

Project Justification - IT Infrastructure Refresh

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Document Control

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Note: Printed copies of this document are uncontrolled.

Document Review

This document has been reviewed by the following parties prior to approval:

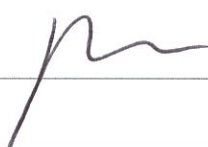
| Reviewer Name | Role | Date |
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Document Approval

Approval of the Project Justification for the IT Infrastructure Refresh project is provided by the signatories shown below.

Changes to this document will be coordinated and approved by the undersigned or their designated representatives via project change management.

The undersigned acknowledge they have reviewed and approved this document.

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| ITEF | IT Executive Forum |
| Approved by ITEF – Refer Correspondence | Date: Oct 2016 |

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1. Project Description

This project is to undertake an infrastructure refresh of the IT environment by incorporating current technologies and architectures and to assess the appropriate platforms for business systems. It will not only refresh the underlying infrastructure but also consider the most appropriate delivery method for each business system. This includes consideration of Cloud services and other specialised externally managed services.

The project will also seek every opportunity to deliver value by ensuring that modern technologies and external services are carefully considered to deliver value to the company and ultimately to the customer. It is estimated that the number of internally managed systems will reduce with some workloads being migrated to Cloud or specialised externally hosted services.

This will result in:

- Constraining increases in operational costs and therefore less pressure on prices
- Ability to deliver services in a prudent and cost effective manner

The project covers the refresh of critical IT Infrastructure including:

- Servers
- Storage
- Network
- Analytics Platform
- Telephony
- Data Centre

2. Objectives/Purpose

The infrastructure refresh elements covered in the document are in accordance with Multinet Gas "IT Asset Management Policy". The purpose of refreshing these platforms is to maintain adequate levels of currency to ensure availability and supportability of IT systems.

3. Strategic Alignment

3.1. National Gas Rules Alignment

The project aligns to the following National Gas Rules (NER) capital expenditure criteria:

- Rule 79 (1) the capital expenditure is such that would be incurred by a prudent service operator acting efficiently in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services;
- Rule 79 (2) (c) (i, ii and iv) the capital expenditure is necessary to maintain the safety and integrity of services and to maintain the capacity to meet the levels of demand for existing services.

This project ensures that MG's IT environment is efficiently and prudently maintained through appropriate infrastructure refresh activities such that it is capable of continuing to support the business in maintaining the safety, integrity and current capacity of MG's services.

3.2. Multinet Gas Strategic Themes Alignment

This project supports the key MG business strategy to:

- Maintain systems to industry standard to reduce risk of disruption to customers and retain levels of efficiency
- Ensure ongoing performance, resilience and safety in the changing distribution network
- Improve asset planning and management through analytics and reporting
- Ensure readiness to achieve regulatory requirements

In supporting the above themes, the IT Infrastructure Refresh supports MG in achieving its business objectives of delivering customers a safe, reliable and sustainable energy supply.

4. Options

Options considered for IT Infrastructure refresh are:

4.1. Option 0: Do Nothing (Status Quo)

This option would continue to run Multinet Gas (MG) computing workloads on existing IT infrastructure and platforms. Although there is sufficient capacity to support growth for the next 2-3 years this option does not address the ageing hardware and the associated increase in support and maintenance costs. Aging IT equipment will contribute to reduced system availability and potentially cause interruptions to services provided by MG and impede the delivery of the capital program.

The Do Nothing option would expose MG to:

- unacceptable (High or Very High) risk associated with system failure based on MG's Risk Management Framework and Policy;
- an inability to deliver the proposed capital program; and
- additional support costs to maintain and support ageing infrastructure.

4.2. Option 1: Refresh Hardware and Cloud Service Uptake

This option would undertake an infrastructure refresh and platform rationalisation by refreshing internally hosted platforms. The refresh would also consider technology innovations to reduce the footprint of infrastructure. Innovations such as Software Defined Networks, processor performance improvements and storage performance and capacity improvements will be used to advantage.

This option would also give consideration to moving some workloads to Cloud and other specialised externally hosted services. Business workloads would be assessed to determine if there were any benefits to running them externally. This would result in a shift away from a total dependence on internally hosted systems.

This option would deliver the following benefits:

- Maintain infrastructure currency for systems that remain internally hosted.
- Avoid higher costs of extended hardware support and maintenance costs associated with running end of life hardware.
- Reduce the hardware footprint for internal systems that would in turn constrain increased expenditure associated with data centre floor space, power and cooling.
- It would deliver additional benefits that Cloud services may provide. These may include reduced operational costs lower capital expenditure in the longer term and improved services through specialised skills.

4.3. Option 2: Refresh Hardware only

This option is similar to Option 1 but does not consider moving any workloads to Cloud or any other specialised externally hosted services.

This option would deliver the following benefits:

- Maintain infrastructure currency for systems that remain internally hosted.

Avoid higher costs of extended hardware support and maintenance costs associated with running end of life hardware.

5. Economic Evaluation

The Economic Evaluation table below is the result from the “Business Case Output” from the “Financial Evaluation Spreadsheet Version 1.3”. This is MG’s Capital Project Evaluation tool. The tool comes with standard parameters and these are protected and cannot be altered.

The tool ranks the project based on Least Cost (Net Present Value). The least cost project will have a Project Ranking of 1.

| | "Status Quo" Reference Case | Option 1: Refresh plus cloud | Option 2: Refresh H/w only |
|--------------------------|--------------------------------|------------------------------------|----------------------------------|
| Net Capex (\$) | \$0 | \$4,848,855 | \$5,276,048 |
| Opex (\$) | \$5,841,338 | \$4,419,657 | \$4,550,337 |
| Risk*** (\$) | \$5,123,981 | \$0 | \$0 |
| Least Net Cost (\$) (PV) | \$10,965,319 | \$9,268,512 | \$9,826,386 |

| | | | |
|------------------------|---|---|---|
| Project Ranking | 3 | 1 | 2 |
|------------------------|---|---|---|

NOTE 1: Opex is based on current Opex costs and estimated savings over 5 years to 2024

NOTE 2: Some IT infrastructure is shared between UE and MG systems. Refresh of shared infrastructure will benefit both UE & MG. However, all costs presented above relate to MG only.

6. Proposed Solution

The proposed solution is Option 1: Refresh Hardware and Cloud Service Uptake. This is also the least cost option.

The UE & MG IT platform technologies are divided into three specific categories. Each category is designed to meet different performance, availability and resilience profiles and each has an associated cost.

1. **Enterprise Platforms.** This technology stack provides high availability and disaster recovery to support business critical functions such as financial management, publishing meter data to the market and supporting critical databases.
2. **General Purpose Platforms.** This covers typical business systems of a less business critical nature. It covers back office functions, IT management functions and general business functions. This category requires lower availability and lower resilience and therefore delivers at a lower price point than Enterprise platforms.

3. **Cloud and Externally Hosted Services.** This covers systems that either require specialised management and knowledge such as payroll systems or commodity capability such as email. This category can generally be delivered at a lower cost than if they were managed internally by accessing expert skills via a service or sharing common business practices that benefit from economies of scale.

This project will undertake an infrastructure refresh and platform rationalisation by deploying contemporary technologies and by assessing key business applications to determine the most appropriate platform or delivery method. This will result in a shift away from the current high dependency on internally hosted systems to a more balanced blend of internally and externally hosted systems. Applications suitable for migration to the cloud will require some pre-work to remove local dependencies and to prepare them for transition to the Cloud.

The scope of this project is all IT platforms including SPARC servers, Intel Servers, Shared Storage, Converged Voice and Data Network, SAP HANA appliances, VoIP telephony platforms and the primary and secondary data centres.

6.1. Platform Inventory

The following table lists the key items of UE & MG's Infrastructure considered by this project:

| | |
|----------------------------------|---|
| Enterprise Platforms | 2 x Half Rack Super Cluster, including: <ul style="list-style-type: none">- T5-8 SPARC servers- Exadata database storage cells- ZS3-ES storage- Infiniband network 10 x SPARC Blade servers (DMZ, DMS) |
| General Purpose Platforms | 20 x Intel Blade servers |
| Storage | 2 x NAS Storage Arrays (medium) 2 x NAS Storage Arrays (small) |
| Network | Nexus 7000 switches to replace EOL Catalyst 6509VE core switches Cisco 3172 10GB and fibre switches |
| Analytics Platform | 2 x SAP HANA Appliances and licenses |
| Telephony | 2 x Cisco UCS servers certified for CUCM |

6.2. Data Centre Service Downsizing

As an outcome of the proposed platform refresh described in section 6.3 below, both the primary and secondary datacentres services can be downsized. Leases for floor space can be reduced and costs for power and cooling will be reduced. By moving some business workloads to externally hosted services and by replacing existing IT equipment with newer, more capable platforms significant downsizing will be possible.

By 2020 generators will need refurbishment. Air conditioning units and early smoke detection units will also require regular maintenance and major overhauls required by 2020.

6.3. Server, Storage and Network

The current servers, storage and network devices will be at end of life which will result in higher support and maintenance costs and an increase in risk that unplanned outages will occur. It will also become more difficult to support modern business applications and software components as software manufacturers drop support for older platforms. This will result in an overall drop in reliability of IT systems and possible unplanned outages to business services.

Core network switches are the backbone of the UE & MG network and will be end of life by 2020. These switches form the essential communications hub for the network and will need to be replaced.

Enterprise Servers (SPARC)

Existing SPARC Servers will be refreshed with the contemporary equivalent. SPARC servers are already highly virtualised and this will continue. Improved server performance, inherent in new servers, and reduced workload will allow the platform to be resized.

General Purpose Servers (Intel)

Intel servers will be refreshed with contemporary servers. The platform is already highly virtualised and this will continue. Improved performance, inherent in new servers, and reduced workload will allow the platform to be resized. With newer servers, greater virtual machine density will be possible that will allow greater utilisation per physical server. Server virtualisation (VMWare) and application presentation (Citrix) technology layers will also be refreshed to maintain supportability and currency.

Data Analytics Platform (SAP HANA)

Existing data analytics platform is based on SAP certified appliances. These appliances will have reached their end of life by 2019 and will need to be refreshed. Migration from the old platform to new will be required and will require specialised skills.

Network

The IP data network is based on Cisco core data centre switches and local area switches. As IT systems move to more virtualised technologies, networks are now becoming virtualised too. Through the introduction of Software Defined Networks (SDN) fewer physical switches will be required and fewer visits to the data centre by support staff will be required. Networks will be less complex, require less cabling and will be software configurable.

Core switches will be end of life by 2021 and will need to be replaced. A pair of core switches are located at each data centre.

Storage

Existing shared storage will be refreshed with the contemporary equivalent. This is particularly important as shared storage relies heavily on mechanical disks. Shared storage already utilises virtual services such as data snapshots and cloning which keeps capacity to a minimum. This practice will continue with the new platform. Where workloads require greater performance, all flash storage will be considered. This will result in a smaller footprint and lower power and cooling costs.

Telephony

Desktop telephony remains the most reliable and consistent platform for voice and video communications. Desk handsets are still the most regularly used devices to communicate between members of the company workforce and external service providers and customers. Desk telephone numbers are the numbers that are published externally; on notices and on customer bills. They remain the most widely used and consistently dependable means of communication.

The refresh will include replacing the two UCS servers and upgrading the call management software to the most current version. New servers will be deployed with a new call manager installed and at a quiet time a momentary cutover will be effected to migrate to the new servers.

6.4. Business Application Migrations

Applications will be migrated based on server platform (SPARC / Intel) and without application modification. The application migration approaches to be used are:

1. **Recreate (As Is):** Where possible all applications will be migrated “as-is” to the newly refreshed platforms. Virtualisation technology will be utilised to reduce complexity, maintain integrity and provide rollback capabilities. Network based replication will be used to synchronise data. The majority of applications will fit in this category.
2. **Recreate (Upgrade):** This option primarily refers to the Intel based application presentation layers and the refreshed virtualisation platform. A new application presentation farm running contemporary Citrix versions will be created and applications will be freshly installed using source environment configurations. A new VMWare ESX farm will also be created to host existing virtual machines
3. **Recreate (Virtualised):** Applications and services residing on physical servers e.g. domain controllers, will be virtualised where possible.

6.5. Resourcing

The sourcing and selection of suppliers, service providers and system integrators will be required. MG will benefit from using a team that is familiar with their systems and the Energy Industry.

The company endorsed procurement process will be followed for the procurement of equipment and services. This will cover:

- Equipment selection and purchase
- Equipment configuration and deployment
- Equipment disposal and asset management
- Application migration
- Hand over to Support
- Ongoing maintenance and support

Professional Services

- **Service Providers:**
The incumbent service providers, (currently Accenture and ASG), will be engaged directly through the existing Project Services Request process under the existing Managed Services / Support Services agreements.
- **Specialty Technical Resources:**
Resources with specific technical skillsets will be engaged directly through existing approved vendors, (currently ASG, MGA and RXP). A Project Services Request process already exists with each of these vendors under a Master Services Agreement.
- **Infrastructure Project Management & Services:**
A Project Manager that specialises in Infrastructure projects and who has experience and knowledge of UE & MG IT platforms and systems will be engaged.

Business Resources

Representatives from the business will be required to participate in Business Reference Forums (BRF) on a fortnightly to monthly basis. These forums will be established to provide guidance, review, update and undertake user acceptance testing during the application migration phases.

Representatives will be requested to assist with the following business application groupings:

- Asset Management
- Customer and Market Systems
- Financial and Corporate Services
- Operation Technology
- Information Technology

6.6. Key Milestones

Actual dates for each milestone will be determined at the time of the business case. At this stage the most significant factor is the overall duration of the project which is expected to be in the order of 24 months. This accounts for the following key milestones:

| Project Phase / Stream | Key Milestone | Expected Completion Date |
|------------------------|--|--------------------------|
| Project Start-up | ITEF Project Approval to Proceed | Apr 2020 |
| Project Start-up | Critical Procurement Activities Complete | Tbd |
| Network Establishment | SD Network Design Complete | Tbd |
| Server & Storage | New Equipment Designs Complete | Tbd |
| Data Analytics | SAP HANA Design Complete | Tbd |

| Project Phase / Stream | Key Milestone | Expected Completion Date |
|------------------------|---|--------------------------|
| Equipment Deployment | Configure and Deploy New Equipment | Tbd |
| Application Migration | Migrate applications to new platforms | Tbd |
| Testing | Disaster Recovery Tests | Tbd |
| Project Close | UE & MG Asset Disposal Complete | Tbd |
| Project Close | Post Implementation Review and Lessons Learnt | Tbd |
| Project Close | Project Completes | Nov 2021 |

6.7. Risks

The risks to MG from NOT proceeding with this project are:

| Risk Description | Risk Rating | Mitigation Strategy |
|---|-------------|--|
| The existing IT systems will become unsupportable with spare parts no longer being available from vendors if the Do Nothing option is selected. | High | Proceed with Option 1 as described in this document. |
| As new software technology becomes available, it is likely to drop support for aging platforms if the Do Nothing option is selected. | High | Proceed with Option 1 as described in this document. |

7. Outputs

The project will deliver the following:

- New assets (servers and network infrastructure) to replace those that have reached end of operational life (in line with MG's "IT Asset Management Policy");
- A consolidated infrastructure footprint constraining ad-hoc growth.

Delivery of this project will conform to MG's Project Delivery Framework

8. Project Capital Costs

The estimated costs of implementing this project are presented in the table below. Whilst infrastructure is shared between UE and MG wherever practical and cost effective, the costs shown are MG costs only.

MG's procurement and project delivery framework processes will ensure that the actual cost of this project will be prudent and efficient.

| Cost Category | \$'000 | Source / Explanation |
|---------------|-----------------|---|
| Labour | \$ 1,914 | Estimate is based on previous Infrastructure refresh with 5% increase due to anticipated additional effort |
| Hardware | \$ 2,070 | This is an infrastructure refresh project hence a high cost for hardware. |
| Software | \$ 753 | SAP HANA licenses and system software licenses |
| Security | \$ 19 | 1% of Labour |
| PMO | \$ 239 | Project Management Office including IT capital Overheads. Reduced from default 7% of Total to 5% due to high cost of hardware |
| TOTAL | \$ 5,012 | |

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Estimated quarterly cash flow (\$'000)

| | Q2 2020 | Q3 2020 | Q4 2020 | Q1 2021 | Q2 2021 | Q3 2021 | Q4 2021 | Total |
|-----------------------|------------|------------|------------|------------|------------|------------|------------|-------|
| Capex Forecast | 307 | 804 | 804 | 797 | 801 | 804 | 696 | 5,012 |

9. Operational Impact

There will be no impact on IT operating costs in the 2018 - 2020 period. Given the planned project timeline, forecast operating benefits will not be incurred until 2021 and beyond.

The Infrastructure Refresh will reduce the complexity in the technology deployed and will result in improved serviceability and reliability. It will also reduce IT operational costs due to the reduced IT equipment support on premise. These Operational savings however will be offset by some increased costs for Cloud Services.

10. Benefits

The following specific benefits are expected to be realised by delivering the scope of work described.

| Benefit | Owner | Benefit Type # | Measure (including quantum expected) |
|--|-------|----------------|--|
| 1. Reduction in hardware maintenance fees for servers, storage and network | IT | Tangible | Based on current hardware maintenance renewal fees. |
| 2. Improved stability, supportability and availability of IT systems | IT | Intangible | Reduction in the number and duration of unplanned outages, thereby increasing system availability measures. |
| 3. Reduction in Infrastructure Managed Services fees | IT | Tangible | Reduction in the number of physical and virtual servers will be reflected in the Managed Services Agreement. |
| 4. Reduced technical complexity of IT systems | IT | Intangible | Reduction in the number of physical and virtual servers and the introduction of a virtual network. |

11. Timeframes

This project is expected to commence Q2 2020 and run until Q4 2021. This time includes project approvals through to project post implementation reviews and formal project closure as per Key Milestones in section 6.6.

12. Risks and Opportunities

The key risks identified, along with their proposed mitigation strategies, that will be managed through the delivery of this project are:

| Risk | Risk Rating | Mitigation Strategy |
|---|-------------|---|
| If there are any constraints or restrictions with internal or external resources, outage windows, system access or other project dependencies due to the high volume of project change proposed for 2020 & 2021, then these constraints will increase the likelihood of delays to this project. | High | Maintain a project schedule and attend project inter-dependency meetings to ensure any potential issues or conflicts are identified early and can be addressed. |
| If a DR event was to occur during the migration period, the overall project duration may be affected. Schedules for some application migrations may need to be renegotiated with Business Owners which may further delay the project. | Low | Ensure DR procedures are well understood and look for what other activities can be undertaken during the DR period. |
| If new hardware platforms and technology do not deliver the same or better compute power and performance as the current environment, then there is a risk of application performance degradation once systems are migrated. | Medium | Proof of Concept testing has been undertaken during conceptual design; these results have defined the solution design for the storage appliance. SPARC and Intel server architectures remain largely unchanged, so these are considered lower risk. |

| Risk | Risk Rating | Mitigation Strategy |
|---|-------------|--|
| Cloud service providers lack appropriate security and privacy measures. | Low | Only tier 1 providers will be considered and a due diligence will be conducted to ensure appropriate security measures are in place and privacy terms meet company expectations. |

End of Document