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

28 February 2020

Accelerating Renewable Energy and Energy Efficiency

Dear Sir/Madam,

Thank you for the opportunity to contribute to the discussion on how to accelerate the uptake of renewable energy in New Zealand. At emhTrade we recognise that we are privileged to have the opportunity to help lead the industry into the future, and participating in this process is one of the ways in which we are able to do that.

emhTrade is a technology business based in Auckland with deep experience in electricity markets. We've been active participants in the wholesale electricity market since 2012, hold reconciliation participant certification, and have developed a number of software products including the world's first residential peer-to-peer electricity platform (trialed on Waiheke Island and in Blueskin Bay) as well as app-based demand response mechanisms. We envision a future with a transactive grid that allows the capability of distributed energy resources to be accessed by different parts of the supply chain at different times, but on terms and according to the preferences of their owners - tomorrow's consumers.

We are pleased to see this discussion paper exploring various ways in which we, as a country, can more rapidly make the changes necessary to meet our climate change objectives. Below, we have answered some specific questions where we feel our perspective can add value to the debate.

If you have any further questions or require clarification on any our responses, please don't hesitate to contact me on stu.innes@emhtrade.com

Yours faithfully,

Stu Innes,
CEO
emhTrade

Question responses

	Section 8: Supporting renewable electricity generation investment.

	Our Perspective: As the developers of the SolarShare peer-to-peer solar service, we have been involved in development and discussion of PPAs in NZ for 5 years. Our platform has allowed the aggregation and subsequent disaggregation of PPAs on a level of granularity down to the household consumer at half-hourly intervals. We also support a number of commercial scale (>100KW) PV installations through this platform. For a number of years we have been conducting deep R&D on flexibility market platforms, specifically focusing on how to integrate DERs and behind-the-meter flexibility resources in a way that allows their capability to be utilised by different parties within the supply chain. We have a vision of the future in which highly granular (temporally and geographically) price signals allow for the efficient use of consumer-owned assets in a way which is reflective of the individual preferences of those consumers. In doing so we'll enable lower cost networks and more rapid uptake of renewable (and intermittent) generation.
8.1	**Do you agree there is a role for government to provide information, facilitate match-making and/or assume some financial risk for PPAs?** Along the spectrum of support for PPAs, our view is that provision of information and potentially match-making are appropriate. Government acting as a formal broker and/or clearing-house for PPAs is beyond what is likely to be efficient. There are a number of commercial entities in NZ that are actively investigating PPAs as well as PPA matching services and platforms and there is a real risk that these activities are crowded out by Government activity in the space. The most effective role for the Government in encouraging PPAs would be to ensure carbon price paths are at a level that make renewable project costs an attractive alternative to wholesale electricity prices. When this occurs, PPAs will become a popular mechanism to transact, and platform, brokerage and clearing house business models will emerge (from today's players and others) to support that.
8.2	**Would support for PPAs effectively encourage electrification and new renewable generation investment?** Not without the fundamental economics changing. Whilst we agree that PPAs are an effective way to de-risk financing of renewable generation projects, and that their uptake will therefore facilitate greater renewable generation investment, we don't think there are any barriers to their use currently and so providing support is unlikely to increase renewable generation investment. There are numerous parties in the market, on both the buy and sell side, that are actively exploring PPAs. The fundamental issue is not the lack of a mechanism by which to transact, but rather a lack of price overlap between buyers and sellers. Where the costs of new generation projects are comparable or below expected wholesale market costs, buyers and sellers are transacting. The reason that there are so few PPAs in the market is that this price overlap is rare. Promoting and facilitating PPAs isn't going to create more in-the-money projects. Renewable generation costs are decreasing, but the effect of this could be further accelerated with higher carbon prices.

8.3	**How could any potential mismatch between generation and demand profiles be managed by the Platform and/or counterparties?** One of the most appealing aspects of PPAs from a renewable uptake perspective is that they can (and should) utilise granular time of use consumption and generation profiles. Other mechanisms, such as renewable energy certificates or annualised PPAs exacerbate the system issues caused by intermittent generation as there is no incentive for parties to align consumption with generation and/or procure other methods for matching profiles (physically or financially) such as peaking, demand response or storage. emhTrade's proprietary SolarShare matching engine has been operating in the market since 2016 (initially under the brand P2 Power) ensuring that energy transacted between parties is done so at a half hourly granularity, and allowing parties transparency in order to predict and procure their residual energy needs from their retailer and/or wholesale markets. Transparency of, and financial (and indeed social) incentive to resolve, profile mismatch is critical to the long term investment required in flexibility (through generation, consumption and storage) to transition the electricity system to be more renewable more rapidly.
8.4	**What are your views and preferences in relation to different options A to D above?**

	Option A: This may facilitate smaller developments participating in the market, but these tend to be the most uneconomic and therefore this option is unlikely to make any impact at the margin. We would be likely to participate in this tender process if it occurred given our experience and technology platform but we note that there are numerous parties in the market offering advisory services that may be crowded out. On balance we don't support option A. Option B: To some extent this is happening already. Numerous councils are actively considering PPAs and peer-to-peer alternatives. Given that, there may be some merit in coordinating across the state sector to bring efficiency and scale to this emerging trend. Again though, we note that price is still the key determinant of whether PPAs are likely to transact. For this to be effective it will need to be a hybrid of Option C and possibly include contribution towards PPA costs from Central Government Option C: We think this option has merit. Aside from the fundamental price barrier, the next most challenging issue with PPAs is the long-term nature of the transaction. There are few entities in New Zealand that are able to make a 15-20 year energy purchase commitment, and fewer still provide the long-term credit risk stability that is required to make a PPA an effective means of de-risking a renewable generation investment. This option could also include some explicit support/subsidy for the PPA price - which, whilst it does incur risk, is a more delicate way to solve the price mismatch problem than say feed-in tariffs (which we note are not proposed). Option D: Again, if this option was to be pursued, our technology and electricity derivative market capability would be well suited and we would likely participate in a tender process. However, we're confident that we could also perform this function independently if and when it became commercially viable. The paper notes that "Care would be needed in setting a level of government financial support if these sub-options are considered so as to not materially raise or influence the earnings of investors…", in which case it is premature to consider a role for a clearing house. While buyers and sellers are still not meeting on price, credit risk management and portfolio aggregation functions will not add value. Finally, we also note that there are still significant gaps in the electricity hedge markets for any entity that intends to use them to manage residual profiles, this despite recent moves by the EA to improve market making. The ability for the transfer of shape risk (through products other than baseload swaps) is virtually non-existent. This must be resolved in order to provide efficient price signals and risk transfer to investors in the technology that can manage these risks (through flexibility).
8.7	**Do you consider the development of the demand response (DR) market to be a priority for the energy sector?**

	We consider DR markets will be a critical piece of the renewable mix in future. In regards to the level of priority for the sector, yes we see the development of these markets as a priority, and have been conducting significant amounts of R&D, with the support of Callaghan Innovation into the development of transactive grid platforms that will facilitate flexibility transactions. However, we also note that further steps need to be taken to ensure there are willing buyers and sellers before the Government invests in platforms. In particular we observe that EDBs are not yet incentivised to consider flexibility as alternatives to traditional network assets. An attempt appears to have been made through DPP3 to put CAPEX and OPEX on an equal footing with changes to the IRIS incentives. However this doesn't address the strong incentive EDBs have to more heavily weight the AMP with CAPEX, particularly that which enters the RAB. Until this lack of incentive is addressed, EDBs are unlikely to play any meaningful role on the buy-side of a demand response or flexibility market. This change has been made through the European Clean Energy Package which has now led the UK to make flexibility services and CAPEX fiscally equivalent options. Whilst there is value to providing flexibility into the energy market, this can be easily captured today under existing market arrangements. We are encouraged to see that Transpower has been trialling procurement of demand response for grid investment deferral but our view is that flexibility will provide the most value to the distribution sector and while there are low incentives for them to try to capture this value, any market platform - including our own - is likely to be significantly under-utilised, which in turn will lead to under-investment in flexible resources, and subsequently slower uptake in renewable generation.
8.8	**Do you think that DR could help to manage existing or potential electricity sector issues?** Absolutely. We are working with a number of parties to trial specific use-cases for flexibility, to deliver value across both energy and transmission and distribution markets. New Zealand's high renewable scenarios - which are required if we are to meet our Paris obligations - all require significant amounts of flexibility in order to maintain a balanced system at affordable levels.

8.9	**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?** As noted above, the primary feature of any market - indeed the critical feature - is willing buyers and sellers. The importance of this is highlighted by the ongoing issues facing the electricity hedge markets and the precarious nature of their liquidity. Vertical integration removes the incentives from the vast majority of buyers and sellers to willingly transact, and so regardless of the features that have been rolled out - ASX as clearing house, various alternate products, various market-making agreements etc. The EA is still struggling to ensure that liquidity will be robust and sustainable (highlighted by declining liquidity metrics and ongoing regulatory intervention). Prior to considering features of a marketplace the correct incentives need to be in place to ensure there are likely to be willing counterparties. Only once that is achieved should the regulatory focus move to more efficiently facilitating trading. Assuming willing participants, the next most important feature of flexibility (and other support service) markets is that they are (or have a clear path to become) massively scalable. Emerging IoT technology that can provide flexibility services will need to be able to access marketplaces, and they will need to do this at scale (albeit potentially through various aggregation methods). As the world of distributed energy resources (DERs) emerges, we are moving toward a future in which the assets that can support the functions of the supply chain are no longer owned by the participants in that chain, but by the consumer. The markets that facilitate access to that capability must recognise that individual consumers will have differing preferences (utility and cost functions) and incorporate them into market mechanisms. Failure to do so will result in fewer assets being made available to the supply chain and the wider system. We are pleased to see the consideration of co-optimisation of assets across the supply chain. We think this is also a key feature of the optimal market mechanism for demand response. By making assets available to the highest value party in (near) real-time, asset utilisation can be greatly improved. Care must be taken therefore to ensure that the facilitators of these marketplaces are not participants themselves on one side or the other. For example it would be of concern to see the Grid Owner being tasked with facilitating a market in which they are one of the primary buyers. This would almost certainly lead to a lack of objective co-optimisation decisions when assets were facing competing bids from different parts of the electricity system.
8.10	**What types of demand response services should be enabled as a priority? Which services make sense for New Zealand?** We are technology agnostic in terms of the providers of flexibility. What is more pressing than enabling certain types of demand response is enabling commercially viable (such that it is CAPEX equivalent) procurement of demand response by EDBs.
	Section 9: Local and community energy engagement <u>Our Perspective:</u> emhTrade builds solutions for tomorrow's smart energy property developments. We created the world's first residential peer-to-peer solar sharing service, we operate the Blueskin Energy Network referenced in this paper, and we are involved in setting up a number of other pilot projects involving energy communities sharing solar and other DER capabilities.

9.1	**Should New Zealand be encouraging greater development of community energy projects?** emhTrade has independently identified community energy projects, specifically those involving shared use of DERs as opposed to community-funded renewable investment and other types of project, as being a key way to advance the energy infrastructure in New Zealand. We acknowledge the concerns regarding the scalability of these solutions, which understandably assume that the greatest decarbonisation impact per dollar is likely to come from large scale investments. However we suggest that much of the investment in distributed energy resources is likely to come from the general public, not from the government funds, and that these investments are likely to be made regardless of government's and industry's own investment decisions. As has happened in many countries, well-meaning but unguided investment decisions by private individuals can have negative effects on energy systems. Encouraging this investment to be optimised through energy communities with well-planned approaches could have the following benefits: ● Lower likelihood of infrastructure destabilisation ● More optimal use of the private investment dollar (i.e. less unused DER capacity) ● Greater access to new energy solutions for those who are financially constrained
9.2	**What types of community energy project are most relevant in the New Zealand context?** It is important to acknowledge that at this stage there is relatively little evidence with which to answer this question. As such, we suggest that a desirable approach is to pursue a wide range of projects, enabling quick identification of the types of project that work well. Notwithstanding this, we believe that the following types of projects are the most worthy of being pursued. *Projects that create a source of demand flexibility* Demand flexibility is a capability that will be of increasing value to the industry in order to manage load, defer asset investment and respond to more intermittent generation from solar and wind. As homeowners and small businesses increasingly adopt smart devices whose behaviour can be managed remotely (within the owner's preferences) there is an opportunity to use these devices to provide flexibility services to the industry. While individuals are unlikely to expend much effort to do this (especially in the early days), a community forum is much more likely to encourage them to do so, as well as being a way to aggregate multiple small providers into a single larger one. *Collective self-consumption projects* Homeowners with their own solar (or other generation) are accustomed to trying to maximise their self-consumption of the resultant energy, since doing so maximises the return on their investment. Community energy projects can be often be designed in such a way that instead of individuals having to consume their generated energy themselves, the community can share the energy (whether owned by the community or by individuals) at favourable prices compared to exporting their excess. This means that the ROI can be increased even further, which encourages larger systems to be installed. *Remote microgrid projects* Intuitively, remote settlements create a disproportionately high burden on distribution networks due to the length of the lines that must be maintained to serve them. Given the rural nature of much of New Zealand, new technology enables the opportunity to completely avoid these situations by creating local microgrids. Storage technologies are essential to such projects, but the amount of storage required can be minimised by applying the same demand

	flexibility principles discussed above.
9.3	**What are the key benefits and downsides/risks of a focus on community energy?** In addition to the benefits discussed in 9.1, we see the following benefits: *Kickstarting social change and acceptance* A strong influence on the adoption of DERs will be social acceptance. Being the first person on your street to get solar or an EV is a big step. Joining an energy community where someone else has already made the decision to invest in such assets is much easier. Once the community is established, it then helps to normalise sustainable energy technology for everyone that sees it. *Rapid experimentation and learning* With the right structures in place (such as an embedded network) energy communities can be used by EDBs as safe places in which to experiment with different types of tariff. This aids the type of tariff reform that the EA is seeking to support the future of energy. An example of this is a central North Island embedded network project that we are involved in. The network contains a large solar array, and we are working with the local EDB to trial smart tariffs that enable residents to share in the benefits of solar, provided they use power when the panels are generating. We have also identified the following risks: *Social inequality* The wealthy are more likely to invest in distributed energy technologies which allow them to make less use of the distribution network, and therefore make less of a contribution towards its costs; the burden of these costs then falls on everyone else - typically the less wealthy. As discussed in our response to question 9.1, this investment is going to happen anyway, but there is a risk that energy communities accelerate it. We believe that there are clear mitigations to this risk: 1. As discussed above, energy communities create opportunities for rapid experimentation and learning in particular with cost-reflective distribution pricing. If this then leads to distribution network pricing reform happening faster, and in such a way that distribution costs are recovered based on the network capacity provided, rather than on its utilisation, then the cost burden will be shared more equitably by all, regardless of wealth or membership of a community. 2. Energy communities do not need to be restricted to the wealthy. In fact, social housing projects are often ideal for creating energy communities and the potential savings are far more meaningful to those on low incomes than to others. *Dependence on market/regulatory conditions* A key risk to consider is that community energy projects often have quite long payback periods. Where a project depends on certain regulatory or market conditions in order to generate a return, a change to these conditions may have significant ramifications. Examples of such conditions include the availability of particular types of distribution tariffs, standards for connecting community-scale hardware to the network, and the ability to create embedded/customer networks. Projects should ideally be designed to not have such dependencies, or minimally be protected from them during their payback period.
9.4	**Have we accurately identified the barriers to community energy proposals? Are there other barriers to community energy not stated here?**

	We agree with the barriers identified. However our experience suggests that the primary barrier is the difficulty in coordinating all the required parties in order to make a project happen. For example, an embedded network project with solar sharing may require cooperation from the local EDB, the owner or developer of the embedded network, a solar installer, energy retailers, an optimisation platform provider, a property management company and a source of finance. Finding parties with the necessary motivations and systems in place is a key challenge. We suggest a possible solution to this in our response to question 9.8.
9.5	**Which barriers do you consider most significant?** The issue mentioned in our response to question 9.4 (difficulty in securing cooperation from all the required parties) is of high significance to emhTrade. Additionally the data access barrier (last row in Table 6) is of key importance, notwithstanding the recent progress made in this area through the ACCES project. The lifeblood for smart grids, artificial intelligence, optimisation algorithms etc is data. The single most important thing to unlock energy innovation in New Zealand is to ensure the simple availability of this data (with due respect to privacy).
9.6	**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?** We would in particular draw attention to the last item in Table 6. The ACCES project has now been completed and we expect the resulting changes to the Code to go a long way towards resolving the issue. It will be extremely important that these changes have the desired effect, but we also believe that this should only be the first step. Accurate, granular, real-time data will unlock an enormous amount of innovation. Half hour data delivered within two days is a big step forward, but at the other end of the spectrum is one-second data delivered in real time, along with additional data such as voltage and frequency. We believe that the consumer should be able to grant access to the best quality of data possible in order to maximise the potential uses of it.
9.7	**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?**

	Clear government position The key advantage of this idea is that it would reduce the uncertainty that energy communities face. Knowing there is precedent or tacit support for a given approach makes it easier to pursue, and where a community doesn't know what options are available there could be an 'off the shelf' approach to follow. There is also the potential to use the government position as a reference when evaluating the value of a proposed project. The key disadvantage is that it doesn't really go far enough to overcome the barrier highlighted in our response to question 9.4. *Government support for pilots* We believe this would be of very high value; having government support to help secure the cooperation of all the necessary parties would hugely accelerate progress for the chosen projects, but more importantly the cross-industry relationships, methods and technology that would likely be developed to deliver these projects could then be available to future projects. In addition, an increased understanding of which types of projects are most effective (as mentioned in our response to question 9.1) would come sooner, which means more of the right type of projects could be supported. One thing to be careful of with this approach however is that the government doesn't use its influence to create any temporary conditions upon which such as projects depend and that cannot be replicated indefinitely. For example, subsidised tariffs or the easing of compliance requirements might help the pilot projects succeed but does not validate that future such projects will be equally successful. *Ability to focus on projects targeted at lower socio-economic groups* As mentioned in our response to question 9.3, energy communities can be designed to work well for social housing projects and can be highly impactful at this scale. Having government support to demonstrate this would enable the benefits to be directed towards the groups most in need.
9.8	**Are there any other options you can suggest that would support further development of community energy initiatives?** We propose that the 'clear government position' idea is extended to the creation of a community energy panel whose role it is to help community energy projects be delivered. Activities that this panel might perform include: ● Proposal review and recommendations ● Establishing a pre-vetted panel of suppliers ● Case studies and publicity for projects ● Creating 'project templates' that are known to work ● Providing a tendering service for councils, property developers etc looking to source coherent community-based solutions There are a number of community energy experts (both individuals and companies) that could contribute to this panel; to succeed we would suggest that their participation would need to be funded as many of them are currently volunteering in their own organisations.
	Section 11: Local network connections and trading arrangements
11.4	**What changes, if any, to the current arrangements would ensure distribution networks are fit for purpose into the future?**

	As noted above we are of the view that in the current regulatory framework, there is little incentive for EDBs to procure services as opposed to assets to meet their quality standards. Currently the key moment of scrutiny on this comes through the review of an EDB's AMP. Today, given the data available, it is difficult for a review to suggest that an alternate to network investment should be considered, and this is easily retorted due to the lack of data. In order to gather real world data on the cost and benefits of alternatives such as demand response services, pilots, trials and experiments must be conducted. This applies both to the utilisation of new services, and to the trialling of network pricing models that may help facilitate their uptake. We are concerned that the recent allowance for innovation in DPP3 does not allow EDBs to actively start undertaking these trials and experiments given the low magnitude. We also observe that in order for greater scrutiny to be applied to AMPs such that alternates to traditional asset CAPEX can be duly considered, data must be gathered not only by the EDBs, but also by regulators. We would support MBIE taking a role in facilitating trials that provide learnings that would inform future EDB investment decisions, and the regulators review of those decisions. Furthermore, we agree with the comment in the paper that "more nimble regulation" will be required to get the industry to move at a pace which is aligned with both the rate of change of technology, and with New Zealand's climate change response ambitions. We are concerned that things like the innovation allowance are cradled in a 5 yearly DPP iteration cycle, when 6 month review would be more appropriate. There are myriad other examples of this sort of inappropriately long iteration cycle which are severely hampering the uptake of renewables in New Zealand.