HERA
innovation in metals

HERA submission: October 2017

Low-emissions economy: issues paper

In response to

NEW ZEALAND PRODUCTIVITY COMMISSION

HERA submission:

New Zealand productivity commission low-emissions economy: issues paper August 2017

Dr Wolfgang Scholz

HERA Director

Serving the New Zealand metal-based industry.

HERA creates value by being the stimulus for research, innovation and development – delivering a trusted national centre for design, manufacturing technology, inspection and quality assurance.

Our commitment to help our members stay one step ahead is strengthened by our vision to be the leading catalyst for metals innovation internationally.

Our specialists in heavy engineering research, industry development, training, advocacy and marketing allow us to partner with our members and clients across the globe – to create opportunity and lead bigger picture thinking.

Industry owned. Member driven. Future focused.

Contents

Cover: Organic Rankine Cycle (ORC) pilot plant designed and build as part of HERA's AGGAT research program by our member PFS Engineering for lower temperature geothermal and waste heat applications

Engaged in the path towards low-emissions

1. Executive summary

HERA, as the industry research association of the heavy metals-based fabrication and manufacturing industry, is primarily engaged in the path to a low-emission economy by assisting industry in developing opportunities for emission reductions across different emitting sources, technologies and processes.

On the one side this would lead to new business opportunities for our industry through new products and services with lower emission profiles.

On the other side in the energy for manufacturing space this would lead to a lower emission profile of our industry sector as an applicant of lower emission technologies.

This submission is limited to HERA's area of competency and comes up with the following summary recommendations:

In response to Question Q1 "how can the Commission add the most value in this inquiry" we support the points specifically made on "taking a longer term perspective and identifying policies and institutions that will be required to achieve a low emission economy that enhances productivity and wellbeing" and "bringing its expertise and understanding of innovation, and the development, adoption and diffusion of new technologies, in the New Zealand economy to this task".

Based on our industry's experience when it comes to the development of meaningful strategies for change, generally the potential of our technology based manufacturing industry is underrated and undervalued and hence lacking government support. The Commission, with its expertise, might be a valuable supporter of policies which drives business opportunities in low emission technologies and their application for the local industry.

Q10 "in addition to encouraging the use of electric vehicles, what are the main opportunities and barriers to reducing emission in transport" we would like to answer with:

- Great opportunities for New Zealand are seen in biogas, biofuels and hydrogen technology use
- Consider supporting innovative New Zealand developed transport solution SkyCabs due to its cost and environmental benefits but also export opportunity potential.
- Don't forget the opportunity to promote cycling and public transport as effective low cost emission reduction options with multiple benefits.
- Barriers are seen in the lack of appropriate risk assessment by current transport planners with reliance on proven established technology preferably from large corporations with perceived lower risk profile

Q11 "What are the main opportunities and barriers to reducing emissions from the use of fossil fuels to generate energy in manufacturing?" we would like to answer as follows:

- Solar energy and other low emission technologies such as from biofuels are technologically ready to replace fossil fuels; however the barrier of cost effectiveness in the face of ongoing low fossil-based energy cost without emission penalty remains.
- Significant untapped opportunities do exist in reducing energy needs through the transfer of waste heat into useful electrical energy via low temperature Organic Ranking Cycle (ORC) technology
- Significant untapped opportunities do exist in reducing energy needs through the transfer of waste heat into useful electrical energy via low temperature Organic Ranking Cycle (ORC) technology

Q12 "What changes will be required to New Zealand's regulatory, institutional and infrastructural arrangements for the electricity market to facilitate greater reliance on renewable sources of energy across the economy?" we would like to answer from first principle with the belief that any arrangements need to consider the macro-economic impact and not just a limited aspect such as the effect on electricity pricing.

We support the comment from Windflow CEO Geoff Henderson that these changes first of all need to have: "A durable carbon pricing mechanism that properly levels the playing field for zero-net emitters as opposed to the inherent subsidies that have been provided to hydro, fossil and geothermal power sources to date. This means the provision for an ETS that meets our international commitments domestically and further incentives not exceeding in total the amount required to ensure that one zero-net technology competes fairly against another zero-net technology."

And also "A competitive wholesale electricity market where there is proper competition to build the next increment of power generation, whether that be wind farms, geothermal power or rooftop solar. At the very least this requires a transparent price on the long-term value of hydro-storage. "

To answer question Q15: "What are the main opportunities and barriers to reducing emission in industrial processes (such as the production of steel, aluminium and cement) and in product use?" with focus on steel and aluminium production we would like to highlight the opportunity to build on the already existing low emission profiles of the New Zealand metals producers as compared to the rest of the world.

The described opportunities for emission improvements, such as through the unique iron-sand to iron smelting process as NZ Steel or the Lanzatech's or CarbonScape technology development and adoption, are only realisable if the New Zealand companies can continue to be world-wide competitive. And in this respect the main barriers are identified not in technology constraints but the NZ free trade environment not being fair to local producers:

- New Zealand privately owned manufacturers operating in a totally incentive-free environment having to compete on non-equal terms against suppliers which are largely government owned and supported by multiple incentive schemes
- Product conformance and adherence to other regulations such as H&S are followed to the letter and increase costs against non-compliant competitors.
- Any issues threating survival of our local companies based on unfair trade such as non-conforming products or dumping need immediate and effect corrective response
- Lack of targeted actions and difficulty accessing R&D support in order to maintain cost competiveness and a world leading carbon emission profile
- Lack of consideration of the benefits of low-emission steel in international trading

Q16 "What policies and initiatives would best promote the design and use of buildings that produce low greenhouse gas emission" we would like to answer with the general comment that the focus needs to be on the energy emission profile of buildings during their operation. Hence education, development of appropriate rating schemes and incentives around achieving best practice such as thermal insulation schemes or feed in tariffs for solar energy systems are the key.

When it comes to the embodied emission profile of products used in building and construction any policies and initiatives need to be based on scientific fact. The development and promotion of rating schemes based on Life Cycle Analyses (LCA) considering the product through all stages of its life is seen as the main opportunity and this may include the increased promotion of New Zealand manufacturers providing Environmental Product Declarations (EPD's).

Q18: "What are the most important interactions to consider for a transition to allow emission economy?" is a question too complex to be answered. In our view a dedicated research program is required which builds a New Zealand emission model in which this interlinkages can be effectively modelled. We believe that this is an excellent opportunity for international co-operation and New Zealand with its small size and the international co-operation in the agricultural emission sector could become a leader in this regard.

In response to Q22 "What type of support for innovation and technology would best help New Zealand transition to a low-emission economy?" our recommendations are:

- From the described failures of the largely SME based low emission initiatives such as Greenlane Biogas, Lanzatech, or Windflow, for New Zealand to capitalise from those R&D capabilities and the investments made it appears that we need to at least match the incentives provided by the overseas countries these companies emigrated to.
- Easily accessible and easy to manage R&D support preferable in the form of R&D tax credit.
- Renewable and low emission technologies need to be maintained as a priority in our contestable R&D grant schemes.

Answering Q25 "In addition to "core" climate policies and institutions, what other changes to policy setting or constitutional framework are required to effectively transition New Zealand to a low-emission economy?" we recommend the following:

- Enforce balanced Government procurement in respect to social, economic and environmental impacts.
- Develop a New Zealand-specific business case for procurement excellence via supportive research and case studies in the low emission technology space
- Develop the concept of lead-user innovation as part of the public sector procurement model.

Please note this submission does not include the view from the NZ steel making or aluminium smelting industry.

2. Introduction

HERA in co-operation with Metals NZ has in the past extensively consulted with our industry members on public sector and also sustainability policies [1].

From first principles our industry sector supports balanced decision making or triple bottom line policies aiming to achieve social, economic and environment impacts from a long-term sustainable local industry.

We also support New Zealand's free trade policy, however, within a framework of fair and equal trade, we believe in targeted investment in the transformation to a higher value, higher income and increased export oriented manufacturing industry in niche markets where we can be cost competitive and/or where we can successfully compete against imports.

With this fundamental position we broadly support New Zealand's role in achieving our Paris agreement obligations and our industry to lead in this regard with its own contribution.

For example all three policy scenarios as expressed in Vivideconomics Netzero in New Zealand report include the low cost emission reduction opportunities which our industry would contribute to and therefore we support this. However, on a side note, we do encourage the agricultural sector to play its part in achieving our New Zealand reduction targets and potentially our industry has a role to play assisting this sector achieving its targets through delivering of products and services in novel niche market technologies. We also see us play a role when it comes to carbon sequestration technology as this likely will require extensive involvement of our heavy fabrication industry in larger scale industrial applications.

In particular we support the strategies as outlined in the ECCA "unlocking our energy productivity and renewable energy potential" document developed as part of the NZ Energy Efficiency and Conservation Strategy 2017 – 2022. In this strategy our industry responds especially to the priority area "renewable and efficient use of process heat" but could also play a role in the other two areas" efficient and low –emission transport" and "innovative and efficient use of electricity".

Q1 Particularly in response to the Question "how can the Commission add the most value in this inquiry" we support specifically the points made on "taking a longer term perspective and identifying policies and institutions that will be required to achieve a low emission economy that enhances productivity and wellbeing" and "bringing its expertise and understanding of innovation, and the development, adoption and diffusion of new technologies, in the New Zealand economy to this task".

Based on our industry's experience when it comes to the development of meaningful strategies for change, generally the potential of our technology based manufacturing industry is underrated and undervalued and hence lack government support. The Commission with its expertise might be a valuable supporter of policies which drive business opportunities in low emission technologies and their application for the local industry.

3. Low emission business opportunities for NZ manufacturing industry

3.1 Transport – other than electric vehicles options

3.1.1 Biogas

The listed strategy to use biofuels and biogas as a substitute for petrol and diesel is considered an applicable technology for New Zealand to support. For example the leading biogas technology developed by HERA member company Greenlane Biogas and which sold in 2014 for NZ$25 million to a UK investor, had technology successfully trailed and used in New Zealand for the supply of converted diesel trucks on biofuels and exported this technology successful to countries such as Sweden. A more successful application of this technology in New Zealand failed due to the rapid fall in diesel cost after the GFC and the lack of government incentives to compensate for this.

The technology continues to be successfully applied in incentive driven countries such as Europe. UK based Green Biogas has now installed over 100 plants and we argue that with the right incentives in the form of R&D and user focused low emission technology incentives, this company would have stayed in New Zealand.

Biogas options from waste remain viable options particularly for bus fleets and locally operating heavy transport fleets filled by local base stations, however to succeed this needs a realistic diesel price which takes account of its carbon emissions or government incentives which correct this.

3.1.2 Biofuels

As demonstrated first by Gull and now by Z-Energy biofuels for cars must be an economic option in New Zealand as in the absence of incentives these privately owned companies would not do this without the appropriate returns.

However, to really drive this consumption and hence local production up, this needs to have in our view some incentive to encourage investment in a suitable fleet of vehicles.

Another example of a leading technology development lost to NZ research and manufacturing industry is Lanzatech which developed the production of ethanol from the flue stacks of the steel making process. This biofuel opportunity is discussed under more detail under the section on reducing emissions from steel making. Again our view is that appropriate government incentives in this case firstly relating to supporting R&D funding could have kept this development in New Zealand

3.1.3 Hydrogen

In our view the most significant opportunity towards low emission transport apart from electric vehicles lie in hydrogen fuel cell vehicles particularly for heavier vehicles and longer distance transport. This option now also includes a market ready version for trains as shown by the Alstom hydrogen train operating in Germany (https://www.theverge.com/2016/9/23/13022400/hydrogen-train-germany-coradia-ilint-alstom-innotrans). This train option must be attractive for New Zealand as it would allow an extension of Wellington and Auckland train network extensions without the costly electrification of the existing lines.

The hydrogen option is particularly attractive for New Zealand due to the capability of hydrogen to be produced from renewable energy in off peak times. This could also be a driver for potential surplus

renewable energy being able to be exported as was discussed at the time of potentially considering closing down the NZ aluminium smelter in Bluff and produce hydrogen from the exiting electrical infrastructure and exporting it by ship to the leading hydrogen vehicle nation Japan.

As with biogas the current price of diesel rather than technical barriers are slowing down the introduction of hydrogen fuel cell technology and with-out incentives or a diesel cost adjustment this technology application will be stifled.

3.1.4 Innovative public transport options

Getting rid of grid lock in our cities through more people using public transport no doubt will not only make a major contribution to the productiveness of New Zealand but will also lead to a lower emission profile.

- The unique and New Zealand developed SkyCabs which provides a cost competitive and environmentally friendly solution (see www.skycabs.co.nz). Assisting this widely patented technology to come alive first in New Zealand would offer a massive business opportunity and great export potential
- An effective network of cycling paths with multiple benefits including health and reduced health cost and an effective interlinking with public transport options

Q10 "in addition to encouraging the use of electric vehicles, what are the main opportunities and barriers to reducing emission in transport" we would like to answer with:

- Great opportunities for New Zealand are seen in biogas, biofuels and hydrogen technology use
- Consider supporting innovative New Zealand developed transport solution SkyCabs not only for its cost and environmental benefits but also export opportunity potential.
- Don't forget the opportunity to promote cycling and public transport as effective low cost emission reduction options with multiple benefits.
- Barriers are seen in the lack of appropriate risk assessment by current transport planners with reliance on proven established technology preferably from large corporation with perceived lower risk profile

3.2 Energy for manufacturing

We fully agree that the 11% of our GHG emission from using fossil fuel in manufacturing can be reduced substantially. We particularly endorse the pathways suggested in the ECCA strategy document for process heat and believe the target of an industrial emission intensity of 1% per annum is realistic if the appropriate priorities are set.

We also accept that there are limitations as to workable alternatives for example when very high processing temperatures are being needed and temperatures achieved via electric means are insufficient. However these high processing temperatures are usually associated with the generation of waste heat and it is especially in this waste heat area HERA sees substantial opportunities for New Zealand via the use of Organic Rankin Cycle (ORC) technology.

ORC works similar to the steam cycle to generate electrical energy; however unlike water the organic fluids used flash into steam at a lower temperature and hence provide an opportunity to create electric energy at lower temperatures than water. The technology is reaching maturity and can also be used to generate electricity from renewable resources such as lower temperature geothermal resources providing generation options for smaller scale electricity generation. However the break-even point in terms of cost effectiveness is not reached under current fossil fuel prices and either incentives or true commitment to emission reductions and triple bottom line criteria is needed to make it successful on a larger scale.

Q11 "What are the main opportunities and barriers to reducing emissions from the use of fossil fuels to generate energy in manufacturing?" we would like to answer as follows:

- Solar energy and other low emission technologies such as from biofuels are technologically ready to replace fossil fuels; however the barrier of cost effectiveness in the face of ongoing low fossil-based energy cost without emission penalty remains.
- Significant untapped opportunities do exist in reducing energy needs through the transfer of waste heat into useful electrical energy via low temperature Organic Ranking Cycle (ORC) technology

3.3 Electricity generation

As shown in Figure 13 of your issues paper, Geothermal and Wind are the renewable large scale growth prospects and we would add photovoltaic energy which is becoming increasingly on-stream through small scale private installers' additions. The fact that these increases were achieved on the basis these technologies becoming price competitive requires noting.

HERA would like to make two comments one on geothermal including its cascaded use and the other one on wind energy particularly in respect to New Zealand wind turbine builder Windflow.

3.3.1 Geothermal energy

HERA understands that there is more consented geothermal capacity existing in New Zealand, but the easy to realise large scale and more cost effective resources have been developed and what remains are the smaller scale and largely Maori owned resources. HERA prepared a comprehensive business cases for smaller scale geothermal and other cascaded use which provides viable pathways technology wise and could find wide application.

However based on the cost of electricity alone these applications are borderline and other factors in the triple bottom line context such as regional job opportunities may have to be considered to make this a realistic contribution to lower emissions.

3.3.2 Windflow

New Zealand company Windflow developed and proved the rugged two-bladed technology but market conditions had been unfavourable for them to proceed and the company is now remaining a going concern.

According to their CEO the New Zealand market was unfavourable because of the ample supply of power and weak prices for carbon in the global emissions trading markets. Windflow had reduced its UK activity to maintaining eight turbines in Scotland where it owned six of them. UK government policy had moved away from supporting wind power.

We understand that there remains to be a niche market for the Windflow turbine due to its unique design for grid stabilisation, rugged environments and being of smaller niche market scale.

Windflow CEO Geoff Henderson's answer in respect to "what is required for the electricity market to facilitate greater reliance on renewable energy?" (Q12) is: "A durable carbon pricing mechanism that properly levels the playing field for zero-net emitters as opposed to the inherent subsidies that have been provided to fossil and geothermal power sources to date. This means an ETS that meets our international commitments domestically (i.e. without buying hot-air credits) and further incentives, not exceeding in total the amount required to ensure zero-net competes against zero-net, but at least sufficient to ensure wind power (being zero-net and a huge resource) is preferred to geothermal which is a significant emitter of CO2 and a relative dead-end technology due to its small resource."

"A competitive wholesale electricity market where there is proper competition to build the next increment of power generation, whether that be wind farms, geothermal power or rooftop solar. At the very least this requires a transparent price on the long-term value of hydro-storage. At the moment there is a Claytons market, which only "discovers" the short-term value of hydro lake levels, has no depth of long-term hedging available, and the only players which can prosper are vertically integrated gentailers with hydro storage (paid for by taxpayers, but now privatised and opaquely priced). For example, is it fair that Meridian can build a wind farm using foreign turbines which everyone knows costs 10-12 c/kWh, but they can internally hedge against their retail positions and hydro-ownership, while NZ Windfarms does the patriotic thing and buys NZ-made turbines, but gets only 5 c/kWh because it is a pure generator? Does it make sense for gentailers to install 100-200 MW at a time when that inherently is too large for NZ to absorb if more than one player does so (as required to achieve macro-economically desirable competition in the generation market)."

In respect to Q12, HERA's position supports what Geoff Henderson is saying and that from first principle any NZ regulations need to consider the macro-economic impact of the regulation made and not just a limited aspect such as the effect on electricity pricing.

3.4 Industrial processes and products

It is acknowledge the metals production processes are high emission processes, however it also needs to be noted that due to its recyclability its emission profile improves over repeated recycling and re-use.

New Zealand metals manufacturers are members of the international convention for emission reduction and both NZ Steel and the NZAS are using electricity from largely renewable resources. Given the fact the NZ Steel iron making process from iron sand is on the leading edge when it comes to emissions, we believe that New Zealand should be growing its steel making contribution and focus its effort on reducing the world wide emission profile as a responsible and sustainable metals producing nation.

Examples of New Zealand world lead technologies to improve the emission profile of steel making process are Lanzatech and just emerging CarbonScape.

3.4.1 Lanzatech

As noted under biofuels New Zealand research company Lanzatech pioneered technology which converts steel making emissions into ethanol and in the process reducing steel makings emission profile. However Lanzatech has left New Zealand due to improved research grants overseas and the technology pioneered at New Zealand steel is now researched further in America with large scale pilot applications in China (see HERA review of this development on)

3.4.2 CarbonScape

CarbonScape Limited is a company based in Marlborough and has developed a world leading, globally patented technology that converts saw dust, forestry waste, coconut shells and other carbonaceous biomass into high value carbon products such as biochar, green coke, activated carbon and graphite. It is co-operating with NZ Steel to trial if their green coke is able to replace coal as a renewable alternative to fossil coking coal.

CarbonScape intends deploying its technology widely to create a virtuous circle of benefits for the people of New Zealand and the world, the environment and all their investors but they still have a long way to go.

While the above examples show the potential of leading low emission technology from New Zealand, they also highlight the difficulty of those industries to access R&D support.

We understand that even large companies such as e.g. NZ Steel due to its low R&D spend to GDP ratio finds it hard to access government R&D support via its grant schemes and more needs to be done to facilitate access.

However, the current main challenges to our local metals manufacturing companies being successful are coming from the free market not being fair and equal. For example as widely reported due to overcapacities in steel making, the price of steel has dropped to values were it is hard for privately owned companies to make sufficient profit to survive and indeed invest in innovative technologies. Claims of steel being dumped into the New Zealand market have been made and registered with the Commerce Commission.

This leaves the territory of survival of the fittest to the ones which are not the best in terms of emission profiles and cost but the ones who are enjoying the best support from government which like in China is the majority owners of the steel mills.

Therefore HERA advocates for fair and equal policies in our free trade environment which assist otherwise competitive and innovative companies to survive. This includes support for a level playing field when it comes to balanced decision making in government procurement, the responsive reaction to dumping claims, the rigid enforcement of product conformance requirements and promotional activities which support local technology development and associated job creation.

To answer Q15: "What are the main opportunities and barriers to reducing emission in industrial processes (such as the production of steel, aluminium and cement) and in product use?" With focus on steel and aluminium production we need to build on the already existing low emission profiles of the New Zealand metals producers as compared to the rest of the world.

The described opportunities for emission improvements, such as through the unique iron-sand to iron smelting process as NZ Steel or the Lanzatech's or CarbonScape technology development and adoption, are only realisable if the New Zealand companies can continue to be competitive world-wide. And in this respect the main barriers are identified not in technology constraints but the NZ free trade environment not being fair to local producers:

- New Zealand privately owned manufacturers operating in a totally incentive-free environment having to compete on non-equal terms against suppliers which are largely government owned and supported by multiple incentive schemes
- Product conformance and adherence to other regulations such as H&S are followed to the letter and increase cost against non-compliant competitors.
- Any issues threatening survival of our local companies based on unfair trade such as non-conforming products or dumping need immediate and effect corrective response
- Lack of targeted actions and difficulty accessing R&D support in order to maintain cost competiveness and a world leading carbon emission profile
- Lack of consideration of the benefits of low-emission steel in international trading

3.5 Buildings and construction

As an industry we support the design and building of energy efficient building in terms of energy used during operation as this is the key contributor to low emissions.

When it comes to the embodied carbon footprint of buildings and constructions the overall emission reduction opportunity is much lower and needs to be well understood as market driven emotional and non-scientific approaches can blur the focus on what can be achieved.

In general we agree with the Royal Society proposal that education on low emission is the key to achieving improvements. However focus has also been put on the development of appropriate rating tools to more accurately measure performance and contribution to lower emissions. Additionally of course incentives such as thermal insulation schemes or feed in tariffs for solar energy systems will greatly influence uptake.

When it comes to embodied energy and associated carbon footprint the application of Life Cycle Assessments (LCA) principles over the whole life of a product including its reuse, recycling or landfill option is in our view the appropriate pathway to describe environmental product performance. Encouraging companies to improve their performance e.g. by issuing Environment Product Declarations (EPD) to internationally acceptable standards is one great opportunity for ongoing improvement.

Q16 "What policies and initiatives would best promote the design and use of buildings that produce low greenhouse gas emission" we wish to answer with the general comment that the focus needs to be on the energy emission profile of buildings during its operation and here education, the development of appropriate rating schemes and incentives around achieving best practice such as thermal insulation schemes or feed in tariffs for solar energy systems are the key.

When it comes to the embodied emission profile of products used in building and construction, any policies and initiatives need to be based on scientific fact. The development and promotion of rating schemes based on Life Cycle Analyses (LCA) considering the product through all stages of its life is seen as the main opportunity and this may include the increased promotion of New Zealand manufacturers providing Environmental Product Declarations (EPD's).

3.6 Cross-cutting Issues

We fully agree on the chapter of cross cutting issues and acknowledge the complexity of the interlinkages.

Q18: "What are the most important interactions to consider for a transition to allow emission economy?" is a question too complex to be answered. In our view a dedicated research program is required which builds a New Zealand emission model in which these interlinkages can be effectively modelled. We believe that this is an excellent opportunity for international co-operation and New Zealand with its small size and the international co-operation in the agricultural emission sector could become a leader in this regard.

4. Policies and institutions

4.1. Support for innovation and technology

Based on our own experience and in the context of New Zealand developed technology to produce low emission energy from waste and geothermal energy it is worth noting HERA led the development of a local industry group under the AGGAT (Above Ground Geothermal and Allied Technology) umbrella and received government R&D co-funding at a time when there was a specific renewable energy topic earmarked in the governments RFP. The project advanced the development of niche market application for ORC technology and identified application opportunities with a number of large scale energy users such as in steel, methanol, or energy from waste options which proofed the application potential.

Although the program was planned and notified to be longer term the project did not achieve project extension in the competitive government R&D funding environment due to the specific renewable energy preference being dropped and science excellence being put ahead of the likely high impact element of the AGGAT proposal. HERA and a Maori trust partner also failed in the regional research institute round with the main argument being that long term funding from the industry may be insecure.

Current HERA position is to try to sell off as much of the gained New Zealand developed ORC IP in the AGGAT program but continue to promote the technology application based on imported ORC equipment. However our HERA conclusion remains that with the right foresight and the will to prioritise renewable energy by government New Zealand as a whole and its manufacturing industry would have a great opportunity being a fast follower and lead in this technology application with niche market export potential in both waste and geothermal energy.

In the wider context HERA advocates for the Sir Paul Callaghan policies that we need to "Get off the Grass" [2] and invest in targeted high-value and higher wage paying industries with good export potential and the described New Zealand developed low emission technologies fall into these categories.

In our view, the only way to get there is via targeted innovation policies applicable to wide industry cross sectors. While we appreciate that the current government is consistently adjusting its R&D spend, the effect on leveraging wide-spread business R&D spending has been limited. In particular, feedback from our membership is that they find it enormously challenging accessing funds from the current mechanism of the Government's R&D grant schemes.

We continue to argue, having easy to access and manage incentives in place for those willing to invest in innovation is the most effective way to create larger scale industry transformation. So rather than provide tax reduction for anyone - individual or business - channelling funds through tax credits into R&D based innovation is our logical conclusion to markedly boost the economy. Offering incentivised opportunities to investors to operate in the low emission technology space provides the additional pull to be investing in the future of the planet and do the right thing as opposed to invest in socially less acceptable options.

In response to Q22 "What type of support for innovation and technology would best help New Zealand transition to a low-emission economy?" our recommendations are:

- From the described failures of the largely SME based low emission initiatives, for New Zealand to capitalise from those R&D capabilities and the made investments it appears that we need to at least match the incentives provided by the overseas countries these companies emigrated to.
- We require easy accessible and easy to manage R&D support in our view preferable in the form of R&D tax credit.
- Renewable and low emission technologies need to be maintained as a priority in our contestable R&D grant schemes.

4.2. Complimentary policies and institution's

HERA works mainly with local manufactures and the public sector represented by local and central government is their single largest client by far. But Government is also able to influence State Owned Enterprise (SOE) procurement policy and the current shift to a mixed private public ownership model through the partial sales process is an opportunity to embed policy in the Mix Ownership Model Bill and/or an amended SOE Act.

Therefore government procurement is a key to business and innovation and we would like to refer to the Metals NZ/HERA Policy Position document in this regard.

Answering **Q25** "In addition to "core" climate policies and institutions, what other changes to policy setting or constitutional framework are required to effectively transition New Zealand to a low-emission economy?" we recommend the following:

- Enforce balanced Government procurement in respect to social, economic and environmental impacts.
- Develop the New Zealand-specific business case for procurement excellence via supportive research and case studies in the low emission technology space
- Develop the concept of lead-user innovation as part of the public sector procurement model.

References

[1] "Position on Public Policy 2015; Metals New Zealand 2015," [Online]. Available: http://www.metals.org.nz/Category?Action=View&Category_id=903

[2] "Paul Callaghan and Shaun Hendy; Get off the Grass: Kick-starting New Zealand's Innovation Economy, Auckland University Press 2013," [Online]. Available: http://www.press.auckland.ac.nz/en/browse-books/all-books/books-2013/Get-off-the-Grass-Kickstarting-New-Zealands-Innovation-Economy.html

Our structure and role

We're an industry-owned and industry-governed research association representing the heavier gauge metals industry of New Zealand, encompassing approximately 600 member companies. Roughly one-third of our funding comes from an industry contribution via a levy on heavy steel and welding consumables, one-third from membership fees and self-generated income while the remaining one-third traditionally comes from contestable government grants.

Since our establishment in 1978 we have maintained a consistent presence supporting industries' research and development needs, resulting in a substantial contribution to the development of the NZ metals industry. One of our more significant achievements is the development of cost effective earthquake resisting structural steel systems leading to the growth of structural steel in the multi-storey building sector from a minimal market share in the 1980's to over 50% today. These systems have been implemented into the NZ construction regulatory system and demonstrated excellent performance in the recent Canterbury and Kaikoura earthquakes.

We represent two sectors of the metals industry. The steel material based construction industry sector which is unified behind a focused sector research strategy driven by us, and the wider heavy engineering and metals manufacturing industry characterised by very diverse individual company interests which make having a joint industry development strategy rather challenging. It is principally this second group that contains the high value niche manufacturing sector that this submission is concerned with.

HERA House, 17-19 Gladding Place
PO Box 76-134 Manukau, Auckland 2241
New Zealand

www.hera.org.nz