



Ceramic artist Liz Stops is among members of the local community restoring the Jabiru Geneebeinga Wetlands in Casino, Northern NSW. More than 130 species of native, local and migratory birds use the site. Stops sees the project as an extension of her art practice.

DISSONANCE AND DECARBONISATION

by Mike Hall

Converting clay into ceramic emits greenhouse gases that contribute to global warming and climate change. Mike Hall reflects on his own firings using a home-built gas kiln, and discusses the response of other artists and potters to the climate crisis.

In a stroke of irony, I started building a new 340-litre (12 cubic feet) ceramic-fibre gas kiln on a day of catastrophic fire danger. Bushfires soon raged near Sydney and smoke blanketed much of NSW's east coast. The smell was eerily familiar: the same toxic gases from the combustion of organic matter in the early stages of firing clay.

I half-joked with my son, who was helping me build it, that one of us at least would have an effective, if claustrophobic, fire shelter, should we face a blaze. The very next day, I read: "Man shelters in kiln as blaze destroys homes in Balmoral". Potter and kiln-builder Steve Harrison used ceramic fibre to shelter as fire swept through his property. Later, Cameron Williams Instagrammed his fire bunker: a mattress in a gas kiln, thermocouple placed outside.

Millions of hectares burnt; an estimated billion native animals incinerated; 34 people dead, thousands of properties destroyed and millions of Australians touched by this disaster.

ACCOUNTING FOR CO₂ EMISSIONS?

These calculations relating to my gas firings are anecdotal, not the result of methodical scientific inquiry. They should be regarded as indicative only.

A 10- to 12-hour cone 06/05 bisque followed by a 5- to 6-hour glaze firing (to cone 04/03) consumes about 4–5kg of propane. Since 1kg of propane equates to 46,452 BTU of energy¹¹, a twice-fired load of earthenware (in my kiln) requires a total of 400,000 BTU. Propane generates 63kg CO₂/million BTU. So emissions from that production (from fuel alone) are about 25kg.

A cone 9/10 glaze firing uses about 15kg of propane, roughly three times as much, especially with reduction and firing-down. So, including the bisque firing, a similar stoneware production would consume about 20kg of propane, releasing 58.5kg of CO₂.

Comparing that with other data, a 36 cubic feet propane kiln in the US, fired by Catherine White and Warren Frederick, consumes 50 US gallons for a 12-hour, cone 9 firing.¹² After conversions, and looking at consumption per cubic feet, that ends up being remarkably similar to mine: a little over 8 kg of CO₂ emissions/cubic foot (0.282 kg per litre) of kiln space.

After this, is it business as usual? As fire irreversibly alters pots in the kiln, have these fires transformed us?¹ Is this a 'moment of change' when we adopt new behaviours and practices?² Should we restrain our urge to commit work to the kiln, sending carbon trapped for millions of years in fossil fuels into the air?

As I contemplate my half-built kiln that will harness energy from a fossil fuel that contributes to climate change³, the cognitive dissonance is as unsettling as the acrid smoke that caused more days of hazardous air pollution in Sydney this summer than during the whole of the past decade.⁴

"The buck stops with each one of us"

Almost three years ago, I wrote an article for this journal on the contribution of ceramic production to greenhouse gas emissions.⁵ The message was: yes, there's an impact, mainly by ceramics industries, but studio artists' and potters' contribution is insignificant.

At the time I spoke to ceramicist Liz Stops, who was well-versed with climate change science having participated in a successful campaign to ban gas fracking in the Northern Rivers of NSW and completed a PhD focusing on environmental sustainability.⁶ She said we'd start to feel the impact in three years. I thought that was overly pessimistic: it turns out to have been prescient.⁷

"The buck stops with each one of us," she wrote in an email in 2017. "I've heard Australian politicians argue that our country's contribution to



Cameron Williams with works ready to be fired, 2019; photo: courtesy artist

greenhouse gas emissions is insignificant compared to those with larger populations and I think that's spurious reasoning and a total copout. So, although ceramics may be a minor culprit, it isn't an excuse to do nothing."

Carbon footprint

I began firing my own work in early 2018 in a home-built kiln – a steel drum with a capacity of 90 litres lined with ceramic fibre – mainly to test local clays and fired with propane. With a kiln this size, deciding what to fire can be a struggle. So I've taken Zen-like pleasure dropping work back into a bucket of slip. I wanted to step up my capacity to fire larger work. But before I built a new kiln, I wanted to better understand my carbon footprint and perspectives of other ceramicists.

A cone 05 bisque and 03 glaze firing creates about 25 kg of CO₂ from fuel combustion alone. (See Box for calculations.) With about 20 firings last year, I created a quarter of a tonne of greenhouse gas emissions – roughly equivalent to driving 920 km from Sydney to Brisbane by car, just from fuel alone.⁸ Stoneware would have generated well over half a tonne. Still, that compares to a return flight Sydney to London of more than 6 tonnes of CO₂ per passenger.

In a study conducted in a commercial environment, the carbon footprint of a sample ornamental earthenware piece was 1.22 kg CO₂ per piece (the piece weighed 0.417 kg). The firing represented almost 90% of the carbon footprint of the piece.⁹



Seedlings; photo: Stewart Scambler

Sustainable practices

When I called Williams, notorious for the huge pots he throws (he'll often load a kiln with a forklift), the bushfire was back within a kilometre of his south coast property. He has a two-tonne gas tank supplying his kilns and thinking about energy consumption "makes me uncomfortable", he says, "which is why I do everything I can to make my workshop practices sustainable".

Solar panels on the roof provide electricity for his workshop. He orders dry clay in loads of 30 tonnes at a time delivered in a single truckload. No plastic, minimal fuel consumption, and 95 per cent of his work is sold before he makes it. Most of what he makes, such as large pots for gardens, ends up containing plants or trees which not only sequester carbon dioxide but "remind people of the importance of nature".

We discussed what he calls "the wobbly, blurry line" between what makes a ceramic object worthy or driveway rubble. "I can't dictate what others choose to fire," says Williams. "One person's clunky ashtray is another's artwork. Who is the arbiter of taste?"

Trees and solar panels

Some ceramicists have long incorporated concern for the environmental impact of their art and craft. Others have changed their practice to become consciously more sustainable.



Pattie Beerens, *Lorax reads A Thousand Plateaus*, 2020, ephemeral sculpture, unfired local Anglesea clay, paper pulp and cotton fibre, h.65cm, w.65cm, d.50cm; location, Point Roadnight cliffs, Victoria; photo: artist

Stewart Scambler is among Western Australia's most acclaimed potters. A woodfirer and teacher who makes one-of-a-kind functional ware from blended local clay he digs himself, he's long anticipated criticism from those concerned about the impact of his method of converting clay to ceramics.

For many years, he's planted more than 100 trees each year on his eight-acre property near York, west of Perth, to offset burning about 2 tonnes of wood in each firing. The buildings are totally solar powered, with battery storage, and have been since they were built in the 1990s.

He has solar panels atop his house next to his studio in Palmyra, and both his practice and teaching is suffused with a resource-conservative approach. He tells his students: "If you plant the trees yourself then nobody can criticise you."

Scambler uses digital pyrometers throughout his kiln to ensure each firing is as efficient as possible. "I don't care how urgent an order is, the kiln always has to be full," he says.

With WA's ceramic arts association applying to host the Triennale in 2025, Scambler says he's considering pushing for a carbon-offset clause in the contract. He worries when he reads about

REDUCING YOUR FOOTPRINT

The following tips are from people interviewed for this article and other sources.

Educate yourself about your carbon footprint.

Understand what your energy consumption is and how you can reduce it.

Change your energy source (switch to renewable electricity through Powershop, for example, if you have an electric kiln) and/or install solar panels, if you're in a suitable location.

Fire smaller work less frequently.

Fire to lower temperatures (a cone 04 firing will consume about a third of the energy of a cone 10 firing). Or if you're making stoneware can you fire to cone 6 instead of cone 10? With a bit of adjusting, cone 10 glaze recipes will work just as well at cone 6 and can halve your firing time.¹³

Experiment with single-firing¹⁴ (combining bisque and glaze firing) to see if it works for you.

Try unfired clay if you're making sculptural work and experiment with different surface finishes.

Make work deliberately, and make for the kiln so that you fire a full load. If you have doubts about a piece before firing, chances are firing it isn't going to make it better.

Lookout for carbon offset programs that are likely to become increasingly available as small businesses and individuals seek to offset emissions.

importing clay, such as Limoges porcelain from France. "We are so used to convenience, whether jumping on a plane, or using materials."

Unfired clay

Melbourne-based Pattie Beerens started working with clay in 2008¹⁰, constructing ceramic sculptures fired in electric kilns. Last year, as part of a deep reflection into her practice, she began creating more organic forms using local clay and a variety of fibre. Most of her work is now unfired and temporal. It can even be deconstructed and re-used. "We don't always need to have an object at the end of it," she says.

Beerens found working with clay strengthens her relationship to nature. At the time of writing, she was about to show her work in glass display cases lining an historic pedestrian underpass in Melbourne slated for redevelopment. She intended it to be "like an upside-down garden that would grow and crumble" and return to the earth.

She wonders whether she's still a 'ceramic' artist, but decides that she is because of the powerful way in which the medium of clay unites artists and potters globally and connects them to the natural world.

Care for the environment

Stops takes the idea of connection with nature further. While her studio practice slowed over the past three years, her involvement grew in a local wetlands restoration project that she came to regard as a kind of community art installation. It helped connect local people to an area used by more than 130 species of native, local and



Mike Hall, *Rescued*, 2018, wheelthrown bottles and jars in Scotland Island clay, stamped, textured, terra sigillata, iron oxide wash, fired to cones 04 and 03, with found materials, h.110cm, w.85cm; photo: Gemma Rasdall

migratory birds, and she used the same skills that artists bring to any project, such as problem solving and design.

“Researching and networking with a committed group, and strategising care for a particular environment, is very similar to staging an exhibition that the audience can interact with,” she says. “But people aren’t our only audience. Ultimately, the project’s success depends on whether it becomes more viable for diverse wildlife.”

Our decision to create ceramics contributes to global warming whatever fuel we use. Fossil fuels, and electricity generated from fossil fuels, are the biggest culprits. How much we contribute, and what we do to minimise it, is a choice we all have to make. So, too, is the message we seek to communicate through our work.

Late last year I sold my first ceramic work at a community art exhibition. Titled *Rescued*, it incorporated found iron roofing burnt in a hazard reduction fire, hardwood planks discarded in a home renovation and clay 'rescued' when a neighbour installed a new septic tank.

Local residents Senator Kristina Keneally and her husband Ben bought the piece. It now hangs on their dining room wall. I hope it reminds them, and their visitors, of the value of local, reusable materials, the power of fire – and the urgent need to decarbonise our economy and rescue ourselves from the consequences of excessive consumption.

Mike Hall is a writer, editor, video producer and part-time potter. He lives on Scotland Island near Sydney. He's on Instagram @mikefhall.

- 1 See Thomas Keneally: 'These fires have changed us' (The Guardian, Australia edition, Feb 1, 2020.)
- 2 The Conversation, Feb 4, 2020. "Lots of people want to help nature after the bushfires – we must seize the moment."
- 3 Extraction of gas, and particularly unconventional gas (or coal seam gas), is a highly polluting activity. Gas is primarily made up of methane, a greenhouse gas which is up to 84 times more potent than carbon dioxide in the short-term. Massive quantities of methane are released into the atmosphere through gas exploration, extraction, processing, and consumption. (Climate Council)
- 4 Sydney Morning Herald, Jan 24, 2020, 'New situation: Record 81 days of bad air quality in Sydney'
- 5 'Flame's footprint: clay, carbon and climate', *The Journal of Australian Ceramics*, July 2017.
- 6 See <http://craftaustralia.blogspot.com/2011/09/liz-stops-musing-on-sustainable.html>
- 7 See The Garnaut Climate Change Review of 2008, which examined the scientific evidence around the impacts of climate change on Australia and its economy, and predicted that without adequate action, the nation would face more frequent and intense fire seasons by 2020.
- 8 Combustion of fuel is only one source of CO₂ emissions. Producing the gas is another major contributor as well as decarbonisation of the clay itself.
- 9 'The carbon footprint and energy consumption of a commercially produced earthenware ceramic piece' *Journal of the European Ceramic Society*, Vol 32 (10), 2012, pp 2087-2094.
- 10 See Focus: Exploring Sculpture, *The Journal of Australian Ceramics*, Vol 58 No 2 July 2019 pp. 41-45.
- 11 See elgas.com.au
- 12 Denise Joyal, 'Aesthetics and environment: kilns and carbon', *Ceramics Monthly*, Feb. 2011
- 13 See Craig Rhodes <https://community.ceramicartsdaily.org/topic/1893-fiber-lined-kiln-construction/>
- 14 See Kylie Gusset, 'The Single Fire' in *The Journal of Australian Ceramics*, July 2019