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Dear Ben

Request for feedback – Expenditure forecasting by electricity distribution businesses and areas of focus for the 2025 default price-quality path reset

Wellington Electricity Lines Limited (**WELL**) welcomes the opportunity provide further feedback to the Commerce Commission's (**Commission**) "*Forecasting and incentivising efficient expenditure for EDBs*" workshop held on 7 November 2022. We appreciated the opportunity to provide feedback during the workshop – the workshop format of providing pre-reading and a detailed agenda allowed us to prepare in advance to participate which was useful. These follow up questions are an equally important step to capture anything missed at the time of the workshop.

Key characteristics of our 2023 AMP expenditure forecast

1. **Climate change impacts are included in 2023 AMP**: The upcoming 2023 AMP will include the impact of New Zealand Emissions Reduction Plan (ERP). The AMP will include updated demand forecasts, constraint modelling and an updated network reinforcement programme. The AMP will also include a long term (25 year) demand forecast and investment profile which will provide context to the 10-year AMP investment schedules. The long-term model shows how we will deliver the ERP related demand over the 25-year transition to becoming carbon neutral.
2. **High level low voltage modelling**: The low voltage constraint modelling is rudimentary due to the lack of network visibility and consumption data. We are now developing alternative models that will produce more accurate low voltage reinforcement forecasts. These will be available for the 2024 AMP.
3. **Continue to refine:** The updated AMP reflects our first cut of the impact of the ERP on our future expenditure. The final ERP was only released in May, so we have had a limited amount of time to model the impact of the demand increases on our future network investment requirements. We will continue to refine our constraint and investment models over the next year.
4. **Asset replacement is also a significant investment driver**: Several of WELL's largest asset fleets are coming to the end of their useful lives. Specifically, the replacement of underground subtransmission cables and power transformers has started and will continue over the next

20 years – these replacement programmes are a step change in the asset replacement programme. These assets were originally programmed to fall outside of the 10-year AMP planning window. However, many of these high voltage assets will also run out of capacity under the ERP demand increase and their replacement will be brought forward. This provides an efficiency opportunity – to replace aging assets with larger capacity.

5. **Demand uncertainty:** While we can be confident that EDBs will have to build new capacity and some of that new capacity will be needed very soon, there is still uncertainty around the size of the demand increase and when new capacity will be needed. Key drivers of uncertainty include what the governments gas decision will be (will electricity be the substitute?), the speed of EV uptake, resourcing availability and the capacity of the low voltage network which EDBs have no visibility over.
6. **Flexibility uncertainty:** Flexibility provides an important opportunity to avoid or defer expensive network reinforcement. However, these services have not been developed and we do not know how much peak demand they will be able to reliably shift. These services need be developed, tested and trialled before their impact on future demand growth can be accurately modelled.

1. Confidence in forecast requirements

1.1. How are EDBs obtaining confidence in establishing the requirements they are forecasting to meet, including but not limited to demand, resilience, and reliability?

Network reinforcement

Our overall AMP processes haven't changed – they are still based on the same robust planning processes that we disclose each year as part of our AMP Information Disclosures. What has changed are the inputs into our new connections and network reinforcement planning – specifically the future demand forecasts. This in turn has led to a full, bottom up, review of the future high voltage network designs – i.e. what is the best overall network design for higher demand levels.

Future demand forecast included:

- A new demand forecast has been developed by modelling:
    - Peak demand levels now (selecting the highest demand peak in the last five years), and in 2050 once New Zealand has decarbonised
    - Changes in peak demand were modelled for
        - Electrification of light transport (for each vehicle class)
        - Electrification of public transport (including rail, air, ferries, bus etc)
        - Transition from fossil fuels (for each customer category)
        - Population growth (brown fields and green fields)
    - The growth rate for each demand driver – growth rates were based on relevant energy policy (e.g. EV subsidies), growth rates to date (e.g. EV uptake rates) and external forecast (e.g. local council population forecasts and growth strategies)
    - Whether the growth is from existing connections (brown fields) or from new connections (green fields).

- Initial inputs verified by external advice and comparison with other networks.
- Regular internal reviews and sign-off.
- External unit cost advice
- The modelling does include different growth scenarios (high/medium/low) which we have used to sensibility check the growth scenario we have used for our reinforcement modelling. We have yet to include forecast error measures, or in-depth scenario modelling. We plan to do this for later versions.
- Noting, this is our first cut – we expect to refine this over the next year as we develop more accurate models, government energy policy is settled, and new growth data becomes available.

Our future network modelling and reinforcement expenditure forecasts includes:

- Bottom up, detailed network planning for the sub-transmission and 11kV networks.
- The detailed designs include consideration of different design options
- Still need to develop a LV model – LV reinforcement requirements are based on a high-level model

Asset replacement and reliability

Our asset replacement planning process hasn't changed. Our asset management strategies assume WELL will maintain the current levels of quality set by the Commission – that assets will be maintained to a level to continue to provide the same level of network reliability. The asset replacement programmes are designed using the following principles:

- The replacement of assets is dependent on asset heath and criticality. The method used to determine asset health is fleet specific, but includes asset survival curves, physical condition-based testing and location-based risk factors.
- The replacement programme considers the probability and impact of an asset faulting and the replacement cost. The fleet replacement strategies prioritise asset replacements that have the lowest replacement cost and greatest benefits in term of safety, reliability, and customer service.
- The fleet asset replacement strategies include the early replacement of strategic assets. Strategic assets include gas cables which are vulnerable to earthquakes

Resilience

Our focus continues to be on earthquake resilience. We have now completed our earthquake readiness programme and we have nearly finished our substation strengthening works. The next step in preparing for a major event is to improve the resilience of the network. Two of the investments to do this are to strengthen Transpower's Central Park grid exit point and to replace WELL's underground gas cable fleet. WELL continues to work with Transpower on the investment needed to strengthen Central Park – this will be a Transpower investment which will then be recovered though Transpower's prices.

The gas cables are included in the underground cable replacement programme (discussed above). These assets have been prioritised where they can. Most of the assets have limited

spare capacity so they have been brough forward even earlier than initially planned to meet the increased loading on the 33kV network. The ERP related demand increase provides an opportunity for their earlier replacement.

Combined models

Many of the assets included in the asset replacement programme (assets which are getting old and need replacing) are also in the reinforcement programme (assets that will run out of capacity and need upgrading). The combined capex programme rationalises the investment programme so that new assets have both the capacity needed to meet future growth expectations and are replaced before they adversely impact quality. The rationalised capex is smaller than the sum of the two individual programmes. The principles used to integrate the work programmes are:

1. Replacing aging assets with new assets with enough capacity to meet the expected increase in peak demand.
2. Where an asset is included on both the replacement and network growth programmes, an asset will be included only once and scheduled to meet the earliest of the asset replacement date or when new capacity is exceeded.

1.2. Are EDBs intending to change the inputs used in forecasting expenditure given key drivers of forecasts may have changed – particularly in the following areas:

1.2.1. Connection growth (e.g., new connections from development, green fields and brown fields)

Yes, as described above, we have a new demand forecast model that includes differentiating whether new demand will be from existing connections (brown fields) or green fields. As highlighted in our submission to the Process and Issues Consultation, we are forecasting the majority of future expenditure to come from network reinforcement and the majority of network reinforcement will be brown fields – upgrading the existing high voltage network – specifically the sub transmission network where we have limited capacity.

1.2.2. Large capacity growth, (e.g., decarbonisation, industrial growth)

The AMP forecast will include known new large connections. These include:

- Decarbonisation related electrification of public transport (busses, rail and Interisland ferries)
- Decarbonisation related large replacement of fossil fuelled boilers
- Population growth and housing shortage driven new subdivisions (based on developer connection requests).

The demand forecast also includes a general forecast for large scale residential gas conversations. These are included as a general forecast reflecting a slow uplift over time.

1.2.3. Incremental demand growth (e.g., EVs, residential technology)

As described above, the demand modelling includes the electrification of each vehicle fleet. The forecast also includes other customer appliances and includes an efficiency factor reflecting that new devices will become more efficient and will reduce their energy use over time.

Population growth forecasts are based on local council forecasts used in their district plans. The district plans include brown and green field growth based on approved new housing subdivisions and infill housing.

1.2.4. Legislative change

The demand forecast includes a slow transition from gas to electricity for residential housing and small businesses. Practically this means that the impact of the transition from gas to electricity only materially impacts the later years (year seven and beyond) of the current demand forecast. We expect to have to update this forecast once the Government gas policy is finalised next year.

1.3. With a potentially increased need for resilience-related investment, what are the key inputs for EDB resilience forecasting?

As outlined above, our current resilience focus is on earthquake resilience. The strategic gas cable replacement is included in the forecast as part of our asset replacement and reinforcement programmes.

Our current forecasts do not include any climate resilience expenditure yet. The local councils are considering the impact of sea level rise. Currently they are not indicating any planning changes. We may need to adjust our forecasts in the future if they do include planning changes.

1.4. What forms of assurance will EDBs use (e.g., external verification) to provide confidence in forecasts, particularly where new forecasting inputs are used?

As discussed above, we have used external experts to provide early checks on our demand modelling inputs and we plan to use external advice to set unit cost. We will consider more detailed external reviews next year as we refine our models and forecasts – noting the short time frames (the ERP was released less than six months ago) and uncertainty (the final gas and energy strategies are still being developed) this year means we have been focusing on developing the models.

Note, we also do not have the allowances to apply a verification process like that used for a CPP. The extent of any external review will be limited to what we can afford within our opex allowance.

2. Step changes and scenarios

2.1. Are there specific events or metrics that can be forecast and then observed that indicate that a step change in expenditure is required or an alternate scenario is playing out?

Network reinforcement

The AMP forecasts network reinforcement requirements by forecasting peak demand (using various drivers of that demand – as discussed above) and comparing it to the network's capacity. The forecasts are updated using observed actuals of the demand drivers. Observable metrics used include:

- Changes in peak demand - can be forecasts and observed (MW) at GXP, zone substation and 11kV substation levels.
- EV numbers
- Number of gas users and their energy used
- New connections and impact on peak demand

Additional metrics that would improve this process include:

- Capacity, peak demand, and voltage profiles on the LV network
- Location and size of EV chargers being connected
- Location of current and new gas connections

Specific events that could result in a new growth scenario include:

- Final government energy policies (specifically the gas policy due in 2023 and the energy policy due in 2024).
- A recession slowing new connection growth and DER uptake rates, or changing government decarbonisation policies.

Asset replacement

The AMP process for developing asset replacement forecasts is based on asset health assessments. We are forecasting a step change in our asset replacement programme as our two largest assets fleets approach replacement. The asset health assessments use key metrics that can be observed and modelled (condition monitoring, reliability performance, asset failure monitoring, asset survival curves etc). Our AMP provides a description of this process.

2.2. What forms of information do EDBs use to build scenarios on the different forecast areas?

As described above, our first draft of the ERP related investment requirements has focused on the most likely investment scenario. We will consider whether alternative scenario modelling will be required next year.

Likely scenarios will include:

- if fossil gas use is transitioned to a renewable gas substitute and none of the current gas connections transition to electricity. However, our current forecast assumes this

transition will be slow and it doesn't impact the peak demand forecast until year seven.

- Modelling the peak demand trigger points for large network reinforcement investments, i.e. if demand was faster of slower than forecast, how does that impact investment timing.

2.3. What are the underlying drivers where EDBs are forecasting a potential significant step change in expenditure requirements compared to previous levels?

The key drivers are:

- Peak demand increases driving a step change in network reinforcement. As outlined in our Process and Issues Paper submission, the sub-transmission network has little spare capacity and ERP driven peak demand increases will trigger the need for capacity upgrades. These assets are in dense urban areas and are expensive to upgrade.
- Our two largest asset fleets (underground cable and power transformers) are approaching their replacement age. This is a step change in our asset replacement programme. The underlying drivers of this programmes are asset health indicators. These are outlined in our AMP.

2.4. Are there trigger points where increased certainty on level of spend required may be obtained?

Key trigger points include:

- Peak demand certainty is the key trigger point. As forecast peak demand becomes more certain (either by actual observable demand or by customers confirming new connections) then the timing of the need to upgrade will become more certain.
- The Government finalising the gas policy will create certainty about whether we will need to prepare for the transition of residential gas appliances to electricity or not.

2.5. What are the key dependencies or risks EDBs have identified which may impact forecast scenarios?

Most of the uncertainty relates to peak demand forecasting:

- The speed of EV uptake, which in turn has been shown to be impacted by the speed of price parity to ICE vehicles and government incentives.
- Economic factors impacting housing growth and the speed of decarbonisation
- The government's decision around gas – whether networks will need to cater for new demand
- Resource and materials availability – whether new capacity can be built at the speed needed.
- The effectiveness of flexibility services to avoid or delay investment

- Visibility of the low voltage network and the ability to forecast constraints and the need for reinforcement (the less visibility we have, the more conservative we will have to be and the earlier we will need to reinforce the network).
- Customer decarbonation decisions – for example, Air New Zealand current aircraft trials which are considering electric aircraft, hydrogen aircraft or a mix.

Other dependencies and risk not relating to demand forecasting include:

- A change in the local council approach to coastal housing
- The works of other infrastructure entities – water works or roading corridor works that require (often unexpectedly) power assets to be shifted.

2.6. Do EDBs consider that the expenditure required to address different scenarios may usefully follow proxies or will these be disjointed and network characteristic and network design specific increases?

Rather than following different scenarios, demand uncertainty is likely to mean that investments will be needed earlier or later than expected (rather than requiring a different network design and investment). If peak demand grows faster than expected, an investment will be needed earlier and visa versa.

An investment will be triggered by reaching a level of peak demand that can no longer be managed using demand management tools.

2.7. What is the sensitivity of the expenditure plan to out-turn differences in requirements like incremental demand growth, resilience, decarbonisation, and connection growth?

The expenditure plan is very sensitive to changes in demand. Modest historic growth in Wellington has meant we have been able to closely match demand and capacity, keeping prices low by not having to build capacity before its needed. However, this means we don't have spare capacity in our network, including the high value sub-transmission network. Large new connections or rapid growth in customer devices like EVs can quickly use up existing capacity and trigger the need for an upgrade.

3. Confidence in expenditure plan

3.1. How are EDBs obtaining confidence that their proposed expenditure plan is the most effective and efficient solution for the forecast level of demand, resilience requirements, and reliability levels?

WELL's expenditure planning process includes a wide-ranging review of alternative solutions, including non-wire solutions and combinations of multiple options into an overall response path, that seeks to manage both capacity and reliability with a plan that is coherent and efficient. WELL's capital evaluation, approval, and delivery process includes robust challenge and oversight at Executive and Board level. Large projects have their feasibility, preferred options, and estimated pricing reviewed by external consultants prior to being approved by the Board.

3.2. In which categories of expenditure do EDBs have greater levels of confidence than others?

Ranking expenditure categories from most certain to least certain:

1. Asset replacement – based on well tested and understood asset health assessment.
2. Network reinforcement – 11kV – uncertain due to demand uncertainty (discussed above). 11kV upgrades are more certain than upgrading other voltage types because 11kV in less impacted by resource uncertainty (as opposed to sub-transmission upgrades) and we have good visibility over constraints (unlike the LV network).
3. Network reinforcement – sub-transmission - uncertain due to demand uncertainty (discussed above). Good visibility over constraints (unlike the LV network).
4. New connections - customers provide little lead time to their connection requests and connections volumes are volatile and difficult to accurately forecast (this has always been the case).
5. Network reinforcement – low voltage - very uncertain due to demand uncertainty (discussed above) and no visibility over constraints.

3.3. Where new sources of uncertainty exist related to potential increases in expenditure requirements, is there a particular driver of the uncertainty

As outlined in 2.5.

3.4. How are EDBs accounting for the uncertainty of timing of when non-network solutions may become available or viable (due to technological developments or scale) and able to defer network investment requirements?

We have included a conservative estimate of the offsetting demand impact of using flexibility or non-wire services. We have included some development costs in the forecast estimate but no allowances for purchasing those services.

Not enough is known about the impact, cost, and dependability of flexibility services to provide an accurate forecast. Flexibility is in the early stages of development in New Zealand. We will update our forecast as we learn more from flexibility trials.

3.5. What forms of assurance do EDBs use, including external verification / challenge to provide confidence in the appropriateness of expenditure plans?

As discussed earlier, the ERP was only released six months ago so the focus has been on delivering a first cut forecast. We have had some external checks of the demand inputs but we haven't had the forecasts verified. We will consider what assurance we may need next year.

It is also important to note that we do not have allowances to verify our forecasts. If the Commission expectation is for networks to externally verify our AMP forecasts, we will need an opex allowance step change.

4. Deliverability

4.1. How are EDBs getting confidence that their expenditure plans are deliverable, particularly if they involve a significant increase from historic levels?

Our early modelling (high level, pre-AMP modelling) which we based the case studies provided in our IM Process and Issues consultation submission on, indicated that the average capex expenditure on the Wellington network is expected to double.

The early modelling has highlighted that resourcing is likely to be an issue as other networks and infrastructure entities are also likely to also have step changes in their works programmes. This has highlighted the need for:

- Flexibility services to spread the investment out, delaying network reinforcement wherever possible
- Increasing resource levels in New Zealand

Both of these actions will require an industry-led approach.

4.2. How are EDB forecasts accounting for availability of materials and skilled staff to deliver programmes of work if there are significant increases in expenditure forecasted?

The final ERP is six months old, and networks are early in the planning process, and yet to confirm what resources will be required.

The next step will be developing how the projects will be resourced.

4.3. What are the trade-offs between asset renewal / replacement and significant new connection work that EDBs make in forecasting, particularly where a step change in expenditure is forecasted?

Asset renewal and network reinforcement is often not a trade-off on the Wellington network because the two largest sub-transmission assets fleets are due for replacement, and these assets are also the assets which are constrained. These assets can be upgraded for little incremental cost as they are replaced.

Where there is a trade-off, and an assets health is critical, WELL will replace assets before focusing on reinforcing the network. Priority is given to maintaining the regulatory quality standards.

Unless the reinforcement is being driven by a very large new load, demand management tools can usually be used to delay network reinforcement (WELL has access to a large ripple control capacity and a meshed 11kV network that allows load to be re-distributed).

4.4. How do EDBs assess achievability of delivery under different scenarios and forecasts?

As above – WELL in in the early planning stages. We will consider different scenarios in the future.

5. Closing

WELL appreciates the opportunity provide further feedback to the Commerce Commission's (**Commission**) "*Forecasting and incentivising efficient expenditure for EDBs*" workshop. Forecasting expenditure is a challenge as we balance uncertainty and short timeframes, with producing a forecast that is a reasonable reflection of our future investment requirements. Practically, the expenditure forecast included in the upcoming 2023 AMP will be a first cut that we will refine over the following year as government energy policies are refined, our demand forecasts are updated and our AMP processes are updated with better forecast techniques and the results of flexibility trials.

If you have any questions or there are aspects you would like to discuss, please don't hesitate to contact Scott Scrimgeour, Commercial and Regulatory Manager, at [redacted].

Yours sincerely

Scott Scrimgeour

Commercial and Regulatory Manager