Response to MBIE Consultation "Accelerating renewable energy and energy efficiency"

Infratec Ltd.

FEBRUARY 2020

Table of Contents

1 Introduction

This document summarises Infratec's response to the consultation "Accelerating renewable energy and energy efficiency" which was launched by The Ministry of Business, Innovation and Employment (MBIE) on 19th December 2019.

It is our understanding that the consultation is evaluating two objectives:

1. Encouraging energy efficiency and the uptake of renewable fuels in industry,
2. Accelerating renewable electricity generation and infrastructure.

Although our primary experience relates to the acceleration of renewable energy generation and infrastructure at a national and community level, we have also provided commentary on energy efficiency measures as appropriate and reflecting on our experience.

This is an exciting time for the New Zealand energy sector. Wind and solar are poised to have a growing role in supply but their deployment needs support in order to accelerate New Zealand's decarbonisation agenda. As such, we hope our response can help accelerate decarbonisation of multiple energy vectors, improve community reliance and reduce electricity prices.

The key messages of our response are as follows:

- It is essential to grow renewable energy resources to provide the electricity needed to decarbonise process heat and transport in New Zealand.
- In the right policy environment, low carbon energy sources are now placed to reduce energy bills, improve diversity of supply and reduce the impact of dry years in the New Zealand electricity sector. Utility scale solar and wind energy are less likely to be rapidly deployed in New Zealand without policy support.
- Solar and wind projects are high-capital investments with long operating lives (>25 years) and low operating costs - therefore needing special financial mechanisms to attract low risk, low premium investors.
- Revenue security and reducing financing will result from long term, low risk contracts. This is essential to bring the cost of generated electricity ($/MWh) from solar PV (and other renewables) to levels that are competitive with historical New Zealand grid prices.
    - We have provided evidence to show the impact that long-term, low-risk contracts can have on generation pricing based on bespoke modelling for this study as well as international examples.
- As outlined in our response to Q8.6, and specifically Figure 1, it is our view that PPAs would immediately accelerate and encourage investment in renewable generation in New Zealand. Our evidence clearly shows that the impact of PPAs is stronger than waiting for future cost down or technology improvements.
- Renewable technologies, particularly onshore wind and solar photovoltaics, are at a high technology readiness level. As such, savings associated with technology improvement or manufacturing are unlikely to improve delivered costs of energy as rapidly as the policy mechanisms that we have recommended in our response.

- Policy support should be provided now as it is counterproductive to wait for technology costs to come down:
    A. Well-designed policy mechanisms can have a disproportionate impact on the cost of electricity generation from renewable sources (as outlined in our response to Q8.6)
    B. Solar/wind can reduce the supply shortages driving dry winter problems and periods of high pricing in New Zealand
    C. We believe that renewable energy can accelerate New Zealand to a 100% low carbon electricity supply – even in a dry hydrological year.

Further, we have made a number of recommendations on how policy options (specifically Option C) might be designed to accelerate a sustainable, efficient and NZ-focussed renewable industry. This includes how policy for renewables support can and should be designed to:

- Promote a sustainable, pro-jobs renewable energy industry for New Zealand.
- Stimulate investment in community energy and ensure local benefits from energy.
- Stimulate wider benefits in how major users might naturally choose to offset their emissions.
- Reduce the severity of price rises in dry years by increasing capacity of other renewable energy sources, increasing energy resilience through diversification of supply

Our response document is structured to mirror the specific questions in the consultation, which are answered sequentially. Within the constraints of commercial confidentiality, we have sought to evidence our responses as much as possible. We would welcome the opportunity to present our findings to the investigative panel if this is felt to be beneficial.

Please direct enquires to:

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1.1 About Infratec

Infratec designs and builds low carbon energy systems as well as conducting consultation activities on batteries, solar and low carbon networks in New Zealand, The Pacific and Indonesia. The company has grown from a two-person company in 2015 to one which today employs over 23 people across New Zealand and The Pacific.

We have delivered or are delivering solar farms, battery storage and/or electricity networks in New Zealand, The Cook Islands, Palau, Nauru, Micronesia, The Marshall Islands, Tuvalu, The Solomon Islands and Indonesia. This list includes some of the largest solar projects in The Pacific and one of the first batteries to provide grid support in New Zealand.

We have a strong reputation for capacity building and consulting, which is based on delivery and development of real projects. These projects include consulting work for alternative network solutions for Transpower in New Zealand, thought leadership in low carbon energy and capacity building work through the NZMATES programme in Indonesia. Our clients range from utilities and Governments, to Donors and private companies, and have included MFAT, The World Bank, The Asian Development Bank and The European Union. All of our projects have a specific focus on engaging local communities and building their capability so they can operate and maintain the renewable assets once we complete the project, which is a key contributor to the long-term sustainability of renewable energy projects in the Pacific.

Our reputation for delivering quality energy infrastructure and providing community outreach saw us named the global operator of the year at the prestigious Champion Canterbury Business Awards in 2016; Best Community Project at the Sustainable Energy Association of NZ (SEANZ) conference in 2018; Best Grid-Connected Renewable System at SEANZ 2019 and finalist for the Inspiring Preference for New Zealand Award at the New Zealand International Business Awards in 2018.

Our Vision

We believe that New Zealand can be a 100% low carbon economy with all electricity sourced from low carbon sources – even in a dry hydrological year. We believe that this can be done in a way which is good for the economy, energy poverty and the environment.

Other notes

Company Structure: Limited Liability Company

Company Number: 9429030588752

Main Office: Pencarrow House, 58-66 Jervois Quay, Wellington

1.2 Other work

Infratec employees are also involved in a number of areas which align with the objectives of this consultation. As such, our responses reflect our experience in the following areas:

- Development of national standard calculations for energy saving and carbon reduction from domestic solar and energy storage in the UK
- Development of community energy projects to achieve energy saving, community project funding, resilience and renewable energy deployment objectives.
- Projection of national energy policy and decarbonisation scenarios through books, research and academic publications

2 Part A: Encouraging Energy Efficiency and the uptake of renewable fuels in industry

2.1 Section 1: Addressing information failures

2.1.1 *Q1.1 Do you support the proposal in whole or in part to require large energy users to report their emissions and energy use annually publish Corporate Energy Transition Plans and conduct energy audits every four years? Why?*

We support the proposal for energy users to report their emissions and energy use as well as transition plans. In addition, we feel that it should be possible to offset some of those emissions through investing in renewable energy (particularly community energy) as outlined in our response to Q8.22.

2.2 Section 2: Developing markets for bioenergy and direct geothermal use

No comments

2.3 Section 3: Innovating and building capacity

2.3.1 *Q3.1 Do you agree that de-risking and diffusing commercially viable low-emission technology should be a focus of government support on process heat? Is EECA grant funding to support technology diffusion the best vehicle for this?*

We agree that decarbonisation of process heat should be one of the priority areas for Government (alongside grid scale renewables) through a combination of electrification, biomass and biogas where appropriate.

We note that there may be a focus on electrification of process heat in line with decarbonisation by some organisations. This requires additional electricity generation which needs to be met by renewable generators.

Electrification can sometimes place an increased strain on electricity networks, particularly in rural areas. However, this is not always the case[1]. Infratec has been involved in a number of consultation exercises which showed value in electrical energy storage to boost network capacity AND/OR to support new renewable energy at reduced costs. We have also seen an instance where a viable economic case for a battery could be made by combining uses for an energy facility as well as grant funding to support local objectives.

Based on our experience, we believe that this remit should include the following:

- Support for technologies which can reduce the costs of electricity distribution – particularly where these can be shown to enable wider decarbonisation efforts in process heat (see response to Q8.13).
- Strengthening reporting requirements around the consideration of alternative network technologies in networks when considering process heat alternatives (see our response to Q11.4). This also applies to supporting local economic growth or electrification of vehicles.
- Regulatory incentives/mechanisms to encourage network innovation – including consultation of the following mechanisms:
    - Establishing a low carbon network fund for innovation projects (e.g. https://www.ofgem.gov.uk/electricity/distribution-networks/network-innovation/low-carbon-networks-fund) which could be paid for under the existing EA levy
    - Evaluation of applying the RIIO framework in New Zealand for encouraging innovation within lines companies - https://www.ofgem.gov.uk/system/files/docs/2018/07/riio-2_july_decision_document_final_300718.pdf
    - Forcing lines companies to disclose the cost/benefit of non-network solutions on all investments they make in their network which have a value of over $500,000. More details on this are outlined in our response to Q11.4.

[1] For example, academic research in the UK found that domestic solar panels only caused cost impacts on <10% of all LV networks. CROSSLAND, ANDREW FREDERICK (2014). Application of stochastic and evolutionary methods to plan for the installation of energy storage in voltage constrained LV networks. Doctoral thesis, Durham University.

We would also suggest that a consultation exercise commissioned by MBIE or EECA could be commissioned to answer the following questions on battery storage for networks:

- Can battery storage reduce network costs in New Zealand like it has in other markets?
- Is this isolated to a few example sites or widespread?
- Are lines companies properly investigating alternatives to traditional network reinforcement and does this apply unilaterally across the industry?
- Under what circumstances are batteries beneficial to networks?

Can these batteries be used to provide community benefits such as assisting local solar or wind projects AND providing resilience?

2.3.2 Q3.2 - For manufacturers and energy service experts: would peer learning and on-site technology demonstration visits lead to reducing perceived technology risks? Is there a role for the Government in facilitating this?

It is our understanding that this question relates to process heat. However, for context, we would like to highlight the following with respect to technologies which may support process heat electrification. Infratec constructs solar and battery storage technologies which are widely applied elsewhere and which are at an advanced level of technology readiness. Enough solar has been installed worldwide to meet all of New Zealand's annual electricity demand 16 times over. Battery energy storage is a growing, multibillion-dollar industry around the world. The New Zealand context does not present particularly unique technology challenges in our sector. Government support for the sector would help reduce any perceived and misguided technology risks, although we would not view that as a responsibility of Government in this case. As such, we would highlight our view that that the most effective and impactful way for Government to support bringing large scale, community-focused solar generation prices to grid parity is through backing PPAs.

Any perceived challenge relates to deployment within New Zealand rather than internationally. As such, we feel that Government backing for projects may be more valuable than technology demonstrations.

2.4 Section 4: Phasing out fossil fuels in process heat

2.4.1 Q4.1 - Do you agree with the proposal to ban new coal-fired boilers for low and medium temperature requirements?

We strongly agree with the principle of removing coal fired boilers in low and medium temperature applications because it sends strong signals to the market that change must occur and sets timeframes for it to occur.

However, we feel that this must be combined with support for alternatives in order to mitigate the risk of unintended consequences. It is our belief that low carbon alternatives should provide opportunities for businesses to be more competitive and improve environmental sustainability. As such, we feel this ban has to be combined with support for alternatives. Suggested support for alternatives is outlined in our other responses.

2.4.2 Q4.2 - Do you agree with the proposal to require existing coal-fired process heat equipment for end-use temperature requirements below 100 degrees Celsius to be phased out by 2030? Is this ambitious or is it not doing enough?

Please see response to Q4.1.

2.5 Section 5: Boosting investment in energy efficiency and renewable energy technologies

2.5.1 *Q5.3 In your view what is a bigger barrier to investment in clean energy technologies, internal competition for capital or access to capital?*

New Zealand is arguably a world leader in community and low carbon energy projects with a dominant and growing role in The Pacific and South East Asia. Growth in the New Zealand solar market may lead to an increase in internal competition, but that should happen naturally.

We therefore strongly feel that the biggest barrier to investment is a market designed to attract investors seeking lower returns (via offering lower risk contracts to market). This is because low carbon projects are typically high in capital with low operating costs and long productive lives (>25years). As such, if there is revenue security, investors can access lower capital and specifically need lower returns.

Access to low-cost capital through secure, long-term PPAs can halve the price for solar electricity generation in New Zealand. This would have a much faster/harder impact than reduction in PV module prices are likely to have in the short or medium term. Long-term PPAs can bring the capital to bring solar below wholesale prices. This is outlined in detail in our response to Q8.4 and is core to our response.

2.6 Section 6: Cost recovery mechanisms

Option 6.1 Introduce a levy on consumers of coal to fund process heat activities

2.6.1 *Q6.1 What is your view on whether cost recovery mechanisms should be adopted to fund policy proposals in Part A of this document?*

In principle, we would support a levy on coal particularly as we feel it is important to reflect the cost of carbon in the fuels that we use in creating economic drivers for a cleaner energy system. There are open questions on whether the levy is best placed on the consumer of the coal, or the producer of the coal. In general, the earlier up the food chain a levy is applied the better, in order to cover all embedded uses. Questions also arise around how the levy would interact with the ETS and whether it would represent a duplication.

We would also caution that, in other nations, particularly the UK, the decline of local coal production (and other mining activities) has led to acute poverty in former mining areas. This must be avoided in New Zealand. As such, we would strongly urge that money levied on coal production is used to support energy and economic diversification projects in areas most affected by a decline in New Zealand coal production.

In particular, we feel that this should support:

- Community energy projects – including energy efficiency, community electricity generation, resilience and decarbonisation of heat.
- Economic development and diversification such as supporting energy businesses in these areas.

Aside

We would also note that the embedded carbon in the manufacture and construction of solar and wind plants are often cited in literature. The median value of energy sources are reported by the Intergovernmental Panel on Climate Change[2] as follows:

- Wind/Solar - 11-48 $gCO_{2\text{-}e}$/kWh
- Coal - 820 $gCO_{2\text{-}e}$/kWh for coal electricity generation
- Gas - 490 $gCO_{2\text{-}e}$/kWh for gas electricity generation
- Geothermal - 6-79 $gCO_{2\text{-}e}$/kWh
- Biomass - 230 $gCO_{2\text{-}e}$/kWh.

I.e. wind and solar are very low carbon in comparison to fossil fuel plants.

We also highlight that these are old estimates for solar/wind and we expect that significant reductions have been seen since publication of this figure due to increased use of renewable energy in manufacturing facilities and also improved efficiency of solar modules.

[2] https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-iii.pdf

I.e. we see a carbon levy being impactful on diversification from coal and gas as well as ensuring carbon impacts of these are properly reflected in the use of fossil fuels.

2.6.2 Q6.2 What are the advantages and disadvantages of introducing a levy on consumers of coal to fund process heat activities?

No further comment in addition to our responses to Q6.1

3 Part B: Accelerating renewable electricity generation and infrastructure

3.1 Section 7: Enabling development of renewable energy under the Resource Management Act 1991

3.1.1 *Q7.8 What specific policies could be included in the NPSREG for small-scale renewable energy projects?*

Please see response to Q7.9

3.1.2 *Q7.9 The NPSREG currently does not provide any definition or threshold for "small and community-scale renewable electricity generation activities". Do you have any view on the definition or threshold for these activities?*

For solar PV generation, we would make note of the following:

- Solar can be deployed on farmland with animal grazing/productive agricultural use on the same land parcel. Such a strategy is common in other parts of the world and has clear benefits to farmers in diversifying income and supporting rural power networks. As such, it is worthwhile to assess if there are restrictions to co-location of solar assets on farmland (for combined agricultural – e.g. sheep grazing – and solar generation usage). This might be something to consider with the New Zealand farming community as a combined study considering possible solutions. More details are provided in our response to Q7.19.
- We see few reasons to place constraints on solar PV systems installed on existing rooftops I.e. rooftop PV should be exempt from planning other than where the roof is of historical or architectural significance – although this does not generally fall within the Resource Management Act.

Other options for feedback

3.1.3 Q7.18 Are there opportunities for non-statutory spatial planning techniques to help identify suitable areas for renewables development (or no go areas)?

Please see our response to Q10.6 with respect to this question.

3.1.4 Q7.19 Do you have any comments on potential options for pre-approval of renewable developments?

We would make two comments with respect to this:

With respect to consenting

Our modelling shows that there could be thousands of solar PV installations of various sizes in New Zealand. If an arduous consenting/planning process is in place, then this could place a high burden on the consenting system. As such, we would recommend a threshold size and/or type of PV system below which solar developments are non-notifiable. This may include

- Solar installations on existing roofs
- Solar installations within existing industrial zones
- Solar installations with fewer than 500 panels in non-sensitive areas.

With respect to mixed land use

We would highlight numerous global examples of co-location of solar PV with farming – for example the use of solar PV farms for sheep grazing, or to provide a home for pollinating insects. As such, we would encourage planning to seek solar assets which provide land for grazing and/or pollinating insects where this has local benefits.

We also note advice from the UK Building Research Establishment on the colocation of agriculture and solar PV generation assets:

https://www.bre.co.uk/filelibrary/nsc/Documents%20Library/NSC%20Publications/NSC_-Guid_Agricultural-good-practice-for-SFs_0914.pdf

3.1.5 Q7.20 Are the current NPSET and NESETA fit-for-purpose to enable accelerated development of renewable energy? Why?

No comment

3.1.6 Q7.21 What changes (if any) would you suggest for the NPSET and NESETA to accelerate the development of renewable energy?

No comments

3.1.7 Q7.22 Can you suggest any other options (statutory or non-statutory) that would help accelerate the future development of renewable energy?

We would encourage Government to investigate the costs and benefits of mandatory carbon emissions reporting by organisations over a particular size. At a simple level, this could just be

carbon emissions associated with primary energy – fuel, transport and electricity. This could utilise existing toolsets (see below) and would allow a clear, low-cost means for organisations to reflect on and measure their emissions.

As part of the development of solar projects, we regularly calculate the carbon savings. To assist with carbon saving reporting, we would recommend that the Government provide a specific tool for determining savings associated with on-site renewable electricity generation. One simple method would be to extend the existing Ministry of Environment tools for "Measuring, reporting and offsetting greenhouse gas emissions."[3]

[3] https://www.mfe.govt.nz/climate-change/guidance-measuring-emissions

3.2 Section 8: Supporting renewable electricity generation investment

Power Purchase Agreement (PPA) Platform

Option 8.1 Introduce a Power Purchase Agreement (PPA) Platform

3.2.1 *Q8.1 Do you agree there is a role for government to provide information, facilitate matchmaking and/or assume some financial risk for PPAs?*

Government-backed PPAs have a number of advantages which positively shift the viability and cost of solar and wind generation in New Zealand which must be recognised:

1. Underwritten contracts attract investors with lower return requirements and this can immediately result in solar power generation at grid parity.
2. Government can recognise the impact on the economy that solar (and wind) have in stabilising electricity prices across New Zealand. Solar and wind keep water in the lakes and keep cheap hydro online for longer in wet and dry years.
3. Long term PPAs are shown worldwide to accelerate renewable investment – more so than cost reductions of materials.
4. New Zealand is in a unique position where PPAs can be offered at or close to grid parity.
5. Solar and wind technology reduce long term costs of electricity for the New Zealand economy through:
    a. Reducing the costs of electricity
    b. Reducing capacity shortages in dry years through keeping water in the reservoirs.

Evidence of the above is provided in our response to Q8.6.

3.2.2 *Q8.2 Would support for PPAs effectively encourage electrification and new renewable generation investment?*

As outlined in our response to Q8.6, and specifically Figure 1, it is our view that PPAs would immediately accelerate and encourage investment in renewable generation in New Zealand. Our evidence shows that the impact of these is stronger than waiting for future cost down or technology improvements given the maturity of solar[4] and wind technology.

3.2.3 *Q8.3 How could any potential mismatch between generation and demand profiles be managed by the Platform and/or counterparties?*

If Government wishes to pursue PPAs with specific sites, then we would note it is international best practice for them to sign a take or pay agreement. Otherwise the investment is too risky and pushes up the costs of finance. For this reason, we would recommend PPAs into the wholesale, national electricity system where demand is much higher and much more assured (rather than with specific sites). All agreements should include a take or pay clause, to mitigate the risk of generation and demand mismatch.

Our vision is that energy supply from low carbon energy PPAs would be against whole New Zealand electricity demand. This removes the need to manage demand against a specific site.

[4] Enough solar PV is installed globally to meet New Zealand electricity needs 16 times over.

In this case, we propose that a Government backed PPA scheme and Transpower[5] work together in setting procurement limits on solar/wind in New Zealand so as to prevent mismatch between national supply and demand. Further, we would highlight that this can create a stable renewable industry rather than the boom/bust industries seen in other nations. Other countries – particularly Australia, the UK, Italy, Spain and Germany – have seen low carbon industries which have grown and then collapsed after sharp and sudden changes in policy. We believe that a managed deployment is key to building a domestic renewable energy industry that is pro jobs, continually improving and sustainable in the long term.

As is discussed in Q8.4, a PPA can still be designed to support the community and demand-side objectives of Government. However, by procuring PPAs against national demand we feel that supply/demand mismatches (which are complex) can be managed by system-wide experts.

3.2.4 Q8.4 What are your views and preferences in relation to different options A to D above?

We think that option C is the only viable and impactful means to accelerate the development of competitive, responsible solar generation in New Zealand. We have provided evidence to support this assertion within this response. This is true with the following caveats to manage deployment:

- We propose a capped procurement of renewable technology (set quarterly or biannually) with a mix of generation types selected. This may be done via an auction and limits the amount that is procured to keep the system in technical and economic balance. Projects are selected based on a merit order which reflects cost of energy and also objectives such as community ownership, reputability of developer, energy volumes, delivery date of the project or the consenting of other generation e.g. a large geothermal plant etc.
    - Under this arrangement, preference can also be given to community or demand-side projects as is desired by MBIE. Infratec strongly support this position as we see new electricity as offering the opportunity to return revenue to communities and to help reduce energy poverty. By backing PPAs, Government can both immediately stimulate a renewable energy industry (Q8.6) and influence investment which supports other objectives.
- A diverse mix of sources can be encouraged to overlay concerns around bioenergy impacts – and support technologies needed for decarbonisation of heat.
- Transpower sets the volumes and maximum project size of solar, onshore wind, offshore wind (and other technologies) that are awarded PPAs in order to ensure:
    - A proportional mix of renewable technology needed to transition New Zealand electricity to reduce risks of supply shortages in a dry year. I.e. transition from a system concerned with dry year supply risk to one which only risks shortages of low marginal carbon power in a year of low wind, sun and hydro.
    - A responsible balance of supply of new renewables to ensure that supply of electricity is reasonable versus demand. Doing so on a national level ensures that the impact of new generation is tempered against a much larger demand profile. I.e. we think that viewing PPAs against national electricity demand means that the

[5] Transpower as the organisation responsible for managing the supply and demand matching of electricity

natural variation of wind/solar can be negated (see below how we still think local benefits can be derived).
    - To cap project size to encourage assets to be spread regionally to maximise local benefits and by a mix of investor types i.e. not one large mega-project of 500MW, rather have 50 reasonable projects of 10MW each.
- A managed and continuous investment in new renewables in order to allow the existing electricity market and assets to evolve their technical and commercial arrangements to respond to renewable growth. This can help avoid the issues of duck curves/negative pricing seen in other markets as well as stranded thermal assets (see comments on this in our response to Q8.29). Hence we propose quarterly or biannual auctions for contracts.
- Consider mechanisms in order to ensure as much revenue as possible remains within the country and with New Zealand companies.
- The placing of maximum buy price on each PPA auction to ensure costs of low carbon energy are beneficial to the system. To determine these, Government would need to balance what a realistic price would be relative to carbon saving, recent grid pricing and long-run power price forecasts.

In our answer to Q8.6, we provide evidence to show the impact that we think Government contracts can have on solar in New Zealand.

In addition, we make the following notes on the other options:

- Option A – contract matching
    - We would support this exercise as it can support the development of contracts under option C and also help participants (developers, consumers) to engage in the electricity industry. Standard contracts should reduce concerns/perceived risks from PPAs and so help accelerate the market.
    - Much work on PPA contracting has been completed in other markets and so we do not see huge risks or costs in this exercise relative to the potential impact.
- Option B – State sector led
    - Government should be seeking PPA contracts for renewable electricity under private contracts with suppliers/installers in order to reduce bills and show environmental vision. However, this is all it should be viewed as – and we are of course willing to offer such services to Government.
    - We feel that pursuit of option C (which impacts the whole electricity industry) would have a greater and more measurable impact on emissions reduction and accelerating renewables. We also feel that the benefits can therefore be accrued by more sectors of the economy.
    - We also feel this this option (and our recommendations on the design of that system listed above) combines the lessons learned from feed-in-tariffs and renewables obligation certificates – namely providing the right type of affordable investment to accelerate renewables, allowing deployment costs/rates to be managed and ensuring generation which reduces the costs of electricity in New Zealand
- Option D – clearing house

- This option may look appealing but risks being complex and difficult to manage in the medium term. These activities would likely be handled by existing suppliers and aggregators in a functioning market.
- We would instead recommend that the PPA is retailed directly into the electricity market with guaranteed offtake of contracts by the market at a price set and backed by Government during Option C.

3.2.5 *Q8.6 For investors / developers: what contract length and price do you require to make a return on an investment in new renewable electricity generation capacity? And, is a long-term electricity contract an attractive proposition if it delivers a predictable stream of revenues and a reasonable return on investment?*

Our evidence shows that long-term contracts with a bankable off-taker have more of an impact on reducing costs than gains in scale, improvements in technology and efficiency gains in industry (see Figure 1).

Solar generation

It is our belief that a 25 year PPA term is required in order to make an attractive return. This mirrors the performance warranty of solar panels from tier one solar panel manufacturers (at least 25 years). Solar energy projects are capital intensive with low running costs and long operational lives. As such, a long term, predictable revenue stream is essential for a solar PV investor to accept lower levels of returns.

This is evidenced by analysis completed by Infratec on the potential PPA pricing from solar PV under different scenarios (Figure 1). As shown, de-risking and lengthening contracts can reduce the PPA price by over 50% and as such this analysis strongly asserts that Government-backed PPAs can **immediately accelerate solar PV investment in New Zealand.**

To further support this, Figure 2 shows the projected costs of a solar PV asset as a percentage of the capital investment. Under this scenario, the following are examples of different risk levels:

- High risk: no floor price AND/OR single customer with high credit risk AND/OR commercial customer operating in market with unstable revenue
- Medium risk: single customer for solar generation – some risk of customer defaulting on payment
- Low risk: floor price or fixed price contract with low credit risk, stable contracting party. Government-backed contracts.

This highlights how much cash is committed in construction of the project and consequently how valuable long term contracts are in reducing the revenue requirements and reducing risks for investors.

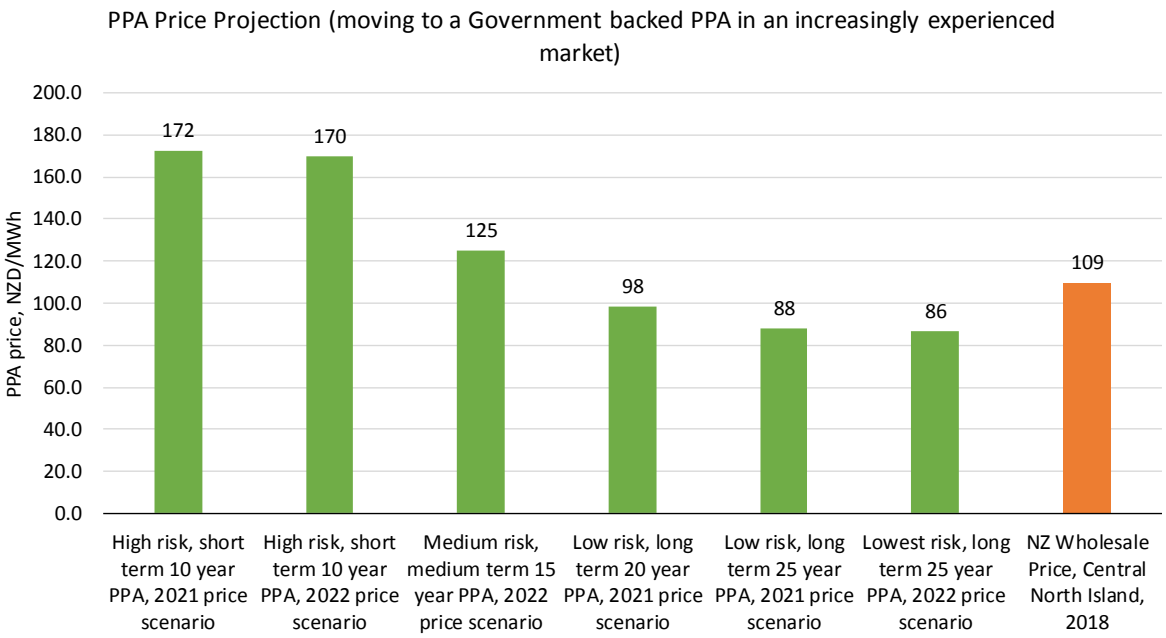

Figure 1: Projected PPA pricing for solar PV under different scenarios. Long term PPAs with low risk (Government backed) and a maturing domestic solar PV market are shown to have biggest impacts on PPA price. PPA index is 1.9%. Short term PPA is 10 years. EPC pricing proprietary but based on internal analysis and projections for reduced module prices from Bloomberg New Energy Finance. Realistic and all-inclusive maintenance costs used in modelling. Analysis completed for a typical grid connected solar asset of the type likely to be invested in by communities (5MWp). Project could be located in most areas of North and Upper South Islands.

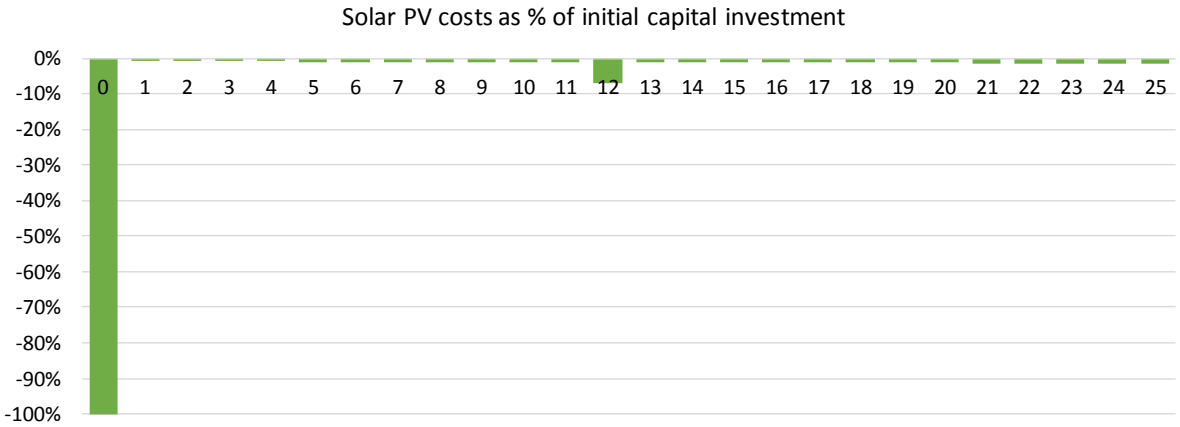

Figure 2: Projected costs for a solar PV asset over a 25 year life including inverter replacement, annual maintenance and construction costs. This highlights how the capital investment is dominant and as such savings in solar energy prices are highly sensitive to the bankability of offtake contracts. Modelling completed for a typical community scale solar PV asset (>7.5MWp).

Wind generation

Long term contracts have had a demonstrable effect on the cost of wind generation in other markets. We highlight in particular the impact that FiTs, Renewable Obligation Certificates and, more recently, Contracts-for-Difference have had on the cost of renewable generation. Figure 3 shows the declining costs of offshore wind in the UK under various CfD auctions. Wind now contracts below the price of gas power stations. We recommend that MBIE consult these to understand and confirm the impact that backing contracts can have on the wind sector in New Zealand.

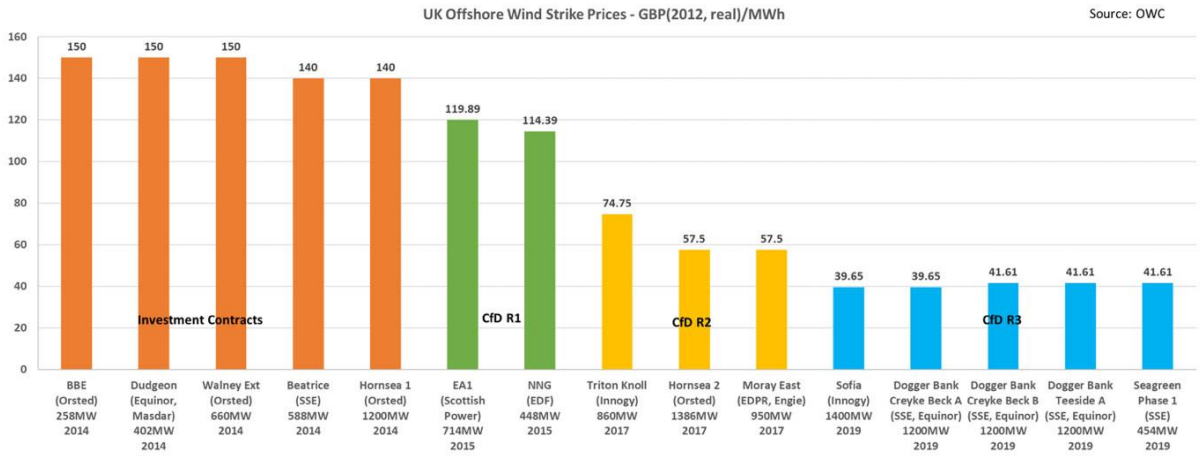

Figure 3: Prices of offshore wind under UK CfDs by auction round[6]

[6] https://owcltd.com/cfd-3-analysis-owcs-deep-dive-into-the-future/

Demand-side participation and demand response

Option 8.2: Encourage greater demand-side participation and develop the demand response market

3.2.6 Q8.7 Do you consider the development of the demand response (DR) market to be a priority for the energy sector?

We believe that demand response is being effectively managed by actors in the industry and that this is designed to align with their needs. This is evidenced by the following examples:

- Transpower operate an effective DR scheme to help match supply to demand and manage network constraints.
- Some suppliers offer smart tariffs and price alerts to match consumption to price signals in the electricity market.
- Line companies are procuring or looking to procure demand response to mitigate network constraints.

For Infratec, we see demand response amongst a fleet of tools to manage network constraints as well as matching supply of electricity to demand (both locally and nationally). As such, we believe that specific support for demand response at a Government level could interfere with the development of a viable and competitive market for other technologies/solutions. I.e. DR may appear to be a priority, but we would suggest that it already exists in the market using market forces.

We would however encourage greater information sharing within the sector with respect to the availability of demand response (or more broadly flexibility) services. As such, we would support the commissioning of a wider study into flexibility in New Zealand. This work could subsequently support the development of organisations to commercialise flexibility and provide benefits to multiple actors in the energy industry. Examples include aggregators in US and European markets who procure/use electricity assets in transmission, generation and local markets – such as batteries.

We would also support greater reporting of demand response procurement by lines companies as suggested in our response to 11.4, as demand response is a form of reduced investment in electricity network infrastructure. Evidence of this in other markets includes the Piclo[7] concept which has been adopted for use by UK Power Networks. This concept is used in our response to Q8.10 where we specifically ask for lines companies to map their constraints and DR requirements to make these open to consumers and competition by market forces.

Note

We would encourage MBIE to mandate Transpower to report on how demand response or another mechanism can be used to manage future capacity shortages (as well as network constraints). This reflects how, as outlined in Q8.27, the nature of capacity should change in New Zealand as we move away from thermal plants for baseload.

[7] https://piclo.energy/

3.2.7 *Q8.8 Do you think that DR could help to manage existing or potential electricity sector issues?*

DR already manages some problems in the electricity industry. Further, DR has an expanding role as networks become more constrained and there is growth in flexible generation. As stated in our response to Q8.7, we feel that industry is already delivering DR.

3.2.8 *Q8.9 What are the key features of demand response markets? For instance, which features would enable load reduction or asset use optimisation across the energy system, or the uptake of distributed energy resources?*

No comments

3.2.9 *Q8.10 What types of demand response services should be enabled as a priority? Which services make sense for New Zealand?*

New Zealand has particularly high lines charges relative to other countries. As such, we would encourage alternative network solutions/non-network solutions (such as DR) where these are more cost effective than traditional poles and wires.

Further, as outlined our response to Q11.4 we do not believe that lines companies effectively report where demand response may be required. This includes:

1. Mapping where demand response constraints are and willingness to pay for demand response in regions. This could allow existing customers to identify assets they have or invest in new assets to support the grid. In particular, this could encourage people to invest in battery storage to support the electricity network and reduce lines costs for everyone.
2. Lines companies being forced to report the costs and assessment of non-network solutions in all cases where an investment of over $500k was made in their infrastructure. This is designed to ensure that (a) lines companies are considering new technology (b) assumptions are being benchmarked against other lines companies and (c) that there is a greater chance of investment in non-network solutions in areas where they offer savings to consumers.

Energy efficiency obligations

Option 8.3 Deploy energy efficiency resources via retailer/distributor obligations

3.2.10 *Q8.11 Would energy efficiency obligations effectively deliver increased investment in energy efficient technologies across the economy? Is there an alternative policy option that could deliver on this aim more effectively?*

We do feel that there is a need for efficiency improvements to cover electricity, heat and transport sectors. Efficiency is estimated to have been responsible for as much carbon saving as closure of coal power stations in the UK. However, we do not have any specific proposals on how this may be achieved.

3.2.11 *Q8.12 If progressed, what types of energy efficiency measures and technologies should be considered in order to meet retailer/distributor obligations? Should these be targeted at certain consumer groups?*

We would recommend that domestic solar and battery storage be included as energy saving technology options to make clear that investment by lines companies is optional. This means lines companies can invest where there are proven savings to consumers in addition to valuation of network benefits. There is some precedent for this.

- In some markets, solar electricity is defined as an energy saving/energy efficiency measure. In the UK, this has been done to allow GST (VAT) exemption, as under EU regulations energy efficiency products can be classified as VAT exempt.
- Domestic solar technology directly reduces the use of fossil fuels and can reduce transmission losses. The classification of small-scale solar generation and energy storage as an energy efficiency technology (along with associated incentives) may permit direct investment by suppliers and lines companies in these technologies.

We encourage MBIE to evaluate work in this area carried out by the Microgeneration Certification Scheme in the UK which covers:

- Technical standards
- Standards to protect consumers
- Standardised calculations to determine energy bill savings with solar and/or battery storage
- Certification for domestic installations to receive payments from energy suppliers

Specifically, we would highlight that the following guidance may be adapted for New Zealand:

- https://mcscertified.com/wp-content/uploads/2019/08/MGD-003-Guidance-Note-Self-Consumption.pdf
- https://mcscertified.com/wp-content/uploads/2019/09/MIS-3002.pdf
- https://mcscertified.com/wp-content/uploads/2019/08/Irradiance-Datasets.xlsx

We also note the following brand new standard in the UK which Infratec employees have helped to develop:

- https://mcscertified.com/wp-content/uploads/2020/01/MIS-3012_Battery-Storage-Systems-V0.1.pdf

3.2.12 *Q8.13 Do you support the proposal to require electricity retailers and/or distributors to meet energy efficiency targets? Which entities would most effectively achieve energy savings?*

Although we recognise the role of retailers and distributors in energy efficiency targets, Infratec would also support the involvement of lines companies in investing in and having a regulatory responsibility for energy efficiency. It should be highlighted that lines companies can be viewed as natural investors in energy efficient technologies as they are seeking long term investment returns, have a mechanism for financial returns and will install the technology where it has most network benefit. In addition:

- Lines companies have capital to invest in areas of energy poverty – i.e. areas with most to benefit from the solar and batteries, but the least capital to invest.
- Lines companies can value the savings/impact of solar and batteries regardless of the credit worthiness or longevity of home occupiers or small businesses. I.e. they are less exposed to credit risk than electricity retailers.
- Lines companies have the inherent resource to maintain solar and batteries assets as needed e.g. preventative and reactive maintenance.
- Lines companies have the ability to install solar and batteries with minimum safety and electrical standards as needed to protect consumers and networks.
- Some lines companies have a specific community ownership and/or community responsibility within their remit/ownership structures.

One way in which this may be achieved is by reclassifying solar and battery energy storage as products which improve energy efficiency. This may be justified through their role in reducing transmission losses. Reclassification may therefore permit lines companies to invest in solar/storage within the existing regulatory framework.

3.2.13 *Q8.14 Could you or your organisation provide guidance on the likely compliance costs of this policy?*

We have previously undertaken consultancy work to estimate the impact that energy efficiency and distributed generation have on revenues for lines companies. We see strong value in this work being undertaken for MBIE or the Commerce Commission as it can help validate advice received from lines companies on such impacts. Although we cannot share specific information at this stage due to client confidentiality reasons, we are able to provide similar analysis to Government on this question based on in-house technical, practical and academic experience.

3.2.14 *Q8.15 Do you consider the development of an offshore wind market to be a priority for the energy sector?*

We strongly believe that New Zealand can deliver a 100% low carbon energy system with a mixture of onshore wind, offshore wind and solar being added to the electricity mix alongside biofuel/hydrogen. We have modelling data to support our findings and also note that this was the finding of a journal paper written in 2010[8]. As such, we strongly feel that **diversifying the electricity generation mix with new low carbon technology is key to 100% decarbonisation of New Zealand electricity.**

We note that a disproportionate amount of policy support for offshore wind over other technologies has been made in other markets (notably the UK) which has damped investment in other low carbon energy types. This has led to thousands of job losses within the solar and onshore wind sectors in other markets[9]. We strongly feel that a balanced growth of new energy technologies is needed for a pro-job, pro-decarbonisation energy strategy. A viable and low-cost electricity sector is one with diverse generation sources – wind, solar, geothermal, hydro and bioenergy.

Details of our 100% low carbon vision can be found at https://www.infratec.co.nz/about-us/our-vision

3.2.15 *Q8.16 What do you perceive to be the major benefits and costs or risks to developing offshore wind assets in New Zealand?*

As stated in our response to other questions in Section 8 of the consultation, we value all forms of low carbon electricity generation for addressing the following in the New Zealand power sector:

- Capacity shortages against existing and projected future electricity demand
- The impact/likelihood of dry years affecting high electricity pricing
- The need for low carbon energy to decarbonise process heat and transport sectors in particular

This is only true if all low carbon generation is supported and as such the risk we see is favouring of a single technology. This is something that we seek to mitigate through our proposed PPA framework described in our response to other questions.

[8] Mason, I., Page, S. & Williamson, A., 2010. A 100% renewable electricity generation system for New Zealand utilising hydro, wind, geothermal and biomass resources. Energy Policy, 38(8), pp. 3973-3984.

[9] https://www.independent.co.uk/news/business/news/solar-power-uk-has-lost-over-12000-jobs-after-government-slashed-subsidies-a7155236.html

Renewable electricity certificates and portfolio standards

Option 8.5: Renewable electricity certificates and portfolio standards

3.2.16 *Q8.17 This policy option involves a high level of intervention and risk. Would another policy option better achieve our goals to encourage renewable energy generation investment? Or, could this policy option be re-designed to better achieve our goals?*

No comment

3.2.17 *Q8.18 Should the Government introduce RPS requirements? If yes, at what level should a RPS quota be set to incentivise additional renewable electricity generation investment?*

No comment

3.2.18 *Q8.19 Should RPS requirements apply to all retailers and/or major electricity users? What would be an appropriate threshold for the inclusion of major electricity users (i.e. annual consumption above a certain GWh threshold)?*

No comment

3.2.19 *Q8.21 What types of renewable projects should be eligible for renewable electricity certificates?*

Please see our response to Q8.16

3.2.20 *Q8.22 If this policy option is progressed, should retailers and major electricity users be permitted to invest in energy efficient technology investments to meet their renewable portfolio standards? (See option 8.3 above on energy efficiency obligations).*

It may be worthwhile for major electricity users to be able to invest in community energy projects in order to offset their own emissions. This would only be true where these have a demonstrable effect in reducing emissions in New Zealand which are equivalent to carbon savings. For example, a major user may invest in a small windfarm to reduce grid carbon emissions to defer an investment in process heat decarbonisation. However, the user would need to demonstrate that this provides equivalent carbon savings to deferring a process heat decarbonisation. This policy could be effective in encouraging emissions savings – business would want to invest in energy technologies where they can return revenue and as such this may lead to investing in their own efficiency/decarbonisation projects.

3.2.21 *Q8.23 Could you or your organisation provide guidance on the likely administrative and compliance costs of this policy?*

No comment

Phase down thermal baseload and place in strategic reserve

Option 8.6 Phase down baseload thermal generation and place in strategic reserve

3.2.22 *Q8.24 This policy option involves a high level of intervention and risk. Do you think that another policy option could better achieve our goals to encourage renewable energy generation investment? Or, could this policy option be re-designed to better achieve our goals?*

No comment

3.2.23 *Q8.25 Do you support the managed phase down of baseload thermal electricity generation?*

We strongly support a phase down of thermal generation and we would strongly urge Government to set an aspirational target at which thermal electricity generation is no longer used for baseload in New Zealand. This is a policy which has been successful in other countries.

3.2.24 *Q8.26 Would a strategic reserve mechanism adequately address supply security and reduce emissions affordably during a transition to higher levels of renewable electricity generation?*

No comment

3.2.25 *Q8.27 Under what market conditions should thermal baseload held in a strategic reserve be used? For example, would you support requiring thermal baseload assets to operate as peaking plants or during dry winters?*

Diversification of supply to wind and solar alongside geothermal, battery and hydro means that thermal plants should transition from baseload to strategic reserve/peaking assets. This reduces the volume of fuel needed to drive thermal plants each year – and as such opens up the potential for sustainable alternatives. As such, we would support shifting thermal assets to sourcing fuel from lower carbon and sustainable sources like bioenergy, anaerobic digestion and possibly hydrogen. Details of our modelling are set out at:

https://www.infratec.co.nz/about-us/our-vision

We also note that these alternatives may have impacts outside the direct participants. For example, large scale biomass may foster a whole new value stream for the agricultural industry. This needs to be considered.

The transition to wind, solar, hydro and geothermal for the majority of annual electricity generation also changes the nature of thermal plants and means they may rarely be used. This affects how the economics of these plants can be viewed – perhaps allowing a higher marginal price of electricity from thermal plants conditional on rare operation of the facilities.

Today, New Zealand's electricity is managed with respect to the dry winter problem i.e. having sufficient backup to meet electricity demand why hydro resources are low. Our modelling shows that adding wind and solar to the New Zealand electricity mix de-risks dry year supply issues. It means that wind and solar provide low carbon energy to reduce total hydro generation needs as well as providing additional capacity to support underlying growth in electricity demand. This

demand, as reported by Transpower, needs to rise to support decarbonisation of transport and heat sectors.

Our proposal turns New Zealand from having supply shortages in a dry year – which may occur once a decade – to one where supply shortages occur in a year of low wind, low sun and dry hydrological conditions. This meteorological scenario is clearly incredibly unlikely – and as such our proposal reduces supply risks for New Zealand.

3.2.26 Q8.28 What is the best way to meet resource adequacy needs as we transition away from fossil fuelled electricity generation and towards a system dominated by renewables?

Please see our response to Q8.29. There is strong evidence that low carbon generation will reduce the price of electricity in New Zealand.

3.2.27 Q8.29 Should a permanent capacity market which also includes peaking generation be considered?

It is clear that a future grid will require peaking assets within something akin to a capacity market. We would highlight that international experience of such markets has seen peaking generation from fossil fuel sources. Some New Zealand hydro assets may also be used (or modified to be used) as peaking plants. This is not necessarily an overtly negative carbon story where peaking assets are used infrequently. However, we feel that there is an opportunity to encourage lower carbon generation. As such, we would seek a capacity market which prioritises low carbon generation and energy storage over fossil fuel plants. This could be done by including carbon costs within the evaluation of different bidders into the capacity market.

3.2.28 Q8.30 Do you have any views regarding the options to encourage renewable electricity generation investment that we considered, but are not proposing to investigate further?

We are aware of interesting proposals for a large pumped storage facility, but we wish to see further evidence of the merits of this relative to other energy storage options. As such, we would recommend that Government commission a study of the potential feasibility, cost, benefits (from a whole energy system perspective) and local/international environmental impacts of storage options in New Zealand including, but not limited to:

- Feasibility and costs of retrofitting pumped storage to each of New Zealand's existing large hydro generation assets.
- Storage potential from future electrification of vehicles including regulations and standardisation of charging infrastructure. The latter is particularly important for open access of charging to all vehicle owners and significantly in ensuring that the required charging infrastructure exists to support the networks and electricity system.
- Flexibility afforded through generation of hydrogen via electrolysis.
- A large pumped storage facility.

3.3 Section 9: Facilitating local and community engagement in renewable energy and energy efficiency

3.3.1 Q9.1 Should New Zealand be encouraging greater development of community energy projects?

Infratec strongly believe that community energy should be a key part of the development of New Zealand's renewable energy strategy, particularly technologies like solar and storage which are accessible by small communities. Diversification of energy generation to include solar, onshore wind and offshore wind should be explicitly stated in the New Zealand Renewable Energy Strategy. Diversification reduces the risk of a dry year impact on price and security of supply.

Energy storage has particular benefits to communities such as enabling local energy trading services, reducing network costs, providing resilience and stimulating renewable investment. We would highlight that network and resilience issues should be considered by lines companies as part of their regulatory responsibility and asset management planning. These benefits should be particularly acute in New Zealand which has long distribution lines, remote communities and geological resilience constraints.

Solar energy can be used to provide electricity generation for the NZ electricity system as a whole as well as providing impacts on energy saving/energy poverty on a local level and job creation.

However, it needs to be recognised that community energy projects require a level of understanding and capital investment which may be beyond what is available to communities who can benefit most from these technologies.

As such, we would support financial incentives from Government to support the development of community energy projects which serve wider community benefits. This may include tax incentives, funding for pilot projects or guaranteed export rates for community energy projects.

Pilot project support could be particularly beneficial, particularly where these provide open business models to support other community projects.

We would also highlight the leading work being performed by New Zealand companies installing solar/battery storage to reduce diesel generator use and expand electricity provision across the Pacific. As such, New Zealand companies who have worked under MFAT, World Bank, EU and ADB projects and are now seeking to transfer that knowledge locally.

3.3.2 Q9.2 What types of community energy project are most relevant in the New Zealand context?

With respect to the proposition for Government backed PPAs in the New Zealand context, this would give the Government the ability to influence the types of community energy projects that are implemented. Specifically, by having regular, capacity-capped auctions for different technologies, Government can develop weightings and frameworks to encourage particular features of generation assets.

Infratec strongly supports local community engagement and benefit within energy projects, and we view this as a key strength of our proposition and success across the Pacific and New Zealand.

Further, shifting the electricity system from one of large central generation to one of many distributed generation sources provides an opportunity to return energy profits to communities. We feel that PPAs could be designed in such a way to ensure that these benefits are realised.

With solar PV, we would specifically support investigation of the following as mechanisms to specifically promote community involvement:

- A cap on the size of a solar PV generation asset which is eligible for PPA retail – notionally 5-10MWp.
- Valuing higher priced PPAs which provide revenue for community energy initiatives such as insulation or efforts for economic diversification.
- Requiring a local ownership component within a project structure.
- Allowing communities to purchase electricity from the solar PV asset instead of the PPA holder where this benefits both the PV owner and the community.

3.3.3 Q9.3 What are the key benefits and downsides/risks of a focus on community energy?

With respect to solar PV, the following risks should be highlighted by focussing on community energy:

- A potential lack of access to capital in order to develop projects.
- Delays associated with community engagement and legal structuring.
- Reduced reward of low power from large solar schemes with lower costs of electricity generation.
- Potentially avoiding solar PV investment in higher yield areas where community sizes are smaller.

We therefore recommend that PPA auctions are open to all projects so that solar energy industry growth is not held back by a pure community requirement. We also recommend that PV does not need to be co-located with a community e.g. a community in Southland could invest in a project in Northland.

3.3.4 Q9.4 Have we accurately identified the barriers to community energy proposals? Are there other barriers to community energy not stated here?

We note that there are significant barriers for true peer-to-peer energy trading such as between houses in residential areas. This is commonly a barrier to some community energy projects and as such we would encourage the regulations around trading to be reviewed with respect to enabling/barriers to community energy.

3.3.5 Q9.5 Which barriers do you consider most significant?

Access to capital may be problematic for community groups – particularly those in the most acute energy poverty. As such, we recommend the following:

- Investigating if low cost capital can be made available for community energy schemes via the Green Investment Bank.
- Providing seed funding for community energy projects, but only where the business cases are publicly reported to stimulate and encourage other investment.

3.3.6 *Q9.6 Are the barriers noted above in relation to electricity market arrangements adequately covered by the scope of existing work across the Electricity Authority and electricity distributors?*

No comments

A clear government position on community energy

Option 9.1 Ensuring a clear and consistent government position on community energy issues, aligned across different policies and work programmes.

Option 9.2 We do not propose any new initiatives in addition to existing work programmes

Option 9.3 Government supports development of a small number of community energy pilot projects

3.3.7 *Q9.7 What do you see as the pros and cons of a clear government position on community energy, and government support for pilot community energy projects?*

No Comment

3.3.8 *Q9.8 Any there any other options you can suggest that would support further development of community energy initiatives?*

There are cases where community energy benefits are tied in with electricity network savings through deferral of investment. At this time, we do not see it being easy for communities and lines companies to both realise benefits of community energy projects.

For example, a community may wish to install a battery along with a solar asset to participate in electricity price arbitrage and shifting of solar from day to evening use. The local lines company may also be able to utilise the battery to defer investment in a new line/substation to meet peak load growth.

As such, we would like the Government to consider the following:

1. Better mapping of network constraints such as having lines companies map constrained areas on their websites (in addition to and as part of the asset management planning process).
2. Consider how lines companies can fairly consider co-investment in community energy and return those savings to consumers.
3. Ensure that energy resiliency (via energy storage) and energy generation (solar/wind) are available to communities through the Provincial Growth Fund.

3.4 Section 10: Connecting to the national grid

The first mover disadvantage

Option 10.1 Encourage Transpower to include the economic benefits of climate change mitigation in applications for Commerce Commission approval of projects expected to cost over $20m. This would be through the inclusion of the (avoided) emissions price cost incurred by consumers calculated on a

consistent basis. Guidance or direction about the emissions price and trajectory would be needed to support this option.

Option 10.2 Put in place additional mechanisms to support or encourage, Transpower, first movers and subsequent customers to agree to alternative forms of cost sharing arrangements by contract.

Option 10.3 Shift some of the cost and risk allocation for new and upgraded connections from the first mover through mechanisms within the Commerce Commission's regulatory scope, with the Crown accepting some of the financial risk. Two identified ways to achieve this are:

10.3.1 Optimise asset valuations under the Commerce Commission's regime in circumstances where demand is lower than originally anticipated because expected (subsequent) customers do not eventuate.

10.3.2 Provide for Transpower to build larger capacity connection asset or a configuration that allows for growth, but only recover full costs once asset is fully utilised, with the Crown covering risk of revenue shortfall.

3.4.1 *Q10.1 Which option or combination of options proposed, if any, would be most likely to address the first mover disadvantage?*

No comment

3.4.2 *Q10.2 What do you see as the disadvantages or risks with these options to address the first mover disadvantage?*

No comment

3.4.3 *Q10.3 Would introducing a requirement, or new charge, for subsequent customers to contribute to costs already incurred by the first mover create any perverse incentives?*

3.4.4

No comment

3.4.5 *Q10.4 Are there any additional options that should be considered?*

No comment

Gaps in publicly available and independent information

Option 10.4 Provide independent geospatial data on potential generation and electrification sites (e.g. wind speeds for sites, information on relative economics and feasibility of investment locations given available transmission capacity).

Option 10.5 Extend the data and information provided in MBIE's EDGS and increase the frequency of publication, and potentially recover the cost through the existing levy on electricity industry participants.

Option 10.6 Produce a user's guide on the current regulations and approval processes relating to getting an upgraded or new connection to the grid.

3.4.6 *Q10.5 Do you think that there is a role for government to provide more independent public data? Why or why not?*

We feel that information about networks could be improved and that this should be done via lines companies as discussed in Q10.6.

3.4.7 *Q10.6 Is there a role for Government to provide independent geospatial data (e.g. wind speeds for sites) to assist with information gaps?*

We believe that there is a need for greater information on electricity network capacity which is not addressed by the consultation. Further, we feel that this should be addressed by lines companies at the request of Government. The reasons for this are as follows.

Electricity network information is vital in the planning of renewable energy as it tells developers the required information about whether the network is strong enough for the distributed energy resources. This is information which is held by all lines companies, but which is frequently not available. This kind of information can help developers quickly find available locations for projects, or restrict sizing – and reduce the lengthy dialogue needed to make these trivial decisions.

Infratec have previously recommended that generation and demand constraint heat maps should be provided by all EDBs within New Zealand. This recommendation was made to Transpower on behalf of Infratec by BusinessNZ. Examples of this in other markets include this heat map by UK Power Networks (https://www.ukpowernetworks.co.uk/internet/en/our-services/documents/EPN-heat-map-190314.pdf).

We have seen that this mechanism is positive to the market, and would have significant advantages to developers of small and large scale community energy:

- It reduces the development time for projects by quickly enabling the identification of capacity in networks. It needs to be stressed that the future electricity system should see hundreds of thousands of applications for renewable generation assets and as such, heat maps can reduce the burden on lines companies and developers when enquiring about likely network capacity.
- It helps planners to identify the best areas to seek consent for new generation.
- It provides policy makers and regulators with greater insight for planning and supporting various generation technologies.
- It helps provide evidence for groups, such as community and iwi groups, when highlighting the need for investment in networks to support local objectives.

3.4.8 *Q10.7 Should MBIE's EDGS be updated more frequently? How often?*

No comment

3.4.9 *Q10.8 Should MBIE's EDGS be more granular, for example, providing information at a regional level?*

No comment

3.4.10 *Q10.9 Should the costs to the Crown of preparing EDGS be recovered from Transpower, and therefore all electricity consumers (rather than tax-payers)?*

No comment

3.4.11 *Q10.10 Would you find a users' guide helpful? What information would you like to see in such a guide? Who would be best placed to produce a guide?*

No comment

Lack of information sharing for coordinated investment

Option 10.7: Provide a database of potential renewable generation and demand sources, location and potential size (e.g. wind, geothermal, milk plant).

Option 10.8 Introduce measures to enable coordination regarding the placement of wind farms to ensure they are more likely to be better distributed around the country.

3.4.12 *Q10.11 Do you think that there is a role for government in improving information sharing between parties to enable more coordinated investment? Why or why not?*

Please see our response to Q10.12.

3.4.13 *Q10.12 Is there value in the provision of a database (and/or map) of potential renewable generation and new demand, including location and potential size? If so, who would be best to develop and maintain this? And how should it be funded?*

Infratec would like to highlight that a resource mapping exercise for solar energy potential is already available from a variety of academic and industry sources. However, we would highlight that New Zealand lags behind in terms of the quality of information available about the savings and benefits of wind/solar investments to interested groups. As such, we would recommend that MBIE expand the remit of EECA or request that organisations like SEANZ undertake exercises to improve their investment advice and carbon saving calculations in line with international expertise. This may include reflecting on leading work being completed by the Microgeneration Certification Scheme on standards and returns calculations of solar and energy storage in the UK.

Please see https://mcscertified.com/wp-content/uploads/2019/08/Irradiance-Datasets.xlsx for a suitable example of effective communication which protects consumers.

3.4.14 *Q10.13 Should measures be introduced to enable coordination regarding the placement of new wind farms?*

We feel that provision of additional information on line capacity and planning resource maps for wind could help facilitate improved and faster consenting of wind assets. This should encourage investment by reducing development costs and risks – whilst also encouraging wind in favourable areas.

3.4.15 *Q10.14 Are there other information sharing options that could help address investment coordination issues?*

Infratec would like to see MBIE to commission a tool to allow industry actors and interested parties to assess different means of decarbonisation. We would highlight the work done by Prof David Mackay in the UK who worked with the Department of Energy and Climate Change to produce a 2050 calculator (http://2050-calculator-tool.decc.gov.uk/#/home) which allowed people to investigate different decarbonisation pathways. This work could be commissioned using resources in industry (Transpower and developers) as well as academia working in partnership and as such could encourage relationships to stimulate low carbon investment ideas – as well as providing a valuable resource for industry.

3.5 Section 11: Local network connections and trading arrangements

3.5.1 *Q11.1 Have you experienced, or are you aware of, significant barriers to connecting? Are there any that will not be addressed by current work programmes outlined above?*

- We note some projects can be delayed by issuing of a suitable meter. At scale, we would anticipate that project teams can manage these issues – but the issue may remain and as such delay deployment of smaller solar in New Zealand.
- In other countries, we have seen cost issues arising from uncertain connection requirements. A particular example is grid protection relays on projects in Australia which were poorly defined and as such led to installers being exposed to costs by network operators after a contract was signed. Clear standards are needed to overcome the regional differences that can occur with different lines companies. We propose a revaluation on connection agreements/processes in different lines companies and consider how their connection rules and standards can be harmonised – rather than just standardised pricing. The remit may also extend to ensuring that lines companies are sharing information and learning (for example, how to respond to different inverter types and inconsistent site acceptance procedures).
- We would recommend stronger guidance or regulation from the EA to ensure that lines companies open up their networks to export of electricity.

3.5.2 *Q11.2 Should the section 10 option to produce a users' guide extend to the process for getting an upgraded or new distribution line? Are there other section 10 information options that could be extended to include information about local networks and distributed generation?*

3.5.3 *Q11.3 Do the work programmes outlined above cover all issues to ensure the settings for connecting to and trading on the local network are fit for purpose into the future? Are there things that should be prioritised, or sped up?*

No Comments

3.5.4 *Q11.4 What changes, if any, to the current arrangements would ensure distribution networks are fit for purpose into the future?*

Infratec strongly feels that stronger regulation is needed to ensure that **all** lines companies (including Transpower) are considering alternative network solutions as part of their investment and asset management planning. Alternative network solutions are the use of technologies (particularly

battery energy storage) to reduce investments in pole and wire infrastructure, improve the resiliency of networks and encourage renewable investment.

There are numerous international examples of such projects offering value to consumers and some early examples in New Zealand.

As such, we would like to see improved reporting from lines companies of where and how they have assessed non-traditional network solutions and the financial/technical/resilience reasons to justify the final investment decisions made. This may be something for the Commerce Commission to investigate. As such, we propose that:

- Lines companies and Transpower are forced to disclose their investigations of alternative network solutions for all major upgrades (>$500,000 investment)
- Lines companies and Transpower provide clearer information on where constraints occur – in particular to open the market to consumers to offer services to assist the network (e.g. utilising existing demand response assets or batteries). This should be done via a map on lines company websites.

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Page 1: Introduction

Q1 Name (first and last name)

Andrew Crossland

Q2 Email

andrew.crossland@infratec.co.nz

Q3 Is this an individual submission, or is it on behalf of a group or organisation?	**On behalf of a group or organisation**
Q4 Which group do you most identify with, or are representing?	**Electricity sector**

Q5 Business name or organisation (if applicable)

Infratec

Q6 Position title (if applicable)	**Respondent skipped this question**
Q7 Important information about your submission (important to read)The information provided in submissions will be used to inform the Ministry of Business, Innovation and Employment's (MBIE's) work on Accelerating renewable energy and energy efficiency.We will upload the submissions we receive and publish them on our website. If your submission contains any sensitive information that you do not want published, please indicate this in your submission.The Privacy Act 1993 applies to submissions. Any personal information you supply to MBIE in the course of making a submission will only be known by the team working on the Accelerating renewable energy and energy efficiency.Submissions may be requested under the Official Information Act 1982. Submissions provided in confidence can usually be withheld. MBIE will consult with submitters when responding to requests under the Official Information Act 1982.We intend to upload submissions to our website at www.mbie.govt.nz. Can we include your submission on the website?	**Yes**

Q8 Can we include your name?	**Yes**
Q9 Can we include your organisation (if submitting on behalf of an organisation)?	**Yes**
Q10 All other personal information will not be proactively released, although it may need to be released if required under the Official Information Act. Please indicate if there is any other information you would like withheld.	**Respondent skipped this question**

Page 2

Q11 Where are you located?	**Respondent skipped this question**
Q12 In what region or regions does your organisation mostly operate?	**All of New Zealand**

Page 3: Areas you wish to provide feedback on

Q13 Part A relates to process heat.Please indicate which sections, if any, you would like to provide feedback on.	**Section 1: Addressing information failures,** **Section 3: Innovating and building capability,** **Section 4: Phasing out fossil fuels in process heat,** **Section 5: Boosting investment in renewable energy and energy efficiency technologies** **,** **Section 6: Cost recovery mechanisms**
Q14 Part B relates to renewable electricity generation. Please indicate which sections, if any, you would like to provide feedback on.	**Section 7: Enabling renewables uptake under the Resource Management Act 1991** **,** **Section 8: Supporting renewable electricity generation investment** **,** **Section 9: Facilitating local and community engagement in renewable energy and energy efficiency** **,** **Section 10: Connecting to the national grid,** **Section 11: Local network connections and trading arrangements**

Page 4: Section 1: Addressing information failures

Q15 Option 1.1 would require large energy users to report their emissions and energy use annually, publish Corporate Energy Transitions Plans and conduct energy audits every four years.Do you support this option?

I support this option in part

Q16 Please explain your answer

We support the proposal for energy users to report their emissions and energy use as well as transition plans. In addition, we feel that it should be possible to offset some of those emissions through investing in renewable energy (particularly community energy) as outlined in our response to Q8.22.

Q17 Which parts (set out in Table 3) do you support?

Respondent skipped this question

Q18 Please explain your answer

Respondent skipped this question

Q19 What public reporting requirements (listed in Table 3) should be disclosed?

Respondent skipped this question

Q20 In your view, should businesses be expected to include transport energy and emissions in these reporting requirements?

Respondent skipped this question

Q21 For manufacturers: what will be the impact on your business to comply with the requirements?

Respondent skipped this question

Q22 Option 1.1. Suggests that requirements to publish Corporate Energy Transition Plans should apply to large energy users, and propses defining large energy users as those with an annual energy spend (purchased) of greater than $2 million per annum.Do you agree with this definition?

Respondent skipped this question

Q23 If you selected no, please describe what in your view would be an appropriate threshold to define ‘large energy users’.

Respondent skipped this question

Q24 Is there any potential for unnecessary duplication under these proposals and the disclosures proposed in the MBIE-Ministry for the Environment discussion document Climate-related Financial Disclosures – Understanding your business risks and opportunities related to climate change, October 2019?

Respondent skipped this question

Page 5: Section 1 - Option 1.2: Electrification information package and feasibility studies

Q25 Do you support the proposal to develop an electrification information package?

Respondent skipped this question

Q26 Would an electrification information package be of use to your business?	**Respondent skipped this question**
Q27 Do you support customised low-emission heating feasibility studies?	**Respondent skipped this question**
Q28 In your view, which of the components should be scaled up and/or prioritised?	**Respondent skipped this question**
Q29 Would a customised low-emission heating feasibility study be of use to your business?	**Respondent skipped this question**
Q30 Please describe any components other than those identified that could be included in an information package.	**Respondent skipped this question**

Page 6: Section 1 - Option 1.3: Provide benchmarking information for food processing industries

Q31 Do you support benchmarking in the food processing sector?	**Respondent skipped this question**
Q32 Would benchmarking be suited to, and useful for, other industries, such as wood processing?	**Respondent skipped this question**
Q33 Do you believe government should have a role in facilitating this or should it entirely be led by industry?	**Respondent skipped this question**
Q34 Please explain your answer	**Respondent skipped this question**

Page 7: Section 2: Developing markets for bioenergy and direct geothermal use

Q35 Do you agree that some councils have regional air quality rules that are barriers to wood energy?	**Respondent skipped this question**
Q36 Please provide examples of regional air quality rules that you see as barriers to wood energy. Please also note which council's plan you are referring to.	**Respondent skipped this question**
Q37 Do you agree that a National Environmental Standards for Air Quality (NESAQ) users' guide on the development and operation of the wood energy facilities will help to reduce regulatory barriers to the use of wood energy for process heat?	**Respondent skipped this question**

Q38 What do you consider a NESAQ users' guide should cover? Please provide an explanation if possible.	**Respondent skipped this question**
Q39 Please describe any other options that you consider would be more effective at reducing regulatory barriers to the use of wood energy for process heat.	**Respondent skipped this question**
Q40 In your opinion, what technical rules relating to wood energy would be better addressed through the NESAQ than through the proposed users' guide (option 2.1)?	**Respondent skipped this question**

Page 8: Section 2 - continued: Developing markets for bioenergy and direct geothermal use

Q41 In your view, could the Industry Transformation Plans stimulate sufficient supply and demand for bioenergy to achieve desired outcomes?	**Respondent skipped this question**
Q42 What other options are worth considering?	**Respondent skipped this question**
Q43 Is Government best placed to provide market facilitation in bioenergy markets?	**Respondent skipped this question**
Q44 How could Government best facilitate bioenergy markets?Please be as specific as possible, giving examples.	**Respondent skipped this question**
Q45 In your view, how can government best support direct use of geothermal heat?	**Respondent skipped this question**
Q46 What other options are worth considering?	**Respondent skipped this question**

Page 9: Section 3: Innovating and building capability

Q47 Do you agree that de-risking commercially viable low-emission technology should be a focus of government support on process heat?

Agree,

Please explain your answer:

We agree that decarbonisation of process heat should be one of the priority areas for Government (alongside grid scale renewables) through a combination of electrification, biomass and biogas where appropriate. We note that there may be a focus on electrification of process heat in line with decarbonisation by some organisations. This requires additional electricity generation which needs to be met by renewable generators. Electrification can sometimes place an increased strain on electricity networks, particularly in rural areas. However, this is not always the case . Infratec has been involved in a number of consultation exercises which showed value in electrical energy storage to boost network capacity AND/OR to support new renewable energy at reduced costs. We have also seen an instance where a viable economic case for a battery could be made by combining uses for an energy facility as well as grant funding to support local objectives. Based on our experience, we believe that this remit should include the following: - Support for technologies which can reduce the costs of electricity distribution – particularly where these can be shown to enable wider decarbonisation efforts in process heat (see response to Q8.13). - Strengthening reporting requirements around the consideration of alternative network technologies in networks when considering process heat alternatives (see our response to Q11.4). This also applies to supporting local economic growth or electrification of vehicles. - Regulatory incentives/mechanisms to encourage network innovation – including consultation of the following mechanisms: o Establishing a low carbon network fund for innovation projects (e.g. https://www.ofgem.gov.uk/electricity/distribution-networks/network-innovation/low-carbon-networks-fund) which could be paid for under the existing EA levy o Evaluation of applying the RIIO framework in New Zealand for encouraging innovation within lines companies - https://www.ofgem.gov.uk/system/files/docs/2018/07/riio-2_july_decision_document_final_300718.pdf o Forcing lines companies to disclose the cost/benefit of non-network solutions on all investments they make in their network which have a value of over $500,000. More details on this are outlined in our response to Q11.4. We would also suggest that a consultation exercise commissioned by MBIE or EECA could be commissioned to answer the following questions on battery storage for networks: - Can battery storage reduce network costs in New Zealand like it has in other markets? - Is this isolated to a few example sites or widespread? - Are lines companies properly investigating alternatives to traditional network reinforcement and does this apply unilaterally across the industry? - Under what circumstances are batteries beneficial to networks? Can these batteries be used to provide community benefits such as assisting local

	solar or wind projects AND providing resilience?
Q48 Do you agree that diffusing commercially viable low-emission technology should be a focus of government support on process heat?	Please explain your answer: See above
Q49 Is Energy Efficiency and Conservation Authority (EECA) grant funding to support technology diffusion the best vehicle for this?	**Respondent skipped this question**
Q50 For manufacturers and energy service experts: would peer learning and lead to reducing perceived technology risks?	**No**
Q51 For manufacturers and energy service experts: would on-site technology demonstration visits lead to reducing perceived technology risks?	**Respondent skipped this question**
Q52 Is there a role for the Government in facilitating this?	Please expand on your answer: With respect to the question on peer learning: It is our understanding that this question relates to process heat. However, for context, we would like to highlight the following with respect to technologies which may support process heat electrification. Infratec constructs solar and battery storage technologies which are widely applied elsewhere and which are at an advanced level of technology readiness. Enough solar has been installed worldwide to meet all of New Zealand's annual electricity demand 16 times over. Battery energy storage is a growing, multibillion-dollar industry around the world. The New Zealand context does not present particularly unique technology challenges in our sector. Government support for the sector would help reduce any perceived and misguided technology risks, although we would not view that as a responsibility of Government in this case. As such, we would highlight our view that that the most effective and impactful way for Government to support bringing large scale, community-focused solar generation prices to grid parity is through backing PPAs. Any perceived challenge relates to deployment within New Zealand rather than internationally. As such, we feel that Government backing for projects may be more valuable than technology demonstrations.

Page 10: Section 3 (continued): Innovating and building capability

Q53 For emissions-intensive and highly integrated (EIHI) stakeholders: What are your views on our proposal to collaborate to develop low-carbon roadmaps?	**Respondent skipped this question**

Q54 Would low-carbon roadmaps assist in identifying feasible technological pathways for decarbonisation?	**Respondent skipped this question**
Q55 What are the most important issues that would benefit from a partnership and co-design approach?	**Respondent skipped this question**
Q56 What, in your view, is the scale of resourcing required to make this initiative successful?	**Respondent skipped this question**

Page 11: Section 4: Phasing out fossil fuels in process heat

Q57 Do you agree with the proposal to ban new coal-fired boilers for low and medium temperature requirements?	**Strongly agree**
Q58 Do you agree with the proposal to require existing coal-fired process heat equipment for end-use temperature requirements below 100 degrees Celsius to be phased out by 2030?	**Strongly agree**
Q59 Referring to Question 56 - is this ambitious or is it not doing enough?	**Respondent skipped this question**
Q60 For manufacturers: what would be the likely impacts or compliance costs on your business of a ban on new coal-fired process heat equipment?	**Respondent skipped this question**
Q61 For manufacturers: what would be the likely impacts or compliance costs on your business of requiring existing coal-fired process heat equipment supplying end-use temperature requirements below 100°C to be phased out by 2030.	**Respondent skipped this question**
Q62 Could the Corporate Energy Transition Plans (Option 1.1) help to design a more informed phase out of fossil fuels in process heat?	**Respondent skipped this question**
Q63 Would a timetabled phase out of fossil fuels in process heat be necessary alongside the Corporate Energy Transition Plans?	**Respondent skipped this question**
Q64 In your view, could national direction under the Resource Management Act (RMA) be an effective tool to support clean and low greenhouse gas-emitting methods of industrial production?	**Respondent skipped this question**
Q65 If yes, how?	**Respondent skipped this question**

Q66 In your view, could adoption of best available technologies be introduced via a mechanism other than the RMA?

Please explain your answer:
With respect to Q4.1 We strongly agree with the principle of removing coal fired boilers in low and medium temperature applications because it sends strong signals to the market that change must occur and sets timeframes for it to occur. However, we feel that this must be combined with support for alternatives in order to mitigate the risk of unintended consequences. It is our belief that low carbon alternatives should provide opportunities for businesses to be more competitive and improve environmental sustainability. As such, we feel this ban has to be combined with support for alternatives. Suggested support for alternatives is outlined in our other responses.

Page 12: Section 5: Boosting investment in energy efficiency and renewable energy technologies

Q67 Do you agree that complementary measures to the New Zealand Emissions Trading Scheme (NZ-ETS) should be considered to accelerate the uptake of cost-effective clean energy projects?

Respondent skipped this question

Q68 Would you favour regulation, financial incentives or both?

Respondent skipped this question

Q69 In your view what is a bigger barrier to investment in clean energy technologies, internal competition for capital or access to capital?

Respondent skipped this question

Q70 If you favour financial support, what sort of incentives could be considered?

Respondent skipped this question

Q71 What are the benefits of these incentives?

Respondent skipped this question

Q72 What are the risks of these incentives?

Respondent skipped this question

Q73 What are the costs of these incentives?

Respondent skipped this question

Q74 What measures other than those identified above could be effective at accelerating investment in clean energy technologies?

New Zealand is arguably a world leader in community and low carbon energy projects with a dominant and growing role in The Pacific and South East Asia. Growth in the New Zealand solar market may lead to an increase in internal competition, but that should happen naturally.
We therefore strongly feel that the biggest barrier to investment is a market designed to attract investors seeking lower returns (via offering lower risk contracts to market). This is because low carbon projects are typically high in capital with low operating costs and long productive lives (>25years). As such, if there is revenue security, investors can access lower capital and specifically need lower returns.
Access to low-cost capital through secure, long-term PPAs can halve the price for solar electricity generation in New Zealand. This would have a much faster/harder impact than reduction in PV module prices are likely to have in the short or medium term. Long-term PPAs can bring the capital to bring solar below wholesale prices. This is outlined in detail in our response to Q8.4 and is core to our response.

Page 13: Section 6: Cost recovery mechanisms

Q75 What is your view on whether cost recovery mechanisms should be adopted to fund policy proposals in Part A of the Accelerating renewable energy and energy efficiency discussion document?

In principle, we would support a levy on coal particularly as we feel it is important to reflect the cost of carbon in the fuels that we use in creating economic drivers for a cleaner energy system. There are open questions on whether the levy is best placed on the consumer of the coal, or the producer of the coal. In general, the earlier up the food chain a levy is applied the better, in order to cover all embedded uses. Questions also arise around how the levy would interact with the ETS and whether it would represent a duplication.
We would also caution that, in other nations, particularly the UK, the decline of local coal production (and other mining activities) has led to acute poverty in former mining areas. This must be avoided in New Zealand. As such, we would strongly urge that money levied on coal production is used to support energy and economic diversification projects in areas most affected by a decline in New Zealand coal production.
In particular, we feel that this should support:
- Community energy projects – including energy efficiency, community electricity generation, resilience and decarbonisation of heat.
- Economic development and diversification such as supporting energy businesses in these areas.

Aside
We would also note that the embedded carbon in the manufacture and construction of solar and wind plants are often cited in literature. The median value of energy sources are reported by the Intergovernmental Panel on Climate Change as follows:
- Wind/Solar - 11-48 gCO2-e /kWh
- Coal - 820 gCO2-e /kWh for coal electricity generation
- Gas - 490 gCO2-e /kWh for gas electricity generation
- Geothermal - 6-79 gCO2-e /kWh
- Biomass - 230 gCO2-e /kWh.

I.e. wind and solar are very low carbon in comparison to fossil fuel plants.
We also highlight that these are old estimates for solar/wind and we expect that significant reductions have been seen since publication of this figure due to increased use of renewable energy in manufacturing facilities and also improved efficiency of solar modules.
I.e. we see a carbon levy being impactful on diversification from coal and gas as well as ensuring carbon impacts of these are properly reflected in the use of fossil fuels.

Q76 What are the advantages of introducing a levy on consumers of coal to fund process heat activities?

No further comment in addition to our responses to Q6.1

Q77 What are the disadvantages of introducing a levy on consumers of coal to fund process heat activities?

Respondent skipped this question

Page 14: Section 7: Enabling development of renewable energy under the Resource Management Act 1991

Q78 Do you agree that the current NPSREG gives sufficient weight and direction to the importance of renewable energy?

Respondent skipped this question

Q79 What changes to the NPSREG would facilitate future development of renewable energy?

Respondent skipped this question

Q80 What policies could be introduced or amended to provide sufficient direction to councils regarding the matters listed in points a-i mentioned on pages 60-61 of the discussion document?

Respondent skipped this question

Q81 How should the NPSREG address the balancing of local environmental effects and the national benefits of renewable energy development in RMA decisions?

Respondent skipped this question

Q82 What are your views on the interaction and relative priority of the NPSREG with other existing or pending national direction instruments?

Respondent skipped this question

Q83 Do you have any suggestions for how changes to the NPSREG could help achieve the right balance between renewable energy development and environmental outcomes?

Respondent skipped this question

Q84 What objectives or policies could be included in the NPSREG regarding councils' role in locating and planning strategically for renewable energy resources?

Respondent skipped this question

Q85 Can you identify any particular consenting barriers to development of other types of renewable energy than REG, such as green hydrogen, bioenergy and waste-to-energy facilities?

Respondent skipped this question

Q86 Can any specific policies be included in a national policy statement to address these barriers?

Respondent skipped this question

Q87 What specific policies could be included in the NPSREG for small-scale renewable energy projects?

Please see response to Q7.9

Q88 The NPSREG currently does not provide any definition or threshold for “small and community-scale renewable electricity generation activities”. Do you have any view on the definition or threshold for these activities?

For solar PV generation, we would make note of the following:

- Solar can be deployed on farmland with animal grazing/productive agricultural use on the same land parcel. Such a strategy is common in other parts of the world and has clear benefits to farmers in diversifying income and supporting rural power networks. As such, it is worthwhile to assess if there are restrictions to co-location of solar assets on farmland (for combined agricultural – e.g. sheep grazing – and solar generation usage). This might be something to consider with the New Zealand farming community as a combined study considering possible solutions. More details are provided in our response to Q7.19.
- We see few reasons to place constraints on solar PV systems installed on existing rooftops I.e. rooftop PV should be exempt from planning other than where the roof is of historical or architectural significance – although this does not generally fall within the Resource Management Act.

Q89 What specific policies could be included to facilitate re-consenting consented but unbuilt wind farms, where consent variations are needed to allow the use of the latest technology?

Respondent skipped this question

Q90 Are there any downsides or risks to amending the NPSREG?

Respondent skipped this question

Page 15: Section 7 - continued

Q91 Do you agree that National Environmental Standards (NES) would be an effective and appropriate tool to accelerate the development of new renewables and streamline re-consenting?

Respondent skipped this question

Q92 What are the pros of using National Environmental Standards as a tool to accelerate the development of new renewables and streamline re-consenting?

Respondent skipped this question

Q93 What are the cons of using National Environmental Standards as a tool to accelerate the development of new renewables and streamline re-consenting?

Respondent skipped this question

Q94 What do you see as the relative merits and priorities of changes to the NPSREG compared with work on NES?

Respondent skipped this question

Q95 What are the downsides and risks to developing NES?

Respondent skipped this question

Q96 What renewables activities (including both REG activities and other types of renewable energy) would best be suited to NES?

Respondent skipped this question

Q97 What technical issues could best be dealt with under a standardised national approach?	**Respondent skipped this question**
Q98 Would it be practical for NES to set different types of activity status for activities with certain effects, for consenting or re-consenting?	**Respondent skipped this question**
Q99 Are there any aspects of renewable activities that would have low environmental effects and would be suitable for having the status of permitted or controlled activities under the RMA? Please provide details.	**Respondent skipped this question**
Q100 Do you have any suggestions for what rules or standards could be included in NES or National Planning Standards to help achieve the right balance between renewable energy development and environmental outcomes?	**Respondent skipped this question**
Q101 Compared to the NPSREG or National Environment Standards, would National Planning Standards or any other RMA tools be more suitable for providing councils with national direction on renewables ?	**Respondent skipped this question**
Q102 Please explain your answer	**Respondent skipped this question**

Page 16: Section 7 - continued

Q103 Are there opportunities for non-statutory spatial planning techniques to help identify suitable areas for renewables development (or no go areas)?	**Yes,** Please explain your answer: Please see our response to Q10.6 with respect to this question.

Q104 Do you have any comments on potential options for pre-approval of renewable developments?

We would make two comments with respect to this:
With respect to consenting
Our modelling shows that there could be thousands of solar PV installations of various sizes in New Zealand. If an arduous consenting/planning process is in place, then this could place a high burden on the consenting system. As such, we would recommend a threshold size and/or type of PV system below which solar developments are non-notifiable. This may include

- Solar installations on existing roofs
- Solar installations within existing industrial zones
- Solar installations with fewer than 500 panels in non-sensitive areas.

With respect to mixed land use
We would highlight numerous global examples of co-location of solar PV with farming – for example the use of solar PV farms for sheep grazing, or to provide a home for pollinating insects. As such, we would encourage planning to seek solar assets which provide land for grazing and/or pollinating insects where this has local benefits.
We also note advice from the UK Building Research Establishment on the colocation of agriculture and solar PV generation assets: https://www.bre.co.uk/filelibrary/nsc/Documents%20Library/NSC%20Publications/NSC_-Guid_Agricultural-good-practice-for-SFs_0914.pdf

Q105 Are the current National Policy Statement on Electricity Transmission (NPSET) and National Environmental Standards for Electricity Transmission Activities (NESETA) fit-for-purpose to enable accelerated development of renewable energy?

Respondent skipped this question

Q106 What changes (if any) would you suggest for the NPSET and NESETA to accelerate the development of renewable energy?

Respondent skipped this question

Q107 Can you suggest any other options (statutory or non-statutory) that would help accelerate the future development of renewable energy?

We would encourage Government to investigate the costs and benefits of mandatory carbon emissions reporting by organisations over a particular size. At a simple level, this could just be carbon emissions associated with primary energy – fuel, transport and electricity. This could utilise existing toolsets (see below) and would allow a clear, low-cost means for organisations to reflect on and measure their emissions.
As part of the development of solar projects, we regularly calculate the carbon savings. To assist with carbon saving reporting, we would recommend that the Government provide a specific tool for determining savings associated with on-site renewable electricity generation. One simple method would be to extend the existing Ministry of Environment tools for “Measuring, reporting and offsetting greenhouse gas emissions.”

Page 17: Section 8: Supporting renewable electricity generation investment

Q108 Do you agree there is a role for government to provide information, facilitate match-making and/or assume some financial risk for PPAs?

provide information	**Strongly agree**
facilitate match-making	**Strongly agree**
assume some financial risk	**Strongly agree**

Q109 Would support for PPAs effectively encourage electrification?

Yes - support for PPAs would effectively encourage electrification

Q110 Would support for PPAs effectively encourage new renewable generation investment?

Yes - support for PPAs would effectively renewable generation investment

Q111 How could any potential mismatch between generation and demand profiles be managed by the Platform and/or counterparties?

If Government wishes to pursue PPAs with specific sites, then we would note it is international best practice for them to sign a take or pay agreement. Otherwise the investment is too risky and pushes up the costs of finance. For this reason, we would recommend PPAs into the wholesale, national electricity system where demand is much higher and much more assured (rather than with specific sites). All agreements should include a take or pay clause, to mitigate the risk of generation and demand mismatch.
Our vision is that energy supply from low carbon energy PPAs would be against whole New Zealand electricity demand. This removes the need to manage demand against a specific site.
In this case, we propose that a Government backed PPA scheme and Transpower work together in setting procurement limits on solar/wind in New Zealand so as to prevent mismatch between national supply and demand. Further, we would highlight that this can create a stable renewable industry rather than the boom/bust industries seen in other nations. Other countries – particularly Australia, the UK, Italy, Spain and Germany – have seen low carbon industries which have grown and then collapsed after sharp and sudden changes in policy. We believe that a managed deployment is key to building a domestic renewable energy industry that is pro jobs, continually improving and sustainable in the long term.
As is discussed in Q8.4, a PPA can still be designed to support the community and demand-side objectives of Government. However, by procuring PPAs against national demand we feel that supply/demand mismatches (which are complex) can be managed by system-wide experts.

Q112 Please rank the following variations on PPA Platforms in order of preference.1 = most preferred, 4 = least preferred.

Government guaranteed contracts	**1**

Q113 What are your views on Contract Matching Services? — **Respondent skipped this question**

Q114 What are your views on State sector-led PPAs? — **Respondent skipped this question**

Q115 What are your views on Government guaranteed contracts?

Government-backed PPAs have a number of advantages which positively shift the viability and cost of solar and wind generation in New Zealand which must be recognised:

1. Underwritten contracts attract investors with lower return requirements and this can immediately result in solar power generation at grid parity.
2. Government can recognise the impact on the economy that solar (and wind) have in stabilising electricity prices across New Zealand. Solar and wind keep water in the lakes and keep cheap hydro online for longer in wet and dry years.
3. Long term PPAs are shown worldwide to accelerate renewable investment – more so than cost reductions of materials.
4. New Zealand is in a unique position where PPAs can be offered at or close to grid parity.
5. Solar and wind technology reduce long term costs of electricity for the New Zealand economy through:

a. Reducing the costs of electricity

b. Reducing capacity shortages in dry years through keeping water in the reservoirs.

Evidence of the above is provided in our response to Q8.6.

3.2.2 Q8.2 Would support for PPAs effectively encourage electrification and new renewable generation investment?

As outlined in our response to Q8.6, and specifically Figure 1, it is our view that PPAs would immediately accelerate and encourage investment in renewable generation in New Zealand. Our evidence shows that the impact of these is stronger than waiting for future cost down or technology improvements given the maturity of solar and wind technology.

3.2.3 Q8.3 How could any potential mismatch between generation and demand profiles be managed by the Platform and/or counterparties?

If Government wishes to pursue PPAs with specific sites, then we would note it is international best practice for them to sign a take or pay agreement. Otherwise the investment is too risky and pushes up the costs of finance. For this reason, we would recommend PPAs into the wholesale, national electricity system where demand is much higher and much more assured (rather than with specific sites). All agreements should include a take or pay clause, to mitigate the risk of generation and demand mismatch.

Our vision is that energy supply from low carbon energy PPAs would be against whole New Zealand electricity demand. This removes the need to manage demand against a specific site.

In this case, we propose that a Government backed PPA scheme and Transpower work together in setting procurement limits on solar/wind in New Zealand so as to prevent mismatch between national supply and demand. Further, we would highlight that this can create a stable renewable industry rather than the boom/bust industries seen in other nations. Other countries – particularly Australia, the UK, Italy, Spain and Germany – have seen low carbon industries which have grown and then collapsed after sharp and sudden changes in policy. We believe that a managed deployment is key to building a domestic renewable energy industry that is pro jobs, continually improving and sustainable in the long term.

As is discussed in Q8.4, a PPA can still be designed to support the community and demand-side objectives of Government. However, by procuring PPAs against national demand we feel that supply/demand mismatches (which are complex) can be managed by system-wide experts.

3.2.4 Q8.4 What are your views and preferences in relation to different options A to D above?

We think that option C is the only viable and impactful means to accelerate the development of competitive, responsible solar generation in New Zealand. We have provided evidence to support this assertion within this response. This is true with the following caveats to manage deployment:

- We propose a capped procurement of renewable technology (set quarterly or biannually) with a mix of generation types selected. This may be done via an auction and limits the amount that is procured to keep the system in technical and economic balance. Projects are selected based on a merit order which reflects cost of energy and also objectives such as community ownership, reputability of developer, energy volumes, delivery date of the project or the consenting of other generation e.g. a large geothermal plant etc.
  - Under this arrangement, preference can also be given to community or demand-side projects as is desired by MBIE. Infratec strongly support this position as we see new electricity as offering the opportunity to return revenue to communities and to help reduce energy poverty. By backing PPAs, Government can both immediately stimulate a renewable energy industry (Q8.6) and influence investment which supports other objectives.
- A diverse mix of sources can be encouraged to overlay concerns around bioenergy impacts – and support technologies needed for decarbonisation of heat.
- Transpower sets the volumes and maximum project size of solar, onshore wind, offshore wind (and other technologies) that are awarded PPAs in order to ensure:
  - A proportional mix of renewable technology needed to transition New Zealand electricity to reduce risks of supply shortages in a dry year. I.e. transition from a system concerned with dry year supply risk to one which only risks shortages of low marginal carbon power in a year of low wind, sun and hydro.

o A responsible balance of supply of new renewables to ensure that supply of electricity is reasonable versus demand. Doing so on a national level ensures that the impact of new generation is tempered against a much larger demand profile. I.e. we think that viewing PPAs against national electricity demand means that the natural variation of wind/solar can be negated (see below how we still think local benefits can be derived).
o To cap project size to encourage assets to be spread regionally to maximise local benefits and by a mix of investor types i.e. not one large mega-project of 500MW, rather have 50 reasonable projects of 10MW each.
- A managed and continuous investment in new renewables in order to allow the existing electricity market and assets to evolve their technical and commercial arrangements to respond to renewable growth. This can help avoid the issues of duck curves/negative pricing seen in other markets as well as stranded thermal assets (see comments on this in our response to Q8.29). Hence we propose quarterly or biannual auctions for contracts.
- Consider mechanisms in order to ensure as much revenue as possible remains within the country and with New Zealand companies.
- The placing of maximum buy price on each PPA auction to ensure costs of low carbon energy are beneficial to the system. To determine these, Government would need to balance what a realistic price would be relative to carbon saving, recent grid pricing and long-run power price forecasts.

In our answer to Q8.6, we provide evidence to show the impact that we think Government contracts can have on solar in New Zealand.

In addition, we make the following notes on the other options:

- Option A – contract matching
o We would support this exercise as it can support the development of contracts under option C and also help participants (developers, consumers) to engage in the electricity industry. Standard contracts should reduce concerns/perceived risks from PPAs and so help accelerate the market.
o Much work on PPA contracting has been completed in other markets and so we do not see huge risks or costs in this exercise relative to the potential impact.
- Option B – State sector led
o Government should be seeking PPA contracts for renewable electricity under private contracts with suppliers/installers in order to reduce bills and show environmental vision. However, this is all it should be viewed as – and we are of course willing to offer such services to Government.
o We feel that pursuit of option C (which impacts the whole electricity industry) would have a greater and more measurable impact on emissions reduction and accelerating renewables. We also feel that the benefits can therefore be accrued by more sectors of the economy.
o We also feel this this option (and our recommendations on the design of that system listed above) combines the lessons learned from feed-in-tariffs and renewables obligation certificates – namely providing the right type of affordable investment to accelerate renewables, allowing deployment costs/rates to be managed and ensuring generation which reduces the costs of electricity in New Zealand
- Option D – clearing house
o This option may look appealing but risks being complex and difficult to manage in the medium term. These activities would likely be handled by existing suppliers and aggregators in a functioning market.
o We would instead recommend that the PPA is retailed directly into the electricity market with guaranteed offtake of contracts by the market at a price set and backed by Government during Option C.

Q116 What are your views on a Clearing house for PPAs?

Respondent skipped this question

Q117 For manufacturers: what delivered electricity price do you require to electrify some or all of your process heat requirements?

Respondent skipped this question

Q118 For manufacturers: is a long-term electricity contract an attractive proposition if it delivers more affordable electricity?

Respondent skipped this question

Q119 For investors / developers: what contract length and price do you require to make a return on an investment in new renewable electricity generation capacity?

Our evidence shows that long-term contracts with a bankable off-taker have more of an impact on reducing costs than gains in scale, improvements in technology and efficiency gains in industry (see Figure 1). Solar generation It is our belief that a 25 year PPA term is required in order to make an attractive return. This mirrors the performance warranty of solar panels from tier one solar panel manufacturers (at least 25 years). Solar energy projects are capital intensive with low running costs and long operational lives. As such, a long term, predictable revenue stream is essential for a solar PV investor to accept lower levels of returns. This is evidenced by analysis completed by Infratec on the potential PPA pricing from solar PV under different scenarios (Figure 1). As shown, de-risking and lengthening contracts can reduce the PPA price by over 50% and as such this analysis strongly asserts that Government-backed PPAs can immediately accelerate solar PV investment in New Zealand. To further support this, Figure 2 shows the projected costs of a solar PV asset as a percentage of the capital investment. Under this scenario, the following are examples of different risk levels: - High risk: no floor price AND/OR single customer with high credit risk AND/OR commercial customer operating in market with unstable revenue - Medium risk: single customer for solar generation – some risk of customer defaulting on payment - Low risk: floor price or fixed price contract with low credit risk, stable contracting party. Government-backed contracts. This highlights how much cash is committed in construction of the project and consequently how valuable long term contracts are in reducing the revenue requirements and reducing risks for investors. (We have provided additional information via email)

Q120 For investors / developers: is a long-term electricity contract an attractive proposition if it delivers a predictable stream of revenues and a reasonable return on investment?

Yes,
Please explain your answer:
This is essential to attract the low capital needed for solar PV investment to be accelerated. Our additional evidence (submitted by email) supports this findings.

Page 18: Section 8 - continued

Q121 Do you consider the development of the demand response (DR) market to be a priority for the energy sector?

Yes,
Please explain your answer:
DR already manages some problems in the electricity industry. Further, DR has an expanding role as networks become more constrained and there is growth in flexible generation. As stated in our response to Q8.7, we feel that industry is already delivering DR.

Q122 Do you think that demand response (DR) could help to manage existing or potential electricity sector issues?

Respondent skipped this question

Q123 What are the key features of demand response markets?

Respondent skipped this question

Q124 Which features of a demand response market would enable load reduction or asset use optimisation across the energy system?

Respondent skipped this question

Q125 Which features of a demand response market would enable the uptake of distributed energy resources?

Respondent skipped this question

Q126 What types of demand response services should be enabled as a priority?

New Zealand has particularly high lines charges relative to other countries. As such, we would encourage alternative network solutions/non-network solutions (such as DR) where these are more cost effective than traditional poles and wires.
Further, as outlined our response to Q11.4 we do not believe that lines companies effectively report where demand response may be required. This includes:
1. Mapping where demand response constraints are and willingness to pay for demand response in regions. This could allow existing customers to identify assets they have or invest in new assets to support the grid. In particular, this could encourage people to invest in battery storage to support the electricity network and reduce lines costs for everyone.
2. Lines companies being forced to report the costs and assessment of non-network solutions in all cases where an investment of over $500k was made in their infrastructure. This is designed to ensure that (a) lines companies are considering new technology (b) assumptions are being benchmarked against other lines companies and (c) that there is a greater chance of investment in non-network solutions in areas where they offer savings to consumers.

Q127 Which services make sense for New Zealand? **Respondent skipped this question**

Page 19: Section 8 - continued

Q128 Would energy efficiency obligations effectively deliver increased investment in energy efficient technologies across the economy? **Yes**

Q129 Is there an alternative policy option that could deliver on this aim more effectively? **Respondent skipped this question**

Q130 If progressed, what types of energy efficiency measures and technologies should be considered in order to meet retailer/distributor obligations?

We do feel that there is a need for efficiency improvements to cover electricity, heat and transport sectors. Efficiency is estimated to have been responsible for as much carbon saving as closure of coal power stations in the UK. However, we do not have any specific proposals on how this may be achieved.

We would recommend that domestic solar and battery storage be included as energy saving technology options to make clear that investment by lines companies is optional. This means lines companies can invest where there are proven savings to consumers in addition to valuation of network benefits. There is some precedent for this.
- In some markets, solar electricity is defined as an energy saving/energy efficiency measure. In the UK, this has been done to allow GST (VAT) exemption, as under EU regulations energy efficiency products can be classified as VAT exempt.
- Domestic solar technology directly reduces the use of fossil fuels and can reduce transmission losses. The classification of small-scale solar generation and energy storage as an energy efficiency technology (along with associated incentives) may permit direct investment by suppliers and lines companies in these technologies.

We encourage MBIE to evaluate work in this area carried out by the Microgeneration Certification Scheme in the UK which covers:
- Technical standards
- Standards to protect consumers
- Standardised calculations to determine energy bill savings with solar and/or battery storage
- Certification for domestic installations to receive payments from energy suppliers

Specifically, we would highlight that the following guidance may be adapted for New Zealand:
- https://mcscertified.com/wp-content/uploads/2019/08/MGD-003-Guidance-Note-Self-Consumption.pdf
- https://mcscertified.com/wp-content/uploads/2019/09/MIS-3002.pdf
- https://mcscertified.com/wp-content/uploads/2019/08/Irradiance-Datasets.xlsx

We also note the following brand new standard in the UK which Infratec employees have helped to develop:
- https://mcscertified.com/wp-content/uploads/2020/01/MIS-3012_Battery-Storage-Systems-V0.1.pdf

Q131 Should these be targeted at certain consumer groups?

Respondent skipped this question

Q132 Do you support the proposal to require electricity retailers and/or distributors to meet energy efficiency targets?

Please explain your answer:
Although we recognise the role of retailers and distributors in energy efficiency targets, Infratec would also support the involvement of lines companies in investing in and having a regulatory responsibility for energy efficiency. It should be highlighted that lines companies can be viewed as natural investors in energy efficient technologies as they are seeking long term investment returns, have a mechanism for financial returns and will install the technology where it has most network benefit. In addition:
- Lines companies have capital to invest in areas of energy poverty – i.e. areas with most to benefit from the solar and batteries, but the least capital to invest. - Lines companies can value the savings/impact of solar and batteries regardless of the credit worthiness or longevity of home occupiers or small businesses. I.e. they are less exposed to credit risk than electricity retailers. - Lines companies have the inherent resource to maintain solar and batteries assets as needed e.g. preventative and reactive maintenance. - Lines companies have the ability to install solar and batteries with minimum safety and electrical standards as needed to protect consumers and networks.
- Some lines companies have a specific community ownership and/or community responsibility within their remit/ownership structures. One way in which this may be achieved is by reclassifying solar and battery energy storage as products which improve energy efficiency. This may be justified through their role in reducing transmission losses. Reclassification may therefore permit lines companies to invest in solar/storage within the existing regulatory framework. We have previously undertaken consultancy work to estimate the impact that energy efficiency and distributed generation have on revenues for lines companies. We see strong value in this work being undertaken for MBIE or the Commerce Commission as it can help validate advice received from lines companies on such impacts. Although we cannot share specific information at this stage due to client confidentiality reasons, we are able to provide similar analysis to Government on this question based on in-house technical, practical and academic experience.

Q133 Which entities would most effectively achieve energy savings?

Respondent skipped this question

Q134 What are the likely compliance costs of this policy?

Respondent skipped this question

Page 20: Section 8 - continued

Q135 Do you agree that the development of an offshore wind market should be a priority for the energy sector?

Neither agree nor disagree

Q136 What do you perceive to be the major benefits to developing offshore wind assets in New Zealand?

We strongly believe that New Zealand can deliver a 100% low carbon energy system with a mixture of onshore wind, offshore wind and solar being added to the electricity mix alongside biofuel/hydrogen. We have modelling data to support our findings and also note that this was the finding of a journal paper written in 2010 . As such, we strongly feel that diversifying the electricity generation mix with new low carbon technology is key to 100% decarbonisation of New Zealand electricity.
We note that a disproportionate amount of policy support for offshore wind over other technologies has been made in other markets (notably the UK) which has damped investment in other low carbon energy types. This has led to thousands of job losses within the solar and onshore wind sectors in other markets . We strongly feel that a balanced growth of new energy technologies is needed for a pro-job, pro-decarbonisation energy strategy. A viable and low-cost electricity sector is one with diverse generation sources – wind, solar, geothermal, hydro and bioenergy.
Details of our 100% low carbon vision can be found at https://www.infratec.co.nz/about-us/our-vision
As stated in our response to other questions in Section 8 of the consultation, we value all forms of low carbon electricity generation for addressing the following in the New Zealand power sector:

- Capacity shortages against existing and projected future electricity demand
- The impact/likelihood of dry years affecting high electricity pricing
- The need for low carbon energy to decarbonise process heat and transport sectors in particular

This is only true if all low carbon generation is supported and as such the risk we see is favouring of a single technology. This is something that we seek to mitigate through our proposed PPA framework described in our response to other questions.

Q137 What do you perceive to be the major costs to developing offshore wind assets in New Zealand?

Respondent skipped this question

Q138 What do you perceive to be the major risks to developing offshore wind assets in New Zealand?

Respondent skipped this question

Page 21: Section 8 - continued

Q139 This policy option involves a high level of intervention and risk. Would another policy option better achieve our goals to encourage renewable energy generation investment?

Respondent skipped this question

Q140 Could the proposed policy option be re-designed to better achieve our goals?

Respondent skipped this question

Q141 Should the Government introduce Renewable Portfolio Standards (RPS) requirements?

Respondent skipped this question

Q142 At what level should a RPS quota be set to incentivise additional renewable electricity generation investment?

Respondent skipped this question

Q143 Should RPS requirements apply to all electricity retailers?

Respondent skipped this question

Q144 Should RPS requirements apply to all major electricity users?	**Respondent skipped this question**
Q145 What would be an appropriate threshold for the inclusion of major electricity users (i.e. annual consumption above a certain GWh threshold)?	**Respondent skipped this question**
Q146 Would a government backed certification scheme support your corporate strategy and export credentials?	**Respondent skipped this question**
Q147 What types of renewable projects should be eligible for renewable electricity certificates?	**Respondent skipped this question**
Q148 If this policy option is progressed, should electricity retailers be permitted to invest in energy efficient technology investments to meet their renewable portfolio standards? (See option 8.3 on energy efficiency obligations).	**Yes,** Please add a comment: It may be worthwhile for major electricity users to be able to invest in community energy projects in order to offset their own emissions. This would only be true where these have a demonstrable effect in reducing emissions in New Zealand which are equivalent to carbon savings. For example, a major user may invest in a small windfarm to reduce grid carbon emissions to defer an investment in process heat decarbonisation. However, the user would need to demonstrate that this provides equivalent carbon savings to deferring a process heat decarbonisation. This policy could be effective in encouraging emissions savings – business would want to invest in energy technologies where they can return revenue and as such this may lead to investing in their own efficiency/decarbonisation projects.
Q149 If this policy option is progressed, should major electricity users be permitted to invest in energy efficient technology investments to meet their renewable portfolio standards? (See option 8.3 on energy efficiency obligations).	**Respondent skipped this question**
Q150 What are the likely administrative and compliance costs of this policy for your organisation?	**Respondent skipped this question**

Page 22: Section 8 - continued

Q151 This policy option involves a high level of intervention and risk. Would another policy option better achieve our goals to encourage renewable energy generation investment?	**Respondent skipped this question**
Q152 Could this policy option be re-designed to better achieve our goals?	**Respondent skipped this question**

Q153 Do you support the managed phase down of baseload thermal electricity generation?

Strongly support

Q154 Would a strategic reserve mechanism adequately address supply security, and reduce emissions affordably, during a transition to higher levels of renewable electricity generation?

Respondent skipped this question

Q155 Under what market conditions should thermal baseload held in a strategic reserve be used?

We strongly support a phase down of thermal generation and we would strongly urge Government to set an aspirational target at which thermal electricity generation is no longer used for baseload in New Zealand. This is a policy which has been successful in other countries.
Diversification of supply to wind and solar alongside geothermal, battery and hydro means that thermal plants should transition from baseload to strategic reserve/peaking assets. This reduces the volume of fuel needed to drive thermal plants each year – and as such opens up the potential for sustainable alternatives. As such, we would support shifting thermal assets to sourcing fuel from lower carbon and sustainable sources like bioenergy, anaerobic digestion and possibly hydrogen. Details of our modelling are set out at:
https://www.infratec.co.nz/about-us/our-vision
We also note that these alternatives may have impacts outside the direct participants. For example, large scale biomass may foster a whole new value stream for the agricultural industry. This needs to be considered.
The transition to wind, solar, hydro and geothermal for the majority of annual electricity generation also changes the nature of thermal plants and means they may rarely be used. This affects how the economics of these plants can be viewed – perhaps allowing a higher marginal price of electricity from thermal plants conditional on rare operation of the facilities.
Today, New Zealand's electricity is managed with respect to the dry winter problem i.e. having sufficient backup to meet electricity demand why hydro resources are low. Our modelling shows that adding wind and solar to the New Zealand electricity mix de-risks dry year supply issues. It means that wind and solar provide low carbon energy to reduce total hydro generation needs as well as providing additional capacity to support underlying growth in electricity demand. This demand, as reported by Transpower, needs to rise to support decarbonisation of transport and heat sectors.
Our proposal turns New Zealand from having supply shortages in a dry year – which may occur once a decade – to one where supply shortages occur in a year of low wind, low sun and dry hydrological conditions. This meteorological scenario is clearly incredibly unlikely – and as such our proposal reduces supply risks for New Zealand.

Q156 Would you support requiring thermal baseload assets to operate as peaking plants or during dry winters?

Yes

Q157 What is the best way to meet resource adequacy needs as we transition away from fossil-fuelled electricity generation and towards a system dominated by renewables?

It is clear that a future grid will require peaking assets within something akin to a capacity market. We would highlight that international experience of such markets has seen peaking generation from fossil fuel sources. Some New Zealand hydro assets may also be used (or modified to be used) as peaking plants. This is not necessarily an overtly negative carbon story where peaking assets are used infrequently. However, we feel that there is an opportunity to encourage lower carbon generation. As such, we would seek a capacity market which prioritises low carbon generation and energy storage over fossil fuel plants. This could be done by including carbon costs within the evaluation of different bidders into the capacity market.

Page 23: Section 8 - continued

Q158 Do you have any views regarding the options to encourage renewable electricity generation investment that we considered, but are not proposing to investigate further? (See pages 90 - 92 of the Accelerating renewable energy and energy efficiency discussion document).

We are aware of interesting proposals for a large pumped storage facility, but we wish to see further evidence of the merits of this relative to other energy storage options. As such, we would recommend that Government commission a study of the potential feasibility, cost, benefits (from a whole energy system perspective) and local/international environmental impacts of storage options in New Zealand including, but not limited to:

- Feasibility and costs of retrofitting pumped storage to each of New Zealand's existing large hydro generation assets.
- Storage potential from future electrification of vehicles including regulations and standardisation of charging infrastructure. The latter is particularly important for open access of charging to all vehicle owners and significantly in ensuring that the required charging infrastructure exists to support the networks and electricity system.
- Flexibility afforded through generation of hydrogen via electrolysis.
- A large pumped storage facility.

Page 24: Section 9: Facilitating local and community engagement in renewable energy and energy efficiency

Q159 Should New Zealand be encouraging greater development of community energy projects? **Yes**

Q160 What types of community energy project are most relevant in the New Zealand context?

Infratec strongly believe that community energy should be a key part of the development of New Zealand's renewable energy strategy, particularly technologies like solar and storage which are accessible by small communities. Diversification of energy generation to include solar, onshore wind and offshore wind should be explicitly stated in the New Zealand Renewable Energy Strategy. Diversification reduces the risk of a dry year impact on price and security of supply.
Energy storage has particular benefits to communities such as enabling local energy trading services, reducing network costs, providing resilience and stimulating renewable investment. We would highlight that network and resilience issues should be considered by lines companies as part of their regulatory responsibility and asset management planning. These benefits should be particularly acute in New Zealand which has long distribution lines, remote communities and geological resilience constraints.
Solar energy can be used to provide electricity generation for the NZ electricity system as a whole as well as providing impacts on energy saving/energy poverty on a local level and job creation.
However, it needs to be recognised that community energy projects require a level of understanding and capital investment which may be beyond what is available to communities who can benefit most from these technologies.
As such, we would support financial incentives from Government to support the development of community energy projects which serve wider community benefits. This may include tax incentives, funding for pilot projects or guaranteed export rates for community energy projects.
Pilot project support could be particularly beneficial, particularly where these provide open business models to support other community projects.
We would also highlight the leading work being performed by New Zealand companies installing solar/battery storage to reduce diesel generator use and expand electricity provision across the Pacific. As such, New Zealand companies who have worked under MFAT, World Bank, EU and ADB projects and are now seeking to transfer that knowledge locally.
With respect to the proposition for Government backed PPAs in the New Zealand context, this would give the Government the ability to influence the types of community energy projects that are implemented. Specifically, by having regular, capacity-capped auctions for different technologies, Government can develop weightings and frameworks to encourage particular features of generation assets.
Infratec strongly supports local community engagement and benefit within energy projects, and we view this as a key strength of our proposition and success across the Pacific and New Zealand. Further, shifting the electricity system from one of large central generation to one of many distributed generation sources provides an opportunity to return energy profits to communities. We feel that PPAs could be designed in such a way to ensure that these benefits are realised.
With solar PV, we would specifically support investigation of the following as mechanisms to specifically promote community involvement:
- A cap on the size of a solar PV generation asset which is eligible for PPA retail – notionally 5-10MWp.
- Valuing higher priced PPAs which provide revenue for community energy initiatives such as insulation or efforts for economic diversification.
- Requiring a local ownership component within a project structure.
- Allowing communities to purchase electricity from the solar PV asset instead of the PPA holder where this benefits both the PV owner and the community.

Q161 What are the key benefits of a focus on community energy?

With respect to solar PV, the following risks should be highlighted by focussing on community energy:
- A potential lack of access to capital in order to develop projects.
- Delays associated with community engagement and legal structuring.
- Reduced reward of low power from large solar schemes with lower costs of electricity generation.
- Potentially avoiding solar PV investment in higher yield areas where community sizes are smaller.

We therefore recommend that PPA auctions are open to all projects so that solar energy industry growth is not held back by a pure community requirement. We also recommend that PV does not need to be co-located with a community e.g. a community in Southland could invest in a project in Northland.

Q162 What are the key downsides or risks of a focus on community energy? **Respondent skipped this question**

Q163 Have we accurately identified the barriers to community energy proposals?

No,
Please explain your answer:
We note that there are significant barriers for true peer-to-peer energy trading such as between houses in residential areas. This is commonly a barrier to some community energy projects and as such we would encourage the regulations around trading to be reviewed with respect to enabling/barriers to community energy.

Q164 Which barriers do you consider most significant? You may select more than one answer.

Other (please specify):

Access to capital may be problematic for community groups – particularly those in the most acute energy poverty. As such, we recommend the following: - Investigating if low cost capital can be made available for community energy schemes via the Green Investment Bank. - Providing seed funding for community energy projects, but only where the business cases are publicly reported to stimulate and encourage other investment.

Q165 Are the barriers noted above in relation to electricity market arrangements adequately covered by the scope of existing work across the Electricity Authority and electricity distributors?

Respondent skipped this question

Q166 What do you see as the pros of a clear government position on community energy?

Respondent skipped this question

Q167 What do you see as the cons of a clear government position on community energy?

Respondent skipped this question

Q168 What do you see as the pros of government support for pilot community energy projects?

Respondent skipped this question

Q169 What do you see as the cons of government support for pilot community energy projects?

Respondent skipped this question

Q170 Are there any other options you can suggest that would support further development of community energy initiatives?

There are cases where community energy benefits are tied in with electricity network savings through deferral of investment. At this time, we do not see it being easy for communities and lines companies to both realise benefits of community energy projects. For example, a community may wish to install a battery along with a solar asset to participate in electricity price arbitrage and shifting of solar from day to evening use. The local lines company may also be able to utilise the battery to defer investment in a new line/substation to meet peak load growth.
As such, we would like the Government to consider the following:
1. Better mapping of network constraints such as having lines companies map constrained areas on their websites (in addition to and as part of the asset management planning process).
2. Consider how lines companies can fairly consider co-investment in community energy and return those savings to consumers.
3. Ensure that energy resiliency (via energy storage) and energy generation (solar/wind) are available to communities through the Provincial Growth Fund.

Page 25: Section 10: Connecting to the national grid

Q171 Please select the option or combination of options, if any, that would be most likely to address the first mover disadvantage.	**Respondent skipped this question**
Q172 What do you see as the disadvantages or risks of Option 10.1?	**Respondent skipped this question**
Q173 What do you see as the disadvantages or risks of Option 10.2?	**Respondent skipped this question**
Q174 What do you see as the disadvantages or risks of Option 10.3.1?	**Respondent skipped this question**
Q175 What do you see as the disadvantages or risks of Option 10.3.2?	**Respondent skipped this question**
Q176 Would introducing a requirement, or new charge, for subsequent customers to contribute to costs already incurred by the first mover create any perverse incentives?	**Respondent skipped this question**
Q177 Are there any additional options that should be considered?	**Respondent skipped this question**

Page 26: Section 10 (continued): Connecting to the national grid

Q178 Do you think that there is a role for government to provide more independent public data?

Yes,
Why or why not?:
We feel that information about networks could be improved and that this should be done via lines companies as discussed in Q10.6. We believe that there is a need for greater information on electricity network capacity which is not addressed by the consultation. Further, we feel that this should be addressed by lines companies at the request of Government. The reasons for this are as follows. Electricity network information is vital in the planning of renewable energy as it tells developers the required information about whether the network is strong enough for the distributed energy resources. This is information which is held by all lines companies, but which is frequently not available. This kind of information can help developers quickly find available locations for projects, or restrict sizing – and reduce the lengthy dialogue needed to make these trivial decisions. Infratec have previously recommended that generation and demand constraint heat maps should be provided by all EDBs within New Zealand. This recommendation was made to Transpower on behalf of Infratec by BusinessNZ. Examples of this in other markets include this heat map by UK Power Networks (https://www.ukpowernetworks.co.uk/internet/en/our-services/documents/EPN-heat-map-190314.pdf). We have seen that this mechanism is positive to the market, and would have significant advantages to developers of small and large scale community energy: - It reduces the development time for projects by quickly enabling the identification of capacity in networks. It needs to be stressed that the future electricity system should see hundreds of thousands of applications for renewable generation assets and as such, heat maps can reduce the burden on lines companies and developers when enquiring about likely network capacity. - It helps planners to identify the best areas to seek consent for new generation. - It provides policy makers and regulators with greater insight for planning and supporting various generation technologies. - It helps provide evidence for groups, such as community and iwi groups, when highlighting the need for investment in networks to support local objectives.

Q179 Is there a role for Government to provide independent geospatial data (e.g. wind speeds for sites) to assist with information gaps?

Yes

Q180 Should MBIE's Electricity Demand and Generation Scenarios (EDGS) be updated more frequently?

Respondent skipped this question

Q181 If you said yes, how frequently should they be updated?

Respondent skipped this question

Q182 Should MBIE's EDGS provide more detail, for example, information at a regional level?

Respondent skipped this question

Q183 Should the costs to the Crown of preparing EDGS be recovered from Transpower, and therefore all electricity consumers (rather than tax-payers)?

Respondent skipped this question

Q184 Would you find a users' guide (on current regulation and approval process for getting an upgraded or new connection) helpful?

Respondent skipped this question

Q185 What information would you like to see in such a guide?

Infratec would like to highlight that a resource mapping exercise for solar energy potential is already available from a variety of academic and industry sources. However, we would highlight that New Zealand lags behind in terms of the quality of information available about the savings and benefits of wind/solar investments to interested groups. As such, we would recommend that MBIE expand the remit of EECA or request that organisations like SEANZ undertake exercises to improve their investment advice and carbon saving calculations in line with international expertise. This may include reflecting on leading work being completed by the Microgeneration Certification Scheme on standards and returns calculations of solar and energy storage in the UK.
Please see https://mcscertified.com/wp-content/uploads/2019/08/Irradiance-Datasets.xlsx for a suitable example of effective communication which protects consumers.

Q186 Who would be best placed to produce a guide?

Respondent skipped this question

Page 27: Section 10 (continued): Connecting to the national grid

Q187 Do you think that there is a role for government in improving information sharing between parties to enable more coordinated investment?

Respondent skipped this question

Q188 Is there value in the provision of a database (and/or map) of potential renewable generation and new demand, including location and potential size?

Respondent skipped this question

Q189 If so, who would be best to develop and maintain this?

Respondent skipped this question

Q190 How should it be funded?

Respondent skipped this question

Q191 Should measures be introduced to enable coordination regarding the placement of new wind farms?

Respondent skipped this question

Q192 Are there other information sharing options that could help address investment coordination issues? What are they?

We feel that provision of additional information on line capacity and planning resource maps for wind could help facilitate improved and faster consenting of wind assets. This should encourage investment by reducing development costs and risks – whilst also encouraging wind in favourable areas.
3.4.15 Q10.14 Are there other information sharing options that could help address investment coordination issues?
Infratec would like to see MBIE to commission a tool to allow industry actors and interested parties to assess different means of decarbonisation. We would highlight the work done by Prof David Mackay in the UK who worked with the Department of Energy and Climate Change to produce a 2050 calculator (http://2050-calculator-tool.decc.gov.uk/#/home) which allowed people to investigate different decarbonisation pathways. This work could be commissioned using resources in industry (Transpower and developers) as well as academia working in partnership and as such could encourage relationships to stimulate low carbon investment ideas – as well as providing a valuable resource for industry.

Page 28: Section 11: Local network connections and trading arrangements

Q193 Have you experienced, or are you aware of, significant barriers to connecting to the local networks? Please describe them.

- We note some projects can be delayed by issuing of a suitable meter. At scale, we would anticipate that project teams can manage these issues – but the issue may remain and as such delay deployment of smaller solar in New Zealand.
- In other countries, we have seen cost issues arising from uncertain connection requirements. A particular example is grid protection relays on projects in Australia which were poorly defined and as such led to installers being exposed to costs by network operators after a contract was signed. Clear standards are needed to overcome the regional differences that can occur with different lines companies. We propose a revaluation on connection agreements/processes in different lines companies and consider how their connection rules and standards can be harmonised – rather than just standardised pricing. The remit may also extend to ensuring that lines companies are sharing information and learning (for example, how to respond to different inverter types and inconsistent site acceptance procedures).
- We would recommend stronger guidance or regulation from the EA to ensure that lines companies open up their networks to export of electricity.

Q194 Are there any barriers that will not be addressed by current work programmes outlined on pages 118 - 122 of the discussion document?

Respondent skipped this question

Q195 Should the option to produce a users' guide (see Option 10.6 on page 110) also include the process for getting an upgraded or new distribution line?

Respondent skipped this question

Q196 Are there other Section 10 information options that could be extended to include information about local networks and distributed generation?

Respondent skipped this question

Q197 Do the work programmes outlined on pages 118 - 122 cover all issues to ensure the settings for connecting to and trading on the local network are fit for purpose into the future?

Respondent skipped this question

Q198 Are there things that should be prioritised, or sped up?

Respondent skipped this question

Q199 What changes, if any, to the current arrangements would ensure distribution networks are fit for purpose into the future?

Infratec strongly feels that stronger regulation is needed to ensure that all lines companies (including Transpower) are considering alternative network solutions as part of their investment and asset management planning. Alternative network solutions are the use of technologies (particularly battery energy storage) to reduce investments in pole and wire infrastructure, improve the resiliency of networks and encourage renewable investment.
There are numerous international examples of such projects offering value to consumers and some early examples in New Zealand.
As such, we would like to see improved reporting from lines companies of where and how they have assessed non-traditional network solutions and the financial/technical/resilience reasons to justify the final investment decisions made. This may be something for the Commerce Commission to investigate. As such, we propose that:

- Lines companies and Transpower are forced to disclose their investigations of alternative network solutions for all major upgrades (>$500,000 investment)
- Lines companies and Transpower provide clearer information on where constraints occur – in particular to open the market to consumers to offer services to assist the network (e.g. utilising existing demand response assets or batteries). This should be done via a map on lines company websites.

Page 29: Additional comments

Q200 Do you have any additional feedback?

We have attempted as much as possible to use the online submission format. However, we have provided extensive supporting evidence to our proposal which is in the attached document. This document is also well formatted with respect to the document structure

We are happy to (and expect to) be consulted on our submission by MBIE. To arrange this, please contact andrew.crossland@infratec.co.nz and greg.visser@infratec.co.uk

Q201 You may upload additional feedback as a file.File size limit is 16MB. We accept PDF or DOC/DOCX.

MBIE Consultation - Infratec - v10.docx (180.7KB)