SUBMISSION ON

MfE Consultation – Phasing out fossil fuels in process heat (national direction on industrial greenhouse gas emissions)

https://consult.environment.govt.nz/climate/phasing-out-fossil-fuels-in-process-heat/supporting_documents/phasingoutfossilfuelsinprocessheat.pdf

Vegetables New Zealand Inc (VNZI)

20 Balance St

Wellington

VEGETABLES NEW ZEALAND INC -**(VNZI):**

Vegetables New Zealand Inc (VNZI) advocates for and represents the interests of 700 commercial vegetable growers in New Zealand, who grow around >50 different crop types and employ over 10,000 workers. Land under vegetable cultivation in New Zealand is approximately 60,000 hectares. This includes a unique set of growers who grow covered crops.

There are approximately 256 hectares of covered/indoor crops in New Zealand (based on 2017 Agricultural Production Statistics data). A 2018 report by NZIER evaluating the contribution of the covered (greenhouse) vegetable crop industries to New Zealand found that the sector provides approximately 2500 jobs.
Crops are grown close to markets throughout New Zealand. Greenhouses are a highly efficient food production system, optimising the use of land, water, and nutrients. Greenhouse growing uses techniques not used in other cropping systems such as CO2 enrichment, soilless cultivation and heating.

Covered crops are a relatively small user of process heat at a national level compared with other sectors. An MBIE factsheet from 2016 estimated that indoor cropping used 3.4 petajoules (PJ) of fuel for process heat (or 1.7% of New Zealand's total process heat demand); most of this was for low temperature (< 100º C) space heating.

Greenhouse vegetables are grown year-round in a relatively stable, controlled environment with optimal growing conditions that offer the ability to produce a lot of vegetables in a sustainable way to feed our growing population. Most vegetables grown in greenhouses in New Zealand are for domestic consumption; the main export crop is capsicums.

Vegetable New Zealand Covered Crops

	2017		**2020**	
	Tonnes	**Farmgate Value**	**Tonnes**	**Farmgate Value**
Capsicum	17680	$ 91,249,289.00	18760	$ 96,724,246.34
Eggplant	1543	$ 7,918,664.00	1697.3	$ 8,710,530.40
Lettuce	3021	$ 27,000,000.00	3927.3	$ 35,100,000.00
Cucumber	18836	$ 21,367,542.00	19777.8	$ 23,504,296.20
Herb	6454	$ 27,367,542.00	8067.5	$ 34,209,427.50
Total	**47534**	**$ 174,903,037.00**	**52229.9**	**$ 198,248,500.44**

Source: Data was sourced by discussions with key growers on their crops and markets. The estimate on growth (2020 figures above) was measured as a % change from 2017 data released by NZIER

The vegetable industry value is circa $2 billion and is broken down as follows:

Total exports	$0.7bn
Total domestic	$1.28bn

EXECUTIVE SUMMARY

VNZI supports the direction of the Ministry for Environment on decarbonising process heat for the reduction of Green House Gases (GHG) in New Zealand. VNZI would like to be included in further consultation, after the initial consultation concludes.

Covered crop growers understand the need for change. Covered crop growers understand the importance of planning change to enable all growers, given the right tools, incentives and policy settings, to continue to be world leading in business practice, while reducing emissions. This is why VNZI, in conjunction with Tomatoes New Zealand and EECA are undertaking a thorough energy survey of covered crop operations in NZ. The final output of this work will give covered crop growers energy efficiency options and energy resource options to meet the proposed GHG emission limits. Given the project is still some way from completion, it is vital for MfE to recognise the work that is underway, and the desire by covered crop growers to ensure the viability of their industry in the economic and political landscape.

Vegetable growers also understand the rationale behind the 2015 Paris Climate agreement, where the climate settings can only be achieved in the considered context of producing food. New Zealand needs to protect its food security position, by feeding its people, while adapting to climate change.

Therefore, VNZI promotes a managed plan to achieve business resilience and climate change. This involves all parties co-designing a planned course of action to achieve climate change settings.

CRITICAL FACTORS:

1. There is no one size fits all model to this problem. Due to the capital investment required in heating, growers will need time to determine return on investment, and reduce the likelihood of stranded assets.
2. Covered crop growers using natural gas for process heat also consume CO2 in the production of food. This needs to be taken into an equation of CO2 net effect.
3. CO2 enrichment of covered crop operations utilises 40-50% of the CO2 produced through the heating process.
4. Covered cropping gives New Zealand food security.
5. Covered crop growers are investing in new technology to improve their energy efficiency and are moving toward renewable energy sources. However, this needs to be balanced against a stable economic and political environment, and time, to ensure return on investment and business resilience.
6. Covered cropping will require a mix of heat options due to glasshouse locations and the demand load on energy resources.
7. Covered cropping (VNZI / TNZ) is partnering with EECA, and energy consultants, to promote energy efficiencies in glasshouses and also optimal renewable heating options for glasshouses. This will inform the direction of the industry and viable energy options for covered cropping.
8. Proposed carbon based process heat emission thresholds for covered cropping should recognise the following:

a. CO_2 net effect – with appropriate dispensation for operations capture and using CO_2 in production – the exact CO_2 dispensation needs to be determined with a co-designed process between industry and Government.
b. Process heat from carbon heat source is exempt from GHG emission limits below 800hrs for peak use times – peak use hours in key periods in plant growth cycles, thereby allowing renewable resources to manage peak loads (peak hour limits need to be determined by region in a co-designed plan).
c. Small carbon heat source output for covered crop operations below 3MW should be exempt from GHG emission limits
d. No GHG emissions plan for covered crop operations under 15MW of process heat output

REQUIRED ACTIONS:

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- **VNZI promotes a co-design process between growers, Government and suppliers to achieve a managed plan for a resilient transition to renewable energy source for business operation and growth.**
- **Process heat emission thresholds need to consider retaining natural gas process heat for covered crops due to CO2 net effect – circa 20-50% of the CO2 generated is used in production of food.**
- **Carbon based process heat is exempt from GHG emission limits if it is used under 800hrs pa during peak use periods to be determined by a co-designed regional plan.**
- **Small covered crop operations with carbon based process heat resources below 3MW boiler output, should be exempt from GHG emission limits.**
- **Covered crop operations with process heat boiler output below 15MW should not have to report a GHG emissions plan.**
- **VNZI promotes the need to maintain the gas infrastructure to ensure renewable gas options (biogas) in the future is viable.**
- **To ensure food security is preserved in NZ, there are likely to be a number of viable renewable energy sources throughout the NZ covered crop network. The best system will depend on the resources of each region.**
- **The work VNZI / TNZ are undertaking with EECA will deliver options each glasshouse can use to gain energy efficiency and viable energy renewable energy. This project is underway and will yield results over the next 10 years. This work needs to be recognised in GHG emission limits**
- **Over reliance on electricity as an alternative is not taking into account the significant upgrade and capacity increase needed on current networks to support growing operations for food, population increases and other non-food industry demands.**
- **Electricity as an alternative is cost prohibitive in many cases due to the capital outlay of heat-pumps and the ongoing running costs. This will cause many greenhouse businesses to become inoperable. There will either be significant cost increases to NZ grown produce, resulting in an increase in imported fresh produce potentially from countries with greater carbon footprints, or business closure reducing the availability of NZ grown fresh produce for our domestic market. This will threaten New Zealand's ongoing food security.**
- **Biomass is a resource which is not in sufficient supply, nor close enough to business, to be a viable option in today's resource market.**
- **Business resilience can only function with a stable / known political and economic environment. The capital cost of new technology has long pay back horizon. Co-design systems involving business, industry and Government are essential for succuss.**

GROWER STATEMENTS:

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Grower Impact Statement and MBIE Submission – Southern Paprika Ltd **28 May 2021**

Website: www.southernpaprika.co.nz

Contact: Blair Morris (General Manager) 027 525 2560

Southern Paprika Ltd (SPL) Overview

Southern Paprika is a 26 Ha Glasshouse operator located 50kms north of Auckland. We currently produce 7000 tonnes of Capsicums per annum for domestic and export markets of Australia and Japan. Currently our production is focused on Capsicum production, however we are able to convert our Glasshouse to production of many different vegetable crops within a short time frame based on requirements of the NZ market. The business has been in operation for 22 years and employees 160 staff. It has invested more than $60 million in capital cost and the annual wage bill is now over $7m, much of which is spent in the Warkworth area.

The Glasshouse industry is considered a large user of Energy and we have always been looking for alternative energy as a replacement for Natural Gas as part of a risk mitigation strategy. However, as we also use the Natural Gas for Co2 enrichment in the Glasshouses, (this increases yield by 15 %) there have been no alternatives.

The company's goal has always been to produce everything in a long term financially efficient and sustainable way. This includes energy, biological production, waste, transport and health.

Protecting the Greenhouse industry is essential to food security. Southern Paprika is located within 50 minutes of Auckland meaning low emissions and cost-effective supply to NZ's largest population base.

Glass House Operations and Energy Requirement

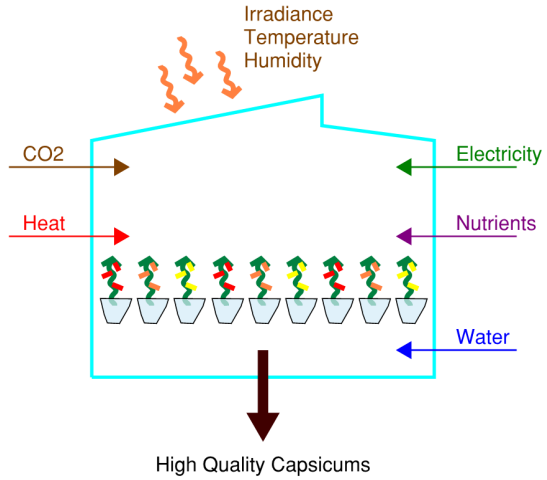
The SPL's main function is to produce high quality capsicums all year round. This is achieved by balancing several inputs to produce optimal growing conditions. Growing operations of the plant is the balance between what SPL can control and the weather external to the glasshouse. The daily changes of solar irradiance, ambient temperature and humidity provide the bounds in which the facility needs to operate. To maintain optimal growing conditions, SPL manage the following consumables.

- Electricity typically used for chiller rooms for storing the capsicums after harvest and

for fans within the glasshouses
• Heating used for space heating and grow pipes for the plants
• CO 2 natural gas boiler flue gas is pumped into the glasshouse following operation of the boilers. This is used for CO 2 enrichment.
• Water & Plant Nutrients encourage crop growth

Space heating is achieved through rail pipes. These circulate hot water which heats the space to maintain optimal temperature within the glasshouse. The rail pipes are predominantly used through the evening when the external ambient temperature drops and the glasshouse loses heat to the outside. To balance the need for heat through the evenings with the need for a carbon enriched environment through the day, the gas boilers typically operate through the middle of the day, with the heat generated stored in large thermal energy tanks adjacent to each energy centre. The CO 2 is then pumped into the glasshouse during the day. To balance the heat demand within the glasshouse, the systems ramp up and down corresponding to the internal temperature of the glasshouse. These can vary through the seasons and is determined by the growing team.

The below figure illustrates a inputs in a typical glasshouse.



CO2 Enrichment Requirements

Gas is predominately used to generate heat through the large gas boilers at each energy centre. The use of the boilers provides two functions: firstly to provide heat, used by the glasshouses, and secondly to provide CO 2, also into the glasshouses. The boilers are used through the middle of the day to charge the thermal tank with hot water and provide CO 2 into the glasshouse for crop development through the middle of the day. The boilers are typically not in operation from 7pm through to the early morning. Through this period, heating of the glasshouse is provided from the thermal energy tank , which is typically exhausted by early morning and the daily cycle is repeated.

The Co2 requirement provides an increase in quality and also a 15% increase in crop production and is therefore considered a necessary input for the Glasshouse production. A review of the required input of CO 2 through the use of the boilers for enrichment within the glass houses has been undertaken. Through analysis of the requested energy input for CO 2 enrichment, it suggests that approximately 10.8 - 21.6GJ per Ha of energy is required through the middle of the day for CO 2 enrichment. For further development of options, this is assumed to be 360GJ across the whole site (26Ha at 13.8GJ/Ha) daily for CO 2 enrichment. This equates to approximately 19.4tCO 2 per day. Relying on gas boilers to provide CO 2 results in a maximum possible reduction of 50% approximately 130,000GJ/year from a baseline of 275,000GJ.

Value of Natural Gas in the Glasshouse Industry

The need for heating and CO2 enrichment makes the Glasshouse industry most suitable for a continued use or partial use of such a fossil fuel. In comparison, all other industries only derive one benefit from the use of gas for heating without capturing and using the CO2 by product. All current proposals by the Climate Change Commission do not take into account that all industries are different and use the resources to derive different benefits. If the Glasshouses industry transition to a completely renewable energy source, the CO2 requirements remains, and the industry will ensure continued supply through gas or alternative options that still result in the creation of CO2. The end benefits being that the industry itself reduces emission through the crop enrichment and sequestration process.

Impacts of removing Natural Gas as the preferred Energy Source.

CO2 replacement

CO2 requirement in covered crops / Glasshouse in effect means that the gas boilers will continue, or alternative liquid CO2 will be used. The process of which may result in an overall increase in emissions from the industry when considering the overall creation and supply chain of alternative options eg transport, production, waste, emissions from alternative energy sources for heat

Maximising benefit of gas

With 50% of carbon emitted from the gas boiler process being captured and utilised by the Glasshouse crops, CCC need to consider if the industry standards proposed apply to all heat production. Perhaps consideration should be given to the net productivity benefits needs to be considered against a range of benefits to New Zealand and New Zealanders.

Productivity of land

As a company focused on only positive benefits for NZ and doing things in a sustainable manner, we believe the CCC need to consider the following:

- A Glasshouse production is approx. 30 times more productive per square meter of a field crop.
- We operate a closed loop water reticulation process with all nutrients collected and reused.
- Limited chemicals used due to climate control and Biological insect control where possible.
- Controlled environment protects reliability of supply compared with outdoor production.
- Year-round production providing import substitution and export revenue in peak periods.
- End of season growing material from Plants used on Avocado and other orchards as compost creating an environmentally sustainable benefit to additional food production for NZ.
- Scale and efficiency allow us to produce affordable produce year around, benefiting lower socio-economic communities in terms of healthy food at a lower cost.
- Our facilities use the latest in European production methods and we are refining this all the time.

Food Security and risk of Import substitution

Horticulture, including covered crops is all focused around obtaining balance in the plants to optimize production. If the balance is lost, crops are impacted through disease or similar and productivity is lost. The same balance applies to our business model where the availability and cost of inputs are equally as important as the plants and production themselves. The inputs impacting the industry to largest extent are labour and energy availability and cost. We are driven to ensure the most efficient model in all things related to these two inputs and if the availability or cost becomes unbalanced, the model is at risk. The end result being import substitution where product is no longer produced competitively in NZ with international imports able to land here at a lower price points for the consumer. When considering the emissions impact from such a result, the climate impact goes against what we are trying to achieve when considering the carbon emission from the transport legs and the increased production levels in the country of origin achieved through the standard gas boiler models and the transport component in servicing New Zealand at the bottom of the world.

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Feasibility Study – process heat for a 7.5ha glasshouse using renewable energy options available today.

Biomass to heat a 7.5ha glasshouse requires 10 to 13 truck and trailer loads of woodchip per day, plus you require a lot of storage area.

This is easy to do by buying a big chipper to chip the slash in forestry area's plus two truck and trailers for transport. I spoke about this with Blair from SPL who had the same idea but together we were fishing in the same forestry area round Kaupakakapa. Point is that within no time we would clean that area up with supply becoming a problem after a few years. So for both parties we agreed that there is not enough woodchip in the Auckland area and this is not a preferred option.

Second option is biodigesters, talking to others that already have digesters planned and did a cost calculation, it works out to be a 30 million capital investment to heat a 7.5 ha greenhouse.

Third option is geothermal and for this a study needs to be done about availability of underground heat. It looks to be the most cost effective option although drilling a hole is 1 million dollar at least, and no access to CO2.

Fourth is waste oil but in my eyes not a real option.

Going forward energy saving and reducing the gas use is the focus, there is plenty of gas to at least to 2050. I think we can realise a 30% reduction in overall gas use by using screens in all greenhouses.

For the CO2, we use 2,500 kg CO2 per week per ha, and I think this has to be taken in account.

Without CO2, we can't ship produce by sea freight due to reduced shelf life and alternatively have to send it by airfreight which has a much worser carbon footprint than sea freight.

Therefore, my focus is on keep using natural gas but in a more sustainable way. The plans of FirstGas, is to add 20% hydrogen to natural gas, this will not affect the burning and efficiencies of boiler, but will reduce the carbon content by another 20%.

Simon Watson

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Stranded Assets:

The proposed changes are severe and will directly threaten the viability of the current stock of glasshouses in New Zealand. This will result in many of them being closed and demolished because they will no longer be profitable (stranded assets).

This will lead to significant job losses and losses of local production.

Typically, a modern glasshouse installation has a productive lifespan of at least 25 years. The current stock of national glasshouses is mostly between 10 and 20 years old. **What the industry needs is a phase out period to allow glasshouses that are only halfway through their economic life to extract the full value of that investment. Ideally this might be by 2035, which would avoid the overnight destruction of this industry.**