



Services for our Sustainable Future

22nd February 2019

Energy Markets
Ministry of Business, Innovation and Employment
PO Box 1473
Wellington 6140

A submission to the Process Heat in New Zealand technical paper

Thank you for this opportunity to make a submission to the Process Heat in New Zealand project team about your “Opportunities and barriers to lowering emissions” technical paper.

As background, I have 40 years of practical chemical engineering experience in Process Heat and I have a proven track record in reducing carbon emissions through my New Zealand and my international work in process integration, demand response and more recently in smart grids looking at how to integrate Renewable Energy. I have worked for business and government. I have been on working groups for the Electricity Authority and the New Zealand Smart Grid Forum. I am now on the ARENA (Australian Renewable Energy Agency) expert advisory panel.

As part of my career, I have managed many project teams like the Fonterra energy team between 2001 and 2006 which achieved a step-changed reduction in carbon emissions (reaching 10% which was then the first corporate target) using predominantly improvements in Process Heat. Our project at Whareroa received an innovation award for the use of a stratified hot water energy storage to make steam and gas savings possible.

I will not go into the individual questions or clauses about the barriers in your report because these are all well known to us in the industry and they reflect a status quo position. It is more important to focus on where Process Heat fits into the professional world of process or chemical engineering. Our discipline underpins the knowledge and experience required to make progress in lowering carbon emissions.

International best practice

I am a Fellow of IChemE and have participated in the IChemE global Energy Centre work. We published in January an “Energy and Resource Efficiency Good Practice Guide” which is directly relevant to your project team’s work¹. New Zealand should recognise these international benchmarks because they will be part of climate change negotiations following COP24 as the rulebook for reporting emissions gets completed.

Does New Zealand comply with best practice now in the Process Heat world? and my answer would be sadly NO due to the lack of wider understanding.

¹ Members of IChemE can download this guide from <https://www.icheme.org/about-us/press-releases/new-guide-will-help-organisations-to-reduce-emissions-and-achieve-international-targets-says-icheme-energy-centre/>

Could New Zealand stand up and say that we are heading in the right direction through a transition to clean energy and my answer would be YES. To achieve this, Government should recognise the importance of chemical engineering principles and the knowledge we have built up over the decades with our experience in Process Integration.

The Opportunity is understanding the whole picture

A Process Heat transition to clean energy is a huge opportunity for New Zealand to build on what we started in the 1960's through to the mid-1990's and then we lost our way when we had surplus natural gas to exploit.

We have a proud history of using geothermal energy and biomass in the North Island and renewable electricity and bioenergy in the South Island in our process industries. We have achieved a number of world firsts in our process industries in New Zealand and these have been recognised by the IEA². I illustrated some of these achievements in my keynote address about climate planning to an international audience of chemical engineers in October³.

Building on the opportunity to increase our competitiveness through better use of Process Heat systems is strategically important for New Zealand. I had expected to see this brought out in your report because the title suggested both opportunities and barriers. I could not find insights into how your policy development is going to build on the **opportunities** for growth of the clean energy economy:

- 1) There is an urgent need for new jobs and careers for the professionals involved in the design of this transition. The process and system engineers of the future are not in the market at the moment with the right skills. There is a huge capability gap in this country and this has been highlighted by the Institute of Directors⁴.
- 2) How process improvements would set targets for less energy use and this would increase energy productivity and the sustainability of our primary processes especially in the dairy, meat and non-animal protein sectors in the future,
- 3) How Renewable Energy options should be integrated into our process development work to displace permanently fossil fuels⁵,
- 4) And lastly, how is innovation going to be encouraged in Process Heat to make New Zealand a leader once again.

Broadening your scope

My recommendation is that you broaden your scope to work towards the opportunities and then the barriers will sort themselves out as part of policy development to deliver meaningful carbon emission targets for each sector. A scope of work could follow the real world model being given attention and publicity now from the Rocky Mountain Institute⁶.

² IEA Insights Series 2017, Renewable Energy for Industry – from green energy to green materials, Cedric Philbert

³ Our Climate Planning Challenge, Stephen Drew, 2 October 2018, Chemeca18, Queenstown – presentation can be provided on request.

⁴ Board Room, Dec/Jan 2019 makes it very clear that climate change and lack of labour and capabilities are the top issues for Directors

⁵ This requires the use of process integration or pinch technology. We pioneered pinch analysis here in 1989 and it is only used still in academia. Our technology transfer has been very poor unlike countries like Switzerland and others in the IEA.

⁶ Quarterly Impact Statement – Rocky Mountain Institute, February 2019

THINK

Our thought leadership has to disrupt business-as-usual thinking with new models for the clean energy transformation.

For example, how should Renewable Energy projects with a much higher capital cost and very low operating cost be treated by business that still sets such artificially high hurdle rates for energy investment and their use of fossil fuels. Boards have to be disruptive in their thinking and be prepared to invest in new models. With technology changing so fast and accelerating, putting in place talent and experience for the future is vital to support this work over the next 5 years. This is seen as a business risk if it is not done.

DO

Demonstration projects provide valuable proof-points to make progress for the clean energy transition.

We have forgotten how important these Research, Development & **Demonstration** projects are to not only de-risk emerging process heating technology but to train and build new capability for the future. Labour quality and capability, especially in the area of process heating is a top business risk for this country. We train just a few chemical engineers each year and the good ones look for jobs here and if they are not available in clean energy will go to Australia where substantial investment is already being made thanks to businesses working with ARENA and State funding agencies. I focused on the importance of public funded demonstration projects in both of my submissions to the Productivity Commission's low emission economy work⁷.

SCALE

Spurring or encouraging competitive innovation and accelerating market adoption to scale is key to building a portfolio of emission reduction projects and achieving sustainable outcomes.

How many process plants in the dairy and meat sectors can we get off fossil fuel in the next 10 years. We did build our first all-electric and zero emission meat plants in the South Island almost 30 years ago. A geothermal dairy plant has recently been built in the North Island.

Again, scaling up from RD&D is what chemical engineers are trained to do.

Thank you for reading my submission and please do not hesitate to come back to me for any clarification.



Stephen Drew, FIChemE

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⁷ SRD Consulting made two submissions to the Productivity Commission – on 2 October 2017 and on 2 June 2018. They both focused on public funding of Demonstration projects especially in the Process Heat area.