

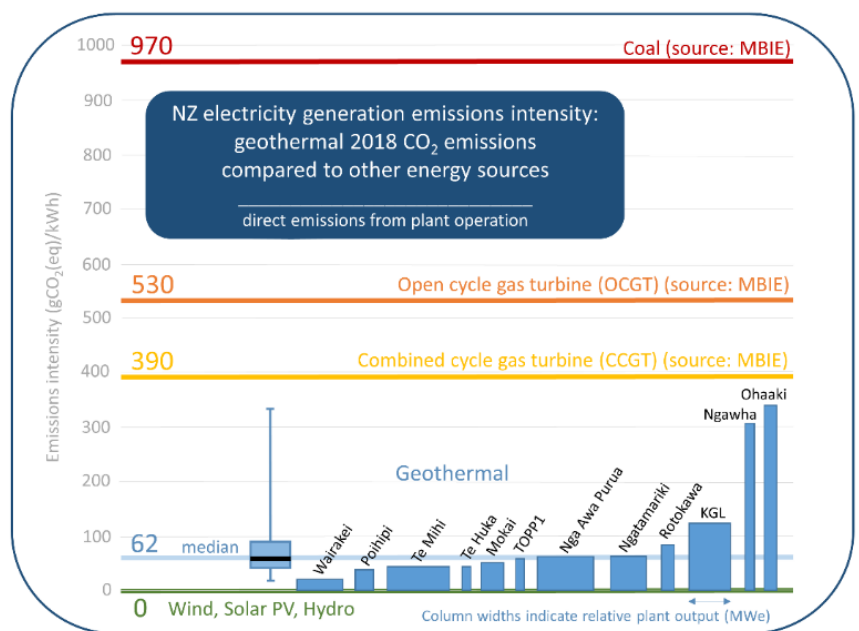
**SPOTLIGHT ARTICLE – PREPARED BY KATIE MCLEAN – CONTACT ENERGY**

**Geothermal Greenhouse Gas Emissions**

The carbon emissions from geothermal power generation have been receiving renewed attention as the worldwide impacts of climate change are becoming even more apparent, and global commitment to reducing emissions grows stronger. No source of energy is carbon-neutral, in every case there are emissions related to either construction, operation or decommissioning, or all three over the full life-cycle of the power station.

Carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) are naturally-occurring in the geothermal reservoir fluid. In their natural state, geothermal systems release carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) via obvious surface features such as fumaroles and bubbling pools, and also through steaming ground and flux through the soil. When a geothermal system is developed for power generation, the gases are released when boiling occurs in the power-generation process, and as the gases are non-condensable they are usually released to the atmosphere. The natural emissions from surface features usually decrease as a result of the development. There is a wide range of opinion on the degree to which the decrease in natural surface feature emissions offsets the emissions from development. Some new light will be shed on this by a three-year [GNS research project](#) led by [Dr Isabelle Chambefort](#), which is now underway.

Regardless of any potential offset, the operational carbon emissions intensity is now routinely recorded for most geothermal power stations in NZ. This data has been collected for 2018 for all the main power stations in NZ (operated by Mercury, Contact Energy, NTGA and Top Energy), and presented at the recent NZGA seminar in Taupo on 11 July, see figure. The median of the geothermal dataset is 62 gCO<sub>2</sub>(eq)/kWh (interquartile range 45-94 gCO<sub>2</sub>(eq)/kWh), and the weighted average (weighted by total GWh of energy generation) is 76 gCO<sub>2</sub>(eq)/kWh. Regardless of the choice of method (median or weighted average) the operational geothermal emissions intensity is



higher than the other forms of renewable energy (hydro, solar, wind) but significantly lower than all fossil fuel power plants.

More details and information on NZ geothermal emissions can be found here: <https://nzgeothermal.org.nz/geothermal-energy/emissions/>

## WHATS BEEN HAPPENING

### NZGA Winter seminar 2019

On July 11, 2019, the NZGA held its annual Winter seminar series entitled “Innovation and the Future of Geothermal in a low carbon World”. The seminar was well attended with approximately ~90 attendees ranging from government, operators, researcher, iwi and interest groups. The line-up included presentations on Icelandic geothermal market innovations ([GeoSilica](#)), NZ transition to a low carbon Economy ([EECA](#)), [Contact Energy's decarbonation strategy](#), Decarbonisation of NZ's dairy industry ([Fonterra](#)), innovative production efficiencies ([Western Energy](#)), and two examples of Direct-Use projects currently underway in the Taupo region ([The Rogue Bore Brewery](#) and [Geo40](#)).



### Presentation of Contribution Awards at the recent NZGA Seminar

Three Contribution Awards were presented at the winter seminar on 11 July. All three were for service as NZGA Board members. The presentations made were to:

**Jim McLeod** The citation was, “Awarded for founding member of NZGA Board and long-term WRC geothermal scientist”.

Jim was an inaugural member of the Board when it was formed in 1992 and served on the Board until 1998 representing Waikato Regional Council.



**Katherine Luketina** The citation was, “Awarded for continuous WRC liaison and service to NZGA Board since 1998”.

Katherine was elected to the Board in 1998, representing Waikato Regional Council, and has served the Board continuously since then. She served on the either as an elected member or as an Observer, when she was required by the Bylaws to stand down after six years of service.

## **Bridget Robson**

The citation was, "Awarded for former NZGA president who set the Board in a new direction, and former BOPRC planner who led the development of science-based geothermal policy".

Bridget was seconded to the board as an Observer in 2011 representing Bay of Plenty Regional Council. She was then elected as President in 2015, representing her company, Eland, before resigning in 2016.



*The Board of the NZ Geothermal Association introduced the Contribution Award in 2017. The guidelines for making an award are intentionally quite wide, leaving it to the discretion of the Board of the time. The contribution may be by anyone of any age, contributing in any area of the geothermal industry. The Board welcomes nominations from anyone who wishes to recognise a colleague in the geothermal industry.*

***Nominations may be forwarded to [committee@nzgeothermal.org.nz](mailto:committee@nzgeothermal.org.nz).***

## **INDUSTRY UPDATES:**

### **Mokai dairy company plant welcome Prime Minister Jacinda Ardern**

Prime Minister Jacinda Ardern visited [Miraka processing plant](#) at Mokai. Miraka uses renewable geothermal energy to generate over 300 million litres of premium milk products each year. Hemi said the company's focus was on animal welfare, sustainable land management and actively supporting farming best practice. "It is a message of hope for New Zealand that we can do things differently, that we can create successful companies that also support the people who supply them," Ardern said.

### **Contact Energy and Natures Flame reducing carbon emissions:**

[Contact Energy will supply Norske Skog's](#) local wood pellet business with direct geothermal energy for its Taupo manufacturing plant. [Nature's Flame](#) – owned by Norske Skog – obtains wood fibre from sawdust or shavings at central North Island saw mills. It then dries and resizes that fibre to produce its energy-dense wood pellet fuel. Contact and Nature's Flame have broken ground on a supply system which should be in place before the end of the year.

### **Mercury posts record geothermal output**

Mercury NZ's geothermal power stations have delivered [record generation for the 12 months](#) through to the end of June. Including Mercury's stake in Tuaropaki Trust's 113 MW Mokai station, the firm's geothermal fleet generated 2,896 GWh across the period. That beat out the previous annual record of 2,830 GWh - achieved in FY 2016 - and last financial year's 2,757 GWh.

Mercury says reliability improvements which reduced outages and specific optimisation work at the 107 MW Kawerau station, which helped it run consistently closer to its upper generation limit, contributed to FY 2019's result.

### **Contact Energy: Decarbonising NZ**

Contact hosted institutional investors and analysts for dinner in Wellington on Wednesday 26 June. Dennis Barnes, Contact's Chief Executive, presented a brief update on the progress of the Wholesale business in delivering on its [strategy](#).

## OTHER NEWS:

### **Call for Nominations for the Board of the NZGA**

The term of office of the following four Directors of the NZGA expires in November 2019: John Burnell, Katherine Luketina, Andrew Rae, Paul Siratovich (Vice President).

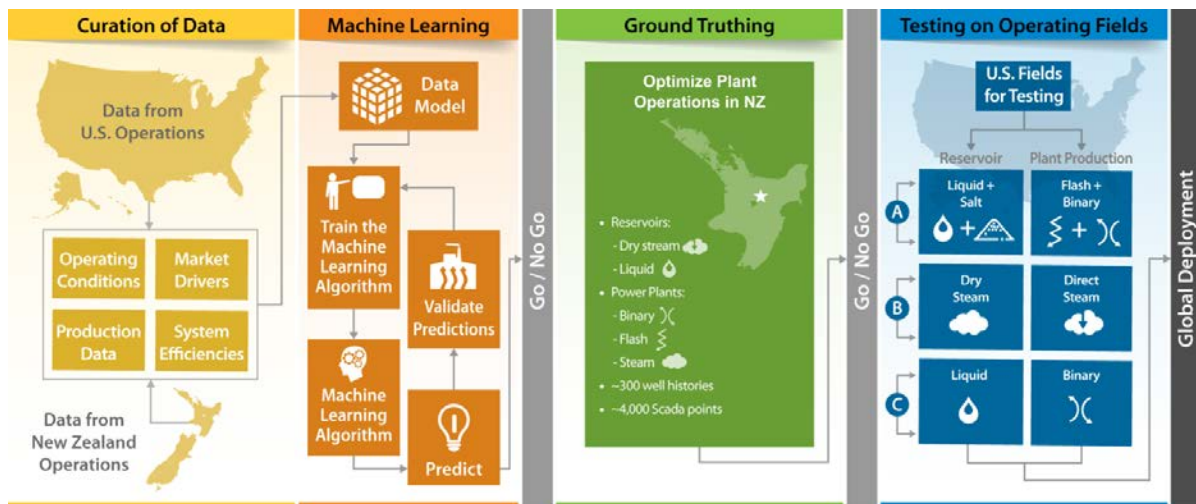
The Nominating Committee is calling for nominations from NZGA members for candidates for Board representation. If more than four nominations are received an election will be held. The person being nominated must be a member of the NZGA. Please provide contact address, email and phone number with the nominations. **Please note that each nomination is to be signed, or an email expressing support, by at least ten current members.**

NZGA members are invited to put forward their nominations for candidate selection to the Secretary by e-mail to [a.seward@gns.cri.nz](mailto:a.seward@gns.cri.nz).

### **Machine Learning for Geothermal Energy**



The US-Department of Energy (DOE) is providing funding to Upflow, to develop machine learning algorithms to increase geothermal asset operational efficiency. The project, [Geothermal Operational Optimization with Machine Learning](#) (GOOML), will use data and expertise from both the US and New Zealand to model, train and verify machine learning algorithms in real world operations. Digital system twins will be developed to provide geothermal operators with guidance towards optimal system management. Uplifts in availability factors greater than 2% are targeted through implementation of advanced analytics and subsequent operational streamlining as seen in other generation technologies. This will be a two-year collaborative project between Upflow, The National Renewable Energy Laboratory (NREL), Contact Energy, NTGA Ltd., Ormat Technologies and Flow State Solutions.



## Brian White joins New Zealand Ministry of Foreign Affairs and Trade

Former New Zealand Geothermal Association Executive Officer Brian White joined the Ministry of Foreign Affairs and Trade (MFAT) as Senior Adviser Energy this year. Brian was previously employed by East Harbour Energy.

As Senior Adviser Energy, Brian's scope will be wider than geothermal energy: he'll also be working on hydro, PV and broader renewable energy projects.

Brian says MFAT were looking for a Senior Adviser that would boost their in-house geothermal expertise to support the range of international geothermal projects it funds through the New Zealand Aid Programme. The Aid Programme's geothermal projects are located in East Africa, Indonesia and the Caribbean, with renewable energy projects in Indonesia and other ASEAN countries, such as Laos. MFAT works closely with partner countries and relevant organisations to identify and deliver projects that are mutually beneficial and increase partner countries' access to renewable energy for both economic and climate resilience.

In the last financial year the Aid Programme funded almost \$100 million in projects focused on energy generation and supply, not to mention the funding it generated through partnerships with regional and international organisations. An example of this is a small geothermal project on the Caribbean island of Dominica. The Aid Programme's contribution was \$2 million for the Project Manager, but MFAT's seed funding generated an additional investment of \$80 million with the World Bank and other partners.

Brian says, "I am looking forward to the opportunity this role provides to make a real difference and also to draw on my experience as NZGA Executive Officer, projects with the World Bank, and some of the MFAT contracts I was involved with through East Harbour."

## WHATS COMING UP...



### NZGW 2019 "Innovation and the future of Geothermal in a Low Carbon World"

The 2019 Workshop will be held at the Owen G. Glenn Building, at the University of Auckland, 25-27 November 2019. Find all the details [here](#).

### GRC Annual Meeting & Expo

[\*Geothermal: Green Energy for the Long Run.\*](#) 15-18 September, Palm Springs Convention Center, Palm Springs California.

### 2020 World Geothermal Congress

[WGC 2020](#) is just under a year away! Held 24 – 30 April 2020 in Reykjavik, Iceland. **Registration now open.**



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