Final Report

Essential Energy 2021-22 Distribution Loss Factors and Methodology

February 2021

Table of Contents

Stakeholder feedback

Essential Energy is committed to engaging with stakeholders. Essential Energy understands the need for an effective and transparent engagement approach including the need to provide stakeholders with the opportunity to provide input into our annual Distribution Loss Factor (DLF) process. The feedback received has been taken into consideration in developing our methodology and calculating DLFs for 2021-22.

As part of its development of 2021-22 DLFs Essential Energy held a roundtable on 1st December 2020. The roundtable focussed on questions detailed in a Discussion Paper that was provided to all participants and sought to get responses and inputs to those questions.

We provided a Draft report and methodology to all participants following the roundtable inviting further feedback outlined in this Final report. For ease of reading, feedback received throughout the engagement is included in this report.

The questions raised by Essential Energy and responses and suggestions received from participants are summarised in this report. The engagement process has provided valuable input around what is important in calculating DLFs. We would like to thank everyone who attended and/or provided feedback for giving us their time and input.

Following assessment of the feedback received, Essential Energy will adopt the following in the development and calculation of DLF's for 2021-22:

- An additional milestone will be introduced to the engagement timeline to allow stakeholders the opportunity to provide feedback on draft DLF's during February 2021.
- Transitional arrangements for stakeholders will be considered where material changes to SSC DLF's occur.
- The provision of draft DLF's will be incorporated into future engagement timelines for the preparation and calculation of annual DLF's.
- The provision of a DLF methodology that is based on principles of fair and equitable, efficient, transparent, and predictable.
- The application of a half-hourly approach to the methodology and calculation of DLF s for 2021-22 and beyond.
- The half hourly approach will be applied to all network sections that have site specific customers (SSCs) connected (load customers or generators).
- Granular data will not be provided to stakeholders - in accordance with our legal obligations.
- Instead, a dummy model will be provided to any SSC that requests it in order to satisfy their own modelling and DLF queries.

In the longer term, Essential Energy has undertaken to engage with AEMO to encourage an industry approach to the DLF and Transmission Loss Factor (MLF) processes.

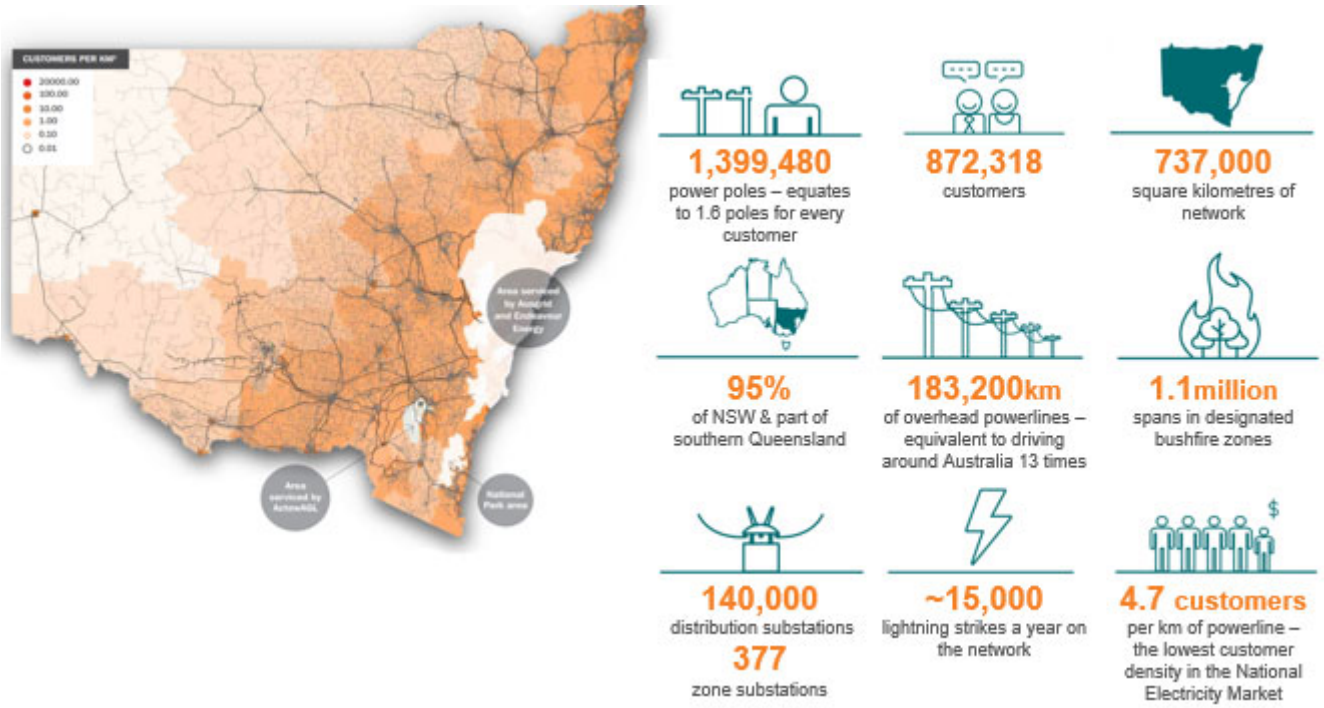
Essential Energy invites you to provide any further feedback on our DLF methodology at any time.

Email	yoursay@essentialenergy.com.au

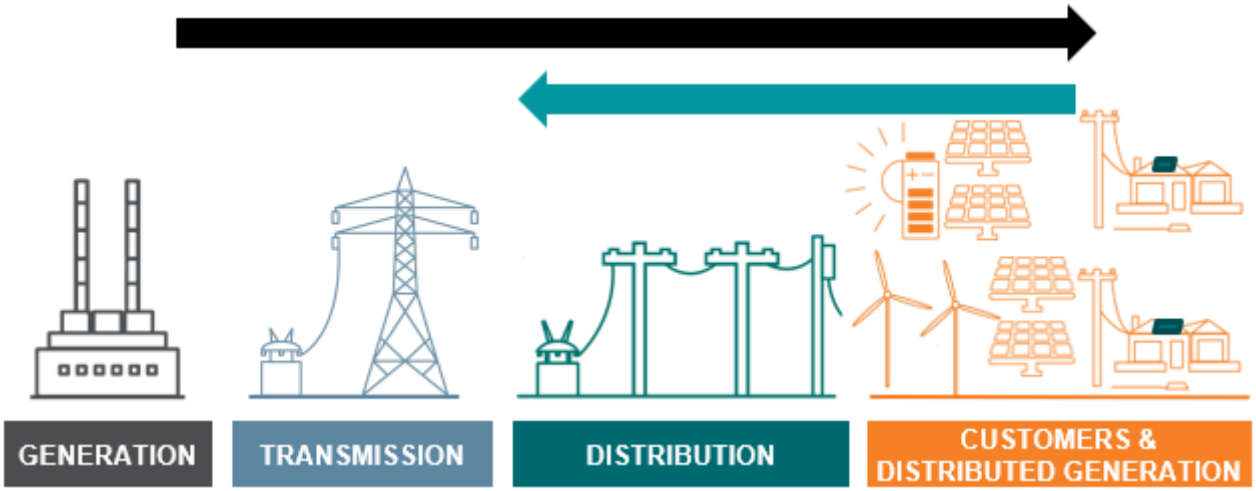
Thank you for your valuable time and consideration of these key issues.

Background

Essential Energy is Australia's largest distribution network and operates across regional and rural NSW and a part of southern Queensland. Essential Energy operates as a State Owned Corporation and is 100 per cent owned by the NSW government. The Essential Energy footprint covers 95 per cent of the State of NSW. Our network is unique in terms of the geographic area it covers, the terrain it traverses, the vegetation that grows within it and the diversity of weather that passes over it. It also has some of the longest feeders in Australia.



Our electricity distribution network was originally built for electricity to flow from large centralised generators such as coal and hydro through the transmission network, then down through our distribution network to homes and businesses – power flowed in just one direction. Increasingly, Essential Energy needs to manage two-way power flows with the continuing connection of large scale generation such as Solar Farms and Wind Farms, and small scale solar rooftop PV.



Essential Energy's network is at the forefront of the energy transition with over 800MW of large-scale renewable generation connected and over 2,300MW between the connection enquiry and construction stage. Essential Energy also has 1000MW of small scale renewable generation on its network from approximately 22 per cent of its small customers.

To put these numbers into perspective, Essential Energy's all time maximum demand is around 2,300MW with average demand at around 1,400MW.

This transition raises a number of challenges and opportunities for the network and the communities we serve, including the future method used to calculate DLFs.

The National Electricity Rules (Rules) chapter 3.6.3[1] require Essential Energy, and other distribution networks, to calculate DLFs each year.

They must be approved by the AER before being published by the Australian Energy Market Operator (AEMO) by 1 April each year. The Rules also state that, if the AER have not published a methodology, the DLFs must be calculated in accordance with the distribution network's own published methodology. Any changes in methodology are approved by the AER. The AER also require DLFs are independently reviewed each year by a suitably qualified firm prior to being submitted.

DLFs directly impact:

- **the amount of energy a load customer pays their retailer for; or**
- **the amount of energy a generator gets paid for in the market by the Australian Energy Market Operator (AEMO).**

[1] The Rules relating to DLFs can be viewed here:

https://www.aemc.gov.au/regulation/energy-rules/national-electricity-rules/current

Engagement timeline

Essential Energy is undertaking an engagement process for the development of the 2020-21 DLF methodology and subsequent calculation of DLFs. The engagement timeline is set out below which outlines multiple checkpoints and opportunities for stakeholder feedback.

Essential Energy released a Discussion Paper on 24 November 2020 and facilitated a round table discussion on 1 December 2020. Appendix A includes a list of participants who attended this roundtable.

Essential Energy sought feedback on the following question:

Question 1

Are there any improvements that can be made by Essential Energy on the above engagement approach and timeline?

Discussion paper and forum stakeholder feedback

Origin Energy requested that changes in methodology be consulted on before implementation with ample time for feedback. Origin Energy also suggested that in following a formal consultation process, Essential Energy should consider providing preliminary and draft losses for stakeholder feedback similar to the process that AEMO uses for MLFs.

Draft report response and proposed actions

Essential Energy proposes to continue the engagement process as outlined above. However, noting Origin Energy's suggestion that preliminary and draft DLF's also be provided for stakeholder feedback, Essential Energy

will introduce an additional milestone to allow stakeholders an opportunity to provide feedback on draft DLF's during February 2021.

Essential Energy will also incorporate the provision of draft DLF's into future engagement timelines for the preparation and calculation of annual DLF's.

Stakeholder feedback on Draft report

EGP supported this additional step, commenting "good as a prompt to request transitional arrangements if changes are material. This makes a slight improvement to short term predictability, and facilitates feeding into AEMO's MLF process".

Essential Energy final position

Essential Energy will undertake to provide preliminary DLFs in mid February of each year.

Recap on 2020-21 DLFs and Methodology

Essential Energy updated the methodology used in calculating DLFs for 2020-21 for SSCs connected to some feeders including the Wellington section of network. This change was introduced because of the increased number of large solar farm generators connected to a few sections of the network and reverse power flows experienced from the increased generation within the network.

The previous averaging methodology was no longer providing an accurate apportionment of losses for feeders with large generators connected. Ten system states were used in calculating 2020-21 DLFs as there is no single network state which can be chosen to represent an average condition for network sections with large generation connected.

The change in approach implemented in 2020-21 for some subtransmission sections of the network was intended as a first step in a transition to using an updated methodology across all network sections with SSCs.

There is more than one way in which losses can be calculated. A load flow allows you to model the power flow and the power loss in the network. Three primary ways to model the power flow and electrical loss were considered during development and post engagement on the 2002-21 DLFs:

- the **average load flow** approach where one load flow is run - Essential Energy used this method for financial years up to and including 2019-20,
- the **ten system states** approach where ten load flows are run – Essential Energy used this method for the first time to calculate losses for 2020-21, and;
- the **half hourly** approach where 17,520 load flows are run and a weighted average is done across all of the half hours of a year. This is similar to the method used by AEMO to calculate transmission loss factors (MLFs)

Figure 1 below provides a summary of the approaches discussed above.

Figure 1: Power flow and electricity loss models

Method/ Approach	 Average load flow	 Ten system states	 Half hourly
Description	Uses a single system state or (single point in time) which averages load flow and therefore losses	Uses ten representative system states (or 10 evenly spaced points on a load duration curve)	17,520 system states represents a simulation of the network for every half hour of the year
Complexity	Easy to calculate	Complex to calculate	Resource intensive to calculate
Accuracy	Less accurate	More accurate	Highly accurate
Applicability	Up to and including 2019-20	2020-21	To be determined

Questions and responses

Each of the questions posed in our Discussion Paper, and discussed at the roundtable, are listed below together with responses from stakeholders and Essential Energy's proposed actions.

Principles for developing DLFs

In developing DLFs for 2020-21, Essential Energy applied a fair and equitable principle to calculating DLFs. Essential Energy sought feedback on the following questions to inform the principles which will underlie the development and application of the 2021-22 DLF methodology.

Question 2

Essential Energy use the principle of allocating losses on a fair and equitable basis for all customers. Do you agree with this principle?

Question 3

Are there any other principles Essential Energy should adhere to?

Discussion paper and forum stakeholder feedback

Elliot Green Power (EGP) agreed the proposed principle of fairness and equity is reasonable but suggested it should be elaborated on, so it is less subjective. EGP also suggested that principles around accuracy and sending effective, predictable and certain locational signals were important to promote efficiency and reduce distortions. Given the materiality of DLFs to individual generator revenues, EGP prefers a methodology that promotes predictability of outcomes to enable signals that generators can respond to. Further, transitional arrangements should be applied where volatile changes in DLFs occur.

Lumo Energy stated that the "cost to cause" (allocating on a causal basis) had been well explained and couldn't understand why a move away from that would be contemplated.

AGL believed the calculation of DLF's should follow the same principles as MLFs, that is, it should not follow a sequence of connection (with and without) approach. AGL further advised that a half hourly method was a gold standard approach and provides certainty and predictability. Overall, AGL preferred a method that is similar to that used for calculating MLFs.

Origin Energy agreed with the principles "fair and equitable" for allocating losses. Origin Energy suggested that a principle that could be considered is transparency, where the methodology and allocation is clear to all stakeholders. They also suggested efficiency was an important principle and that it was efficient to allocate losses on a causal basis.

Cotton Australia acknowledged the impact of mismatches between generation and load on sections of Essential Energy's network and questioned if batteries could be part of a solution.

St Vincent de Paul advised it was leaning towards shared costs across everyone but there could be other signals Essential Energy could provide, such as a map with current and future connection information.

Draft report responses and proposed actions

Most stakeholders agreed that adopting a fair and equitable principle in calculating DLF's was reasonable but suggested predictability, transparency and efficiency were also important. Stakeholders also acknowledged DLFs provide an important locational signal. Essential Energy agrees that these principles should be applied in the development and preparation of 2021-22 DLF's and beyond.

Essential Energy will calculate DLF's using the following principles:

- **Fair and equitable –** by ensuring network users accurately contribute to the losses created through their connection, that is they will be allocated losses that they contribute, not on a sequence of connection "with or without" basis;

- **Efficient –** by allocating losses to site specific customers on a causal basis and providing accurate signals related to where users connect to the network and the distance to the transmission connection point;
- **Transparent –** by providing clear information on the methodology and how losses are allocated to all SSCs and stakeholders to the extent possible. This will include the provision of draft DLF's prior to finalisation of DLF's each year; and
- **Predictable –** by developing a methodology and approach to calculating DLFs that provides for as much certainty as possible. Although certainty can be difficult due to the changing dynamic of Essential Energy's network, Essential Energy will continue to provide transitional arrangements for SSCs where material changes to DLF's occur.

Stakeholder feedback on Draft report

The principles outlined in the Draft report were supported by EGP in their response to our DRAFT report.

EGP further suggested "Essential Energy should explicitly state it will consider transitional arrangements to address material DLF changes caused by either methodology changes or input changes. We also recommend that any transitional arrangement that is less than 10 years in length to be considered too short for addressing the concerns of major future generators that are not afforded the luxury of dynamic business models".

Essential Energy final position

Essential Energy will adhere to the principles outlined above.

Transitional arrangements are not a requirement under the Rules, and Essential Energy is cognisant that any SSC with a transitional DLF is receiving a benefit at the expense of other customers. A 10 year transition would likely be unworkable from an administrative perspective given the other factors that impact DLFs annually. However, Essential Energy will consider shorter transitional arrangements, such as three years, for SSCs impacted by material changes in DLFs

Modelling approach

In response to stakeholder feedback received following the implementation to Essential Energy's 2020-21 DLF methodology, Essential Energy proposed several options in its Discussion Paper to calculate DLFs for 2021-22 and beyond. Figure 2 summarises the models and approaches outlined in the Discussion Paper.

Figure 2: Power flow and electricity loss models being considered for 2021-22

Method/ Approach	 Ten system states	 Half hourly	 With and without
Description	Uses ten representative system states (or 10 evenly spaced points on a load duration curve)	17,520 system states represent a simulation of the network for every half hour of the year	Existing SSCs keep the DLF they already had and the new generator connecting is only assigned a DLF for the incremental change in losses on that network section
Complexity	Harder to calculate	Resource intensive to calculate	Harder to calculate

Accuracy	Less accurate	Highly accurate	Less accurate
Applicability	2020-21	To be determined	Used by Powercor

Essential Energy sought feedback on the following questions:

Question 4

What is your preferred methodology for calculating DLFs? And Why?

Question 5

Are there any other approaches Essential Energy should consider to calculating DLFs in 2021-22?

Question 6

Do you agree with using half hourly system states for calculating DLFs?

Question 7

Do you agree with the "with and without" methodology? If so;

- **When a new SSC connects (load or generation), should existing DLFs be held constant (grandfathered)? If so, for how long?**
- **If an additional SSC connects – how would the loses be attributed between them and the preceding connection?**
- **If network augmentation or other changes occur, how would losses for that network section be treated?**

Question 8

What do you think is "fair and equitable" when calculating DLFs;

- **allocating losses on a causal basis (the losses that each SSC contributes), or**
- **allocation of losses on a "with and without" (sequence of connection) type basis?**

Discussion paper and forum stakeholder feedback

Origin Energy stated its preferred methodology is one based on a half hourly approach. Origin Energy believes this method would be more accurate than the average load and the ten system states methods given the volatility of large solar and wind on DLF's. Origin Energy also recommended that Essential Energy should balance the trade-off between the costs of using a more complex method, with the improvements in accuracy of losses.

AGL commented that the method should be consistent across the network and that the methodology to be applied should be known for new generators. AGL also stated it would be messy to calculate DLF's inconsistently.

Red Energy stated it was important that a half hourly approach was used so new connections to the network understood the approach that would be applied.

NEOEN stated that Essential Energy's modelling should be relied on and that stakeholders should trust Essential Energy's assessment of the benefit of different models. NEOEN questioned the benefit of a half hourly approach – commenting that if there is no generation, then what additional benefit was there of using the half hourly method as the impact is not known until calculations for all sites impacted are done. They questioned if there really is a benefit, and stated it would have to be known that the half hourly method would be used when new generation is going to connect.

At the round table EGP stated it was difficult to comment or take a position without data to do their own modelling and assess for themselves. EGP queried if losses due to other factors such as transformers and theft are taken into account, and questioned if they are material. GHD noted that theft and metering are not included, but transformer losses are included when calculating Essential Energy's DLFs. A reconciliation is done each year on calculated losses compared to actual inflows and outflows and this indicated an error of less than 0.5 of a per cent so immaterial.

In EGP's written response to Essential Energy's discussion paper, EGP re-emphasised the importance of predictability. EGP also re-iterated that they were unable to provide a fully considered response without access to the half-hourly data used to model DLF's. However, EGP noted that the chosen methodology should be robust to changes in the energy systems and to achieve accuracy, continuity and predictability the following were highlighted as important:

- Robustness of methodology - comparable inputs should lead to comparable outcomes
- Continuity of methodology - should vary as little as possible in the future
- Predictability of methodology - should allow DLF evolution foresight to customers.

EGP also highlighted rooftop solar PV and suggested Essential Energy consider how the methodology can properly allocate losses in case of reverse flows from rooftop solar PV

EGP stated the effort to migrate to half-hour granularity is reasonable and the benefits it provides far outweighs the effort required

Cotton Australia highlighted the recent developments around Renewable Energy Zones (REZs) in Essential Energy's network area and questioned how this would impact the DLF methodology and calculations in the future. It was acknowledged by Essential Energy there is very little detail on how REZ's will impact the transmission and distribution networks, but has the potential to be significant. They stated the DLF methodology should be considered in this context.

Draft report response and proposed actions

Most stakeholders preferred the half hourly approach for calculating DLF's for 2021-22 and beyond. Essential Energy believes the half hourly approach best delivers on the principles of fair, equitable, efficient, transparent, and predictable, when:

- compared to the other approaches listed above in Figure 2;
- considering the potential impacts of REZ's in Essential Energy's network area; and
- minimal or no changes are applied to the methodology in future years.

Essential Energy therefore proposes the application of a half-hourly approach to the methodology and calculation of DLF s for 2021-22 and beyond.

The Rules only require site specific DLFs be calculated for large generators greater than 10MW so roof top and small scale generation systems are not calculated separately. However, their impact on network flows is considered in the network modelling, which is the basis of DLF calculations for site specific customers, by deducting them from total load on each network section.

Stakeholder feedback on Draft report

Red Energy provided additional feedback to the Draft report, commenting "we support the decision to adopt a half hourly approach to the calculation of DLFs. The methodology will provide more accurate outcomes compared with the current average load flow methodology. It will be better equipped to capture reverse power flows and thus allocate loss factors to those parties that have caused them. This will be especially important as the level of Distributed Energy Resources (DER) begins to grow rapidly and two way energy flows increase."

EGP supported this approach, commenting “we support the decision to adopt a half hourly approach to the calculation of DLFs. The methodology will provide more accurate outcomes compared with the current average load flow methodology. It will be better equipped to capture reverse power flows and thus allocate loss factors to those parties that have caused them. This will be especially important as the level of Distributed Energy Resources (DER) begins to grow rapidly and two way energy flows increase.”

EGP also questioned the treatment of rooftop solar on reverse power flows in their response to the Draft report, stating “To be fair and equitable, we believe that losses incurred by small scale embedded generation should not negatively affect the DLF of other customers”. They further commented that In the draft methodology, reverse flows on the system would result in greater line loading and losses which would ultimately be negatively affecting DLFs for Site Specific Customers (e.g. Large scale solar installations). At a minimum, EGP suggested that the additional losses incurred by reverse flows at the lower voltage levels should not be allocated to other customers on the network, and their DLFs adjusted accordingly. Also adding that to avoid future changes to the methodology, the consideration of reverse flows should be explicit in the methodology, and their impact to other customers mitigated.

Essential Energy final position

Essential Energy will adopt half hourly system state modelling in calculating the DLF for every SSC.

As discussed above, EGP have questioned the impact roof top solar on reverse power flows and suggest that losses at lower voltages are allocated to SSCs. This is not the case, and SSCs are not being allocated losses in the low voltage network caused by rooftop solar.

The models of sub-transmission systems used for calculating SSC losses include all connection points in the sub-transmission system, with connection points at lower voltages aggregated to zone substations. This includes all rooftop solar PV systems downstream of the zone substation. All loads in the sub-transmission system are captured in the Transmission Connection Point load profile.

The load flow model calculates the losses attributable to each connection point in the sub-transmission system simultaneously for each system state. Exports of rooftop solar PV into the sub-transmission system will increase the net reverse flow along the feeder to the Transmission Connection Point, which will increase the losses attributable to both the solar farm SSC and the exporting zone substation relative to a system state where rooftop PV is not being exported into the sub-transmission system.

The losses from exports attributed to the low voltage customers downstream of the zone substation are not being allocated to the SSC. These losses are treated separately and will form a part of the lower voltage DLFs.

The likely future increase in two way flows in all network sections will not change the method used for calculating SSC DLFs. Essential Energy maintain the half hourly method is robust for any network flow state.

Universal application versus specific localities

There are almost 70 transmission connection points on Essential Energy’s network, that is, where the Essential Energy network connects into the transmission network, and another ten connection points with other distributors. The 2020-21 methodology of using ten system states was only applied to a small number of connection points for 2020-21 DLFs, including the Wellington feeder.

Essential Energy considered extending the revised 2021-22 methodology to all network sections with any large customer connection and sought feedback on the following question:

Question 9

Should Essential Energy consider the application of a more robust and complex method of calculating DLFs for all transmission connection points?

Discussion paper and forum stakeholder feedback

Most stakeholders supported calculating DLFs on all sub-networks using the most accurate approach (half hourly approach); however, it was noted that this should be balanced with cost impacts if they are found to be significant.

Lumo Energy questioned if a more granular method was worth the additional cost and how much difference it would make. A hybrid approach sounded reasonable of using differing methods on different network sections.

Red Energy supported a universal application of the half hourly approach so new connections to the network understood the approach which is going to be applied.

AGL commented that the method should be consistent so that new generators understood what method is to be used.

Origin Energy commented that the half-hourly method should be applied to all transmission connection points. Origin Energy believe a consistent approach will promote transparency and avoid any unintended consequences of using multiple methods across the network.

NEOEN consider it is for Essential Energy to determine what is best based on the trade-off between accuracy and benefit. However, it was considered critical that confirmation of the method that would be used was known when any new generation is connected to the network.

EGP considers consistency on all network sections is the best approach.

Cotton Australia considers that Essential Energy should factor in the REZs when assessing the application of a more robust and complex methodology.

Draft report response and proposed actions

Stakeholders noted that while the costs of the half hourly approach would be higher than the other approaches, the increased accuracy was worth the additional expense, while others were concerned that the additional accuracy may not justify the additional cost, particularly for sub-networks with low levels of embedded generation.

Essential Energy note that the cost and time associated with modelling the half hourly states is estimated to be somewhat higher than the single system (average) state approaches. However, given that this method does provide the greatest level of accuracy it will be used to calculate DLFs for all SSCs (either generation or load) connected to Essential Energy's network from the 2021-22 year. Essential Energy consider the increase in cost for this level of modelling is justified in providing consistency and transparency for customers.

If a new generator or load customer connects to Essential Energy's network, their initial DLF, and any future DLFs, will be calculated using the half hourly method. This will provide greater certainty and predictability for customers in the method used for calculating their DLFs.

The ten system state method will no longer be used.

Stakeholder feedback on Draft report

EGP supported the approach outlined in the draft report commenting that it "addresses the criticism of the previous methodology around the Wellington feeder being targeted".

Essential Energy final position

Essential Energy will use half hour system state modelling in calculating the DLF for every SSC.

Transparency and access to data

During the 2020-21 DLF methodology engagement, it was suggested by some stakeholders that transparency and full availability of data is important in order to undertake their own modelling for the development of Essential Energy's 2021-22 methodology. However other stakeholders have stated that individual data is confidential and commercial in nature and would not agree to their information being released.

As a compromise, Essential Energy proposed that a dummy model could be provided with anonymised data to mimic network sections.

Essential Energy sought feedback on the following questions:

Question 10

What information relating to your energy consumption or generation do you consider to be confidential, and why?

Question 11

Would you agree with providing individual data for any proponent to undertake their own modelling?

Question 12

Would you be satisfied with a dummy model being created that mimics network sections for your reference?

Question 13

Are there any safeguards that Essential Energy could implement to ensure data could be shared but satisfies confidentiality requirements?

Discussion paper and forum stakeholder feedback

Origin Energy submitted that consumption data is confidential and individual data cannot be provided to other proponents to undertake their own modelling. A dummy model would suffice for the purpose of modelling the network.

AGL stated if the information is public then this information should be provided to anyone who requests it. AGL and Red Energy also questioned if aggregated data would be useful. GHD advised it was of limited benefit because of the need to model the network as is - if data is aggregated you lose locational impacts and energy flows at each connection point.

Red Energy thought that a dummy model was not practical and was likely to be more work than actual modelling with half hourly states. Red Energy suggested that Essential Energy publish a forward looking DLF for a future year to give an idea of what DLFs would be, noting that they would not be held to them.

Lumo Energy commented that the data should be shared and that generators required data to reconcile bills.

NEOEN questioned what a dummy model would provide, and how accurate or useful would it be. GHD explained the Wellington dummy model they had built and how it was anonymised, noting it was probably only useful to generators.

NEOEN also questioned why the data was required by stakeholders, it would be inappropriate if it was just to check Essential Energy's calculation. They also stated that if the methodology is agreed then there is a need to trust the calculations are done in line with the AEMO model and MLFs, otherwise it is too complicated and questioned what the data was really being used for. They were not prepared to share confidential data with other parties.

EGP stated that as all data is public information there should be no problems in sharing data, adding full 5 minute data in csv file is published by AEMO for market generators. They stated that forecast data is not public but they were happy to share this as they generate when the sun shines so it is not sensitive information.

EGP questioned if GHD received all the data in order to calculate DLFs each year and if so, was there any issue with confidentiality and why can't EGP also receive the data.

EGP stated they are looking at the forward financial curve and Essential Energy were unusual in not providing full data as other network service providers in other states generally do provide all data it to allow financial modelling to be undertaken for the future. They also noted the previous (averaging) method had been easier to work with and not as sensitive to underlying assumptions. They advised it was difficult for them to comment on a method that

provides a fair outcome when they can't access the model and data to do their own calculations. Regarding a dummy model, EGP considered that if it can't resolve the issue around confidentiality then a dummy model would be the next best solution.

EGP sought clarification on what the confidentiality obligations are that Essential Energy must comply with. It states that other network service providers such as Powercor, Ausnet Services and Ergon Energy have provided them with the necessary data and models to undertake DLF studies.

GHD and EGP(Baringa) subsequently noted that they do not in fact have access to customer's full half hourly data in other states and that it's the network model that's required to run simulations.

Overall EGP suggests that the issue of non-disclosure of data is Essential Energy's practice to not provide all of the data and network model rather than being based on data protection requirements. They strongly encourage Essential Energy to release the network models and underlying data (potentially through modified data or confidentiality agreements) so that a greater level of stakeholder engagement can be facilitated. However, if data cannot be disclosed they suggest that consideration should be given to grandfathering DLFs for new or existing generators for a reasonable time period.

Cobar Mine stated that they were comfortable with Essential Energy using their data but did not consent to providing their data to a broader field.

Ulan Mine said that only publicly available data should be shared by Essential Energy.

Draft report response and proposed actions

Essential Energy recognises the difficulties raised by stakeholders during the round table and in submissions provided to Essential Energy's discussion paper surrounding provision of data and information.

Essential Energy has legal obligations it must comply with regarding customer data including metering installation and energy data. Consequently, Essential Energy unsuccessfully sought permission from affected customers to share and release its data with stakeholders.

Some stakeholders questioned why Essential Energy's consultant, GHD, was provided all of the data required to undertake DLF modelling. Essential Energy engages GHD as a service provider and provides services for Essential Energy under contractual terms and conditions. Confidentiality provisions are included in the terms of contract. Further, Essential Energy has regulatory obligations to calculate DLFs on an annual basis. GHD were not able to share the data or use it for any other purpose.

In the absence of customer permissions, Essential Energy is obligated to comply with:

- Individual Connection Agreements between Essential Energy and high voltage customers and market generators include clauses around maintaining confidentiality.
- Part F Security of metering installation and energy data in Chapter 7 of the Rules[2], also includes confidentiality obligations. Clause 7.15.1 in particular states that metering data information must be treated as confidential information.
- Chapter 8 of the Rules[3] also imposes confidentiality requirements on Essential Energy as a market participant, clause 8.6.1 stating that a Registered Participant must not disclose confidential information to any person except as permitted by the Rules.

Given that some SSCs do not consent to Essential Energy providing their confidential data, Essential Energy will not provide this data in accordance with our legal obligations. Essential Energy notes the provision of data from some networks to EGP and is keen to understand the mechanism in which the provision of data occurred.

Consequently, Essential Energy proposes to provide a dummy model to any SSC that requests it in order to satisfy their own modelling and DLF queries.

Stakeholder feedback on Draft report

In their response to the Draft report EGP further stated that they believed that supplying;

- network model

[2] Chapter 7 of the Rules can be viewed at www.aemc.gov.au/sites/default/files/2020-12/NER%20-%20v156%20-%20Chapter%207.pdf

[3] Chapter 8 of the Rules can be viewed at https://www.aemc.gov.au/sites/default/files/2020-12/NER%20-%20v156%20-%20Chapter%208.pdf

- load data snapshots
- generation data for non-scheduled generators, and
- forecast data, including for new entrants

would be a reasonable alternative to having full access to customer data.

They also stated that a dummy model "can be useful to the stakeholders but must be more reflective of the existing network" and should include the following features in order to provide transparency and predictability for stakeholders.

- Reflect the actual topology of the network:
  - Accurate line properties
  - Accurate line/transformer inventory
  - Correct number and location of Zone Substations
- Reflect the actual losses on the system:
  - Accurate flows on the lines
  - Accurate flows on the transformers
- Spatial granularity
  - Sub-transmission lines at a voltage level >= 33kV
  - Zone substations
  - Transformers

Essential Energy final position

Essential Energy will provide a dummy model to any SSC that requests it in order to satisfy their own modelling and DLF queries, containing as much anonymised data as possible without compromising our confidentiality obligations. However, capturing a full network model down to 33 kV would however be difficult and time-consuming and the process of anonymising data in a model at this level would be close to impossible and would create significant additional cost for limited benefit.

Essential Energy maintain that, given a half hourly methodology is agreed and DLF calculations will be done more in line with the AEMO model and MLFs, there is less need for stakeholders to do their own modelling as noted by NEOEN, particularly given that both load customers and other generators are not prepared to share confidential data with other parties. This means we can not provide load data snapshots, generation data for non-scheduled generators, or forecast data, including for new entrants

Information on Essential Energy's network including diagrams of each subtransmission section of the network, with large load and generation sites included, can be found in our Distribution Annual Planning report. This also includes forecast information and details of any known future generator connections.
https://www.essentialenergy.com.au/-/media/Project/EssentialEnergy/Website/Files/Our-Network/DAPR-2020.pdf
Further information on our overhead network can also be found on the "Look up and Live" website
https://www.essentialenergy.com.au/safety/look-up-and-live
Essential Energy's Regulatory Reset Information Notices may also provide further useful forecast information.
https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/essential-energy-determination-2019-24/proposal#step-57774
It should also be noted that all known information on current loads and connected generation, any known future connections of generators and other details relating to the section of network they are connecting to is provided to new entrants as part of the connection agreement process.

Interactions with Marginal Loss Factors (MLF)

MLFs are losses that occur in the transmission network and AEMO are responsible for calculating those MLFs.

There has been some concern around the separate and isolated calculation processes that can lead to unintended consequences as DLFs are not available at the time MLFs are calculated. It has been suggested that this misalignment could lead to an under or over statement of forecasts used to calculate MLFs.

Essential Energy is keen to explore if there are improvements that could be made to either the DLF or MLF calculation processes to alleviate these concerns and posed the following questions.

Question 14

Are there any improvements Essential Energy can make to its DLF processes to better account for AEMO's MLF processes?

Question 15

Should MLFs and DLFs have a common methodology and be interlinked?

Discussion paper and forum stakeholder feedback

EGP stated that in its prior engagement with AEMO, AEMO made it clear that the interaction between MLFs and DLFs is an area they hadn't turned their mind to and that it needed to take into account Essential Energy's methodology and approach when calculating MLFs. EGP further explained that there needs to be an interaction because generators could potentially be impacted twice. EGP also suggest that maintenance and outages should be taken into account as these can have significant impacts. They considered it should not be too much to ask to give AEMO forward notice of DLFs.

EGP acknowledged there is no regulatory obligation to align DLFs and MLs however recommended there should be alignment of the calculation processes where possible, for example, granularity of data used, alignment of timing releases of MLFs so DLFs can be incorporated and that generators/loads should be named and not anonymised by NMI.

NEOEN agreed this will become more topical as more generators connect to the distribution network. They consider there is lots of work for both sides to do and for the process to be complimentary where possible.

Most stakeholders noted that broader industry participation would be required to resolve the issue – ideally this would include AEMO, transmission and distribution network service providers.

Draft report response and proposed actions

Essential Energy recognises the challenges associated with the interaction between DLF and MLF calculation processes.

In the short term, and as discussed above, Essential Energy proposes to provide draft DLF's during February 2021. Essential Energy will also incorporate the provision of draft DLF's into future engagement timelines for the preparation and calculation of annual DLF's. This should assist in earlier provision of DLF's to AEMO's MLF calculation process.

Essential Energy agrees with stakeholder there is more work to be done on aligning DLF and MLF processes. However, this needs to involve broader industry consultation and by its very nature is a longer-term initiative. Essential Energy has undertaken to engage with AEMO to encourage an industry approach to DLF and MLF processes.

Stakeholder feedback on Draft report

No feedback was received.

Essential Energy final position

Essential Energy has commenced engagement with AEMO regarding the DLF and MLF process.

Other longer-term considerations

It is inevitable that more large-scale renewable generators will connect to the Essential Energy's network in the future and that there will be an increasing number of feeders that experience reverse flows of electricity.

Essential Energy agrees that an industry wide discussion is required on how losses are calculated across the distribution and transmission level and sought feedback on the following question.

Question 16

What can Essential Energy do to facilitate a broader industry engagement on the issues of losses within the electricity industry?

Discussion paper and forum stakeholder feedback

There was limited response to this specific question, however, significant feedback was provided in relation to the interaction between DLFs and MLFs as discussed above.

Stakeholder feedback on Draft report

No feedback was received.

Essential Energy final position

Essential Energy has commenced engagement with AEMO regarding the DLF and MLF process.

Appendix A -Attendees at discussion forum

Name	Organisation
Gavin Dufty	St Vincents de Paul
Miyuru Ediriweera	PIAC
Jennifer Brown	Cotton Australia
Chris Twomey	EGP
Umberto Tamburrino	EGP
Mirielle Winter	Neoen
Janine Lea Barrett	Aeris Resources
James Pownall	Glencore
Sandeep Bansal	Santos
Stephen Prunster	Santos
B Lopez	Blueshore Energy
Julian King	Pacific Hydro
Sarah-Jane Derby	Origin Energy
Steven Leopardi	AGL
Steve Ford	Red Energy
Constantine Noutso	Lumo Energy
Hubert Lehman	North Parkes
Marcelino Rivera	North Parkes
Visko Sulichich	CBH Resources
Giorgio Dallarmi	CBH Resources
Bill Lockley	Aurelia Metals
Tom Villiers	PARF
Peter Sherry	EGP (Baringa)
Remy Nguyen	EGP (Baringa)
Scott Sandles	EGP (Baringa)
Craig Owens	GHD
Stephen Hinchcliffe	GHD
Ryan Dudley	Cutler Mertz