment technologies, and using data analytics to pin-point water loss.

"Singapore is an internationally recognised model city for integrated water management and a thriving global hydrohub because of our strong belief in R&D and continuous innovation to tackle current and future water challenges," said Mr Ridzuan Ismail, director, Water Supply Network, PUB.

"We are happy to work with Xylem to develop novel water solutions to enable IoT and data analytics to enhance our water network management. For instance, with predictive maintenance, we can achieve better resource optimization and extend asset life of the infrastructures, thereby reducing water loss and strengthening the resilience of our water supply."

"We are delighted with Xylem's expansion in Singapore, including the setting up of its new technology hub," said Mr Lim Tse Yong, director, Capital Goods, Singapore Economic Development Board (EDB). "This is testament to Singapore's continued attractiveness as a location for companies to innovate and forge collaborations in developing solutions to meet the region's needs. We look forward to the exciting technologies and solutions that Xylem will create in partnership with our innovation ecosystem."

Xylem first entered the Singapore market in 1982 and has since grown and expanded its facilities. The expertise located in Xylem's new Singapore office is focused on bringing new technologies to the region, such as the Advanced Infrastructure Analytics (AIA) platform, the Advanced Metering Infrastructure (which has more than 12 million water end points and 14 million combination-utility end points globally) and a powerful portfolio of digital solutions to optimize water networks.

ABOUT XYLEM

Xylem (XYL) is a leading global water technology company committed to developing innovative technology solutions to the world's water challenges. The Company's products and services move, treat, analyse, monitor and return water to the environment in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced infrastructure analytics solutions for water, electric and gas utilities. The Company's approximately 17,000 employees bring broad applications expertise with a strong focus on identifying comprehensive, sustainable solutions.

Headquartered in Rye Brook, New York, with 2018 revenue of \$5.2 billion, Xylem does business in more than 150 countries through a number of market-leading product brands. For more information, please visit: www.xylem.com

ABOUT A*STAR

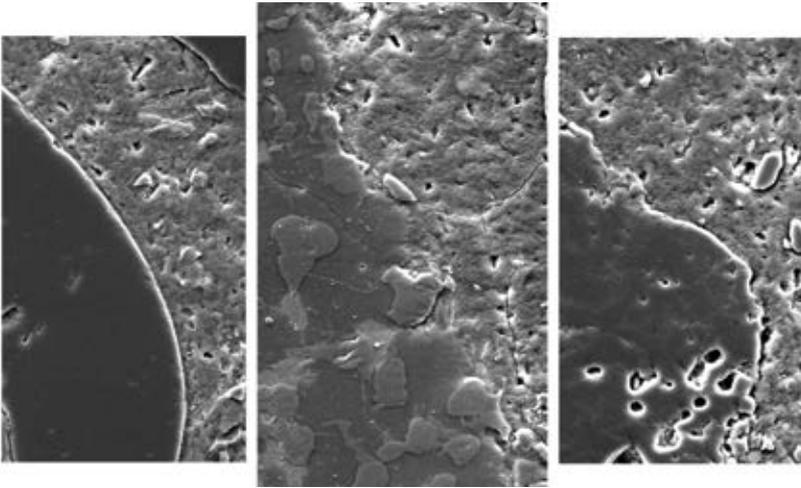
The Agency for Science, Technology and Research (A*STAR) is Singapore's lead public sector agency that spearheads economic oriented research to advance scientific discovery and develop innovative technology. Through open innovation, A*STAR collaborates with its partners in both the public and private sectors to benefit society.

A*STAR's Institute of High Performance Computing (IHPC) was established in August 1998 to provide leadership in high performance computing as a strategic resource for scientific inquiry and industry development. It seeks to power discoveries through advanced methodologies, techniques and new tools in modelling, simulation and artificial intelligence.

Its core research areas are in the realm of complex-coupled systems, mechanics and fluid dynamics, large-scale systems, digital modelling, adaptive and collaborative computing, data mining and analysis, computational electronics and electromagnetics, computational materials science and chemistry.

For more information on A*STAR, please visit: www.a-star.edu.sg

Below: Magnified images showing concrete made with treated slag (centre), conventional aggregates (left) and raw slag (right). The treated slag forms a more seamless bond with the cement paste, making the concrete stronger.



Making stronger concrete with ‘sewage-enhanced’ steel slag

Researchers have shown how a by-product of steel making can be used to both treat wastewater and make stronger concrete, in a zero-waste approach to help advance the circular economy.

Produced during the separation of molten steel from impurities, steel slag is often used as a substitute aggregate material for making concrete.

Steel slag can also be used to absorb contaminants like phosphate, magnesium, iron, calcium, silica and aluminium in the wastewater treatment process, but loses its effectiveness over time.

Engineering researchers at RMIT University examined whether slag that had been used to treat wastewater could then be recycled as an aggregate material for concrete.

The concrete made with post-treatment steel slag was about 17% stronger than concrete made with conventional aggregates, and 8% stronger than raw steel slag.

Water engineer Dr Biplob Pramanik said the study was the first to investigate potential applications for “sewage-enhanced” slag in construction material.

“The global steel making industry produces over 130 million tons of steel slag every year,” Pramanik said. “A lot of this by-product already goes into concrete, but we’re missing the opportunity to wring out the full benefits of this material.”

“Making stronger concrete could be as simple as enhancing the steel slag by first using it to treat our wastewater.”

“While there are technical challenges to overcome, we hope this research moves us one step closer to the ultimate goal of an integrated, no-waste approach to all our materials and by-products.”

In the study, civil and water engineering researchers found the chemical properties of the slag are enhanced through the wastewater treatment, so it performed better when used in concrete,” Pramanik added. “The things that we want to remove from water are actually beneficial when it comes to concrete, so it’s a perfect match.”

Civil engineer Dr Rajeev Roychand said the initial study was promising but further research was needed to implement the approach at a larger-scale, including investigating the long-term mechanical and durability properties of enhanced slag.

“Steel slag is currently not in widespread use in the wastewater treatment industry – just one plant based in New Zealand uses this by-product in its treatment approach,” he said.

“But there is great potential here for three industries to work together – steel making, wastewater treatment and construction – and reap the maximum benefits of this by-product.”

The study, *‘Recycling steel slag from municipal wastewater treatment plants into concrete applications – A step towards circular economy’*, with RMIT School of Engineering co-authors Professor Sujeeva Setunge and Professor Kevin Zhang, is published in *Resources, Conservation and Recycling* (DOI: 10.1016/j.resconrec.2019.104533).

Major wastewater infrastructure upgrade to cater for Drouin’s growth

Victoria’s Gippsland Water is one step closer to delivering an upgraded wastewater treatment plant in Drouin to cater for the town’s booming growth.

Acting Managing Director Simon Aquilina said site preparation works were completed in June and the major construction contracts were signed in December, allowing construction to begin in February.

Mr Aquilina said the \$50 million project would result in cleaner wastewater, greater safeguards for public health and the ability to recycle more wastewater for irrigation.

“Drouin’s population is growing rapidly and this means we need to expand the capacity of the existing wastewater treatment plant to meet the town’s needs.”

“Building a new mechanical plant at the existing site offered the best value for our customers,” he added. “The design also includes solar panels onsite to help reduce the carbon output of the new plant.”

Mr Aquilina explained the new mechanical plant will work together with the existing lagoon system to produce wastewater that can be returned to the environment.

“The treated water released from the new treatment plant will be of higher quality, which will better protect the ecology of local waterways and Westernport Bay.”

Mr Aquilina said the major construction contractor would work with GROW Gippsland to provide opportunities for local sub-contractors.

The main construction of the plant should be complete by mid-2022 with the plant fully operational by the end of 2022.



A computer-generated model of the future Drouin wastewater treatment plant.

Bubble tech blows microplastic problem out of the water

An innovative Australian technology that uses bubbles to remove contaminants from water offers a solution to an emerging global pollution crisis – microplastics.

The technology belongs to EVO CRA, an Australian water treatment company that was formed in Tasmania in 2011. The patented process, known as *Ozofractionative Catalysed Reagent Addition* or OCRA, literally floats the microplastic out of the water where it is collected and sent for recycling.

EVO CRA's Managing Director Mark Sykes says OCRA is a solution for many water-based environmental challenges.

"Microplastics are plastic items smaller than 5mm that are found in everyday products such as sunscreen, shampoo and detergent. Too small to be filtered out in the treatment plants, they wash into waterways where they harm our aquatic wildlife," he said.

"OCRA offers a positive solution to this complex environmental issue. The technology can be applied as a pre-treatment, that is, before the plastic enters the sewerage system or at the treatment plant to remove the particles before discharge."

World leader in microplastics research Dr Thava Palanisami is working with Evocra and is supportive of their work in this area.

"Evocra was an early entrant into finding a solution for microplastics which is a potential planetary boundary threat. OCRA has demonstrated it has a part to play in the solution of remediating the 12.7m metric tonnes of plastic litter than enter the ocean each year", he said.

Plastics can enter the human food chain and when ingested by marine life, can potentially cause death from starvation.

Mr Sykes said the applications for OCRA were vast with capability to treat minerals and contaminants in mining, oil and gas extraction, agriculture and aquaculture, high intensity industrial manufacturing, municipal water and wastewater treatment, and contaminated land remediation.

The world's largest environmental consulting firm, Arcadis, recently signed an exclusive licensing agreement to use OCRA to treat toxic PFAS (per-and poly-fluorinated alkyl substances), a component of products such as aqueous fire-fighting foams (AFFS), household chemicals, carpets and some clothes.

In the OCRA process, chemicals or metals attach to tiny, charged micro-bubbles, each the size of a width of hair, and balloon out of the water. In a world first, the technology was successfully used to help remediate a PFAS impacted industrial sewer resulting from a fire-fighting foam spill at the Brisbane Airport in 2017, removing greater than 99.9% of contaminants.

Mr Sykes said OCRA was addressing old, new and future water contamination issues.

"Our first commercial application was in acid mining drainage which has been an ongoing problem for the mining sector. PFAS is an international challenge we are facing right now and microplastics are certainly an emerging issue. Evocra are passionate about delivering technologies that have high social impact and that offer solutions across the spectrum in Australia and globally."

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ACRS 2-STAGE CERTIFICATION

SO YOU KNOW YOU'RE GETTING THE STEEL YOU SPECIFIED

As we all know, not all building materials are manufactured, processed, or fabricated to the minimum performance requirements of Australian and New Zealand Standards. So, when designers and procurement officers specify steel to particular standards, steel suppliers, builders, and building surveyors need to actively confirm that the steel they receive and sign off for or certify as meeting Regulations, is not just the right steel - they equally need to confirm that this conforming steel was cut, bent, and welded so it is still compliant when it is delivered and installed on the project.

Philip Sanders the Executive Director of ACRS, explained:

"You can take the best steel in the world and easily ruin it by inappropriate processing or fabrication - and if the steel was the wrong steel in the first place, the best steel processing, or fabrication won't make it right."

Using steel certified through ACRS' integrated, 2-stage certification system takes away that problem.

The ACRS 2-stage certification system was adapted for Australian and New Zealand conditions from European best practice for high-risk building materials. The ACRS system certifies both the steelmaking at the mill and again the last point at which the steel properties can be

changed before delivery and installation in the structure. This type of system is called a "bookended" system and is far more robust than a single point certification of either just the mill, or just the processor or fabricator (or of one stage being certified by one certifier and the second stage by another).

As ACRS steel certification covers both ends of the supply chain, the ACRS 2-stage system inherently includes full materials traceability - not just for reinforcing and prestressing steels, but also for structural welded sections manufacture, covering CC1 to CC3 to AS/NZS 5131, which are increasingly used in construction.



ACRS MAKES IT EASY

A simple check for the ACRS logo on the markings or tags and labels on the delivered material, matched to the supplier's ACRS certification - which can be checked and validated by visiting the ACRS website (www.steelcertification.com) - provides easy and stringent validation that the materials being used meet both the relevant materials and design and construction Standards, as well as the building Codes or government specifications.

ACRS Stage 2 certification of the reinforcement processor, or welded structural section fabricators is the vital link between the steel producer (ACRS Stage 1 certified) and the end-user on the construction site, ensuring that:

- All steel is from an approved source and satisfies the requirements of the relevant product Standard.
- Steel is correctly handled and processed so materials performance is not compromised during subsequent rebar processing or steelwork fabrication.
- The necessary procedures and documentation are in place to ensure full product traceability from steel mill through materials scheduling and fabrication to delivery to site.

Regrettably, ACRS is approached for help with too many examples of insufficient care in purchasing and later signing-off delivery of materials. This problem has been reported to ACRS on industrial building projects, multi

storey buildings, and even bridge projects.

Whilst the majority of projects manage procurement and supply well and are aware of the pitfalls, ACRS now often hears the excuse that just-in-time (JIT) supply practice means that even if the contract and specification calling up AS/ NZS Standards with ACRS certification is available months, or even more than a year ahead, the steel is ordered just a short time before delivery is required to site "...and we had to take what steel we could get to keep the contract moving".

Some suppliers and distributors have told ACRS that they often don't get the original contract specification, or were never informed ACRS certified material was a contract requirement.

Although not a uniform practice by any means, it is happening far more often than it should. The solution is simple: Inform the steel supplier, processor, or fabricator, and check on receipt that ACRS certified steel has been supplied.

This growing problem in some areas of the supply chain is why, in July 2019 and following in-depth development with industry, ACRS released a *Steel Traceability Scheme* offering steel and steel product suppliers (such as rebar coupler and structural bolt suppliers), distributors, and steelwork fabricators the opportunity to demonstrate the same rigour in product traceability as provided by ACRS Stage 1 and Stage 2 certificate holders.

For more details, contact ACRS at: info@steelcertification.com



WHY IS ACRS INDEPENDENT 2-STAGE STEEL CERTIFICATION SO IMPORTANT?

Philip Sanders, speaking on behalf of the Australasian Certification Authority for Reinforcing and Structural Steels ("ACRS") says: "You cannot just accept certification of the steel mill (Stage 1). You need to know what arrives on site. Is all the steel you expect? If it is, has it then been properly processed or fabricated?"

"Historically, Australia and New Zealand have accepted a more relaxed product verification regime at the processor or fabricator (Stage 2) level than most developed countries, and these less onerous requirements have saved builders significant time and money in checking and testing costs."

"However, in today's dynamic market with global sourcing and supply, we can only maintain our traditional approach by the use of expert and independent certification systems to provide the minimum necessary assurance of both steel manufacture and equally the supply of that steel to site," he added. "If not, as shown increasingly over the past few years, there will be more poorly performing structures as non-conforming materials are substituted for those the customer, and the public have been led to expect."

"ACRS was set up to do this in 2000, based on the system set up in the EU and UK - who were some of the first to experience these problems," Philip Sanders explained. "In the last 20 years, ACRS has developed and expanded this system to meet the specific needs of Australian and New Zealand construction industries government and public."

WHY YOU NEED BOTH ACRS STAGE 1 & STAGE 2 CERTIFICATION

ACRS End-to-End Traceability

When we say 'end-to-end', we're talking about the ability to track information on all raw materials, components, and associated processes across the supply chain, including the design, manufacturing, supply, and delivery phases.

'End-to-end' traceability is part of the ACRS product certification scheme's cornerstone 'All Products, All Locations rule' which has provided market confidence in steels supplied under ACRS product certification for nearly 20-years.

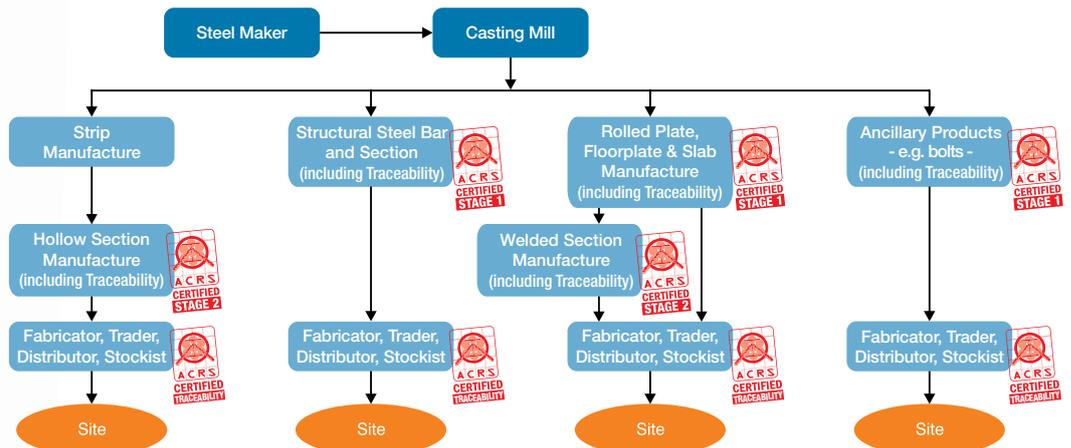
The ACRS 2-stage 'Chain of Certification' – certifying steel from mill to site

Steels supplied to AS/NZS Standards can be made non-conforming by processes as cutting, bending and welding.

So, if you only have certificates from the steel mill, it means you only have half the story. The ACRS steel scheme certifies both the steel mill (Stage 1) and steel reinforcement ("rebar") processor, mesh manufacturer, or structural welded section manufacturer - providing a rigorous mechanism covering the two critical aspects of steel supply, and the traceability of materials between them. This 'chain of certification' provides a vital link between the steel manufacturer, the steel supplier, and the construction site.

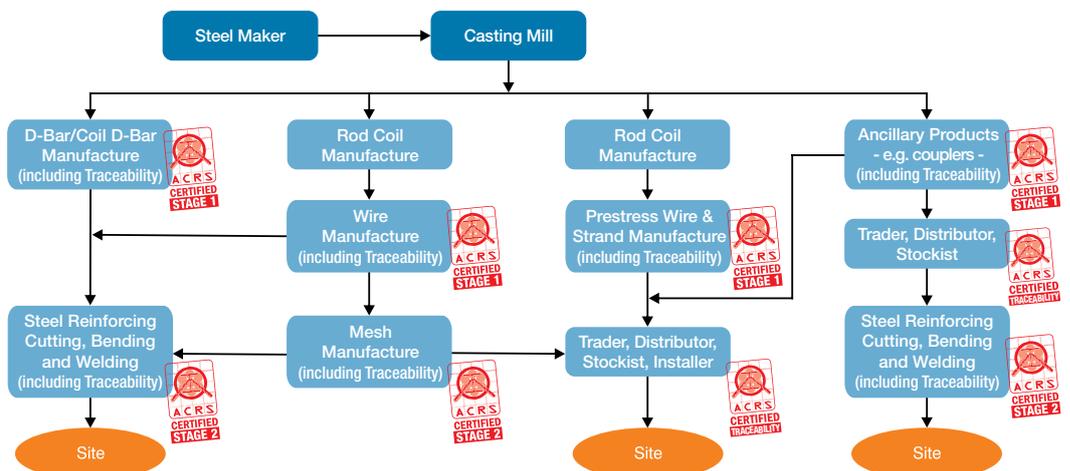
For your steel to be ACRS certified, it must be covered by both ACRS Stage 1 and ACRS Stage 2 certification. Any break in the 'chain of certification' between the steel mill and the processor or fabricator means the steel delivered to site is not ACRS certified.

ACRS Structural Steel Chain of Certification



For structural steels, ACRS certifies BOTH the steel mill that manufactures the steel AND the manufacturer or fabricator of any welded structural steel sections. Verification of the outputs of both these supply streams is essential for any structural steels and steelwork claiming to conform with AS/NZS 5131. ACRS has worked with the ASI to deliver "end-to-end" certification from steel mill to construction site via the ASI's Steelwork Certification Australia fabricator scheme to provide consumers confidence in structural steelwork from the purchase of verified and traceable ACRS certified structural steels, through the supply chain to ACRS certified welded section fabricators and then through supply, delivery and erection of all finished fabricated steel on the project site.

ACRS Reinforcing Steel Chain of Certification



For reinforcing steels, ACRS certifies BOTH the steel mill that manufactures the steel AND the steel reinforcement processor and mesh supplier. Verification of the outputs of both these supply streams is essential for any steel reinforcing materials claiming to conform with the Standards.

SUBSTITUTION OF SPECIFIED STEELS BY UNVERIFIED STEELS

Philip Sanders explains there are two basic causes driving steel substitution, both often linked to the (usually) lower cost of unverified steels compared to steels meeting AS/NZS Standards:

1. Deliberate substitution: (e.g. supplying overseas grade steels such as BS-EN or more frequently these days, Chinese Standards' steel grades that do not meet minimum AS/NZS requirements). Product swapping is very common in the supply prestressing strand and structural steels – both manufactured steels and finished fabricated steels. Even worse, we are now seeing supply of completely different products altogether. For instance, ACRS has recently assisted an engineer who specified hot rolled structural sections to be supplied to AS/NZS 3679.1 and ACRS certified. Instead, what arrived on site were welded steel beams manufactured from plate made from overseas steel grades not meeting AS/NZS Standards. In another case, cold-formed steels were supplied instead of the specified hot rolled structural sections.

2. Mistaken substitution: Many mills manufacture different products to different standards to satisfy their international customers, and these variable products are widely available in the supply chain. Some suppliers buy similar looking product manufactured by the same company but to different country's standard (usually as it is cheaper) and supply this material instead of the specified, ACRS certified product. As a recent example, ACRS was approached over structural steels manufactured by an ACRS certified company, but the supplied material did not have the expected ACRS markings, labels, or documentation. On investigation, ACRS and the engineer discovered that the steel, although very similar in size and profile, had been made to a different steel standard for use in a third-country, and never intended for use in Australia or New Zealand.

Please contact ACRS, free of charge, if there is any aspect of steel specification, procurement, and supply that your team would like to discuss. All enquiries are confidential. Email: info@steelcertification.com or call +61 2 9965 7216.

BUSINESS AS USUAL WHEN BUSINESS IS UNUSUAL

ACRS Executive Director, Philip Sanders, confirms continuation of ACRS product certification for conforming steel producers and suppliers, and the maintenance of verified steel supply during the COVID-19 pandemic.

ACRS is very pleased to confirm that its operations have not been interrupted by the current crisis, and ACRS certificates remain fully valid. Philip Sanders says; "We are working closely with our institutional stakeholders to deliver ongoing assurance that the wide range of manufactured and processed steels supplied under ACRS certification continue to meet the requirements of both applicable AS/NZS Standards and related Government-based specifications."

To limit the effects of the current restrictions and speedily resume normal operations upon the lifting of travel restrictions, ACRS has developed detailed, emergency provisions which allow ACRS to continue remote assessment of some site processes and systems coupled with increased market testing of materials, where required, to maintain rigorous and effective certification at the levels expected and required by users of ACRS certificates for the duration of this emergency.

"For all involved in the supply chain, we fully understand every company has its own sourcing policies and requirements, and ACRS will be working closely with you to maintain the highest possible levels of purchasing flexibility, yet not reduce the

rigour of the ACRS certification system and its value to certificate users." Sanders says.

ACRS' temporary emergency measures allow steel purchasers, specifiers and consumers relying upon ACRS certificates to remain assured that the manufacturers and suppliers currently supplying to their projects remain ACRS Certified.

ACRS' uninterrupted certification services mean that you will continue to enjoy the maximum possible choice of independently verified conforming steels. Similarly, ACRS certification will continue to assist suppliers, steel users, and consumers avoid receipt of non-ACRS Approved materials, or mixed supply of ACRS Approved and non-ACRS Approved materials through this difficult time, and you can continue to verify this is the usual way via the ACRS website.

Full details are available on the ACRS website at www.steelcertification.com.

For any enquiries, please email ACRS at: info@steelcertification.com



Thermal insulation barrier provides corrosion protection and “cool-to-touch” properties

Industries and facilities around the world face challenges linked to the maintenance of pipework, tanks, and vessels. Damage and deterioration of pipes, valves and fittings are a widespread problem and occur due to corrosion, erosion, thermal cycling, and chemical attack. In order to save energy costs and reduce waste, companies are recognising the importance of insulating their equipment to prevent heat loss and increase efficiency, however, this creates another issue, corrosion under insulation (CUI). CUI is a major issue which occurs on equipment operating in low, ambient, and high-temperature environments.

The role of insulation for heat conservation is crucial, but also shielding personnel from burns when working with hot machinery and equipment is extremely important as metallic surfaces at $\geq 60^{\circ}\text{C}$ can lead to hot burns when touched.

Moreover, equipment operating in low temperatures and sub-zero conditions can result in ice-build-up, condensation and dripping of water, increasing slipping hazards and provoking ice burns when handled at $< 0^{\circ}\text{C}$. In this case, it is essential that the insulating material possesses anti-icing properties.

Various solutions are available in the market such as traditional insulation, barriers or guards and water-based coatings. However, individually, they do not hold all the requirements to insulate machinery and equipment whilst also providing corrosion prevention and personnel protection from potential contact burn injuries.

It is for that reason that Belzona has developed an innovative, two-component, polymeric, solvent-free system - Belzona 5871. This multi-functional material provides thermal insulation and corrosion protection, whilst improving safety, efficiency, and durability of the industrial equipment all in a single product.

Belzona 5871 is designed to be applied onto metal pipework, ducting, tank/vessel externals, and other industrial equipment. It is thermally insulating and improves efficiency whilst also preventing contact burn injuries, condensation, and icing. It can be applied by brush, cartridge, or heated airless plural spray which is ideal for small, complex geometries or rapid application over large areas, offering a fast return to service and high film build with potentially just one layer of product.

Upon application, the product forms a lightweight, high-build closed-cell foam. Due to the foaming epoxy technology, Belzona

5871 expands up to three times its applied thickness e.g. 1mm applied gives 3mm cured thickness, thus increasing the amount of product on the surface. Furthermore, Belzona 5871 is a solvent-free corrosion barrier, eliminating the need for any additional primer or top-coats, reducing the number of layers needed compared to conventional coating solutions. Overcoat times are up to 24 hours irrespective of temperature or humidity providing application flexibility. The cure speed and reduced number of layers required, ensure a fast return to service.

To test the thermal barrier properties, comparison between a section of uncovered steel substrate and a section of substrate protected with Belzona 5871 was carried out to determine the thickness required to reduce the surface temperature to below 60°C (140°F) as required by ASTM C1055 to prevent contact burn injuries. For example, Belzona 5871 applied at a thickness of approximately 2.2mm to give a cured thickness of 6.6 mm, will reduce the surface temperature from 120°C (248°F) to below 60°C (140°F). Belzona 5871 is insulating and capable of reducing heat transfer thus providing a safe to touch surface and preventing contact-burn injuries. The insulating properties of Belzona 5871 were confirmed using the Lee's disc method giving a low thermal conductivity of approximately 0.1 W/m.K .

Several tests have been carried out to confirm the corrosion resistance of the Belzona 5871 system.

CUI conditions have been simulated using heated pipe sections. The system was repeatedly cycled between 120°C (248°F) and 10°C (50°F) over a period of 1000 hours with alternating wet (with a constant deluge of water at 5 litres per minute) and dry periods. Following the test, the multi-layered systems did not show any blistering, delamination, or cracking and there was no evidence of corrosion.





Monash researchers develop world's most efficient lithium-sulphur battery

A 35°C (95°F) salt spray test has also been carried out, in accordance with ASTM B117 on a single layer of Belzona 5871 following two different cure regimes; a 20°C (68°F) cure and 120°C (248°F) post-cure. A vertical 50mm scribe was added to both samples to encourage corrosion. The test samples did not show any signs of failure even after 3000 hours of continuous exposure.

A continuous water immersion test was performed, in accordance with ISO 2812-2, where a substrate with a single layer of Belzona 5871, was immersed at 40°C (104°F) in deionised water. The substrate did not exhibit any signs of deterioration after 4500 hours (substrate cured at 20°C/68°F) and 2000 hours (substrate post-cured at 120°C / 248°F).

These tests confirm the excellent corrosion resistance properties of Belzona 5871 under a variety of conditions.

The product's anti-icing and anti-condensation properties were independently evaluated by performing an ice build-up test. The sub-zero trial was performed on one, two and three layers of Belzona 5871.

The test confirmed that Belzona 5871 prevents ice build-up and condensation even at sub-zero temperatures.

In conclusion, Belzona 5871 is an innovative solution, providing machinery and equipment with thermal insulation barrier to increase efficiency and durability. In addition, the protection against corrosion and solving problems of CUI extends the service life of equipment, reducing future replacement costs. Belzona 5871 is also a safety-conscious solution, reducing surface temperatures to below 60°C (140°F) to prevent contact-burn injuries.

Belzona 5871 is available in orange and is supplied in two pack sizes: 8 x 0.6 litres and 2 x 7.5 litres. For more information, please visit: www.belzona.com/5871

Imagine having access to a battery, which has the potential to power your phone for five continuous days, or enable an electric vehicle to drive more than 1000km without needing to "refuel".

Monash University researchers are on the brink of commercialising the world's most efficient lithium-sulphur (Li-S) battery, which could outperform current market leaders by more than four times, and power Australia and other global markets well into the future.

Dr Mahdokht Shaibani from Monash University's Department of Mechanical and Aerospace Engineering led an international research team that developed an ultra-high capacity Li-S battery that has better performance and less environmental impact than current lithium-ion products.

The researchers have an approved filed patent (PCT/AU 2019/051239) for their manufacturing process, and prototype cells have been successfully fabricated by German R&D partners Fraunhofer Institute for Material and Beam Technology. Some of the world's largest manufacturers of lithium batteries in China and Europe have expressed interest in upscaling production, with further testing to take place in Australia in early 2020.

The study was published in *Science Advances* earlier this year – the first research on Li-S batteries to feature in this prestigious international publication.

Professor Mainak Majumder said this development was a breakthrough for Australian industry and could transform the way phones, cars, computers and solar grids are manufactured in the future.

"Successful fabrication and implementation of Li-S batteries in cars and grids will capture a more significant part of the estimated \$213 billion value chain of Australian lithium, and will revolutionise the Australian vehicle market and provide all Australians with a cleaner and more reliable energy market," Professor Majumder said.

Pictured above: Associate Professor Matthew Hill, Dr Mahdokht Shaibani and Professor Mainak Majumder with the lithium-sulphur battery design.

"Our research team has received more than \$2.5 million in funding from government and international industry partners to trial this battery technology in cars and grids from this year, which we're most excited about."

Using the same materials in standard lithium-ion batteries, researchers reconfigured the design of sulphur cathodes so they could accommodate higher stress loads without a drop in overall capacity or performance.

Inspired by unique bridging architecture first recorded in processing detergent powders in the 1970s, the team engineered a method that created bonds between particles to accommodate stress and deliver a level of stability not seen in any battery to date.

Attractive performance, along with lower manufacturing costs, abundant supply of material, ease of processing and reduced environmental footprint make this new battery design attractive for future real-world applications, according to Associate Professor Matthew Hill.

"This approach not only favours high performance metrics and long cycle life, but is also simple and extremely low-cost to manufacture, using water-based processes, and can lead to significant reductions in environmentally hazardous waste," Associate Professor Hill said.

The research team comprises: Dr Mahdokht Shaibani, Dr Meysam Sharifzadeh Mirshekarloo, Dr M.C. Dilusha Cooray and Professor Mainak Majumder (Monash University); Dr Ruhani Singh, Dr Christopher Easton, Dr Anthony Hollenkamp (CSIRO) and Associate Professor Matthew Hill (CSIRO and Monash University); Nicolas Eshraghi (University of Liege); Dr Thomas Abendroth, Dr Susanne Dorfler, Dr Holger Althues and Professor Stefan Kaskel (Fraunhofer Institute for Material and Beam Technology).



Compostable cucumber wrap adapts to new industries

by Jessica Bassano

A fully compostable shrink-wrap developed in South Australia for cucumbers is being adopted by other food sectors and a global airline.

The material's Adelaide-based manufacturer, BioBag World Australia, has doubled production in the past six months and will significantly boost its output again from next month when a second extruder and conversion machine arrives from China.

BioBag World Australia managing director Scott Morton said the company had recently partnered with Qatar Airways, which now used the compostable packaging to reduce waste and collect food scraps.

He said in the past three months the compostable packaging had also been used to replace traditional mailing films covering magazines and newspapers, as well as to wrap meats.

"We have a lot of butchers who have decided to go plastic free. They're using the film to wrap meat before they freeze it," Morton said.

"And, instead of giving you a plastic bag when you buy your meat, they're giving you a compostable bag. That compostable bag can be reused at home to collect your scraps

and then it goes into the organics bin where it breaks down."

The alternative plastic wrapping was initially used last year on cucumbers sold at South Australian independent grocer Drakes Supermarkets.

It was created in partnership with South Australian produce and packaging business IG Fresh Produce and launched in September as an environmentally friendly alternative to the traditional polyethylene plastic wrap.

Morton said while the bulk of the business' growth was driven by Australia's agricultural sector, the company had collaborated with a number of international organisations.

"Overall the growth is staggering. You've got whole countries now banning plastic produce bags – you can't buy a plastic shopping bag in France or Italy and you've got South Australia looking to ban some plastics," he said.

"The really exciting thing is that we're making it here in Adelaide and we're now able to make almost any product because it's becoming really mainstream.

"Someone can ring us up with the specifications required and we make that product. It's business as usual in exactly the same way as if it was a plastic product."

The Norway-based BioBag produces more than one billion bags a year at six factories around the world, including one in South Australia where the compostable cucumber wrap was developed and is manufactured.

Morton said the arrival of the new machinery from China would not only drastically increase the company's output but also allow BioBag World Australia to produce more robust compostable wrapping and bags.

"The beauty of that extruder is we'll be able to make some more advanced products," he said.

"It means that we can put more advanced materials into the one blend and as a result we can change the properties of the end product.

"For example, we could make a film that has a barrier property to block gas or moisture. It really gets into advanced plastic replacing."

South Australia has led the nation in recycling and plastic reduction, introducing a container deposit scheme in 1977 and banning single use plastic bags in 2009.

Last year the South Australian Government introduced legislation to ban a range of single-use plastic products including plastic straws, cutlery and stirrers.



BioBag World Australia Managing Director Scott Morton says the new extruder will allow the company to make more advanced products in Adelaide.

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NH foods proves the value of green energy underfoot



While many environmentally aware energy planners look to the skies for wind and solar solutions, an astute Australian beef processor is showing what can be achieved by tapping the wastewater in its drains for green energy profits and sustainability benefits.

NH Foods Australia's Oakey Beef Exports plant in Queensland has shown food and beverage producers globally how environmentally responsible companies can tap the energy potential of their organic wastewater streams by anaerobic digestion technology to extract millions of dollars' worth of biogas to replace fossil energy purchases.

The Oakey plant on Queensland's Darling Downs uses a Global Water & Energy (GWE) COHRAL™ (Covered High-Rate Anaerobic Lagoon) plant installed by Australian environmental engineering and green energy authority CST Wastewater Solutions, and is on target to achieve total ROI over the next couple of years and to go on to produce bottom line results virtually in perpetuity thereafter.

"The wind doesn't need to blow, and the sun doesn't need to shine to produce this green energy – it is a highly viable renewable in its own right, which complements the many excellent solar and wind energy sources suited to other projects," said CST Wastewater Solutions Managing Director,

Michael Bambridge. "Ultimately, the plant will pay for itself with biogas then going on to produce virtually free energy for many years after that."

The performance of the plant – which was subjected to a review as it completed its fifth year of service – was so good that it was selected as a finalist in the global awards of the International Institution of Chemical Engineers (IChemE) late last year. The IChemE awards represent 37,000 engineers worldwide and recognise outstanding projects, people and companies in areas such as water and energy sustainability that benefit society in measurable ways.

An earlier GWE anaerobic digestion plant has previously won an IChemE award for its performance on cassava waste processing in Thailand, again turning a potentially smelly production byproduct into a profitable asset.

The review of the NH foods plant – which stores biogas it produces in a 6000m³ spherical polyester storage vessel – showed that the clean, compact and robust COHRAL™ plant is in outstanding condition, having required only routine maintenance over that time, while at the same time:

- Reducing Oakey's dependence on fossil fuel gas by the equivalent of upwards of \$A800,000 (\$US557,000) a year at current production levels of up to 4000m³ of biogas a day.

- Providing the capacity to produce even more biogas in the future – up to 6000m³ a day as stock throughput rises, saving the equivalent of 12,000 tonnes of CO₂, equivalent to removing 2,700 cars from the road.
 - Radically increasing the quality of the plant's wastewater effluent by transforming waste extracted from it into easily and safely stored energy.
 - Paying for itself, with total ROI to be achieved within approximately the next two years and the plant going on to contribute to ongoing profitability.
- "The GWE COHRAL™ plant occupies just half the footprint of comparable covered anaerobic lagoons and a much smaller space than is required by typical energy-hungry and odorous open aeration lagoons in service globally," says Mr Bambridge. "The biogas generated is directly used in the Oakey plant's existing boiler, where it replaces natural gas, and sharpens cost-efficiencies."

The Oakey Beef Exports plant is one of Australia's largest beef export facilities, with its products going to over 34 countries worldwide. The GWE anaerobic digestion technology involved in the COHRAL™ installation – and in compact reactor (tank) installations of the technology – is applicable to any industry with a biological waste stream, including food and beverage applications and livestock processing operations drawing on a global population of about one billion cattle (as well as a billion sheep, 750 million pigs and 16 billion poultry). Beef is the first challenge for carbon neutral livestock production and far-sighted organisations such as NH Foods Australia and the industry's Meat and Livestock Australia are national leaders, working towards a beef industry zero carbon footprint nationally by 2030.

Mr Bambridge says the plant is a leading example of a sustainability-focused company in the meat and livestock industry, which is particularly significant, given the United Nations Framework Convention on Climate Change, which recognises that beef is a major greenhouse gas (GHG) emitter with the beef sector of the livestock industry estimated to produce about 14 per cent of all GHG emissions.

For further information, please contact CST Wastewater Solutions, T: +61 (0)2 9417 3611 E: info@cstwastewater.com or visit the website: www.cstwastewater.com

ib vogt sells and constructs 180 MWp PV plant in Spain

ib vogt recently announced the sale and commenced construction of the 180 MWp “Bienvenida” photovoltaic project in Badajoz, Spain. The Talanx Group, one of the major European insurance groups and institutional investor, has acquired the plant. ib vogt has set up an innovative long-term power purchase agreement (PPA) for the project with Shell Energy Europe and will perform all operational contracts for the project delivery and operation.

The Bienvenida project was initially acquired as an early stage development project by ib vogt in 2017 and developed to achieve a capacity of 180 MWp on only 175 hectares of land located in Extremadura, one of the sunniest places in Spain. It is being constructed with a fully wrapped EPC contract and full lifetime operation for the client. ib vogt has developed and successfully implemented an innovative power contracting structure with Shell Energy Europe, who will buy the produced energy. The agreement between the parties includes an attractive price hedging that balances price volatility while remaining exposed to opportunities in the Spanish power market.

Anton Milner, CEO of ib vogt GmbH, stated: “This project is the culmination of a number of years of development work and is the first of a series of major “grid parity” projects that we are developing in Southern Europe. Importantly, these will help drive the penetration of clean electricity in Europe on a stand-alone economic – unsubsidised – basis. We are delighted and proud to be working with the Talanx Group and to be able to support their sustainability and portfolio objectives.”



Graphene solar panels featured on first electrically self-sustaining, custom luxury homes

S2A Modular – creator of the first electrically self-sustaining, custom and smart-connected luxury residence, the #GreenLuxHome – is currently the only modular residential/commercial building entity with the right to feature patented PV Graf™ technology from FreeVolt, a disruptive European solar company that has developed the world’s first and only graphene solar panel.

FreeVolt’s Patented Graphene solar panel technology marks a new era in PV technology, and are reported to deliver a longer service life while also being cheaper to produce.

The Graphene panels also reportedly eliminate issues such as microcracks caused by high-temperature soldering of expensive metals during production, which can negatively affect power output, reliability, and overall effectiveness of traditional solar panels. PV Graf™ technology eliminates thermal stress during production and cracking that results from that production – resulting in dramatically longer service life and far better, lasting efficiency. Production costs are also lowered by removing the need for metals like silver and copper.

FreeVolt claims that the PV Graf™ technology delivers a number of significant benefits over traditional PV designs. According to FreeVolt, PV Graf™ technology creates more than 20 percent greater energy production (kWh per kWp). They also claim that the graphene-based material makes the new technology immune to temperature and other environmental factors that otherwise would reduce production of current.

“This is not just a better solar panel – this is the first and only technology of its kind, featuring graphene,” said Ryan Leusch, business development director of S2A Modular.

“It’s a completely different solar science, with patented architecture and materials, that turns the industry on its head. With many current solar panel designs, effectiveness can decline in as little 5-6 years when materials begin to degrade and energy output decreases.”

“With FreeVolt’s PV Graf™ technology, which brings a near-indestructible quality, service life and energy production are dramatically enhanced – while also eliminating degradation and making it immune to any temperature or weather factors that negatively affect other solutions out there” he said. “No matter what mother nature brings, PV Graf™ technology delivers consistent and better performance. And moisture is no longer a threat.”

“Graphene is 200 times more durable than steel. The scientific properties associated with graphene, including near-indestructible qualities, enable PV Graf™ technology to virtually eliminate degradation. Extreme durability dramatically extends service life and removes almost all the reliability issues that have been associated with traditional solar panels,” Mr Leusch added. “Only S2A #GreenLuxHome units and commercial buildings will be able to feature PV Graf™ panels built-in – ushering in an exciting new era in solar technology and green living worldwide”



UQ researchers develop framework for climate change mitigation in mining

University of Queensland researchers have developed a framework that aims to reduce the mining industry's impact on climate change by accounting for sources and sinks of greenhouse gas (GHG) emissions. The proposed framework, published in *Nature Geoscience*, will allow the mining industry to better monitor, gather and assess emissions data, identify measurement gaps and evaluate and apply mitigation strategies.

UQ *Sustainable Minerals Institute* (SMI) researcher and lead author Dr Mehdi Azadi said primary mineral and metal production accounted for about ten per cent of the world's energy-related GHG emissions in 2018. He said the framework addressed climate change related issues by identifying major mitigation pathways.

"Rising standards of living have led to increasing demand for mining activities to provide the minerals and metals required by many technologies," Dr Azadi said.

"While the mining sector contributes to global emissions, it is also increased affected by climate change."

"Our framework examines the sources of GHG emissions across the mining supply chain – from mining, ore processing, transportation, to waste management – and identifies ways to improve mitigation strategies," he said.

"Fugitive emissions reduction, resource efficiency, energy usage, and biological solutions are the four major pathways we have identified as major opportunities for GHG mitigation in mining. These pathways will allow policymakers and miners to create flexible plans for addressing GHG emissions by taking into account operational requirements and external factors," Dr Azadi added.

"The framework is flexible enough to be tailored to a specific commodity, mining operation, climate or country."

The researchers highlighted copper mining in Chile as an example of how the climate change impacts of mining may be calculated.

"Using this framework, we hope to collaborate with governments, the mining industry and research institutions to create guidelines or toolboxes for certain commodities, climates, countries and operations," Dr Azadi said.

"Our framework will help the industry reduce its carbon footprint and provide financial benefits by lowering energy consumption across the supply chain, while also decreasing the adverse environmental impacts caused by mining operations."

"For green technologies to be effectively implemented, it is essential that the mining industry accurately and transparently account for greenhouse gas emissions,"

Dr Azadi said. "But this isn't just about reducing mining's effect on climate change, it is also about reducing climate change's effect on mining; the industry needs accurate data to reduce its carbon footprint and improve risk management."

The article is co-authored by SMI Associate Professor Mansour Edraki, UQ and University of Delaware Professor Saleem H. Ali and University of Technology Sydney's Dr Stephen Northey.

Professor Saleem H. Ali said carbon accounting in mining was increasingly important.

"Carbon accounting of mining is becoming even more urgent now because minerals for clean energy infrastructure are being widely explored," he said.

"Understanding the full carbon budget of extraction is important in considering a range of potential supply sources and processing technologies."

SMI Director Professor Neville Plint said the framework reflects the Institute's commitment to working with the minerals industry to implement sustainable changes.

"An important part of improving mining's role in sustainable a sustainable world is working with industry to develop and implement solutions that are practical and effective – this framework is a great example of that."



Reducing human impact in the Antarctic

Findings from the first wide-ranging environmental assessment of the Australian Antarctic Division's Casey research station suggest better data will be key to reducing the impact of future operations.

Improvements in data collection, better monitoring equipment and behaviour change were among the key recommendations in the report, the findings of which were published recently in the *Journal of Industrial Ecology*.

The result of a six-year study undertaken by RMIT and Swinburne Universities, the report is the first comprehensive assessment of the environmental impact of Australia's Antarctic infrastructure.

The researchers were commissioned by the Australian Antarctic Division to look at the life cycle of Casey research station to determine where the impact of operations could be reduced.

Lead researcher, RMIT's Associate Professor Karli Verghese, said the findings provide a roadmap for the AAD to reduce the environmental impact of the station.

"We modelled scenarios around freight management options, energy efficiency, generation and storage, and wastewater management to identify the best approaches going forward," said Verghese.

"This information will help inform the future operations of the station, ensuring the AAD can reduce the environmental impact of having people in this environment."

The AAD received early findings from the study in 2018 and is looking for opportunities to implement some of the recommendations in current and future operations.

AAD's Environmental Manager, Andy Sharman, said the Division continually seeks opportunities to improve efficiency and reduce environmental impacts including emissions to the atmosphere and the marine environment in Antarctica and the Southern Ocean.

"This work provides us with a detailed assessment that we can use when upgrading our existing station infrastructure and plan for new capabilities such as the arrival of Australia's new icebreaker, RSV Nuyina and the development of an inland traverse capability.

In March 2019, the AAD installed the first Australian solar farm in Antarctica at Casey research station, providing up to 30 kilowatts of power and already saving close to 4000 litres of diesel.

"The energy savings from this system are expected to increase even more through the peak of summer when there is almost 24 hours daylight," Mr Sharman said.

The AAD runs four permanent research stations, three on the Antarctic continent and one on Macquarie Island in the sub-Antarctic.

Insights from the report will help to compare and benchmark between stations and to guide future projects.

The *Journal of Industrial Ecology* has published two academic papers from the assessment, 'The environmental impacts of operating an Antarctic research station' and 'Development of an environmental impact reduction strategy for Australia's Antarctic infrastructure', that can be downloaded for free for the next three months from:

<https://onlinelibrary.wiley.com/doi/10.1111/jiec.12972> and

<https://onlinelibrary.wiley.com/doi/10.1111/jiec.12970> respectively.

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The case of the missing microns: CST solves a gritty problem

With 85% of Australia's population living within 50km of the coast, sand and fine grit are ever-present problems in municipal and industrial water and wastewater systems.

Distributed in Australia by wastewater and screening authority CST Wastewater Solutions, the latest range of fine screening, grit removal and clarifier technologies from Smith & Loveless have been specifically developed to address these issues.

According to Smith & Loveless, as much as 40-80% of the grit contained in municipal wastewater is in the 105-200 micron size range, but most grit removal systems are designed to remove grit in the 200-300 micron range.

"This discrepancy has meant that many grit removal systems have been stuck in the 20th Century, but Smith & Loveless has new, superior technology to advance grit removal and improve local wastewater systems," says Mr Michael Bambridge, Managing Director of CST Wastewater Solutions.

BRINGING GRIT REMOVAL INTO THE 21ST CENTURY

Smith & Loveless' latest PISTA® V10™ system removes 95% of grit down to 105 microns, and features full variability of the inlet and outlet channels.

The new system features a hydraulic vortex grit chamber design that utilises a new baffle system. This type of grit removal system – one of the first of its kind in the industry – provides the ability to design the inlet and outlet channels at any variable angle up to the full 360° of the chamber. Designers can arrange the system to fit existing sites, or maximise space during construction on new sites.



Smith & Loveless' PISTA® technology sets a new benchmark in grit removal, with 95% efficiency down to 105 microns. Most grit removal systems can miss the mark because they are only designed to remove grit in the 200-300 micron range

THE CHOICE IS CLEAR FOR CLARIFIER TECHNOLOGY

In addition to grit removal systems, CST is also the Australian distributor for Smith & Loveless' range of high performance clarifier technologies, including centre feed clarifiers, peripheral feed clarifiers, and solids contact clarifiers, which can all be custom designed to customer specifications.



A Smith & Loveless clarifier, installed in Tasmania by CST Wastewater Solutions for the Norske Skog paper mill.

CST has been distributing, engineering and installing clarifiers for municipal and industrial applications in Australia for more than 20 years, including large size clarifiers up to 55m in diameter. In addition to new installations, many projects have involved retrofitting or upgrading existing plants to cost-effectively improve performance.

One of the latest Smith & Loveless clarifiers is their CLAR-I-VATOR®, which is a high-rate solids contact clarifier used for economical and efficient chemical precipitation in municipal and industrial water and wastewater treatment applications.

"The CLAR-I-VATOR has a number of design and process advantages. It minimises the amount of chemicals needed and provides a stable process operation that is less dependent on incoming flow variations," says Mr Bambridge.

"It is simpler to operate and requires less ongoing maintenance compared with typical sludge blanket designs. It also produces the highest level of effluent quality due to the deep water clear zone," he said.

CST, as an authorised Smith & Loveless dealer, has clarifier installations across Australia, including some for major clients like WaterCorp in WA and the Norske Skog paper mill in Tasmania.

For further information, please contact Michael Bambridge, CST Wastewater Solutions, T: +61 2 9417 3611, E: info@cstwastewater.com or visit the website: www.cstwastewater.com

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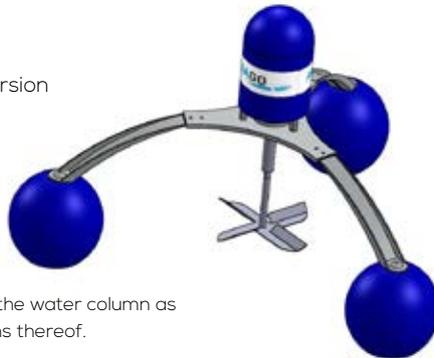
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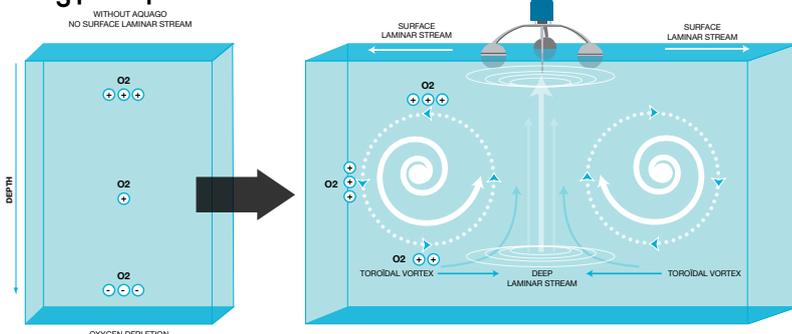
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ABB and Volvo to electrify Gothenburg's city streets

Starting in 2020, 157 new Volvo electric buses will start operating on the streets of Gothenburg, Mölndal and Partille in Sweden, powered by charging infrastructure solutions from market leading provider, ABB. This landmark announcement represents an important step towards achieving a sustainable public transport solution for the 180 million trips made by bus in the region each year.

In line with the Swedish government's vision that Sweden should be climate neutral by 2050, public transport company Västtrafik expects to have electrified all city traffic in Västra Götaland by 2030.

Volvo Buses and ABB are helping to realize that aim with the supply of 157 new electric buses and supporting charging infrastructure to bus operator Transdev.

With services scheduled to commence in December 2020, the new electrified lines will mean a total of 220 electric buses to transport Gothenburg's residents and visitors by the end of the year.

"Volvo Buses is a leader in electromobility and solutions for sustainable public transport. Together with ABB and our partners, we have created a common holistic transport solution that will make public transport in Gothenburg quieter and emission-free", says Håkan Agnevall, President, Volvo Buses.

"The solution shows that electric buses are not only something for the future, but already today provide cities with public transport that is sustainable and financially viable," Mr Agnevall added.

19 new high-power electric chargers will be installed during the second half of 2020 before the new buses go into operation, and another two stations are planned for the future.

The buses in Gothenburg, Mölndal and Partille will be charged by 450kW high power Panto Down chargers from ABB. A modular solution based on OppCharge, an open interface for direct current (DC) electric bus charging, the solution offers high-power charging via an automated rooftop connection. ABB will supply a complete solution that includes both the

charging stations and all the necessary grid connection hardware via ABB's cable distribution cabinets.

The buses will be recharged in just three to six minutes at charging stations along the routes. The high-power chargers, a part of ABB's innovative ABB Ability™ offering of digital solutions and services across all business areas, delivers web-enabled connectivity that allows network operators to perform remote monitoring and configuration of charge points and also minimises downtime and increases efficiency.

"The sustainable transformation of bus traffic in Gothenburg is an example of how ABB is pursuing its *Mission to Zero*, with the goal to develop innovations that will contribute to a zero-emission future. We have the products and solutions to deliver electricity from generation to the point of consumption in a safe, smart and sustainable way", says Frank Muehlon, Head of ABB's global business for E-mobility Infrastructure Solutions.

With room for 150 passengers and an 88 percent reduction in CO₂ when transitioning to electricity, the new buses combine high passenger capacity with low environmental footprint.

ABB is a world leader in electric vehicle infrastructure, offering the full range of

charging and electrification solutions for electric cars, electric and hybrid buses as well as for ships and railways. ABB entered the EV-charging market back in 2010, and today has sold more than 13,000 ABB DC fast chargers across over 80 countries. ABB recently received the Global E-mobility Leader 2019 award for its role in supporting the international adoption of sustainable transport solutions.

ABB offers products and services that provide a crucial contribution to increased sustainability in industry. More than half of ABB worldwide sales are generated with technology that contributes to the elimination of the causes of climate change. It is the goal of ABB within the scope of *Mission to Zero* to increase the sales share of solutions and systems for increased sustainability to 60 percent by the end of 2020.

ABOUT ABB

ABB is a technology leader that is driving the digital transformation of industries. With a history of innovation spanning more than 130 years, ABB has four customer-focused, globally leading businesses: Electrification, Industrial Automation, Motion, and Robotics & Discrete Automation, supported by the ABB Ability™ digital platform. ABB's Power Grids business will be divested to Hitachi in 2020. ABB operates in more than 100 countries with about 147,000 employees. For further information, please visit: www.abb.com



Global electric car count climbs from 5.6 To 7.9 million

The number of electric cars on the road worldwide had risen to around 7.9 million in 2019, an increase of 2.3 million from the previous year. The number of new registrations again reached a record high, but the growth rate was just slightly up compared to 2018.

China remains the undisputed global leader with 3.8 million e-cars. It is followed by the USA with nearly 1.5 million cars. The growth rate for new registrations dipped in these two countries.

In Germany, by contrast, the market remained on its positive trajectory, even if the growth curve was not quite as steep. Nearly 231,000 electric vehicles were on German roads at the end of 2019.

These new figures are sourced from a recent survey conducted by the Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW). According to its scientists, Tesla accounted for the largest share of new registrations worldwide in 2019 with 361,000 vehicles. German automakers again improved on the previous year's showing. BMW is in fifth place worldwide with 114,500 electric cars. VW took sixth place.

New registrations reached a record high in 2019 at 2.3 million vehicles worldwide. However, the global growth rate was just four percent, compared to 74 percent in the previous year. This development is largely attributable to the reduced subsidies for battery-powered vehicles in China and the USA. Even so, the number of new registrations in these countries approached the previous year's marks with 1,204,000 in China, down 52,000 from the previous year, and 329,500 in the USA, down 31,800 from 2018.

Germany bucked the international trend as the number of new registrations continued to rise, topping last year's 24 percent growth rate with 61 percent this year. The country is now third worldwide with 108,600 newly registered electric cars, moving up one place from last year's showing. Norway follows in fourth place with 81,540 newly registered vehicles.

A different picture emerges when it comes to e-vehicles' share of total new passenger car registrations. More than one of every two

new passenger cars in Norway is electric. This 57-percent share is the largest worldwide. By comparison, electric cars account for only three percent of new registrations in Germany, five percent in China and two percent in the USA.

Norway follows on the heels of China and the USA, taking third place with 370,800 electric vehicles in total. Japan is in fourth place with around 300,000 cars, followed by France with 274,100 and the United Kingdom with 235,700. Germany is in seventh place with 230,700 electric vehicles, which is one step up from the previous year's placing.

"Although the growth rate for newly registered electric vehicles is relatively high in Germany, the market continues to lag behind," says Prof. Frithjof Staiß, Managing Director of the ZSW. "This development will have to pick up a lot more momentum to reach the German government's goal of seven to ten million electric vehicles by 2030."

Tesla is in the lead in terms of cumulative new registrations with over 875,000 e-cars. Chinese automakers BYD and BAIC follow in second and third place with around 737,000 and 480,000, respectively. Two German companies took fifth and sixth place – BMW with 398,000 cars and VW with 351,000.

Tesla is also the undisputed leader in 2019 with 361,000 newly registered cars, followed by the three Chinese companies BYD (219,000), BAIC (158,000) and SAIC (126,000). BMW and VW are also ranked fifth (115,000) and sixth (93,000) in this category. The gap to the global leaders is considerable: Tesla accounts for far more new vehicle registrations than BMW and VW combined.

TESLA ALSO IN THE LEAD WITH 2019 MODELS

Tesla's Model 3 took the top position in cumulative new registrations with 445,000 vehicles despite being on the market for less than three years. The Nissan Leaf and Tesla Model S, last year's most frequently registered models, follow with 434,000 and 281,000, respectively. The only German model in the top ten in terms of cumulative new registrations is the BMW i3 with over 155,000 registrations.

Tesla's Model 3 is also clearly ahead in 2019's statistics with 297,000 new registrations. Its lead over the runners-up is considerable with the BAIC EU Series accounting for 111,000 and the BYD Yuan for 68,000 new registrations. BMW 5 Series plug-in hybrids achieved the best German result, taking sixth place with 46,000 models sold. The fact that seven of the top ten newly registered vehicles are purely battery-powered merits special mention.

Narrowing the focus to the German market, the statistics for new car registrations have little in common with the global figures. The Renault Zoe defended its first-place ranking with 9,430 cars sold. The BMW i3 was a very close second with 9,380 cars, a total that includes both the battery-powered electric model and the version with a range extender. It edged out the Tesla Model 3 with 9,010 cars.

"The odd success notwithstanding, the numbers show that German automakers have to step up their efforts on a much broader scale to keep up with the world leaders," says Staiß. "It is crucial for the German automotive industry that its upcoming e-models achieve market success."

This could also spare German carmakers billions of euros in fines. As of 2021, there will be stiff penalties to pay if the averaged CO₂ emissions for the entire fleet of vehicles sold exceeds regulatory targets. These funds could then be put to better use for investing and creating value in Germany – for example, with in-house battery cell production capabilities.

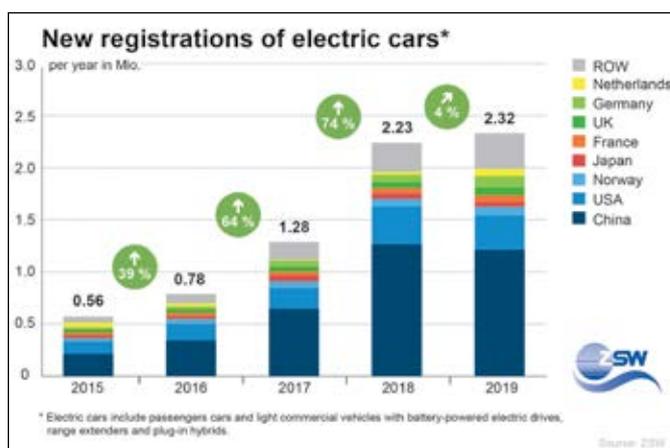
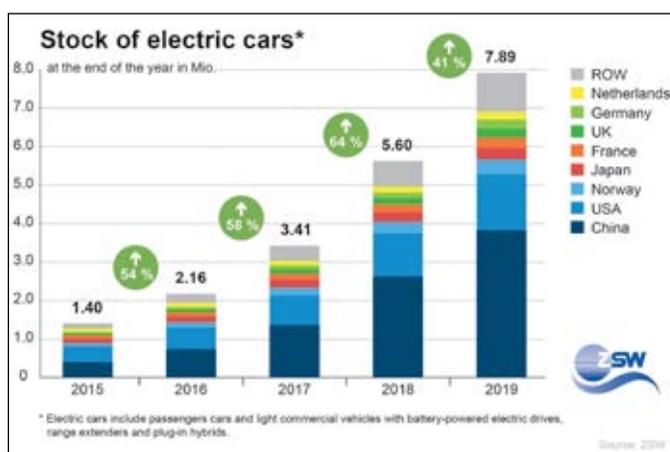


THE BASELINE – VEHICLES RECHARGED WITH ELECTRICAL POWER

The report encompasses only those passenger cars and light commercial vehicles with battery-powered electric drives, range extenders and plug-in hybrids – that is, all vehicles that are charged externally with electrical power. It does not factor in full hybrid vehicles that can cover shorter distances with a relatively small battery, but cannot be charged externally; nor does it include mild hybrids and vehicles equipped with fuel cells. This assessment is based on data from the German Federal Motor Transport Authority, government agencies and NGOs abroad, and other sources.

The authors of this report were able to ascertain the number of previously and newly registered electric vehicles in countries worldwide. However, data on specific makes and models is not

available on a global scale. This is why the authors based their analysis of newly registered makes and models on data sourced from the 18 largest markets for e-vehicles. ZSW's figures represent a conservative assessment of actual developments. The paucity of globally available data that distinguishes among registered electric cars by their make and model prompted the authors to use the phrase "cumulative new registrations" for these figures.



"Although the growth rate for newly registered electric vehicles is relatively high in Germany, the market continues to lag behind. This development will have to pick up a lot more momentum to reach the German government's goal of seven to ten million electric vehicles by 2030."

ABOUT ZSW

The Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (Centre for Solar Energy and Hydrogen Research Baden-Württemberg, ZSW) is one of the leading institutes for applied research in the areas of photovoltaics, renewable fuels, battery technology, fuel cells and energy system analysis. There are currently around 280 scientists, engineers and technicians employed at ZSW's three locations in Stuttgart, Ulm and Widderstall. In addition, there are 100 research and student assistants.

Roadmap needed to integrate electric vehicles into Australia's energy market



The Australian Energy Market Commission (AEMC) says Australia needs a forward-thinking plan to get the energy system 'market ready' for an electric vehicle future. In a new issues paper released recently as part of its 2020 retail energy competition review, the Commission says planning ahead for the boost in energy use from electric vehicles will ensure this new technology has a positive impact on the energy market.

"Electric vehicles will boost demand for electricity and could have a big impact on the energy market," said Commission Acting Chief Executive Suzanne Falvi.

"Sales of electric vehicles increased by more than 200% between 2018 and 2019 and we need to lock in lower cost ways to support consumers who want them. If we get ahead of the curve, we can make sure this technology makes a positive contribution to our future power system and doesn't become another cost driver."

"We're starting a conversation with this issues paper to generate ideas and identify what barriers to innovation there might be that could stop new electric vehicle products and services reaching consumers," Ms Falvi added.

The Commission's issues paper gives public charging stations as one example of how electric vehicles can have a large impact on the grid. One charging station built in Adelaide in 2017 with eight chargers was equivalent to the connection of 100 new homes. The paper also says that while electric vehicles have an obvious value as a mode of clean transport, they could also benefit the market by promoting more efficient use of the infrastructure we already have.

"Electric vehicles have potential to put energy power back in the hands of consumers and help keep the system reliable and secure," Ms Falvi said.

"With the right systems in place, households can charge their vehicles when energy is cheap and have the option to sell power back into the grid when it's more expensive. Along with solar PV and smart appliances, electric vehicles can be part of a consumer's future toolkit to reduce their energy output when prices are high."

The AEMC issues paper says digitalisation will see smart and flexible charging systems benefitting consumers without any conscious effort. It also says that if given the right market signals, electric vehicle charging load could provide a significant demand response resource for the system.

In California for example, *Enel X* is aggregating electric vehicle charging loads, providing a 30MW/70MWh resource in energy markets. This 'virtual battery' of more than 6,000 chargers can ramp up and down to meet energy market needs, with customers involved receiving incentives.

Technology developments might also mean greater potential for households to use electric vehicle batteries 'behind the meter' to soak up excess rooftop solar generation and then discharge electricity to their own home or to the grid. But so far, limited uptake of electric vehicles means there aren't many retail products targeting this market.

"Electric vehicles are an opportunity for retailers or new energy providers to innovate with new residential products," Ms Falvi said. "While existing consumer protections must apply to new products and services, we need to make sure that existing rules and regulations don't stifle innovation."

The Commission wants to know what products and services are being developed, both for residential and public charging - for example, in workplaces, shopping centres and car parks. It also wants to know whether retail market competition is resulting in innovation in this space.

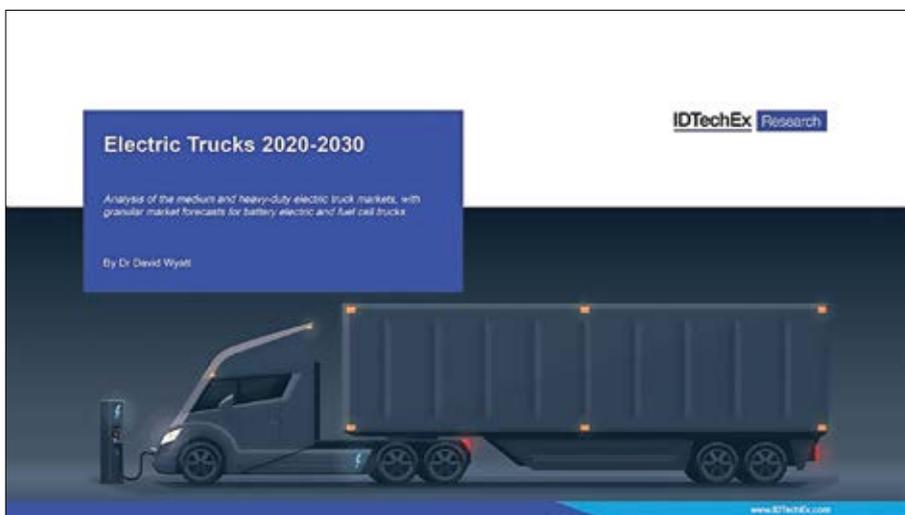
In asking stakeholders for feedback, the Commission is considering whether any existing retail regulation is creating barriers to electric vehicle use.

ELECTRIC VEHICLES: FAST FACTS

- Nearly 8 million sold worldwide to date
- More than 6,700 sold in Australia in 2019
- 22 models currently available and nine more expected in 2020
- 1930 public vehicle charging stations in Australia as of July 2019 – a 140% increase in the year to July 2019
- 70% of vehicle owners are likely to have access to dedicated charging stations at home or work

ABOUT THE AEMC

The Australian Energy Market Commission (AEMC) is the rule maker, market developer and expert adviser to governments on energy. It protects consumers and achieves the right trade-off between cost, reliability and security.



‘Electric trucks 2020-2030’ report from IDTechEx

IDTechEx Technology Analyst Dr David Wyatt has recently published a report update “*Electric Trucks 2020-2030*”, focusing on electrification in the medium and heavy-duty truck markets, providing a comprehensive set of market forecasts.

Along with the rest of the automotive sector, the medium and heavy-duty truck market is evolving. Governments around the world, recognising the potentially catastrophic repercussions of unfettered climate change and witnessing the detrimental impact on human health from vehicle exhaust pollutant emissions in urban environments, are taking decisive action, that will, in the coming decades, drive vehicle manufacturers to zero on-road exhaust emission powertrain solutions. Consequently, many believe that the days of the fossil fuel-powered combustion engine are numbered.

In the face of tightening CO₂ emission legislation for new trucks, that will be difficult to meet in the relatively near future with a fossil fuel combustion engine, and increasing pressure to limit peoples exposure to hazardous air pollutants in city centres, that are in large part the result of on-road transportation, a much cleaner source of power is required for future medium and heavy-duty trucks. This need is compounded by increasing demand for freight delivery as the retail industry grows its online sales platforms and people gradually abandon private car ownership for mobility as a service (MaaS) platforms.

It is already clear that it is impossible for ICE-powered fuel efficiency improvements to deliver the required emission reductions in the long-term. The future is either battery-electric or fuel cell electric vehicles. They

deliver a zero on-road emission solution, that immediately protects people from PM and NOx emissions in urban areas and passes the burden of decarbonisation from vehicle manufacturers on to the generators of electricity.

Diesel and petrol combustion engines are already a technology of the past, prudent companies in the automotive industry are already transitioning themselves toward the electric and fuel cell supply chain. All major truck OEMS are now investing in zero-emission trucks projects for fear of being left behind.

The IDTechEx “*Electric Trucks 2020-2030*” report is intended to help businesses across the automotive value chain plan for the future in this rapidly changing market. The report provides 48 forecast lines for battery electric and fuel cell electric trucks, that include a ten-year outlook for vehicle production, market penetration and market value, with separate forecasts for both the medium and heavy-duty truck markets and regional segmentation for China, North America, Europe and ROW.

An up-to-date overview of the battery and fuel cell electric truck market is provided in the report, with detail about current demonstration projects and efforts by major players in the industry to commercialise zero-emission trucks, across each of the key regions.

The report presents background to technology development in the electric truck market, including fuel cells and electric hybridization, along with a discussion of key enabling technologies for electric truck deployment such as batteries, motors and charging infrastructure.

Red Energy charges into the EV space

Red Energy announced recently announced that it will offer Electric Vehicle owners electricity every weekend to charge their cars with free usage charges.

In a new product offering to electric vehicle owners, Red will provide electricity between 12 noon and 2pm every Saturday and Sunday with free electricity usage charges. *The Red EV Saver* will also include Red’s renewable matching promise. This provides customers with a guarantee that for every unit of electricity they use, Snowy Hydro will match it by generating one unit from a renewable source.

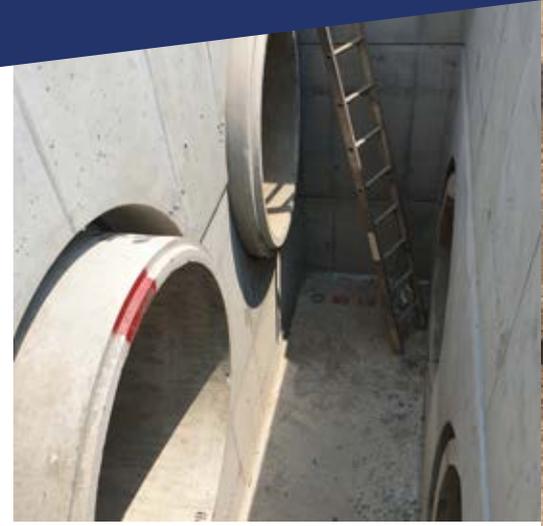
“We are a business that’s owned and powered by one of Australia’s leaders in renewable energy, Snowy Hydro” said Iain Graham, CEO of Red Energy. “This product is supported by Red’s renewable matching promise. We know renewables are important to electric vehicle owners which is why we think Red’s offer will appeal to these customers”.

Charging an electric vehicle is estimated to add approximately 35% to an average customer’s annual consumption. Red Energy’s offer will minimise the cost of “fuel” for the customer. Customers require a smart meter or an interval meter. Red Energy can assist with the installation of a smart meter if they don’t have one.

Red Energy has three electric vehicles in its company fleet and has plans to install a charging station at its Richmond Contact Centre in Melbourne.

For more information, please visit: www.redenergy.com.au





BROOKWATER TRUE TO ITS NAME WITH EFFICIENT STORMWATER COLLECTION



Precaster: Humes
Location: Ipswich, QLD
Client: Brookwater Residential
Civil Contractor: BMD Group
Engineer: Jacob Meecham, BMD Group

Water is the lifeblood of any community and a new development south of Brisbane is proving just that.

Brookwater is a premier residential golf community in Ipswich offering a distinct blend of everyday living, golf and leisure. Below it, lies an elaborate precast concrete stormwater collection system.

From the project's inception, developer Brookwater Residential collaborated with leading design organisations to shape a wholesome living environment where home design, stunning landscape architecture and quality amenities have been used in combination to create spacious, safe and inviting facilities. Offering a variety of properties to suit all types of lifestyles, the estate contains facilities for every stage of life.

DEMAND FOR EFFICIENT STORMWATER DRAINAGE SYSTEM

Luxurious properties demand efficient stormwater drainage and in Brookwater's case this was a high priority as it partnered with civil contractor BMD Group.

Accordingly, BMD contracted National Precast member Humes to manufacture a complete modular precast solution. With its head office based in Brisbane, the company has factories all over Australia and was well-equipped to deliver an outstanding stormwater solution.

PIPES AND MODULAR PITS

With twin DN1500 reinforced concrete stormwater pipelines running through the estate, three large custom pits of various dimensions were required to meet pipeline access and change of depth requirements. All three of the pits, the largest measuring 4100mm long by 1200mm wide and 3200mm high internally, were supplied as modular pieces including the base, chamber and lid.



OFF-SITE MANUFACTURE TO SPEED CONSTRUCTION AND MINIMISE SAFETY RISK

Choosing to use a precast solution offered BMD the advantage of greatly reducing the construction programme and exposure to on-site hazards that an in-situ installation would have required. The choice to use precast concrete allowed for the major components of the project to be manufactured in an off-site location in

a controlled factory environment, this being Humes' Ipswich facility.

Delivered to site as required, the construction site was also kept hazard-free as there was no requirement for on-site storage.

The major lifting and installation component for each of the three custom pits was completed in just two hours with only an additional day's labour required for grouting, sealing and lid placement.

GOOD OUTCOME FOR ALL

BMD were impressed with the general quality and finish of the custom pits.

With the installation going smoothly and significantly reducing labour time, BMD's Project Engineer, Jacob Meecham said "Everything has been going well from our end, I would definitely look to use Humes moving forward for these types of structures".

And for the residents, stormwater drainage will never be an issue.



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LAPP's new ÖLFLEX® ranges of low-smoke, flame-retardant halogen-free cables and cable systems are focused on safety and helping protect against fire and smoke inhalation.



Halogen-free cable systems respond to safety and sustainability demands

With increased demand for safety in public and private buildings, places, spaces and infrastructure, specifiers are now focusing on materials that protect people in case of fire.

Designers, specifiers, contractors and facility managers understand that smoke and poisonous fumes can be a greater risk to lives than that of fire alone, says global cable systems technology leader LAPP, which is established in 50 countries.

So, to optimise safety in construction and development projects – and to help future-proof them to comply with evolving requirements – LAPP Australia is introducing significant local stocking holding of expanded ranges of German-manufactured halogen-free, low-smoke and fire-retardant cables and cabling systems designed to comply with some of the world's most stringent safety requirements.

The new ÖLFLEX® ranges of low-smoke, flame-retardant halogen-free cables and cable systems are designed for facilities ranging from high-rise buildings and

public entertainment facilities, spaces and places, through to airports, rail and road terminals, recreational and tourist facilities, stadiums, ports, factories, and fire hazard areas of process and production facilities in industries such as mining and energy, oil and gas, bulk handling and food processing, agribusiness and utilities including water and waste handling.

"These new products are engineered to enhance the safety of public and private infrastructure by ensuring that they comply with strict safety standards today, while also extending the sustainability and fit-for-purpose standards of new structures by meeting and exceeding the most advanced requirements being imposed upon them," says LAPP Australia General Manager Mr Simon Pullinger.

He says the biggest issue sometimes facing specifiers is the full understanding of what is a true low smoke-halogen free cable (LSHF – Low Smoke, Halogen Free, or LSZH (sometimes LSOH) – Low Smoke, Zero Halogen).

"According to the international standards with which LAPP products comply, a cable or cable system that ensures security during fire must have passed three tests pertaining to halogen content, low smoke density and flame propagation."

"LAPP's range of low-smoke halogen-free products are accordingly stringently tested to IEC and VDE standards to ensure peace of mind where human life or valuable property are exposed to a high risk of fire hazards."

Examples of the new halogen-free products include:

- Different varieties of ÖLFLEX® Classic 128 H and 128 CH, which are suitable for power and control on static installation or for occasional flexing up to 0.6 – 1kV voltage operations. They are also UV resistant. The CH version contains a copper wire braid for EMC protection.

They may be used in public facilities, airports, railway stations and construction, particularly where human and animal life as well as valuable property are exposed to a high risk of fire hazards.

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