ENA response to the AER's straw man proposal - Asset Categorisation for use with the AUGEX and REPEX Models

Introduction

The Energy Networks Association (ENA) is pleased to provide a response to the Australian Energy Regulator's (AER) proposal – *Asset categories and sub-categories for the replacement and augmentation expenditure tools*. This document provides some comments in relation to the AER's proposed categories and suggests an alternative approach to asset categorisation.

To ensure clear understanding of terms used in this response, the ENA proposes the following standard to apply to both REPEX and AUGEX models. *Asset Groups* form the highest aggregated level and are presently referred to by the AER as Asset categories. *Asset Groups* are made up from *Asset Categories* (the AER currently refer to these as sub-categories) under which each DNSP is then able to map their own *Asset Sub-categories* from the data they have available. The REPEX and AUGEX models are based on *Asset Groups* and *Asset Categories*.[1]

The ENA notes that the list of groups and categories provided in the AER's document does not consider the fundamental issues required in developing *the Expenditure forecast assessment guideline* in that it does not address the principles on which categorisation should be made. The general principle that has been followed in developing this alternative proposal for asset categorisation is to develop key asset categories that can be segmented to a level that provides the AER with a degree of granularity that will address their needs.

At the highest level, the *Asset Groups* should represent assets that are common to DNSPs and DNSPs record information for the management of those assets. There is likely to be broad correlation between high level asset groups across the industry. There is also likely to be diversity around the level of granularity reported by each business at different asset category levels and businesses will naturally want the information they record to form the basis of any individual assessment approach. Finally, there is likely to be some divergence in the systems used to record asset sub-category information and, therefore, the quality of information able to be produced.

The *Asset Groups* and *Asset Categories* suggested in this document are based on DNSPs' best judgment as to the data that can be supplied to the AER, which is robust, consistent across DNSPs and suitable for the REPEX and AUGEX modelling. Members of the ENA consider that any alternative classifications may diminish businesses' ability to provide data in such a manner. Notwithstanding the above, there are likely to be some limitations which would vary from business to business. For example, it is unlikely that businesses will be in a position to provide all required data at auditable quality. RIN requirements will need to reflect these limitations.

Further, *Asset Categories* that have been proposed in the *Asset Groups* have a clearer relationship to the costs of augmentation or replacement than the categories proposed by the AER, and will have a high degree of commonality across all distributors. At this level, it is expected that the majority of capital expenditure should be able to be modelled without posing undue data gathering costs on DNSPs. The proposed list has been developed being cognisant of the AER's expectation that more than 100-150 categories is likely to be of limited utility.

It is appreciated that individual DNSPs may wish to include additional categories to make visible to the AER situations where asset or network-specific issues are driving the need for expenditure that differ from benchmark expenditure for an asset category modelled by REPEX or AUGEX. Also, each DNSP has different levels of data availability and different business risks that they are required to manage. The proposed categorisations allow for this flexibility. Individual categories will be able to be rolled up by the AER into the *Asset Groups* proposed for broader assessment. We would expect that these issues could be addressed during the framework and approach consultation process which appears to be consistent with the intention of Clause 6.8.2(c2) of the National Electricity Rules. To

[1] The AUGEX guidelines use the terms "Network Segments" and "Segments" which correspond to the terms *Asset Groups* and *Asset Categories* used throughout this document.

take an example, an *Asset Category* of protection relays has been proposed within the *Asset Group* of SCADA, Communications and Protection. A DNSP that had a specific relay replacement program involving particular relay types that they wished to highlight might also model *Asset Sub-categories* of Electromechanical Relays, Electronic Relays and Digital Relays.

With regard to the categorisation proposed by the AER, it is specifically noted that the categorisation of assets by geographic location and load density (urban, short rural etc.) does not represent well the costs associated with augmenting or replacing those assets. While location will have some cost impact, load density is irrelevant as a cost driver for replacement capital expenditure. Further, the definitions of CBD, urban and rural feeders provided are different to those that apply in the AER's STPIS scheme, potentially leading to different categorisations of assets for reliability reporting and expenditure forecasting purposes. The classification of assets into these categories will also be difficult for some DNSPs because of the lack of available information. The provision of this feeder classification information will require changes to the data extraction process and is likely to be undertaken through a number of high level assumptions, which will make benchmarking between DNSPs difficult.

Therefore, it is recommended that these categories are not used in either the REPEX or AUGEX model.

REPEX Categories

General comments

The AER has proposed asset groups of poles, conductors and pole top structures. A number of DNSPs do not keep data specifically related to pole top structures, as these structures are managed as an intrinsic part of the pole asset. For these DNSPs, expenditure on pole top structures is likely to be either capex for a single asset replacement, or it will be included as part of a pole replacement or line re-conductoring project. Including pole top structures as part of either the conductor group or the pole group is, however, likely to cause difficulty in establishing the correct replacement unit cost based on historic project expenditures. It is therefore suggested that these three categories are combined into a single "lines" group, recognising that this category will model expenditure that has been developed from a bottom-up program of both conductor and pole replacement projects. This would also enable DNSPs to use company-specific sub-categories (including pole top structures and conductors) below the high-level group of "lines". For example, backyard poles operated by ActewAGL in ACT might need to form a separate sub-category due to the differences in costs associated with their replacement.

The inclusion of street lighting and metering assets may not be necessary for purposes of determining DUOS in cases where these assets deliver alternative control services and the pricing models used for these will likely make replacement expenditure volumes irrelevant. Expenditure on replacement of poles shared between street lighting assets and the distribution network would be modelled in the appropriate "lines" group.

The ENA notes that some of the businesses have already provided the AER with the data for the REPEX modelling during their regulatory determination process. The ENA would like to re-emphasise that the list of *Asset categories* that are proposed in this document will be further sub-categorised by businesses; therefore, it should not be considered that less data will be provided to the AER. The NSPs will be providing detailed information about their assets through developing *Asset Sub-categories* that are appropriate to the networks they operate.

***Proposed Asset Groups and Asset Categories*[2]**

(Asset Groups- in bold & capitals; Asset Categories-listed below Asset Groups)

LINES

Possible sub-categories to be determined by each DNSP

- 132/110kV Steel tower
- 132/110kV Concrete pole
- 132/110kV Wood pole
- 66kV Concrete pole
- 66kV Steel pole
- 66kV Wood pole
- 33kV Concrete pole
- 33kV Steel pole
- 33kV Wood pole
- 11/22/SWER Concrete pole
- 11/22/SWER Steel pole
- 11/22/SWER Wood pole
- LV Concrete pole
- LV Steel pole
- LV Wood pole

Comment:

Categorisation of poles by voltage level, with the highest voltage conductor on a pole being applicable is a better categorisation than geographic area or a broad category such as subtransmission. Conductor voltage is an appropriate driver of pole replacement cost.

The suggestion of staked versus unstaked as a further categorisation for poles, as proposed by the AER, makes sense as these have different standard lives. However, only using staked versus unstaked category fails to recognise other categories of poles that have different standard lives; for example poles installed in different environments such as costal locations.

As there are a variety of different environments that will impact on pole life and unit costs, which will not be consistent across DNSPs, individual companies need to be free to use company-specific *Asset Sub-categories* below *Asset Categories* level.

UNDERGROUND CABLES

Possible sub-categories to be determined by each DNSP

- Underground submarine - 110kV / 132kV
- Underground non submarine - 110kV /132kV
- Underground submarine – 33kV / 66kV
- Underground non-submarine – 33kV / 66kV
- Underground subtransmission non-submarine – 22kV
- Underground submarine – 11/22kV
- Underground non-submarine – 11/22kV
- Underground non-submarine – 11/6.6kV
- Underground submarine – LV
- Underground non-submarine – LV

[2] This list of categories represents an initial industry position on standard asset categorisation. However, the NSPs should have the capacity to nominate additional categories in a case in which their assets do not logically fit within categories provided in this list. For example, the Stobie pole (a steel and concrete pole) is only used by SA Power Networks.

TRANSFORMERS

Possible sub-categories to be determined by each DNSP

- 132/110kV : 66kV, >100MVA
- 132/110kV : 66kV, ≤100MVA
- 132/110kV : 33kV, >100MVA
- 132/110kV : 33kV, ≤100MVA
- 132/110kV :11/22kV, >60MVA
- 132/110kV :11/22kV, ≤60MVA
- 66kV : 11/22kV, ≤15MVA
- 66kV : 11/22kV, >15MVA and ≤40MVA
- 66kV : 11/22kV, >40MVA
- 33kV : 11/22kV, ≤15MVA
- 33kV : 11/22kV, >15MVA and ≤40MVA
- 33kV : 11/22kV, >40MVA
- 22kV : 11/6.6kV, ≤15MVA
- 11/22kV :400V, <50kVA, pole mounted (including surge arrestors and drop out fuses)
- 11/22kV : 400V, ≥50 kVA and <315 kVA, pole mounted (including surge arrestors and drop out fuses)
- 11/22kV : 400V, ≥315 kVA, pole mounted (including surge arrestors and drop out fuses)
- 11/22kV :400V, <50 kVA Ground/pad mounted, <50 kVA
- 11/22kV :400V, ≥50 kVA and <315 kVA, Ground/pad mounted
- 11/22kV :400V, ≥315 kVA, Ground/pad mounted
- 12.7kV SWER Isolating
- 12.7kV SWER
- 22kV Regulator

Comment:

- 315kVA is a standard size distribution transformers hence the proposal to increase from 300kVA to 315kVA as the logical break point.

- The use of highest 'name plate rating' for categorisation overcomes any potential definitional issues. It is the available forced cooling rating that represents the useful management parameter and replacement cost estimate. For example, a transformer purchased as 20/33MVA (ONAN/ODAF), would use the 33MVA (ODAF) rating for this purpose.

- Distribution transformers should include surge arrestors and drop out fuses.

SWITCHGEAR (including associated current and voltage transformers)

Possible sub-categories to be determined by each DNSP

- 132kV substation, indoor (GIS)
- 132kV substation, outdoor
- 132kV line
- 66kV substation, indoor
- 66kV substation, outdoor
- 66kV line
- 33kV substation, indoor
- 33kV substation, outdoor
- 33kV line
- 11/22kV zone substation
- 11/6.6V zone substation
- 11/6.6kV distribution substation
- 11/22kV distribution substation
- 11/22kV line (excluding drop out fuses)

- 400V

Comment:

It is recognised that some DNSPs may wish to separately model different categories of switchgear such as isolators, reclosers and, circuit breakers. Sub-categories would be used for this purpose.

SERVICES

- Overhead service assets
- Underground service assets

SCADA, COMMUNICATIONS & PROTECTION

Possible sub-categories to be determined by each DNSP

- Protection relays
- SCADA Data Unit (RTU)
- Microwave radio equipment
- Microwave radio towers / civil establishment
- Substation metering
- Pilot cables - copper
- Pilot cables - fibre optic
- Remote monitoring units
- Other SCADA assets as determined

OTHER ASSETS

Possible sub-categories to be determined by each DNSP

- Capacitor bank 110/132kV
- Capacitor bank 66kV
- Capacitor bank 33kV
- Capacitor bank 22/11kV
- Substation civil establishment major indoor
- Substation civil establishment major outdoor
- Substation civil establishment medium indoor
- Substation civil establishment medium outdoor
- Substation civil establishment small indoor
- Substation civil establishment small outdoor
- Substation other (includes batteries, neutral earthing resistors, reactors etch)
- Voltage transformers 110/132kV where these are not included in switchgear
- Voltage transformers 66kV where these are not included in switchgear
- Voltage transformers 33kV where these are not included in switchgear
- Voltage transformers 22kV where these are not included in switchgear
- Voltage transformers 11kV where these are not included in switchgear
- Current transformers 110/132kV where these are not included in switchgear
- Current transformers 66kV where these are not included in switchgear
- Current transformers 33kV where these are not included in switchgear
- Current transformers 22kV where these are not included in switchgear
- Current transformers 11kV where these are not included in switchgear
- Audio Frequency Load Control (AFLC) equipment
- DC Batteries
- DC battery charges
- Neutral earthing resistors
- Reactors

IT

Comment:

The REPEX model works most effectively when there are a large number of similar assets to be replaced. From an IT perspective, this may apply, for example, to a fleet of desk top computers, monitors etc. Not every company owns IT assets like these as they may consider leasing to be a more cost-effective solution. IT assets that are owned are generally fewer in number and more complex in nature. The rate of technological change in IT means that when these assets are due to be replaced, the proposed solution is unlikely to be like for like and may involve a substantially different technology, which makes this category of expenditure unsuitable for modelling with REPEX. It is considered that IT replacement expenditure is better assessed through detailed engineering review and should not be modelled with REPEX.

AUGEX Categories

General Comments

The categorisation of assets below the highest level (subtransmission lines, subtransmission substations, zone substations, high voltage feeders, distribution substations, low voltage feeders) in a standardised way that aids the AER's understanding of augmentation capital expenditure is difficult.

Categories should represent asset groupings with similar augmentation cost drivers, be they the size of the asset and, hence, the cost associated with augmentation, or the characteristics of the load serviced by the asset segment, which may drive asset utilisation, supply security levels etc.

The disaggregation of asset categories into geographic/load density segments (urban, short rural etc) is not recommended as these categories are not strong drivers of augmentation cost and are not universally used by all DNSPs. Categorising subtransmission assets in this way will result in a number of assumptions that may not be consistent across DNSPs as subtransmission assets (including zone substations) may service loads in multiple categories. Additionally, the capacity of a zone substation is more a cost driver than the type of feeders it serves. At the lower levels of the network (distribution substations and low voltage feeders) there is limited information held about these assets, which will require a number of assumptions to be made to populate the AUGEX model. Further categorisation, where information is not readily available to do this, will result in further assumptions, which will detract from the accuracy of the outputs.

The following comments are offered specific to each of the main *Asset Groups*:

SUBTRANSMISSION ASSETS (subtransmission lines, subtransmission substations, zone substations)

At this level, it is agreed that the augmentation capex categories are appropriate although the AER needs to be aware that with relatively small numbers of large, unique projects at this level, the modelling may not provide meaningful answers and detailed engineering review will be required. These projects are sufficiently important to the security and reliability of the network to warrant this level of attention.

Because of the relatively small number of projects in this group, further categorisation is likely to result in insufficient expenditure being modelled to justify the costs associated with additional categorisation. Further, the unique nature of the projects in each category will mean that benchmarking between companies will need to be heavily qualified.

HV FEEDERS

This is the *Asset Group* where modelling using AUGEX is likely to produce the best results due to the relatively large number of similarly categorised projects that are carried out on this group of assets. However, the categorisation of this group needs to be considered in light of the augmentation expenditure drivers. A separate category for voltage constrained feeders may be considered necessary by some DNSPs because of the range of different utilisation thresholds that will apply for these feeders.

Where individual feeders service a specific category of customers that have load characteristics that are substantially different from other feeders, these too may be usefully categorised. However, different DNSPs are likely to have different categorisation requirements due to different planning criteria, therefore in this respect and the value in defining these categories in a standardised way to enable benchmarking is likely to be limited.

DISTRIBUTION SUBSTATIONS

As for high voltage feeders, this *Asset Group* is likely to produce reasonable results when modelled in AUGEX because of the homogenous nature of the asset and associated augmentation projects. Data availability is, however, limited and sampling may be needed to obtain a utilisation profile which, if it is

not truly representative of the overall asset population, and therefor may not be useful for benchmarking between DNSPs.

Again, it is considered that location/reliability classification is not a particularly appropriate basis for categorisation of this asset group. A more appropriate basis may be customer type and/or transformer type (e.g. pole or ground mounted), which is likely to affect utilisation, growth rates and unit costs and, therefore, be a more representative driver of augmentation expenditure. Assumptions would, however, need to be made for this categorisation as well as this information is not known for all distribution substations which again may limit the usefulness of this segmentation for benchmarking purposes.

The proportion of total augmentation capex spent on augmentation of distribution substations is relatively small and the value in categorisation of this category may not justify the costs of data collection.

LOW VOLTAGE

It is noted that augmentation expenditure in this *Asset Group* was not originally intended to be modelled with AUGEX when the model was first introduced to NSW DNSPs. The value of including low voltage feeders in the scope of AUGEX is questionable as the availability of data at this level of the network is extremely limited and will require additional data capture to obtain a representative sample. Given this lack of data at asset category level, further categorisation by location as suggested by the AER is not considered practical.

It has been suggested by the AER that a sampling approach could be used to obtain approximations for the required modelling parameters. Several issues with this approach are noted:

- Obtaining a statistically representative sample of LV feeder data would be a large task given the number of LV feeder operated by DNSPs, for example, Ausgrid has over 60,000 LV feeders.

- It is not clear how a capacity factor or utilisation threshold would be determined given the lack of metering data at LV level.

- The accuracy of the modelled results for forecast assessment and benchmarking purposes will depend on the statistical reliability of the sampling process, which is likely to vary between DNSPs.

The value that the AER will obtain from requiring data to enable modelling of LV augmentation capex may not be justified given the costs involved. It is noted that the proportion of total capex that is spent on augmenting the LV network is generally small; typically it is less than 5%.

Given the limitations associated with attempting to model LV augmentation expenditure, the AER is recommended not to include LV feeder as an asset group. As the alternative, the AER should combine the categories of distribution substations and low voltage feeders as a single asset group, with no further categorisation. This may enable a slightly better estimation of network utilisation, growth rates and capacity threshold with minimal reduction in the AER's visibility of expenditure detail, although it should be noted that the lack of data still causes considerable concern over the validity or reliability of the results that will be obtained from this approach. It is noted that the proportion of the augmentation capex forecast for this combined category is likely to be less than 5% of total forecast system capex and it is unlikely that any further categorisation could be justified, given the costs involved.

RECOMMENDATION

It is suggested, given the issues identified above, that for the first iteration of the use of the AUGEX model, only the highest asset group are specified for use by the AER. As individual DNSPs make use of lower categories that they feel represent the characteristics of their networks, the AER can assess

the degree of commonality achieved and the value that they see in specifying a lower level of categorisation, which may be used in subsequent use of the model.