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Gas shortage heightens growers' transition challenge

Felicity Wolfe - Tue, 11 Jun 2024
Vegetable growers need cheaper energy solutions or face exiting the business as energy costs rise and gas supplies tighten.

Vegetables New Zealand energy engineer Ellery Peters says natural gas makes up a large proportion of the sector's emissions and growers are now dealing with fluctuating prices and availability.

Supply contracts are getting smaller, and, in some cases, growers are being told they must "shut off their supply now", Peters says.

"We are trying to support their transition from that, if they are forced to."

He says growers have also been responding to rising carbon prices.

In 2019 about 50 per cent of the industry's emissions profile was from coal, followed by natural gas and then other hydrocarbons such as diesel and waste oil.

"What we have seen from the new data we have collected in 2024 is that portion of coal has reduced substantially, and it is actually dominated by natural gas."

Some larger growers are switching to biomass, Peters says.

"But many of the small-to-medium players are moving to waste oil from coal because they find that it's a very easy switch and it's the cheapest fuel source that they can find for themselves."

Gas is now the sector's largest source of fuel. It is "difficult to move away from natural gas for a lot of the very, very large growers because they actually collect the CO2 that comes off the flue gas and put it back into their greenhouses."

That CO2 adds an extra 25 per cent to crop productivity, and Peters notes that even producers using renewable energy often run generators for the CO2 alone.

"Finding a solution to that is very challenging."

Small grower challenges

Speaking at the Carbon and Energy Professionals conference last month, Peters says his role is to support "time-poor" growers to reduce energy costs.

He says it is difficult for growers to offset these costs because "they are price-takers".

Vegetables New Zealand is working to stem the exit of growers from the market because it impacts New Zealand's food security.

Just having large growers in specific sites means that if a natural disaster or disease wipes out a region's crop, the country becomes more reliant on imports.

"It is very important we have diverse growers around the country," he says.

"We really want to encourage a lot of our small to medium growers to continue growing."

Many growers have assets more than 20 years old and defer investment as long as possible.

"Now they're facing a turning point. Do they sell up their property, or do they further invest?"

He "fills the gap" in growers' energy knowledge around fuel switching, and opportunities to improve their energy efficiency.

He told delegates that the smaller growers find it hard to switch to electric alternatives because a "like-for-like switch" to electrification ends up "blowing out" the capital cost more than it needs to be.

Growers size their boilers for the winter months, he says. They also need to oversize the units for a negative 5- or 10-degree cold snap that could come only "once in every few years".

Additionally, air-source heat pumps are not ideal for operating at those temperatures.

"There is a high-temperature heat pump that runs in Auckland. It works quite well because of the humid climate and that's combined with a buffer tank."

"But for the rest of the country it's a bit of a risk," he says.

"If they don't have enough heat during one of these cold periods, their crop dies."

He says a dual-fuel system with “a little bit of fossil fuel” to ensure certainty needs to be part of the conversation.

Co-location

There have been some “really nice projects” where growers have collaborated with other industries around co-location, allowing capital and operating cost reductions, Peters says.

NZ Gourmet, for example, has co-located with Tuaropaki Power Company and Mercury NZ’s Mōkai geothermal station, using direct steam through a heat exchanger to heat greenhouses. However, it does not receive CO2 for its tomato-growing operation and runs a natural gas boiler to pump CO2 into the greenhouse.

The grower is collaborating with Contact Energy for a new 18 ha site next to the Ohaaki geothermal power station in Taupō which will be supplied with about 12,000 tonnes of CO2.

Turners and Growers are partnering with EcoGas to provide space for a renewable gas plant, taking off waste heat and CO2 in return.

Data centres may become a good source of constant waste heat, benefiting both industries.

“Greenhouses need that 24-to-25-degree Celsius hot air and around 80-degree hot water if they are using radiative pipework.’

Efficiency first

However, moving beside a geothermal station is not an option for many growers and Peters says efficiency is the first thing to look at.

He begins by looking at the low-cost improvements that can be made onsite.

Greenhouses require the right heat, airflow and humidity.

Optimising air distribution fans can reduce temperature stratification within the structures and save between 5 to 10 per cent of their energy use by reducing the "heat you’re just losing out the top”.

Better use of smart venting controls can reduce energy demand by taking factors such as wind direction and speed into account to prevent moisture and heat from being sucked out.

Windbreaks and other venting controls can reduce wind and cold air getting through gaps, which can “make up a huge percentage of the heat demand that is lost.”

Insulation is a “classic” issue, Peters says.

“They either haven’t insulated the pipework coming out of the boiler properly, or the boiler itself can be insulated better.”

Higher-cost improvements include equipment such as dehumidifiers. Peters says installing a dehumidifier at a Matamata site saw a 20 per cent drop in energy and increased crop productivity by about 10 to 15 per cent.

“This was purely because, without needing to vent that humidity out, it increased the amount of CO2 that was retained in the house.”

Going Dutch

A possible solution could come from the experience of the Netherlands, where growers have experienced huge increases in the price of natural gas, electricity and CO2 emissions.

In response, the Netherlands is pairing heat pump technology with low-temperature geothermal heat. The Dutch aim for 45 per cent of greenhouses to have geothermal heating by 2030, and 65 per cent by 2050.

GNS is currently working on modelling New Zealand’s low-temperature geothermal resources – particularly in Pukekohe – of between 10 and 20 degrees, Peters says.

The barrier to low-temperature geothermal is the very high capital cost and the risk associated with drilling before knowing if the resource is available.

“There needs to be some way to mitigate that risk to growers.”

Vegetables New Zealand is looking at getting funding to buy a tool to allow growers to “plug into" the geothermal data and "see if there is any available”.

The Netherlands shows what is possible – “they have to dig a lot deeper for their geothermal resource than we do”, Peters says.

While New Zealand wells generally need to be between 500 and 1000 metres, “in the Netherlands they drill up to 2000 metres to find the same type of heat”.

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