Jemena Limited

Usage and Governance Guide

IT Long Term Forecasting Guide

Version 1.2

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Glossary

IT Project Investment Tool	A top-down tool for estimating projects which are beyond the normal short-term forecasting/budgeting processes
IT Regulatory Team	Reports to the Regulatory Team and the CDO and is responsible for building the IT project information for inclusion in the EDPR and AA submissions
Opex	Operating Expenditure
Regulatory Team	The supervisory group which builds the overall proposal for the EDPR and AA submissions
Capex	Capital Expenditure

Abbreviations

AA	Access Arrangement (for gas)
ACS	Alternative Control Services
AER	Australian Energy Regulator
AMI	Advanced Metering Infrastructure
BAU	Business As Usual
CI	Configuration Item – an entry in the CMDB detailing a hardware or application system
CDO	Chief Digital Officer
CMDB	Configuration Management Database (from ITIL)
EDPR	Electricity Distribution Price Reset
EPMO	Jemena's Enterprise Portfolio Management Office – this body approves and oversees all large-scale Corporate projects including those IT initiatives which are considered to fall under its remit
GIS	Geospatial Information System
IB	Investment Brief – a document detailing the case for investment in an area of IT e.g. Cyber-Security
IT	Information Technology
ITIL	Information Technology Infrastructure Library - a set of detailed practices for IT service management
ITLT	IT Leadership Team
JEN	Jemena Electricity Networks
JGN	Jemena Gas Networks
OT	Operational Technology
PMO	Jemena's IT Group Portfolio Management Office – this group manages IT projects in the organisation and guides the approvals process for all of the smaller projects which have not initiated from the EPMO
RAB	Regulatory Asset Base
RAS	Regulatory Analysis & Strategy – a section within the Regulatory Team which assembles the complete project list (asset and IT projects) and performs the analysis to prepare the price reset proposals
RIN	Regulatory Information Notice – a mechanism for reporting on expenditure for both the network and IT to the AER
RTS	Real Time Systems
SCADA	Supervisory Control And Data Acquisition
SCS	Standard Control Services

1. Document purpose and structure

1.1 Components of IT modelling process

This document describes our modelling process for our long-term Information Technology (**IT**) capital expenditure (**capex**) forecasts for inclusion in:

- Jemena Electricity Networks' (**JEN**) Regulatory Proposal (**EDPR**) for the 1 January 2021 to 31 December 2025 (2021-25) regulatory control period, which is due to be submitted to the Australian Energy Regulator (**AER**) in July 2019.[1]
- Jemena Gas Networks (**JGN**) Access Arrangement (**AA**) proposal for the 1 July 2020 to 30 June 2025 (2020-25) access arrangement period, which is due to be submitted to the AER in June 2019.

As this document discusses, while the businesses' next periods commence six months apart, their IT capex needs have many similarities and interdependencies.

We investigated a range of best practice IT estimation methods when developing a fit-for-purpose IT capex forecasting tool. Our research indicated that "[i]n principle, one should prefer top-down estimation in the early (conceptual) phases of a project and switch to bottom-up estimation where specific development tasks and assignments are known."[2] Our approach to forecasting IT expenditure is consistent with this best practice model.

This document describes the design criteria and constraints of our modelling, how we intend it to be used and maintained and the governance arrangements in place for overseeing its future use.

There are four components to modelling our IT capex forecast, being the:

- *IT Project Estimation Tool* which is used to forecast projects where a full business case either cannot be undertaken or is not warranted (see section 3.3). This tool is used in creating a long-term forecast and is based on a top-down methodology.
- Short-term IT forecasts which are business-case driven and the inputs are taken from the IT Portfolio Management Office (**PMO**) and Enterprise Portfolio Management Office (**EPMO**) forecasts. They are developed using standard project methodologies and budgets and are typically scheduled no more than 24 months out.
- A consolidation process which takes the short and long-term forecasts as sources and presents them in a format for inclusion into the broader model suite that forms part of the overall regulatory proposal. When consolidating projects from the above sources, checks are undertaken to ensure projects are not double counted or missed and that capex is correctly applied for each business in a regulatory year.
- Output sheets which are in a format that feed into a broader suite of regulatory submission models for each business.

This document focuses exclusively on IT capex. The IT Project Estimation Tool does not factor in any future opex changes such as software/hardware maintenance, support staff or cloud subscription service costs.

Furthermore, our Operational Technology (**OT**) applications such as Supervisory Control and Data Acquisition (**SCADA**) and other Real Time Systems (**RTS**) are managed within the two businesses and are not included in our IT capex forecasts. The central IT group manages the infrastructure and management tools that the

[1] Shortly after drafting this document, we have become aware that the regulatory period for JEN's next regulatory period may be deferred by six months. This change will not affect the timing of projects forecast in this document but it will trigger a change to the aggregation of the six monthly forecasts into annual totals for JEN. Because the timing of projects does not change, JGN's reported expenditure (by year) is not impacted by the change in JEN's regulatory year. Once the change is confirmed, then this methodological document will be updated.

[2] Adam Trendowicz, Ross Jeffery, "Software Project Effort Estimation, Foundations and Best Practice Guidelines for Success", 2014. Pg. 143.

SCADA/RTS applications run on. As a result, there are projects for these elements in the forecast. Checks are performed to ensure there is no double counting or gaps between IT and OT projects.

Our long-term IT capex forecast is driven by our IT strategic plans. Our activity is based on maintaining and refining the current application systems and infrastructure, which are essential to supporting the business functions. We use extensive and detailed information about the equipment and software in operation to build the project list and to provide inputs into the estimation models.

We calibrated our top-down *IT Project Estimation Tool* against 2018 actual costs to ensure the robustness of our long-term IT capex forecast (see Appendix B). The verification process involved subjecting 44 statistically significant IT projects with a total cost of $45 million, comparable to a whole year's IT spend across the whole of Jemena, to double-blind testing. This revealed a median error in project cost estimation of only $4,512.

This document focusses on:

- The IT Project Estimation Tool.
- Developing long-term forecasts.

Our entire model, and our use of the *IT Project Estimation Tool*, were independently reviewed by Deloitte. Their report recommended several usage and governance improvements and assessed whether the approach is fit-for-purpose. Their recommendations have been reflected into this document.

1.2 Forecasting the businesses' different Regulatory years

The businesses' next periods are largely beyond the planning horizon for our PMO and EPMO. As a result, a long-term forecasting approach is needed to determine our capex forecasts for our regulatory proposals.

Our approach is to develop a forecast that produces a single cost per project per regulatory year, although some projects cover multiple years while others recur multiple times in the period. The *IT Project Estimation Tool* takes the input forecasts and produces a total IT spend per year based on the year of activity of a project for the five years of the regulatory periods.

A regulatory year is a calendar year for JEN and a financial year (FY = Jul-Jun) in the case of JGN. The long-term forecast – which estimates and apportions costs across RYs – take into account the differing treatment of RY between each of JGN and JEN.

The focus of the long-term forecast, and the regulatory submissions, is exclusively on IT capex spending. Operating expenditure (opex) allowances are calculated differently. The modelling produced by the *IT Project Estimation Tool* does not attempt to factor in any future opex changes such as software/hardware maintenance, support staff or cloud subscription service costs.

1.3 Intended Use of the Long-Term Forecasting

We have template spreadsheets that list the projects that are deliverable in their next periods for the businesses. These templates include provision for project names and unique ID (see Appendix A), the categorisation of each project, identification of differences between the businesses, and a costing for each regulatory year from 2019 to 2025.

The output sheets from the forecast model link to the template spreadsheets so that the IT project lists for each network business can be input into the broader submission modelling.

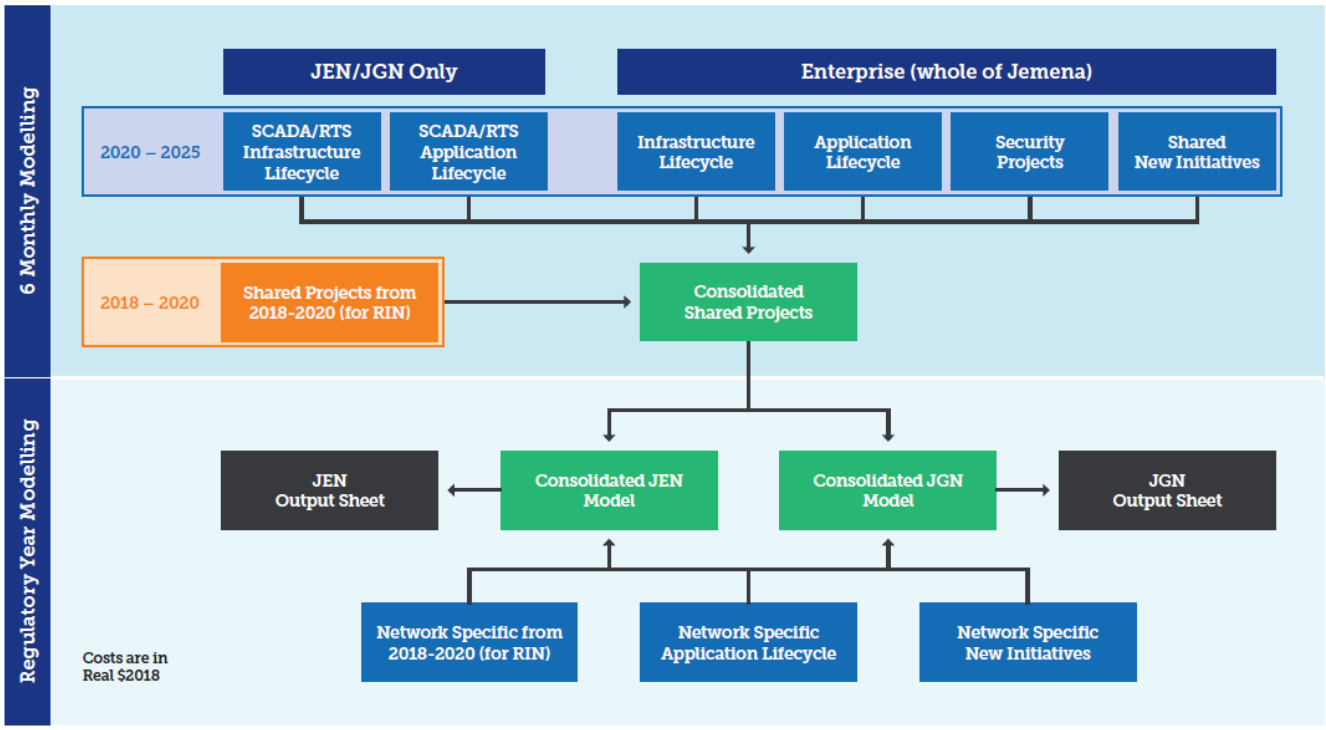
The projects that we expect to undertake in the penultimate and final regulatory years of the current periods are included as part of the modelling as some of them continue into the next periods, in which case they form part of our capex proposals.

Many IT systems are shared across the Jemena portfolio of businesses. The mapping process from the source forecasts to the output templates takes account of shared projects by apportioning capex to the respective businesses.

1.4 Data Flows in the Model

Figure 1–1 outlines the inputs (blue & orange), calculations (green) and outputs (black) for our IT capex program for the next periods. It shows how JEN and JGN's IT requirements relate to the Jemena program requirements.

Figure 1–1: Outline of Jemena's IT capex program



The forecasts from the output sheets are included and referenced in the respective sections of our:

- Technology Plan – the document that outlines our overall IT strategy.
- Investment Briefs – a set of documents that outline our IT investments within a class of projects.

We will submit these documents to the AER with our proposal documents for each asset.

In the next regulatory periods, the IT PMO will use our long-term forecast, as reflected in our proposals, when reviewing and referencing materials included in the capex proposals, especially to see what parameters were used to estimate the project costing.

Because the process of creating price reset submissions is a recurring one for the organisation the long-term forecasting process, this document and the forecast model will have enduring benefit when the process is performed again in subsequent EDPR and AA periods.

2. Governance and Oversight

2.1 Model Ownership

The owner of our IT capex forecasting model, and the person accountable for its outcome, is the Chief Digital Officer (**CDO**). This accountability is tied to the budgeting process within Jemena and aligns to the EPMO, which approves and oversees all large scale IT project activity within the businesses in the short-term (12-24 months).

The CDO, and the IT Leadership Team (**ITLT**), are responsible for ensuring that the project listing, the proposed spread of projects over the planning horizon and the overall forecast for the regulatory periods meet the "necessary and sufficient" requirements for the long-term program of work. The ITLT must be satisfied that it can continue to operate the IT function within the businesses.

The CDO and the ITLT are involved in developing the capex forecasts for the regulatory proposals and are involved in detailed reviews of the Technology Plans and Investment Brief documentation, which include the project lists, costings and timeframes.

Through its oversight processes, the ITLT has been directly involved in shaping the direction of the modelling and, for certain key projects, the direction of specific initiatives' sizing estimates and timing.

2.2 Approver of Changes to the Forecast

The lead of the IT Service Planning Manager is responsible for authorising changes to the forecast and the respective output templates. This lead is responsible to the CDO for making those changes, particularly to cost estimates and timings, within the remit set out by the EPMO, the CDO and the ITLT for the coming regulatory periods.

2.3 Model Design

The input sheets for the model (i.e. the blue and orange items in Figure 1–1) were taken from the short and long-term forecasts prepared by the IT Service Planning Manager. This team maintains the long-term forecast inputs and the importing of project information from the PMO short-term forecasts. Project changes in the input sheets are made by the IT Service Planning Manager.

The Regulatory Analysis & Strategy (**RAS**) team determined the mechanism for translating the input sheets into the output sheets so that the completed sheets can be delivered back to it. These translation mechanisms are generally not affected by the addition or removal of projects or changes to the timing or cost estimates on the input sheets. They have required little maintenance since their construction. The general edits that are made to project costings and timings as the forecasts are being built therefore do not impact the calculation or output sheets. Section 4 discusses the process for modifying the model.

2.4 Model Location & Protection

The model resides within a secure collaboration environment accessible only by authorised personnel. A copy is held in the Enterprise Content Management System (**ECMS**) for the corporate record, once the model is finalised.

The model is only accessible in this secure collaboration environment on a read-only basis to Jemena staff involved in the projects for the regulatory proposals, as well as the IT PMO and the ITLT. While users can save copies to a new filename outside of the secure collaboration environment, they cannot update the master copy. The file is also protected by an Excel modify password, which is known by only a few key staff.

The translation ("Calc") sheets and the output sheets are password protected to prevent unauthorised alterations.

2.5 Protection From Duplication or Omission Between IT & OT

The delineation between IT and OT responsibilities is clear in Jemena. This means that there is no duplication or omission of projects between the two groups. The two groups share their respective project lists when preparing and finalising the forecasts.

It is possible to identify which projects relate to IT and network assets based on their numbered coding. IT projects have an "IT" prefix. Each group can readily search the total project list to check whether there are any missing areas of coverage.

3. Formulation of the Long-Term Forecast

3.1 IT Project Planning and Management

Jemena has developed a strong capability in systems, change management and governance. This knowledge is captured in the system documentation, project management framework, and program governance that Jemena has created. Jemena also recruits technical staff, subject management experts and a management team that have capabilities in systems management – as is demonstrated in Jemena's ability to meet industry obligations within timeframes and within regulatory allowances.

Using strong system management capability, we typically conduct around 50 distinct capitalisable IT projects each year. The budget approval cycle for these projects is managed on a calendar year basis in accordance with Jemena's corporate reporting cycle. We take care to ensure which regulatory year capex is incurred, and added to the regulated asset base, recognising that the businesses have different regulatory years.

The IT PMO forecasts only the current, and part of the next, calendar years in detail. The EPMO has a high level view of IT capex for two years, which requires it to makes assumptions about possible large-scale project activity. We develop long-term IT forecasts for subsequent years using the *IT Project Estimation Tool*.

3.2 Lifecycle Projects vs. New Initiatives

Most of the IT projects in our long-term forecast are focussed on maintaining the current level of our IT services (recurrent expenditure).

When an **existing system or application requires regular upgrades or replacement** we refer to this as "life-cycling" that system. These lifecycle projects frequently have historical precedent to inform their business cases and the timing and frequency of their replacement are generally well understood because of the information retained about these systems.

Our Jemena IT Group maintains a Configuration Management Database (**CMDB**) that details all of the current application systems, infrastructure and client devices used by our businesses. Each Configuration Item (**CI**) in the CMDB contains details about the version in use and when it is expected to be due be replaced or upgraded. Lifecycle upgrades therefore have a strong base of detailed information to inform forecasting future costs.

Extracts of these CIs from the CMDB drive the first blocks of projects within the forecast.

Where an application system or piece of infrastructure is identified as essential and a due diligence review concludes that it is necessary to replace, upgrade or maintain it (subject to an approved business case), a lifecycle project is created in the forecast and the timing of the capex is informed by the detail in the CI about when the current version expires.

Many of the CIs do not lead to projects, for example because:

- Some systems represent low business value and the risk of running them without life-cycling is considered acceptable. This reflects its rating within the CMDB. All systems are rated through negotiation with the business users based on the level of importance to operations and required restoration times following system outages. Many of the highest rated systems have restoration times measured in hours. The lowest level has no restoration targets.
- Some systems, generally smaller ones, are routinely upgraded through normal support. Such maintenance is essentially conducted as an opex program.

- Other systems are destined for decommissioning. This could be through a planned replacement with a completely different system or potentially even a move to cloud solutions. Decommissioning costs are factored into new system implementation projects, rather than through life-cycling.

In preparing our long-term forecast for our proposals, we extracted CIs from the application system list and annotated them with comments explaining why CIs that did not get a project in the forecast had been left out. This file resides in the secure collaboration environment for future reference.

We estimate the CIs that generate a project requirement using the *IT Project Estimation Tool*. The IT support teams provide the sizing estimations and then verify the output costs based on their experience. This process can be iterative and in some cases the size, timeframe and complexity parameters in the *IT Project Estimation Tool* are adjusted to fit known historical capex when there is good evidence to show that a system has been more or less difficult to maintain in the past.

Where the CMDB shows there are equipment or software costs to accompany a lifecycle project, these are identified separately and the forecast tracks these alongside the *IT Project Estimation Tool*'s implementation cost to produce a total project capex amount.

Lifecycle projects have the greatest certainty about both their estimated costing and their timing, given their historical precedents. There is an assumption in the forecasting that a "steady-state" process will continue for the planning horizon for these lifecycle systems.[3] Clearly, circumstances can and do change in the future in ways that challenge this steady-state assumption. However, we assume that these currently active systems will require addressing in the timeframe set down for them in the CMDB. We consider this is the best basis for planning. A change in circumstances often still results in the need to invest, in which case allocated funds are applied to an alternative that meets the same, or similar, objectives.

New initiatives (largely non-recurrent expenditure) are treated differently to lifecycle projects (largely recurrent expenditure). These are created out of new business' requirements such as:

- New or changing regulatory rules.
- Seeking business improvements through process reviews or the adoption of new IT systems to meet a new business requirement.
- Vendors announcing changes to product roadmaps (abandoning lifecycle replacement plans).
- Industry technology developments, which require a response. An example of this is the advances being made in "smart grid" sensors and distributed energy resources in electricity distribution.
- Responding to growing levels of cyber-security threats.

For these initiatives we conduct two streams of activity as part of our long-term forecasting to identify possible new initiatives.

The first is a business-focussed stream that explores changes that the respective asset management groups see as a priority for IT in the planning horizon. In the most recent version of the forecast, we conducted almost 50 interviews with decision makers across the business to understand their requirements.

The second stream focusses on the technology-driven aspects of new initiatives. Primary inputs come from the IT group, especially the technology architects, and from discussions with key vendors and industry analysts.

Both of these streams result in new initiatives being added to the forward plan. Most of these will not have clear historical precedents to guide their costings or timings, of the kind that are available for recurrent projects,

[3] This approach is consistent with the feedback from Jemena's customer consultation exercises, where customers sought for us to 'maintain' our current levels of reliability of supply.

however, based on Jemena's strong IT management capabilities, we are able to reasonably estimate the necessary works and therefore costs.[4]

We conduct preliminary assessments to determine what an eventual business case will look like by considering questions such as:

- How large is the project likely to be? This is often measured in terms of its footprint within the business and the amount of process change involved. In some cases, the technical change is overshadowed by the impacts of people and process change.
- Does the project involve more complexity than usual? Is it likely to be a drawn-out activity calling for greater project management or does it involve the use of specialised resources that are in short supply?
- What value is the project likely to return? We expect initiatives that are not strictly compliance-driven to have a non-negative NPV or to mitigate an unacceptable level of risk.

There is an iterative discussion for each new initiative, which involves multiple rounds of feeding back the output produced by the *IT Project Estimation Tool* against the expectations of the business owner in terms of value to the business (which can be measured by a number of metrics).

3.3 IT Project Estimation Tool

As noted, it is not practical to perform full business cases for projects beyond 12-24 months in the planning horizon. This is because of, amongst other things:

- Uncertainty caused by rapid shifts in the technology landscape, making cost estimation difficult.
- Reluctance from vendors to provide firm estimates for projects that will not start in the short-term.
- The addition of "risk premiums" to any quotes that are provided by vendors to cover their uncertainty.
- The cost. Approximately 5% of all project costs relate to preparing the business case. For very large projects this can exceed $1 million. This investment would largely be lost as any future approval to proceed would typically require the business case to be almost completely revisited.

Based on this, we have built a fit-for-purpose estimation tool for long-term forecasting. It is based on the management experience, as noted in section 3.1, that these are the key drivers that affect IT costs when estimating cost estimates of projects into the medium and long term. These are prepared in relative size (cost) bands and generic costs are varied if there is greater complexity or a drawn-out timeframe is expected. These additional factors allow for fine-tuning of the primary project-size selection for other influencers that the estimator believes will have on the project budget. In this way, we produce a reasonable estimate of costs for each project. In essence, the approach we use to forecast capex in the *IT Project Estimation Tool* is a modified version of a top-down mechanism.[5]

We determine capex forecasts over the short term (i.e. 12 to 24 months) using bottom-up estimation techniques in order to yield an accurate total forecast of IT capex.

We expect some "unders and overs" with the actuals from our top-down modelling approach. We gain a level of comfort that the complete program of work covers the necessary business requirements by comparing the forecast and historical capex.

[4] With all changes arising within our domain of experience in the energy context—including technical and regularity requirements—we are confident about change impacts and cost estimates, that is, we are not developing programs of work outside of our industry where we do not have experience at all, and therefore less able to estimate costs.

[5] Whilst our estimation approach uses an *experience based model* to determine costs, our method for determining the programs or work is determined on a bottom up basis, that is, we only seek to invest in programs of work where there is an identified need.

The *IT Project Estimation Tool* uses three parsimonious inputs to determine a capex estimate for a given project:

- Size – based on approximate costs. We have developed seven escalating levels ranging from very small ($75k) to enterprise ($2.1m and above). This provides a full range of costings which scales across the majority of projects that we undertake. Estimators will base the size selection on both past experience of projects as well as weighing expected benefits and risks.
- Timeframe – We have developed five levels of timeframe using 3-month intervals, ranging from small (3 months) to large (more than one year) that also reflects the majority of projects undertaken and which estimators can readily pick from to select the timeframe of the project
- Complexity – We have developed five levels, ranging from low to high. Examples of factors that impact on complexity include:
  - Projects which are routinely performed, e.g. client device upgrades, and which are performed by in-house staff are considered less challenging.
  - IT initiatives which involve substantial changes to processes or structural changes within the business are more challenging than those which involve merely technical changes.
  - A requirement for specialist skills or needs to call upon external resources indicates higher complexity.
  - Systems with market testing requirements bring in external parties to the mix.
  - High availability and Real Time Systems have smaller testing windows and require greater care and planning when being updated.
  - Interfaces to other systems, particularly ones which involve some of the other factors above, also carry greater levels of complication.

The timeframe and complexity parameters are used to escalate the base project estimate. Simplistically, Cost = Size * Timeframe uplift * Complexity uplift.

The most important contributor to the estimate though is the size parameter and it is selected using expert assessment. Project managers and support team leaders have long experience with like-sized projects. Our validation of the use of the *IT Project Estimation Tool* (see Appendix B), comparing estimates to actuals, has demonstrated that historically our band selection has been reliable.

3.4 Maintaining and Updating the Estimation Tool

The *IT Project Estimation Tool* estimates projects at a point-in-time and all the input and output costs currently reflect real $2018.

After the current price reviews, the base costs for the project size bands in the *IT Project Estimation Tool* may need to be updated for changes in costs, technology, the market and the business environment.

We recalibrated the base costs for size using a validation check, as is described in Appendix B. We compared the actual costs from the 2018 program of work with the *IT Project Estimation Tool* predictions in a double-blind trial. Back-cast testing and calibration was undertaken to assess the robustness of the model parameters, it means that we have greater confidence that the estimation parameters and that it eliminated any contingency that may have crept into the project estimates. Because historical actual expenditure—being the basis for the forecast—does not have any contingency included, contingency amounts cannot be inferred in the forecasts going forward. This is a superior approach to bottom up forecasts where risk premiums (that is contingency amounts) for longer time horizons generally arise.

4. Modifying the Model

4.1 Model Maintenance

We do not alter the design of the *IT Project Estimation Tool*, the long-term forecast and submission model without oversight from the designers.

For our proposals, as illustrated in Figure 1–1, we use input tabs to assemble the short-term and long-term project information. We translate this through a number of intermediate and output sheets to arrive at a format suitable for submission to the RAS team. We may add, delete or modify projects without needing to change any of these other tabs in the workbook.

The 'Home', 'Change Log' and the 'Output | Summary Stats' tabs are the only other tabs that need changing if modifications are made.

Any design or format changes to the 'Input | Forecast project list' ', 'Calc' or 'Output' tabs need to be examined by the designers for potential impacts to the information that would flow to the RAS team. The model owner (the CDO) and the RAS team are notified of any changes and what effect, if any, there has been on the number of projects and the total capex program.

If a design change is made, we ensure a clean version is stored in the document environment. A copy of the model prior to the design change is stored in ECMS as a secondary backup.

4.2 Adding Projects

When a new project is required in the long-term forecast, the unique Project ID (see Appendix A) is the first attribute chosen. There are blocks of project IDs which group similar or related projects together. The next number in this block is selected for the new project.

The project is then entered into the first blank row at the bottom of the 'Input | Forecast project list' tab. The project name is added first, then the Project ID.

The *IT Project Estimation Tool* is used to determine what parameters to use for the project.

A project name is chosen which is as meaningful as possible so that when the IT PMO refers back to the list it has the best chance of understanding what was intended. The name should note if the project is to "lifecycle" an existing product.

The service code for electricity Standard Control Services (**SCS**) projects is "GII" for infrastructure projects and "GID" for application systems. The code "GIS" might be used in the very rare case that the project deals with OT outside of the corporate environment (i.e. the other side of the firewall). RAS is consulted to provide any clarification.

"GIN-S" is generally the service code for electricity Alternative Control Services (**ACS**) projects, such as some components of the Advanced Metering Infrastructure (**AMI**).

We choose other categorisations that follow in the project row, which are used to populate the output sheets, based on other, similar projects.

It is important to maintain consistency in the convention used to classify the program of work for internal and external reporting.

We use half-year modelling in the forecasts because of the overlap between JEN's and JGN's regulatory years.

Columns make provision for device/software numbers (modelled on the half-year that they are expected to fall) where these are known from the CMDB. Equipment and software is typically ordered at the start of a project when estimating timing.

We note the project frequency in the respective half-years in which we expect them to occur. An extended project can be shown as having '0.5' of its costs in consecutive half-years. The totals tally this to a single project cost.

Likewise, inserting '1' into separate half-years indicates that a project occurs more than once. This is common for lifecycle projects, which tend to be performed on cycles shorter than five years. Care is taken to ensure that this reflects the lifecycle timeframes for the product in order to avoid duplication.

The inputs for project size, timeframe and complexity are inserted next and automatically calculate the project cost. This output is not manually over-ridden.

Any device costs or additional software costs for a project are input next. There needs to be a corresponding number in the devices' section of the forecast to match this cost or the project will not pick up the additional amount.

The total cost is calculated based on the sum of all the projects and the device/software costs.

The 'Checks' tab indicates whether all inputs have been performed correctly.

The 'Output | Summary Stats' tab can be used to check whether the addition of a project impacts the JEN and/or the JGN totals as expected.

Revised totals are copied and pasted as a value into the check box beneath each total so that a "previously known point" figure is retained through the changes.

An entry is made in the change log to record why the change has been made and who authorised it. The 'Home' tab is updated with the date of the latest update.

4.3 Deleting Projects

On occasions, a new project is no longer required in the long-term forecast for the proposal. This may be due to a lack of business support or because it is superseded by another initiative. Regardless, the project line is not removed from the model.

Instead, 'Project Absorbed' is entered into the project name and the Project ID is retained. The numerical information and categorisations is deleted so that the project does not add to the total cost.

The 'Checks' tab indicates whether this amendment has been performed correctly.

The 'Output | Summary Stats' tab can be used to check whether the deletion has impacted the JEN and/or JGN totals as expected.

Revised totals are copied and pasted as a value into the check box beneath each total so that a “previously known point” figure is retained through the changes.

An entry is made in the change log to record why the change has been made and who authorised it. The ‘Home’ tab is updated with the date of the latest update.

4.4 Modifying Projects

When a project is modified, even if it just to enter a more descriptive project name, the same checks and updates to the change log need to be made as for additions and deletions.

If the change involves more than just amending the input parameters or timing, such as changing from “lifecycling” a system to replacing it with a new product, the project is deleted (as per section 4.3) and a new one is added.

Appendix A
Unique project ID definition

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A1. Unique project ID definition

Projects sourced from the short and long-term forecasts require a unique identifier for the proposals.

A1.1 Source types

There are four types of projects/initiatives in the IT forecasts:

- JEN specific (i.e. 100%):
  - Where initiatives and projects are aligned purely with JEN.
  - Examples include the AMI metering systems and the market B2B interfaces.
- JGN specific (i.e. 100%):
  - Where initiatives and projects are aligned purely with JGN.
  - Examples include the JGN customer portal and the gas network Geospatial Information System (**GIS**).
- Shared Enterprise (i.e. split between JEN and JGN, but with costs also allocated to other group entities):
  - The split is based on the capital allocation, which apportions 35.1% to JEN and 45.3% to JGN.
  - Examples include core finance and human resource systems, infrastructure and cyber-security products.
  - Shared projects make up over half of the initiatives by number but, because they are often smaller initiatives and their costs are shared, they represent less than half of the overall long-term capex forecast.
- Shared JEN and JGN only:
  - In the less-common instance where a system is used purely within the two regulated network businesses, and not across the Jemena enterprise, the split is adjusted to total to 100% of the value by grossing up the enterprise cost-sharing ratio.
  - Examples include the SCADA systems and Dial Before You Dig (**DBYD**) systems.

A1.2 Project Identifiers

Project IDs begin with the designator “IT” to distinguish them from other business projects when they are included in the regulatory modelling.

The next designator in the ID is either “S”, “E” or “G” to designate Shared, Electricity or Gas specific projects. In the cases of projects which are specific to JEN and JGN only, this is denominated by a classification of “Shared-Enterprise” or “Shared-JEN & JGN Only” in the corresponding Network Cost Allocation column of the forecast.

The next designator is a letter (A-H) or a number (18-20) grouping the source of project together as outlined in the table below.

Table A1–1: IT project designator

Designator	Category
18, 19 or 20	Indicates Short-Term Forecast projects from the years 2018-2020

Designator	Category
A	Enterprise Infrastructure Lifecycle
B	SCADA/RTS Infrastructure Lifecycle
C	SCADA/RTS Application Lifecycle
D	Enterprise Application Lifecycle
E	Enterprise New Initiatives
F	Network Specific Application Lifecycle
G	Network Specific New Initiatives
H	Network Specific Compliance Driven Initiatives

These designators are then followed by an incrementing sequence of numbers to distinguish the individual projects within that grouping.

Where the A-H designations are used, this indicates that the project is from the long-term forecast list and uses the Estimation Tool unless some specific work has been done on a business case for that initiative.

For example: ITSA01 is the first shared infrastructure lifecycle project in the listing.

A1.3 Shared Sources – Appear in Both JEN and JGN Long-Term Forecasts

There are five blocks of shared projects:

- Infrastructure lifecycle (ITSAxx):
  - The list of hardware is extracted from the CMDB.
  - All corporate infrastructure is now considered shared across the Enterprise.
- SCADA/RTS infrastructure lifecycle projects (ITSBxx):
  - This relates to infrastructure costs and management tools for the SCADA and RTS.
  - These initiatives are categorised differently in reporting to the AER and have their own group.
  - These tools are also used exclusively by the two regulated network businesses.
  - Note – the SCADA application software is managed and maintained by the OT Group. The Jemena Corporate IT Group only provides the platforms that the SCADA and RTS applications run on.
- SCADA/RTS application lifecycle (ITSCxx):
  - This relates to application costs for the SCADA and RTS layered products, management and security tools.
  - As for the infrastructure for SCADA/RTS, these are categorised differently and are limited in use to the two regulated network businesses.
- Application lifecycle (ITSDxx):

  - The list of shared systems is derived from the current applications list in the CMDB.

- New shared initiatives (ITSExx):
  - These are derived from other projects/initiatives which are designed to add new capability or to rectify deficiencies in systems and processes over and above that accomplished during the normal cycle of upgrades.

There are no shared regulatory compliance-driven projects.

A1.4 JEN-Specific Sources - Appear Only in the JEN Long-Term Forecast

There are three blocks of JEN-specific initiatives:

- JEN-specific application lifecycle (ITEFxx)
  - These are derived from the current applications' list in the CMDB where those applications are dedicated to JEN.
- JEN-specific new initiatives (ITEGxx)
  - These are derived from other projects/initiatives, which are designed to add new capability or rectify deficiencies in systems and processes over and above those performed during the normal cycle of upgrades.
- JEN-specific regulatory compliance driven projects (ITEHxx) – examples might include:
  - 5-Minute meter reading and settlement capability.
  - A project to provide functionality for the Common Data Model – still currently being determined for timing.
  - Provision for support of a centralised DER register.

Business-specific projects are modelled by regulatory year (i.e. based on a calendar year) and the consolidation process brings the shared projects back from a six-month viewpoint into a regulatory year view.

A1.5 JGN-Specific Sources - Appear Only in the JGN Long-Term Forecast

There are also three blocks of JGN-specific initiatives:

- JGN specific application lifecycle (ITGFxx):
  - These are derived from the current applications list where those applications are dedicated to JGN.
- JGN-specific new initiatives (ITGGxx):
  - These are derived from other projects/initiatives, which are designed to add new capability or rectify deficiencies in systems and processes over and above that performed during the normal cycle of upgrades.
- JGN-specific regulatory driven projects (ITGHxx) – an example might include:
  - Gas Day Harmonisation (change start of gas day).

Business-specific projects are modelled by regulatory year (i.e. based on a financial year) and the consolidation process brings the shared projects back from a six-monthly viewpoint into a regulatory year view.

Appendix B
Estimation tool calibration

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B1. Estimation tool calibration

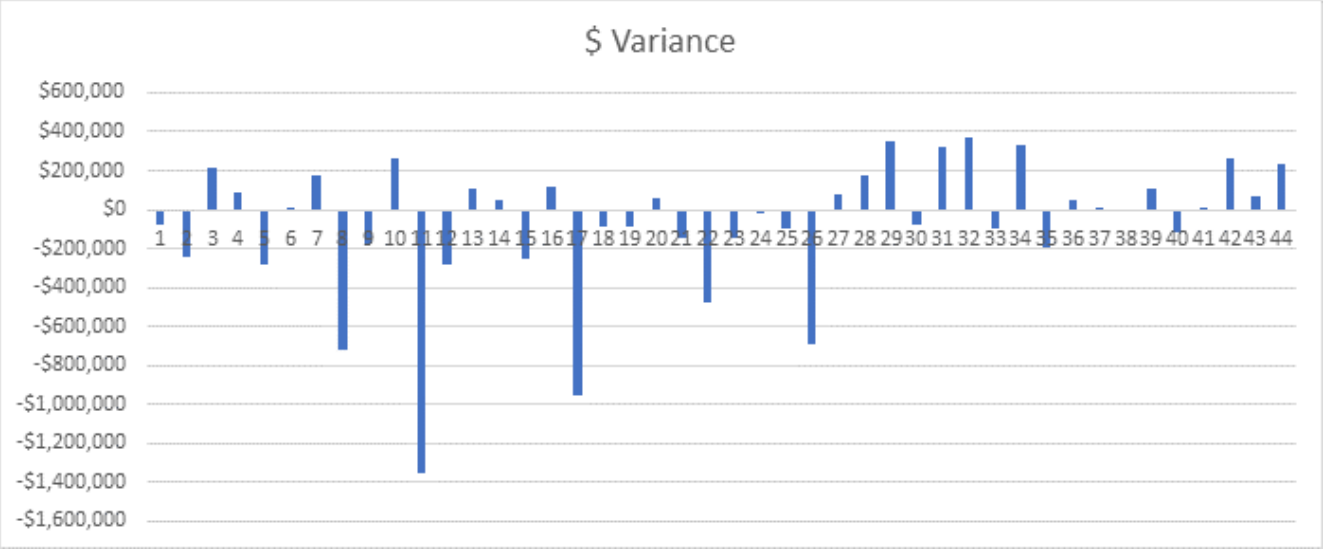
B1.1 Calibration Test

In early 2019, we undertook a calibration to validate the accuracy of our *IT Project Estimation Tool*.

We selected 44 (out of 50) projects using only the project description as input. Costs and timings were removed until the estimation was performed. Section B1.2 details the process that we used.

The total for all projects under consideration was $45 million and the estimation tool gave a prediction of $41.8 million, a shortfall of 7%.

Figure B1–1: Variation arising from IT Project Estimation Tool



Note – projects in the test were sorted alphabetically by name.

The graph shows that there were a combination of under and over-estimates, however they generally balanced each other out across the overall program of work.

In forecasting infrastructure projects, the size of the equipment fleet, the full replacement timeframe for life-cycling it and the relative costs of replacement, in today's terms, are known. Over a long enough timeframe, peaks and troughs in hardware purchasing will naturally level out.

Only the implementation component of projects is subject to the *IT Project Estimation Tool*.

The mechanism within the *IT Project Estimation Tool* for the implementation component of a project essentially involves selecting a "band" (very small to enterprise) that a project is expected to fall within, which drives an estimation from a base cost for that band escalated by parameters tied to complexity and timeframe. It is the "Size" band selection that has the most material influence on the outcome.

The expectation going in to our validation test was, while the band selection may not always be correct, there would be unders and overs across the program from this selection that would level out across the program.

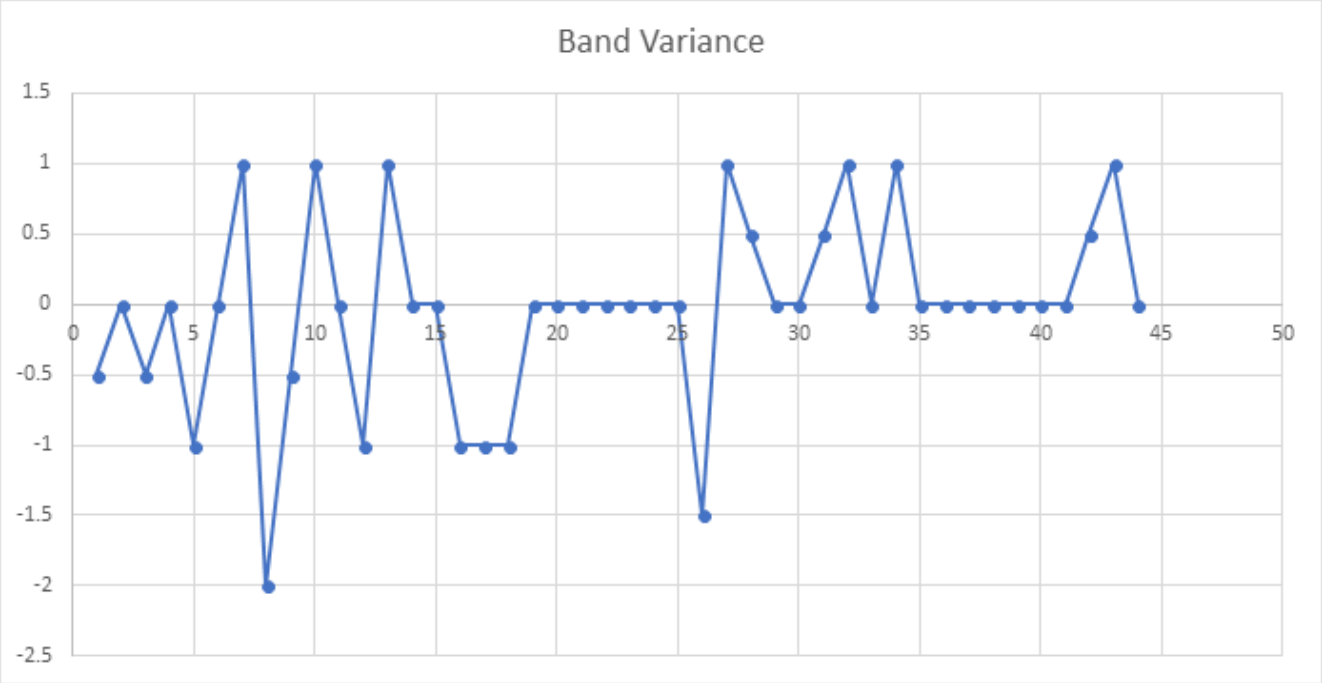
This was born out in practice. We analysed how far out of the actual band the estimation for the project fell. We found that:

- 24 projects were in the band estimated
- Six projects were somewhere halfway between two of the estimation tool's bands. In these cases, they were evenly split between unders and overs when they were forecast.
- 12 projects were a full band away from the estimation tool's bands. These were also split evenly between unders and overs.
- Two projects where the forecast of the band was materially low.

Generally speaking, the sizing was closer on projects, which had historical precedents available. New initiatives have greater uncertainty and more unders and overs. This was expected.

Figure 4 shows the unders and overs, being how far out of the actual band the estimation for the project fell.

Figure B1–2: Project band variation



The two projects that were most under-estimated – "Core Process Performance Dashboard (**CPPD**)" and "Mature the JOM – CPPD2" – turned out to be related elements of the same ongoing program and both ended up being just over $1 million in actual costs.

Overall, as a program of work, the unders and overs have proved to be remarkably self-levelling. The fact that the median difference in project costs between actual and estimate was only $4,512 is testament to the balancing effect of unders and overs when adopting a top-down estimation mechanism.

This gives the validating team confidence in the design of the *IT Project Estimation Tool* and the base levels for the "size" bands. The parameters provide a workable prediction of the program given the level of certainty that exists.

Once the real costs of the projects were revealed it became evident that the estimated project timeframe has often been optimistic. The median timeframe for estimations was 7-9 months – the mid-point for the timeframe parameter. Many of the projects turned out to take longer in practice and the median timeframe across all the projects was closer to 12 months.

This does not indicate a problem with the tool itself, but rather with its use. Accurately reflecting the true project duration on the estimation would have closed the gap by only 1% to -6%. This learning will be fed back to the IT PMO so that, when they are using the *IT Project Estimation Tool* into the future, they recognise the potential for projects to run longer than expected.

Projects that run for longer than predicted periods typically lead to delays in starting other projects and sometimes to project cancelations if resourcing is constrained and the business case is marginal. In other words, unders and overs will take care of the variance across a whole program of work without artificially trying to extend the project's timing beyond what has been input into the long-term forecast to date.

B1.2 Estimation Tool Calibration Process

The process used for setting up the 2019 trial was as follows.

A project list was obtained from the IT PMO spanning 2017-2019. The figures contained actuals from 2017 and 2018 extracted from Finance and IT PMO business case forecasts for 2019. PMO actuals for 2017 and 2018 were matched with extracts for RINs and contained whole of project costs - whereas RIN data is often split into two or more entries per project. There were a couple of exceptions, such as a 2018 SCADA project that is reported in the RINs but was conducted in the network business and hence not performed by the IT PMO. Aside from those notable exceptions, the project totals were clean.

Projects which did not have a material spend in the 2018 year were removed from consideration. Projects which started in 2017 and continued into 2018 were retained on the assumption that minor influencers such as inflation would have little bearing given the overall level of uncertainty in the *IT Project Estimation Tool*.

Likewise, projects which started in 2018 and were forecast to continue into 2019 were also included. These projects were retained on the basis that they were in-flight, had undergone rigorous business cases and had approved budgets forecast in Real $2018, which meant that the future costs had a high level of rigour in their development and could be considered closer to actuals.

Lastly, projects which had no relevance to JEN of JGN were excluded.

This left 44 projects. The list of project names, and information on whether they were shared, JEN and JGN-related, were then extracted without the timing information or actual costs.

An estimation "expert" team was then given just the project description to estimate each project using the *IT Project Estimation Tool*.

Where a project was matched by an equivalent in the current long-term forecast, the estimate defaulted to using the project parameters and details from there.

The team did not know what the total cost for the project list was going to be, because it was a subset of the full activity and overlapped some years. Typically, when preparing long-term forecasts, modellers can compare the entire program of work to historical budgets. This top-down feedback mechanism isn't available in a calibration test such as this and the team had to consider each project purely on its merits.

There is always some level of subjectivity in estimating based purely on a project description, which can led to more inaccurate estimate. However, there is also a level of uncertainty on projects five years out and the calibration process needs to maintain similar levels of uncertainty to be valid.

The process depends upon the fact that this is long-term forecasting for a program of work. Projects may be expected to have unders and overs but these cancel each other out in a larger program of work when they are totalled.