Draft Business Case Package

- Identity and Access Management (IDAM)
- Industry Data Exchange (IDX)
- Portal Consolidation (PC)

18 December 2023

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Version Release History

Version	Issue Date	Author	Details
0.1	18/12/2022	Reform Delivery (NEM Reform)	Draft for feedback

Introduction

AEMO would like to thank industry for their participation throughout 2023 via the Foundational and Strategic Initiatives Focus Group (FaSI FG); this participation, collaborative engagement and development of the target state, transition strategy and business case inputs including costs and benefits has enabled the development of this package.

The development and assessment of options in the draft business case package would not have been possible without this collaboration.

The release of the draft business case package starts the next stage in the engagement process for the FaSI FG throughout the first quarter of 2024. There will be further opportunities for participants to review industry implementation cost ranges and provide further submissions or approaches to extrapolation, to better inform the final business case.

AEMO is seeking direct feedback on:

initiatives identified for proceeding and associated decision points / timeframes; and

- o industry implementation costs and benefits to inform the 2024 engagement sessions.

The next stage of industry briefings will be scheduled for late January / early February 2024:

- o FaSI Working Group – 22 January 2024
- o Stakeholder one-to-one meetings
- o Submissions to Draft Business Case Package – 9 February 2024
- o Further engagement processes will be outlined at January Working Group meeting

Overview

The energy sector is at a pivotal juncture: Given the inflection point we are at as an industry, AEMO has taken the time to assess whether strategic step-change investments in foundational services is preferred over continuing to invest in tactical legacy software for the provision of Identity and Access (IDAM), Industry Data Exchange (IDX), and Portal Consolidation (PC) capability. This working draft business case aims to assess the benefits and costs of those different approaches and ensure that we are able to provide a secure foundation for the renewable energy market transition.

A key question under consideration is whether to allocate resources strategically to provide a secure and fit-for-purpose technology foundation to deliver better consumer outcomes, or if the current reactive (as needs) approach to uplifting AEMO and participant systems to align capabilities with reform dependencies remains viable.

AEMO has identified IDAM, IDX and PC as a subset of foundational initiatives that will serve as prerequisites to the NEM Reform Implementation Program. The existing landscape of IDAM, IDX and PC requires industry participants to interact through different access points, causing an inconsistent, fragmented and duplicated user experience when accessing AEMO's systems.

Due to the mandatory cybersecurity uplifts (such as SOCI Act requirements) and advanced security capabilities such as identity federation, context-based authentication, the "do nothing" option is too risky, for both AEMO and industry, to be recommended. As a result, AEMO has developed the potential options on the basis that the initiatives will address identified industry pain points. IDAM, IDX and PC initiatives aim to create a fit for purpose, resilient and secure framework for existing market business services and provides the agility to support services for new NEM Reform Initiatives as well as an extensible framework for other energy markets. The initiatives will also provide a platform for the development of new market services, strengthening the market's ability to transition to a renewable generation future.

The implementation timeline was developed in collaboration with industry; longer timeframes are provided for the foundational period in order to reduce the workload for industry for NEM Reform program initiatives and provide the opportunity to enable changes to be implemented through lifecycle upgrades. The proposed timeframes will be confirmed in consultation with industry throughout the consultation period.

AEMO will continue working with industry to improve and refine the range of costs, along with benefits, to be considered in the final business case and is seeking further submissions and feedback through the workshops in early 2024.

Recommendation Summary

Compelling drivers exist to develop new foundational capability across IDAM, IDX and PC areas. Given short term reform roadmap congestion & need for fiscal prudency, *AEMO recommends a phased investment approach for IDX* to address critical security needs, support near-term NEM reforms, provide flexibility for the future & address priority industry pain points.

	RECOMMENDATION	RATIONALE
Identity and Access Management	**PROCEED** with a Strategic target state, AEMO investment of **$21M** over 2 years	• Address key security vulnerabilities and reduce attack surface area – identity management is the most impactful "weak link" in the cyber security chain • Manage expected increase in identities for management: DERs, small generators • AEMO TCO cost differential of **$7M**, & total Industry costs of **$35M** are smaller than the potential cost and customer impact of security breaches
Industry Data Exchange	**PROCEED** with a Strategic target state Foundation phase, AEMO investment of **$20M** over 2 years **DEFER** decision on Transition phase to Q4 2025.	• As the grid becomes digitised, data exchanged is increasing in volume, frequency and requires lower latency • IDX Foundation phase represents an efficient and unified implementation of data exchange capabilities across multiple reforms requiring it (AEMO costs are **$20M** compared to **$29M** if done initiative by initiative, and if participant cost ratios are similar, then total industry costs would be **~$65M** compared to **~$94M** if done piece-meal) • Migrating legacy services is difficult to assess at this stage given the cost uncertainty and value uncertainty. Deferring the decision point on migrating legacy services – IDX Transition phase – allows for more certainty on cost and value estimates and more information to guide optimising the transition approach.
Portal Consolidation	**PROCEED** with a strategic target state, AEMO investment of **$6M** over 2 years	• Portal Consolidation Strategic target state delivers benefits to address identified industry pain points for a cost of **$6M** for AEMO and **$13M** for industry • Reduces AEMO's attack surface area in the most common 'entry point' for bad actors

1. Executive Summary

Background Context

AEMO was established in 2009 and has since expanded its mandate and technology landscape to cover the NEM, WEM, and gas markets, leading to the use of diverse solutions by industry participants and AEMO in a fragmented technology environment. This has led to increased systems complexity and inefficiencies, and higher AEMO and Industry costs, exacerbated by a strong tendency of back-compatibility as new services are rolled out. As the energy transition rollout continues at pace, the market systems required a review to assess the ability to provide a foundation for future requirements.

Given the inflection point we are at as an industry, we believe that now is the time to assess whether strategic step-change investments in these foundational services is preferred over continuing to invest in tactical legacy software. This working draft business case aims to assess the benefits and costs of those different approaches.

Key Drivers for Change

Energy Industry Transformation

Energy Transition imposes the **most significant set of reforms** on the Australian energy industry since the creation of the NEM.

We are at a pivotal juncture: whether to allocate these resources **strategically** to provide a secure and fit-for-purpose technology foundation to deliver better consumer outcomes, or to take a **tactical, reactive and fragmented** approach, compounding complexity in AEMO and participant IT landscapes, increasing implementation and operational expenses and reducing agility to respond to change.

Security Concerns

The interconnectivity of the energy sector and digitisation of the grid is **increasing the surface area** of potential vulnerabilities that can be exploited, and the impact if security is breached.

Community expectations and **government directives and legislation** impose additional accountabilities and responsibilities for AEMO and industry to safeguard the critical services we collectively operate and protect our customers from impact.

The presence of multiple routes for managing identities and access, coupled with non-standard data exchange protocols and patterns, existing alongside diverse entry points to AEMO services collectively represent an **unacceptably vulnerable landscape**.

Industry Pain Points

The existing landscape of IDAM, IDX and PC requires industry participants to interact through different access points, using different protocols, formats and standards, and causing an inconsistent, fragmented and duplicated user experience when accessing AEMO's systems.

This leads to higher ongoing operational costs for AEMO in activities needed to support the performance of its functions. This has a cascading effect of administrative burden for the participants.

For example: current IDAM current services are disparate, requiring users to retain multiple sets of credentials, and AEMO's existing data exchange mechanisms use inconsistent standards, protocols and formats.
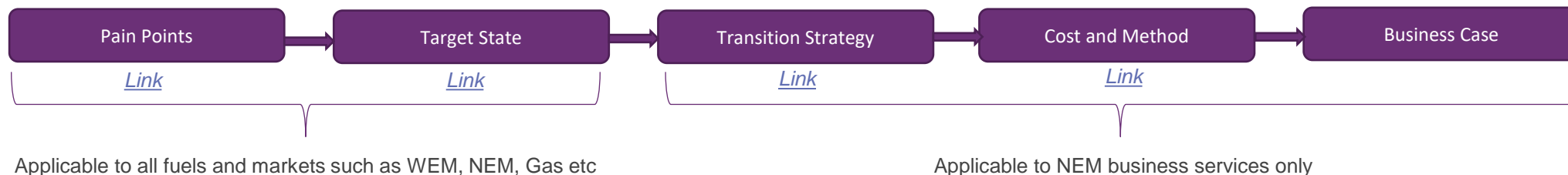
Business Case Approach

AEMO identified IDAM, IDX and Portal Consolidation as foundational initiatives that serve as prerequisites to the NEM Reform Implementation Program. These involve uplifting AEMO & participant systems to align capabilities with reform dependencies. The key outcome from these initiatives will be creating a fit for purpose, resilient and secure framework for existing market business services and provides the agility to support services for new NEM Reform Initiatives as well as an extensible framework for other energy markets.

Approach

AEMO has been collaborating with the industry participants (FaSI Focus Group) to develop a business case to assess the feasibility of implementing these three initiatives: IDAM, IDX and Portal Consolidation.

This was completed over more than 6 months and more than 10 consultation workshops of on average 4 hours each:
1. Identification of current industry pain points relating to these domains
2. Development of conceptual target state solutions that would materially address those pain points, and refinement based on feedback
3. Transition Strategy covering guiding principles, sequencing and bundling of business services and prioritisation of tranches, including a flexible sunset period
4. Initial Implementation Cost Estimates and a methodology for assessing the business case
5. (This document) a working draft business case package

Pain Points	Target State	Transition Strategy	Cost and Method	Business Case
Link	*Link*	*Link*	*Link*	

Applicable to all fuels and markets such as WEM, NEM, Gas etc

Applicable to NEM business services only

Identified Foundational Capability Gaps

The absence of foundational capability to support new reforms was identified across three areas.

Identity and Access Management

Problem Statement:
AEMO's Identity and Access Management (IDAM) services are disparate, requiring users to retain multiple sets of credentials in order to access AEMO business services. The legacy IDAM services do not implement best practices in cyber security controls (e.g. multifactor authentication) and are insufficient to meet new industry obligations introduced under the SOCI Act.

What are we trying to achieve
A unified mechanism to authenticate and authorise external identity when accessing AEMO services, consolidating and improving overall cyber security controls.

Industry Data Exchange

Problem Statement:
AEMO's existing data exchange systems have been variously acquired over the last 10-15 years, and use inconsistent standards, protocols and formats. AEMO's markets are also undergoing significant transformation, resulting in new data exchange needs. AEMO introducing new data exchange patterns without a unified target state and roadmap is inhibiting participants from modernising their systems and quantifying the benefits of their investments.

What are we trying to achieve
A unified data exchange mechanism to support the secure and efficient exchange of data between energy stakeholders for new services required by NEM Reforms, existing legacy services and provide a framework extensible to other energy markets.

Portal Consolidation

Problem Statement
AEMO browser services are exposed over a disparate range of end points and require multiple sets of credentials to consume these services. This results in a suboptimal user experience for energy stakeholders. The requirement to access browser services via private networks creates technical barriers to consuming these services.
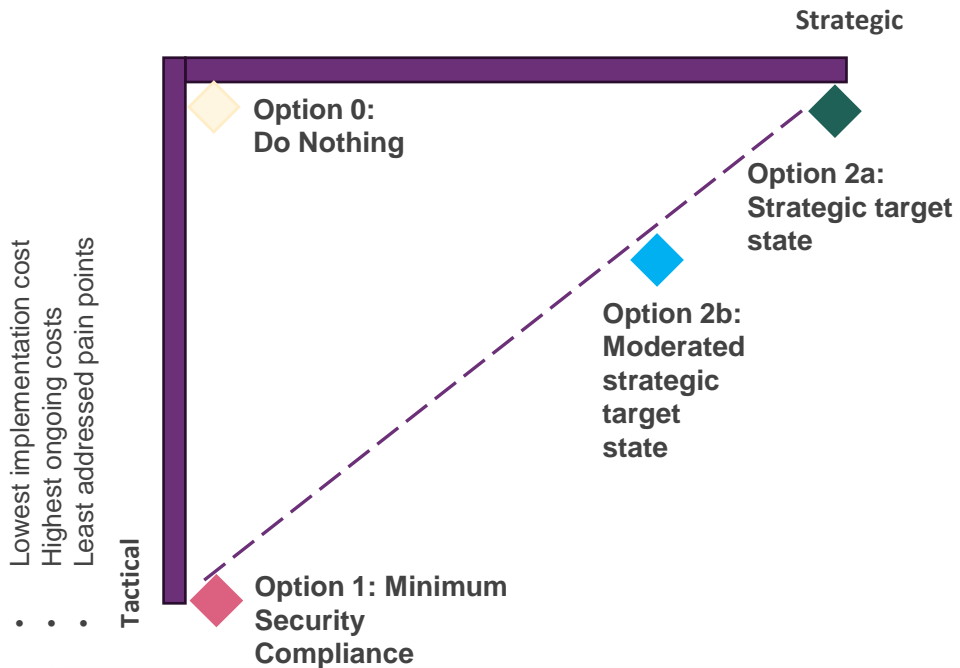
What are we trying to achieve
The aim of the Portal Consolidation project is to enable a unified stakeholder experience that hosts web applications. The portals framework is an enabling platform that supports energy market participants and other partners to consume AEMO browser services in a secure manner.

Options Development

We identified two main options which "bookend" the many possible options available: A tactical "minimum compliance" Option 1 and the target state solution Option 2a. Other available hybrid options could be finessed during Delivery.

- Highest implementation cost
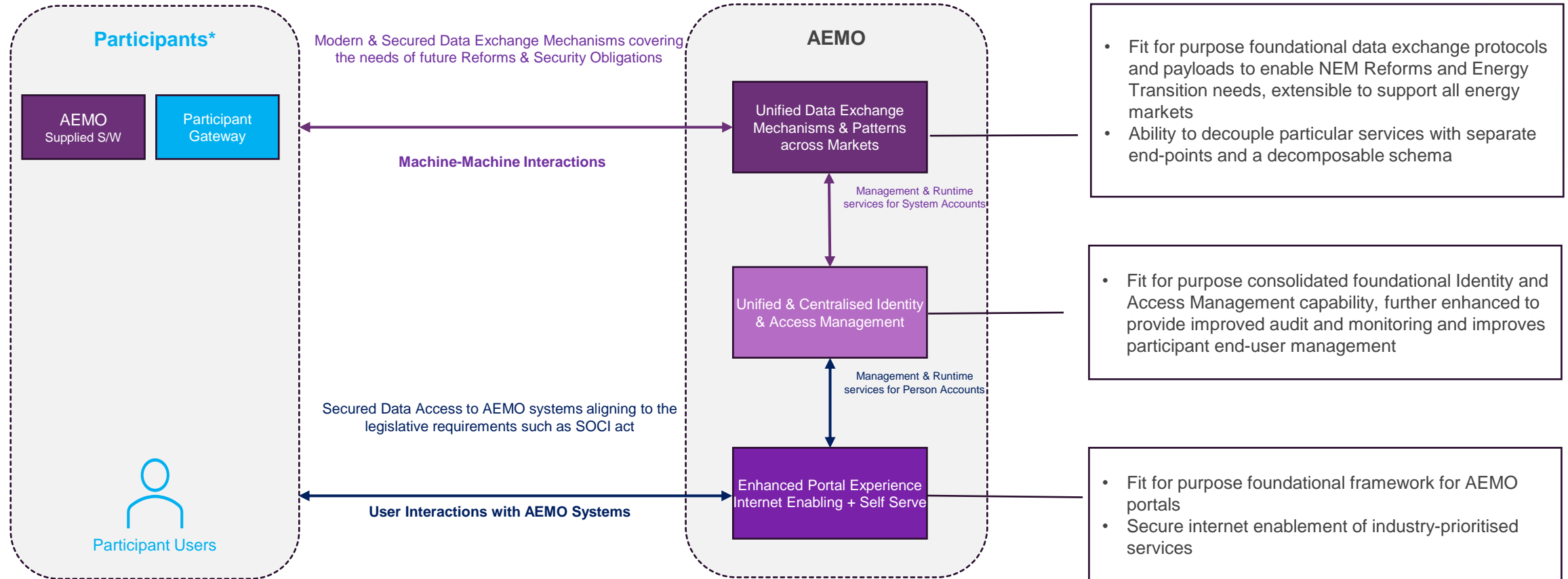- Lowest ongoing costs
- Addresses pain points

Strategic

Option 0:
Do Nothing

Option 2a:
Strategic target
state

Option 2b:
Moderated
strategic
target
state

Option 1: Minimum
Security
Compliance

Tactical

Lowest implementation cost
Highest ongoing costs
Least addressed pain points

Option	Description
Option 0 – Do Nothing	We conducted a risk assessment against current system landscape & found this option unacceptable – our SOCI compliance obligations **would not be met** & cyber risks are **unacceptably high.** This option has therefore been discounted from further analysis.
Option 1 – Minimum Security Compliance	This option addresses the most egregious security risks from Option 0 and puts in controls to address remaining risks.
Option 2b – Strategic target state moderated by IDX payload (retains asexml)	This option arose during industry consultation as a potential hybrid option that dilutes the full benefits of target state in order to reduce estimated costs. It does not address all industry pain points.
Option 2a – Strategic target state	This is the strategic target future state, as collaboratively designed with industry to address identified industry pain points, enable deliverability of future reforms and materially address security risks.

While there are many hybrid options that could be considered reflecting different scope parameters, to simplify the analysis of the business case we considered options representing the minimum and maximum scope.

As the target state sets a 'high' bar in terms of cost, it is anticipated there is only upside should opportunities to rationalise or change scope be identified during Delivery, especially during the Design and Consultation phases.
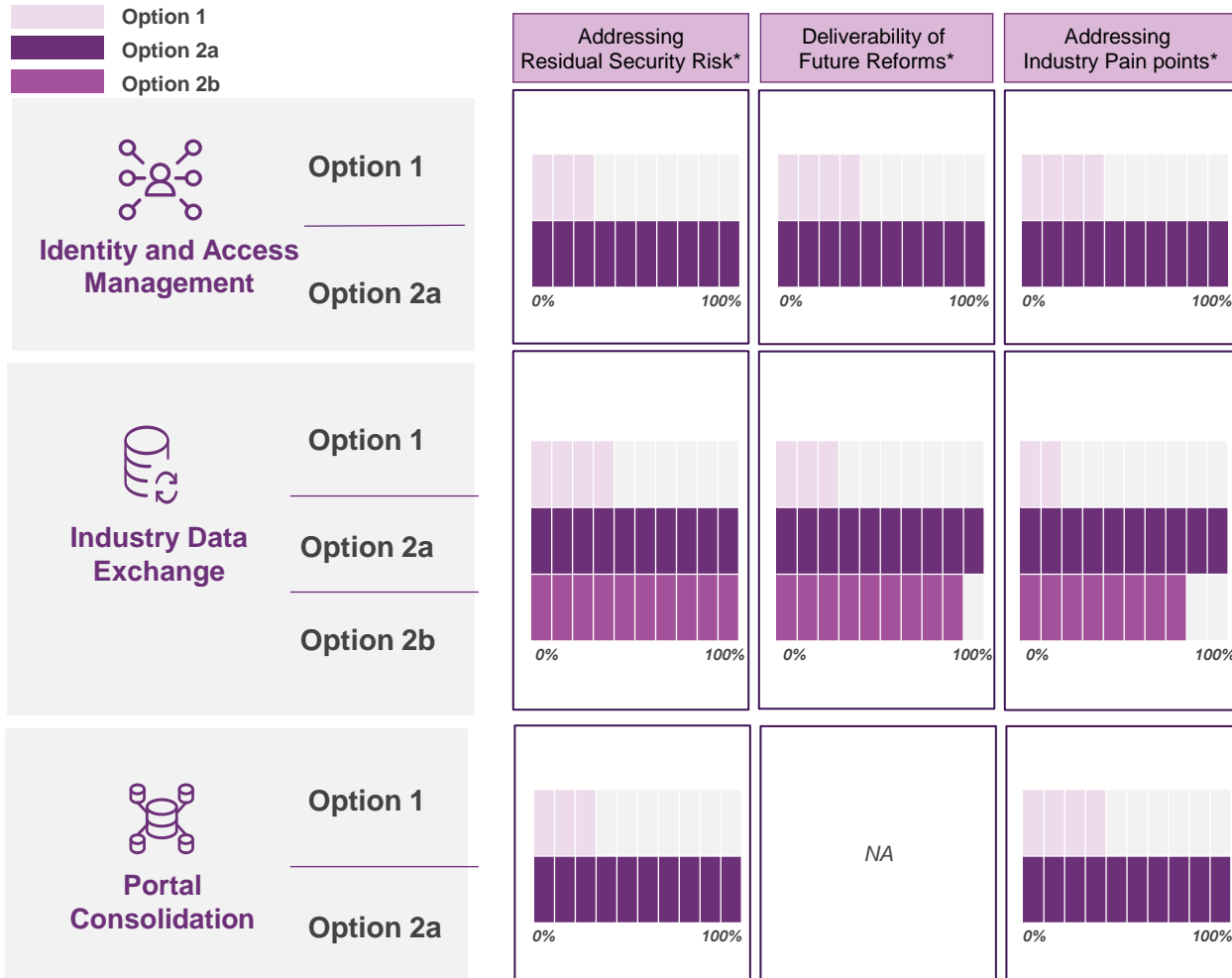
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Strategic Target State (Option 2)

Target state was developed in collaboration with industry, and provides a strategic, "secure by design" foundation for identity management, data exchange and portal access services to AEMO and the industry. It delivers a 'step-change' capability uplift and addresses current industry pain points .

Participants*

AEMO Supplied S/W	Participant Gateway

Modern & Secured Data Exchange Mechanisms covering the needs of future Reforms & Security Obligations

Machine-Machine Interactions

Secured Data Access to AEMO systems aligning to the legislative requirements such as SOCI act

Participant Users

User Interactions with AEMO Systems

* Includes Participants, Service Providers, 3rd parties, non-Participants etc

AEMO

Unified Data Exchange Mechanisms & Patterns across Markets

Management & Runtime services for System Accounts

Unified & Centralised Identity & Access Management

Management & Runtime services for Person Accounts

Enhanced Portal Experience Internet Enabling + Self Serve

- Fit for purpose foundational data exchange protocols and payloads to enable NEM Reforms and Energy Transition needs, extensible to support all energy markets
- Ability to decouple particular services with separate end-points and a decomposable schema

- Fit for purpose consolidated foundational Identity and Access Management capability, further enhanced to provide improved audit and monitoring and improves participant end-user management

- Fit for purpose foundational framework for AEMO portals
- Secure internet enablement of industry-prioritised services

Assessing Options against key drivers

AEMO's assessment is that Option 2 is superior to Option 1 in (i) addressing security requirements, (ii) enabling future reforms to be delivered and (iii) addressing identified industry pain points.

Legend:
- Option 1
- Option 2a
- Option 2b

Identity and Access Management
- Option 1
- Option 2a

Industry Data Exchange
- Option 1
- Option 2a
- Option 2b

Portal Consolidation
- Option 1
- Option 2a

Column headers: Addressing Residual Security Risk*, Deliverability of Future Reforms*, Addressing Industry Pain points*

(charts shown with 0% to 100% scales; Deliverability of Future Reforms for Portal Consolidation marked NA)

Key Notes

Addressing Residual Security Risk
- Option 1 addresses security pain points from a minimum compliance perspective. It still retains a large surface area of multiple identity systems, multiple data exchange protocols and technologies, and multiple entry points to AEMO's web presence.
- Option 2 takes a strategic, *'secure by design'* view to identity management, data exchange and portal access needs. It *unifies* platforms and protocols, thereby reducing our attack surface area

Deliverability of Future reforms
- Option 1 does not provide a holistic platform to support upcoming NEM2025 Reforms with respect to identity management and data exchange. As immediate examples, DER Data Hub and the requirement for Power Quality data from the Metering Services Review would need to be developed independently under Option 1.
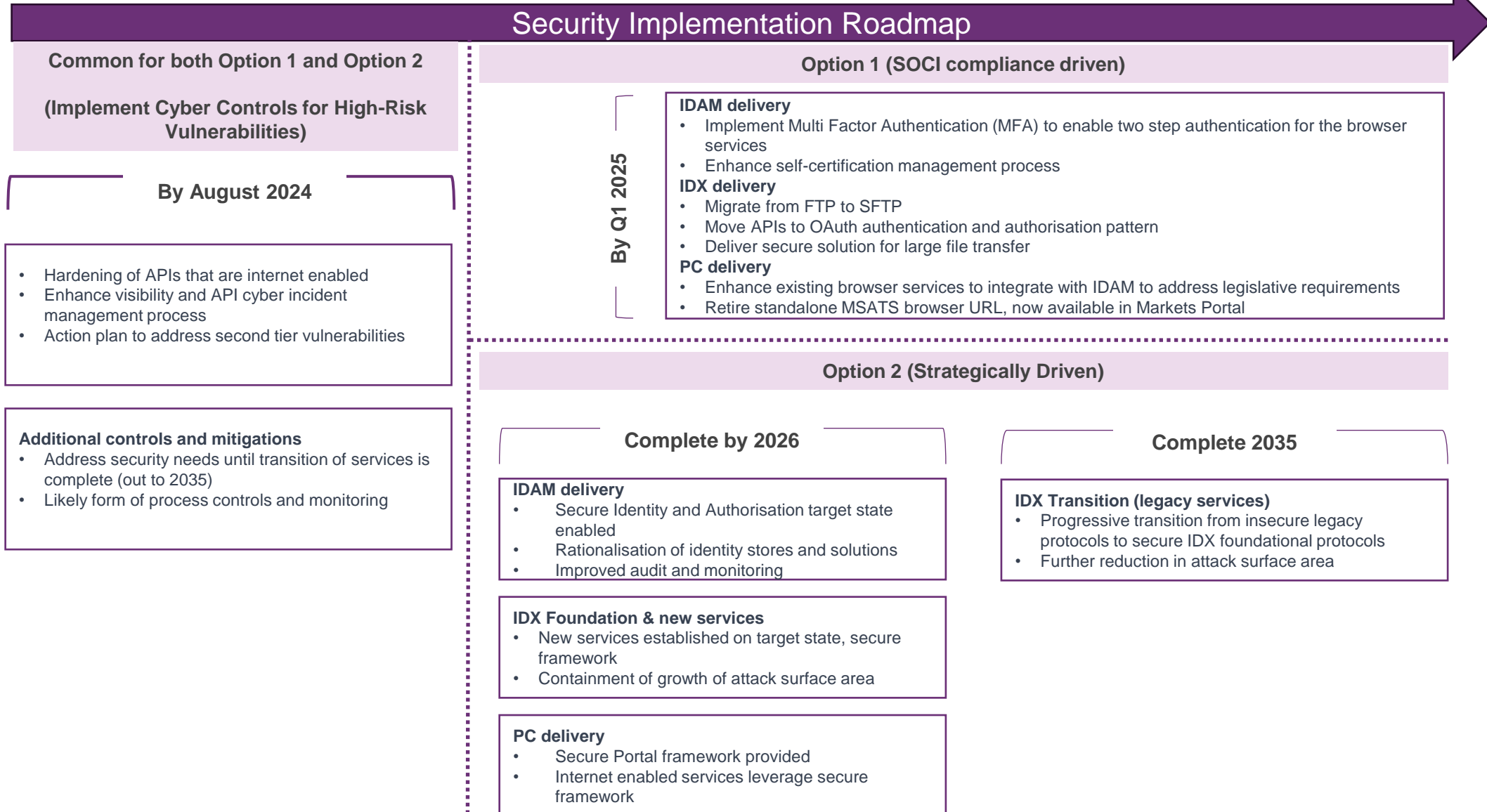- Option 2 for IDAM and IDX is explicitly designed to provide this leverageable foundational capability

Addressing Industry Pain Points
- Option 2 was scoped in collaboration with industry to fully address identified industry pain points.
- Option 1 addresses a very limited number of pain points

*Percentages are derived from individual option ratings in relation to the overall score – please refer to 'option assessment' section for more details

Addressing residual security risks

Both Option 1 and Option 2 address AEMO and industry's SOCI security compliance obligations, and both would need work to address immediate security risks by August 2024. Option 2 provides further reductions in residual security risk beyond bare minimum compliance.

Security Implementation Roadmap

Common for both Option 1 and Option 2

(Implement Cyber Controls for High-Risk Vulnerabilities)

By August 2024

- Hardening of APIs that are internet enabled
- Enhance visibility and API cyber incident management process
- Action plan to address second tier vulnerabilities

Additional controls and mitigations
- Address security needs until transition of services is complete (out to 2035)
- Likely form of process controls and monitoring

Option 1 (SOCI compliance driven)

By Q1 2025

IDAM delivery
- Implement Multi Factor Authentication (MFA) to enable two step authentication for the browser services
- Enhance self-certification management process

IDX delivery
- Migrate from FTP to SFTP
- Move APIs to OAuth authentication and authorisation pattern
- Deliver secure solution for large file transfer

PC delivery
- Enhance existing browser services to integrate with IDAM to address legislative requirements
- Retire standalone MSATS browser URL, now available in Markets Portal

Option 2 (Strategically Driven)

Complete by 2026

IDAM delivery
- Secure Identity and Authorisation target state enabled
- Rationalisation of identity stores and solutions
- Improved audit and monitoring

IDX Foundation & new services
- New services established on target state, secure framework
- Containment of growth of attack surface area

PC delivery
- Secure Portal framework provided
- Internet enabled services leverage secure framework

Complete 2035

IDX Transition (legacy services)
- Progressive transition from insecure legacy protocols to secure IDX foundational protocols
- Further reduction in attack surface area

Addressing Industry Pain Points

Only Option 2 target state solution addresses all the industry pain points identified through workshops. Option 1 partially addresses security-related pain points but otherwise does not provide benefits to industry.

Industry Key Pain Points Addressed by Both Options 1 & 2

Industry Key Pain Points Addressed by Option 2 Only

Identity and access management

Need for Multi-factor authentication to enhance security

Multiple credentials required to access different AEMO systems

Lack of reporting capabilities to conduct periodic assessments

Lack of Federation

Inadequate self-service capabilities e.g.: Password reset

Lack of pre-defined entity catalogue and role catalogue

Inability to automate user offboarding

Industry Data Exchange

Partially

Inconsistent authentication and decentralised authorisation

Multiple patterns for the same regulated transactions

Lack of consistent standards across Systems / Fuels / Jurisdictions

Management of multiple patterns, most of which have had zero uptake

Mandatory aseXML schema updates are costly

Need for improved speed to market of business and regulatory changes

No option to configure message delivery orders

Fully

Inconsistent authentication and decentralised authorisation

Suboptimal reliability of service for automated market interfaces

Portal Consolidation

AEMO Browser services exposed over disparate range of portals

Inconsistent user experience

Maintenance of the disparate portals is costly

Inadequate self-service capabilities e.g.: password reset

Lack of cross-browser capability

Lack of personalisation features

Addressing Future Deliverability of Reforms

Building foundational capability in a strategic way (Option 2) builds capability that we know can be significantly leveraged in two immediate reforms, and that we can reasonably assume will be utilised in future reforms. Option 1 does not deliver any of these benefits.

Known Related Upcoming reforms

DER Data Hub

The DER Data Hub is a *new* data exchange mechanism for DER-related transactions (e.g., DOEs, network constraints). Regardless of its exact form and timing, industry will need a modern and secure exchange mechanism for this

Metering Services Framework

The rollout of smart meters is to start in mid-2025 and end in 2030. Basic Power Quality data will need to be transacted between Metering Providers and Distributors. This represents significant volumes of data.

IDX Option 2a will provide data exchange protocols that can securely and reliably handle the data exchange required in these reforms.

IDAM Option 2a provides a solution to store and manage identities of VPP's and others, required for DER Data Hub.

Likely Related Upcoming reforms

Integrating Price Responsive Resources (Scheduled Lite)

Other reforms in the NEM2025 program

Unlocking CERs through flexible trading (FTA2)

We have ~$220M budgeted for AEMO to implement NEM2025 reforms over the next 5 years on the assumption that a strategic foundational capability is available.

We estimate an uplift of 10% associated with these new reforms relate to data exchange, and 5% with identity management that would be required if Option 2 does not proceed.

Unknown future reforms

e.g., ICF's requesting modifications to retail transactions

Rule changes resulting in changes to EMMS

We estimate ~$100K of schema change related costs per year can be avoided if we can leverage foundational capabilities developed in Option 2a

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Financial Assessment: Full Scope Delivery (Industry-wide)

For IDAM and PC, Option 2 strategic target state compared to Option 1 addresses the key drivers at a delta TCO of $40M[1] and $17M respectively – this is a conservative (high watermark) estimate given industry cost impacts associated with IDAM Option 1 and industry cost savings (benefits) associated with IDAM and PC have not been quantified. IDX Option 2 compared to Option 1 has a delta TCO of $200M, due primarily to the costs associated with migrating legacy services.

		AEMO Costs		Industry Costs	
		Implementation	TCO	Implementation	TCO
Identity and Access Management	Option 1	$4M	$20M	$2M	*Costs expected but unquantified*
	Option 2a	$21M	$27M	$35M	*Cost-savings expected but unquantified*
Industry Data Exchange	Option 1	$10M	$45M	$73M	*Costs expected but unquantified*
	Option 2a	$51M	$69M	$249M	*Cost-savings expected but unquantified*
	Option 2b	$42M	$60M	$174M	
Portal Consolidation	Option 1	< $1M	$2M	< $1M	*n/a*
	Option 2a	$6M	$7M	$13M	*Cost-savings expected but unquantified*

Recommendations

PROCEED with IDAM Strategic target state, conservative industry-wide delta TCO of $40M is justified by the reduction in residual security risk and industry pain point benefits.

UNABLE TO RECOMMEND TO FULLY PROCEED AT THIS STAGE – Industry cost impacts relating to transition reflect a high level of uncertainty, recommend a reconsideration of investment approach (see following slide)

PROCEED with PC strategic target state, conservative industry-wide delta TCO of $17M is justified by the reduction in residual security risk and industry pain point benefits.

1. All financial figures presented on this slide have a +/- of 40%

IDX: addressing cost uncertainty & reform delivery congestion

AEMO recognises that industry costs & associated work for IDX – specifically the migration of legacy services - are material in the context of a congested reform delivery agenda, particularly 2025. We conducted a scope re-assessment of IDX to differentiate between scope required to facilitate upcoming reforms (IDX Foundation), and the migration of legacy services (IDX Transition). We recommend a phased investment approach wherein IDX Foundation proceeds and the decision for transition of legacy services is deferred to Q4 2025.
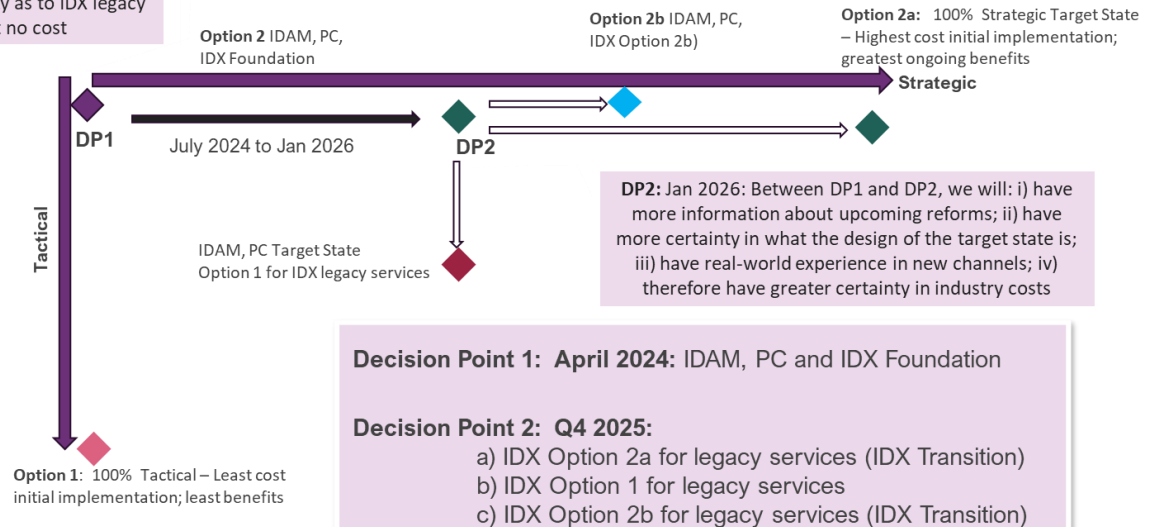
Key Considerations

- Immediate term NEM Reforms (DER Data Hub and Metering Services Review) require new data exchange capability

- Industry participants have identified significant cost uncertainty in IDX Transition (migrating of legacy services), which represents the majority of IDX industry costs

- Substantial reform agenda over 5 years, particularly high delivery congestion in 2025.

- Historically, similar industry-wide changes addressing legacy services are difficult to justify without associated functional benefits for customers. E.g. Open Banking – linked technical uplifts with immediate functional customer benefits such as Osko fund transfers

Recommendation: Phase IDX investment decision and scope across **two decision points**:

- **DP1**: **IDX Foundational** – scope is to build capability that efficiently supports upcoming new reforms in a secure and extensible way. This does not impose an impact to the transition timeline under DP2.

- **DP2: IDX Transitional (New standalone business case in Q4 2025)** – scope addresses the migration of legacy services. Deferring until Q4 2025 will enable a business case to be developed and decision made with greater certainty of costs and knowledge of upcoming reforms to inform a transition strategy.
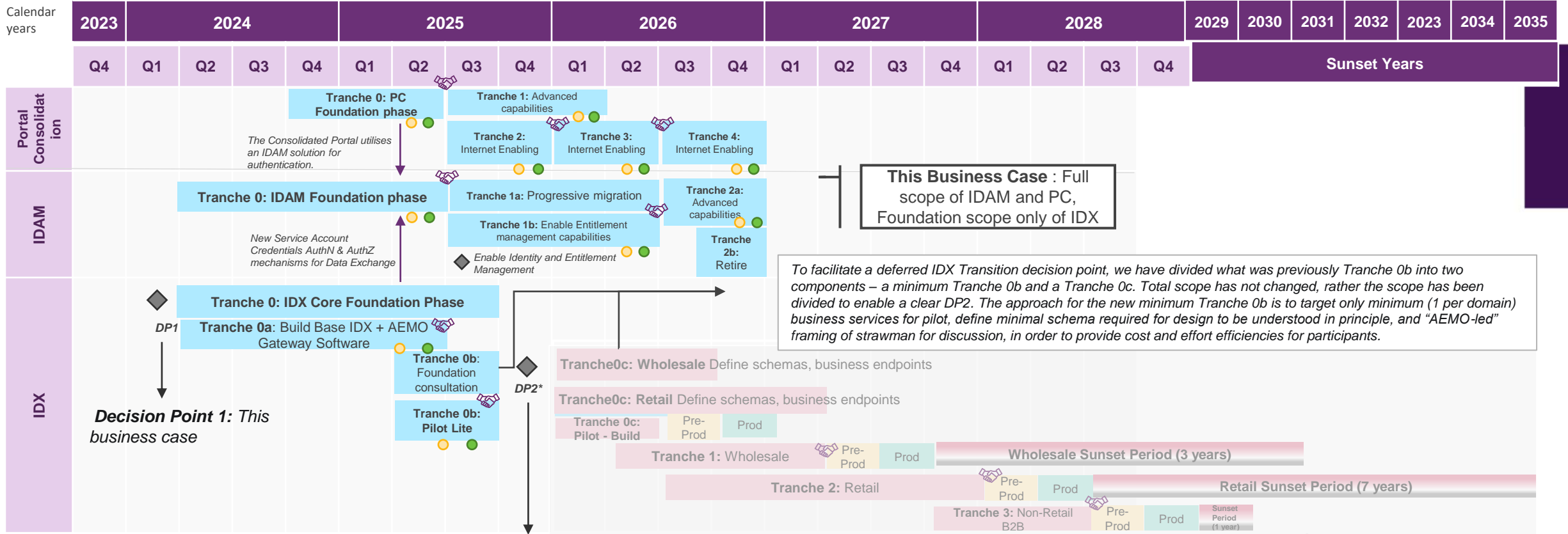
DP1: Q1 2024 (business case 1): still preserves optionality as to IDX legacy services at no cost

Option 2 IDAM, PC, IDX Foundation

Option 2b IDAM, PC, IDX Option 2b)

Option 2a: 100% Strategic Target State – Highest cost initial implementation; greatest ongoing benefits

Strategic

DP1

July 2024 to Jan 2026

DP2

Tactical

IDAM, PC Target State Option 1 for IDX legacy services

DP2: Jan 2026: Between DP1 and DP2, we will: i) have more information about upcoming reforms; ii) have more certainty in what the design of the target state is; iii) have real-world experience in new channels; iv) therefore have greater certainty in industry costs

Decision Point 1: April 2024: IDAM, PC and IDX Foundation

Decision Point 2: Q4 2025:
a) IDX Option 2a for legacy services (IDX Transition)
b) IDX Option 1 for legacy services
c) IDX Option 2b for legacy services (IDX Transition)

Option 1: 100% Tactical – Least cost initial implementation; least benefits
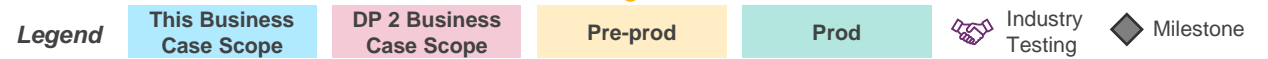
Phased Investment Delivery Timeline

This timeline was developed in collaboration with industry. To facilitate a phased investment decision approach, we have modified the IDX timeline to divide activities into two decision points – Decision Point 1 (this business case, Q1 2024) for IDX Foundation and Decision Point 2 (a new business case, Q4 2025) for IDX Transition. This has involved a sharp reduction in scope for Tranche 0b to minimal activities only.

Calendar years	2023	2024				2025				2026				2027				2028				2029	2030	2031	2032	2023	2034	2035
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Sunset Years						

Portal Consolidation

- Tranche 0: PC Foundation phase
- Tranche 1: Advanced capabilities
- Tranche 2: Internet Enabling
- Tranche 3: Internet Enabling
- Tranche 4: Internet Enabling

The Consolidated Portal utilises an IDAM solution for authentication.

IDAM

- Tranche 0: IDAM Foundation phase
- Tranche 1a: Progressive migration
- Tranche 1b: Enable Entitlement management capabilities
- Tranche 2a: Advanced capabilities
- Tranche 2b: Retire

New Service Account Credentials AuthN & AuthZ mechanisms for Data Exchange

◆ *Enable Identity and Entitlement Management*

> **This Business Case** : Full scope of IDAM and PC, Foundation scope only of IDX

IDX

- Tranche 0: IDX Core Foundation Phase
- Tranche 0a: Build Base IDX + AEMO Gateway Software
- Tranche 0b: Foundation consultation
- Tranche 0b: Pilot Lite

◆ *DP1*

Decision Point 1: *This business case*

◆ *DP2**

> To facilitate a deferred IDX Transition decision point, we have divided what was previously Tranche 0b into two components – a minimum Tranche 0b and a Tranche 0c. Total scope has not changed, rather the scope has been divided to enable a clear DP2. The approach for the new minimum Tranche 0b is to target only minimum (1 per domain) business services for pilot, define minimal schema required for design to be understood in principle, and "AEMO-led" framing of strawman for discussion, in order to provide cost and effort efficiencies for participants.

- Tranche0c: Wholesale Define schemas, business endpoints
- Tranche0c: Retail Define schemas, business endpoints
- Tranche 0c: Pilot - Build | Pre-Prod | Prod
- Tranche 1: Wholesale | Pre-Prod | Prod | Wholesale Sunset Period (3 years)
- Tranche 2: Retail | Pre-Prod | Prod | Retail Sunset Period (7 years)
- Tranche 3: Non-Retail B2B | Pre-Prod | Prod | Sunset Period (1 year)

*Decision Point 2: *The timeline for activities listed within DP2 Business Case: IDX Transition would be finalised as part of the business case associated with DP2. Note that this revised timeline does not extend the previously socialised timeline in total.*

> **DP 2 Business Case**: IDX Transition scope only*

Legend

This Business Case Scope	DP 2 Business Case Scope	Pre-prod ○	Prod ●	🤝 Industry Testing	◆ Milestone

Financial Assessment: IDX Foundation Revised Scope (Industry Wide)

For AEMO, this division of scope and consideration of financial impacts based on *new services only* yields a clearly superior TCO for developing this capability holistically (Option 2 IDX Foundation) rather than initiative by initiative (Option 1). We do not currently have data points for industry costs under these scope scenarios and seek industry submissions. As a starting point for discussion, if we can take an assumption that industry cost impacts scale in a similar ratio to AEMO's cost impacts, Option 2 is a better TCO by $38M* than Option 1 Industry-wide.

New Services Only

		AEMO Costs		Industry Costs	
		Implementation	TCO	Implementation	TCO
Industry Data Exchange	Option 1 (new initiatives)	n/a	$29M	n/a	~$94M[3] *(strawman estimate based on scaling)*
	Option 2 (IDX Foundation only)	$20M[1]	$20M	~$65M[2] *(strawman estimate based on scaling)*	~$65M

Recommendation

PROCEED with IDX Strategic target state Foundation phase, AEMO investment of **$20M** over 2 years

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Scope of Option 1 (new initiatives):	Scope of Option 2: IDX Foundation Only
Implementation Nothing – no cross-initiative foundational capability is developed ahead of new NEM reform initiatives	Establish Foundational data exchange capability for energy transition and industry-driven priorities that can be used in upcoming reforms. Specifically, reduce Scope of Tranche 0b to limit the pilot, minimise consultation on legacy services schema to be 1-2 services per domain.
Ongoing (new reforms) For each upcoming reform, data exchange requirements are assessed and solutioned for in independent consultations and design processes.	The data exchange component of new reforms has been budgeted on the basis of this framework already being developed and tested and consultations conducted.

1. In assessing AEMO's cost impact for this revised (reduced) scope of Tranche 0b, we determined a cost split of the original $13M Tranche 0b cost into a revised scope Tranche 0b of $4M and a new Tranche 0c of $9M.

2. We have no data point from industry specifically for this revised scope. If we apply the same ratio of cost reduction from AEMO (4:9) to industry's Tranche 0b costs, we obtain a total of ~$65M, noting that we would expect industry apportioning for IDX Foundation to be less than AEMO's since we are proposing an AEMO-led approach.

3. We have no data point from industry on the expected cost of new reforms without a foundational capability in place. If we apply the same ratio of AEMO for foundational vs initiative by initiative (namely, $20M:$29M) then we obtain a total cost of ~$94M.

* All financial figures have a +/- 40% uncertainty

Future Extensibility and "Upside"

For all three initiatives of IDAM, PC and IDX Foundation, Option 1 has inherent uncertainty that could require further (unplanned) investment and constrained benefit opportunities while Option 2 target state has potential upside benefits. Foremost among these are the opportunities to extend to WEM and gas markets.

Dimension	Option 1	Option 2
Risk of increased complexity identified during design / build	In Option 1, the risk is inherent as a result of uplifting multiple legacy technology platforms – custom, legacy systems tend to have unidentified complexities	Option 2 target state architecture provides an agile, extensible framework that is 'secure by design', hence the risk to deliver new capability is contained
SOCI requirements may increase as the vulnerability /risk assessments continue to be conducted	Option 1 leverages legacy platforms and is likely to drive further investment due to the reactive design	Option 2 is 'Secure by design' and investment in new capability reduces risk of additional investment
Implications for other energy markets	Option 1 would require duplicated investment to uplift technology stacks in other markets	Option 2 provides a framework that can be leveraged by other markets at lower cost. As an example, we know that WEM is looking to develop DER data hub-related transactional capability.
Scalability and Flexibility	Option 1 has no provision to support increasing digitisation of the energy landscape. Future reforms would require uplifting the systems in silo and duplicating efforts and could also pose risks that current systems are not prepared to meet the rapid transformation.	The Framework in Option 2 is extensible to support non-market interactions and increasing digitisation of the energy landscape. The need for this will grow with the increasing digitization of the energy landscape (e.g., AER can leverage this when interacting with participant organisations)

Next steps

- The publication of the draft business case package on 18 December 2023, will form the basis of ongoing industry consultation in early 2024.

- The next FaSI Working Group meeting will be scheduled for 22 January 2024. AEMO will provide a walk-through of the draft business case package.

- There will be further opportunities for participants to review industry implementation cost ranges and provide further submissions or approaches to extrapolation, to better inform the final business case.
  - AEMO will be seeking submissions on the Draft Business Case Package by 9 February 2024

- Further engagement will occur with the Reform Development Committee and Program Consultative Forum in February and March 2024.

- Additional engagement steps will be developed with the FaSI WG at the January session 2024.

Questions / Engagement

- AEMO is seeking direct feedback on the recommended approach, industry implementation costs and proposed timeframes that will inform the 2024 engagement sessions.

- Seeking industry views and feedback on the recommended approach to:
  - Items identified for proceeding (IDAM, PC and IDX Foundation)
  - Deferred decision on DP2 – the migration of legacy services (IDX Transition)
- Further refinement for industry costs and benefits, specifically for the revised scope of IDX Foundation
- AEMO welcomes any feedback from the participants to NEMReform@aemo.com.au.

2. Purpose

AEMO

Context

The Energy Security Board (ESB) was tasked by the former Council of Australian Governments Energy Council (COAG EC), to advise on design changes required in the National Electricity Market (NEM) as it transitions from a fleet of largely coal-fired generation to more variable renewable generation.

The ESB divided the work into four interrelated reform pathways complemented by a Data strategy for the NEM.
The National Cabinet subsequently approved the Post-2025 reform recommendations on 29 October 2021.

ESB Post-2025 Reform Pathways

Resource Adequacy Mechanisms — Essential System Services — Transmission and Access — Integrating DER and Flexible Demand

Data Strategy

- One of the main enablers for the NEM Reform Implementation Program (~$300M) is the development of IT systems and business processes.
- IDAM, IDX and Portal Consolidation were identified as a set of foundational and strategic initiatives within the NEM reform implementation program to provide foundational frameworks that the upcoming reform initiatives can leverage.
- This provides an opportunity that life-cycle type investment can be brought forward and delivered in the same timeframes as the reforms to avoid the duplication of investment
- Central to the success of the Foundation and Strategic Initiatives is AEMO's commitment to fostering collaborative relationships with stakeholders across the energy spectrum. Over a period of 6 months and 10 consultative forums, AEMO has developed a conceptual target state, a transition strategy and a strawman roadmap for these initiatives in collaboration with the industry

Key Drivers and Challenges

Energy Industry Transformation

Energy Transition imposes the **most significant set of reforms** on the Australian energy industry since the creation of the NEM

We are at a pivotal juncture: whether to allocate these resources **strategically** to provide a secure and fit-for-purpose technology foundation to deliver better consumer outcomes, or to take a **tactical, reactive and fragmented** approach, compounding complexity in AEMO and participant IT landscapes, increasing implementation and operational expenses and reducing agility to respond to change.

Security Concerns

The interconnectivity of the energy sector and digitisation of the grid is **increasing the surface area** of potential vulnerabilities that can be exploited, and the impact if security is breached

Community expectations and **government directives and legislation** impose additional accountabilities and responsibilities for AEMO and industry to safeguard the critical services we collectively operate and protect our customers from impact

The presence of multiple routes for managing identities and access, coupled with non-standard data exchange protocols and patterns, existing alongside diverse entry points to AEMO services collectively represent an **unacceptably vulnerable landscape**.

Industry Pain Points

The existing landscape of IDAM, IDX and PC requires industry participants to interact through different access points, causing an inconsistent, fragmented and duplicated user experience when accessing AEMO's systems. This leads to higher ongoing operational costs for AEMO in activities needed to support the performance of its functions. This has a cascading effect of administrative burden for the participants.

For example: current IDAM current services are disparate, requiring user to retain multiple sets of credential.
AEMO's existing data exchange mechanisms use inconsistent standards, protocols and format

Key Challenges

1 **End of Life, Disparate Identity and Authorisation Platforms**
Security posture must be strengthened to address susceptibility to cyber-attacks by nation-state actors and cyber criminals and provide support for new regulatory obligations.

2. **Fragmented and Insecure Industry Data Exchange**
Inconsistent protocols and standards are not prepared to meet the rapid transformation & innovation, driving increase tactical spend to support change, maintenance cost, whilst reducing agility to adapt.

3. **Inconsistent Portal Services**
Multiple distinct Portals offer inconsistent user experience, require multiple credentials to access services and do not provide a foundation to support new services

Problem Statements – IDAM, IDX and PC

The current state of identity and access management, industry data exchange and multiple portals present specific challenges which require to be resolve to achieve strategic and initiative objectives.

Identity and Access Management

Problem Statement:
AEMO's Identity and Access Management (IDAM) services are disparate, requiring users to retain multiple sets of credentials in order to access AEMO business services. The legacy IDAM services do not implement best practices in cyber security controls (e.g., multifactor authentication) and are insufficient to meet new industry obligations introduced under the SOCI Act.

Industry Data Exchange

Problem Statement:
AEMO's existing data exchange systems have been variously acquired over the last 10-15 years, and use inconsistent standards, protocols and formats. AEMO's markets are also undergoing significant transformation, resulting in new data exchange needs. AEMO introducing new data exchange patterns without a unified target state and roadmap is inhibiting participants from modernising their systems and quantifying the benefits of their investments.

Portal Consolidation

Problem Statement
AEMO browser services are exposed over a disparate range of end points and require multiple sets of credentials to consume these services. This results in a suboptimal user experience for energy stakeholders. The requirement to access browser services via private networks creates technical barriers to consuming these services.
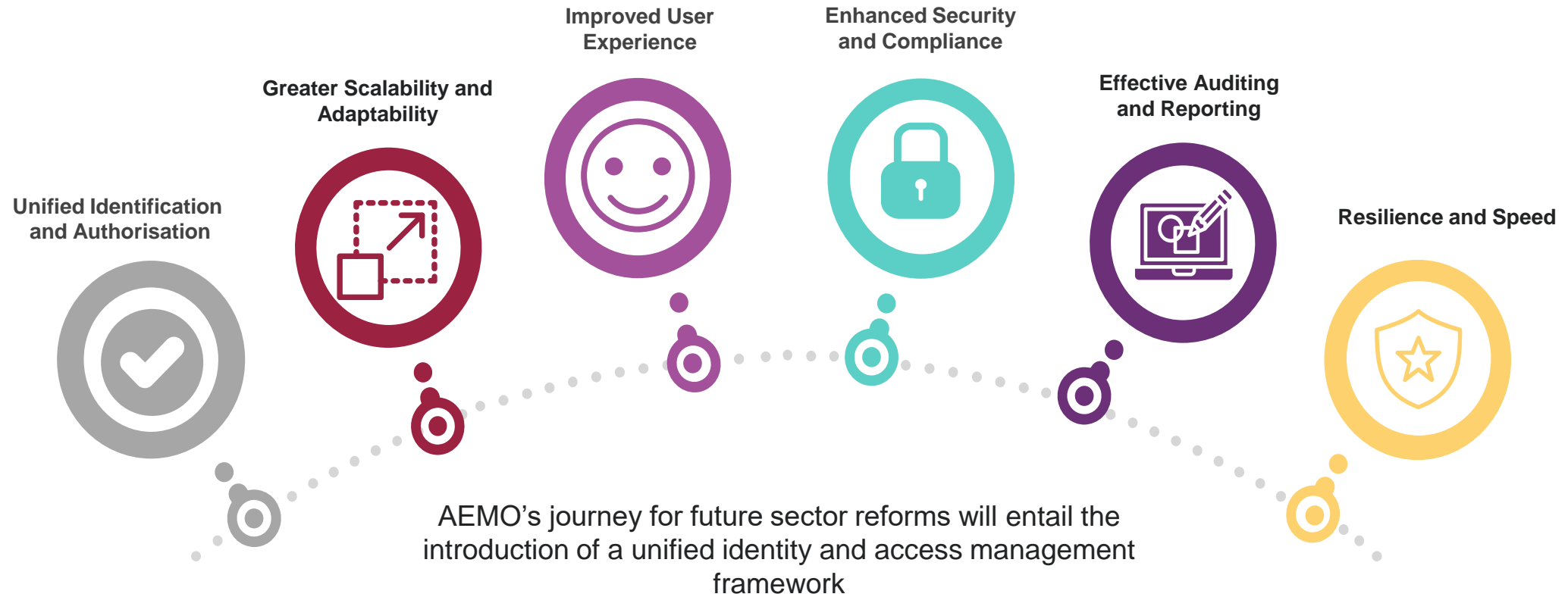
IDAM Industry Pain points Summary

Below is a summary of the key pain points from Business and Technical focus group discussions, classified into themes according to the challenges they pose to the legacy IDAM services.

User accounts

Participant Administrator (PA) experience

- Perform **repetitive tasks** e.g., creation of roles, unable to inherit the roles from an existing set
- Lack of ability **to identify inactive, unused, and suspicious accounts**
- Inability to set **expiration dates for user access** to automatically revoke access upon expiration
- Lack of **reporting capabilities** to conduct **periodic assessments**
- Inability to **automate user offboarding**, resulting in increased risk of unauthorised access and security risks
- Need to extend PA concept to other markets.
- Lack of **role catalogue** with pre-defined roles.

User experience

- **Multiple credentials** required to access different AEMO systems
- **Lack of integration between the Participant's organisation and AEMO's identity store (Federation)**
- Inadequate **self-service capabilities** e.g. Password reset, consent management, etc
- Inadequate training material, support, and documentation to support the complex user management landscape
- Lack of **designation of account to a specific AEMO environment** such as pre-production or production

Governance and Compliance

- Lack of the visibility of the **audit trail to monitor significant identity and access management services**
- Need for **Multi-Factor Authentication (MFA)** to enhance security by requiring multiple forms of authentication, such as tokens, SMS verification, fingerprint or facial recognition (Windows Hello), and authenticator apps.

System accounts

Management of Service Accounts

- **Multiple user credentials** are required to access AEMO systems
- **Multiple access controls** to access AEMO systems
- **Multiple AuthN patterns** e.g., API keys, Basic Auth and OAuth
- Inadequate capabilities for **managing password changes** e.g., the use of shared credentials across multiple applications necessitating concurrent change
- Lack of **designation of account to a specific AEMO environment** such as pre-production or production

Future

Future Needs and capabilities

- **Context based authentication** - Dynamic risk assessment is embedded into the access decision by calculating risk using user behaviour and context analytics to protect against stolen credentials.
- Explore **data sharing capabilities** in markets beyond NEM

IDAM Objectives

IDAM enables the foundations for future reforms and secures Australia's energy sector essential operations.

Improved User Experience

Enhanced Security and Compliance

Greater Scalability and Adaptability

Effective Auditing and Reporting

Unified Identification and Authorisation

Resilience and Speed

AEMO's journey for future sector reforms will entail the introduction of a unified identity and access management framework

IDX Industry Pain Point Summary

Below is a summary of the key pain points from Business and Technical focus group discussions, classified into themes according to the challenges they pose to IDX services.

Complexity and inconsistency	• Protocols, formats and standards are inconsistent and unnecessarily convoluted. • Lack of consistent standards across Systems / Fuels / Jurisdictions
Define Roadmap	• There is no clear data exchange roadmap for future capabilities. • Legacy exchange methodologies & need for data exchange roadmap definitions (target & transition state)
Manage Cost-Effective Change	• Provide cost effective centralised services to reduce industry cost • Mandatory schema updates are costly, aseXML schema version change mandates industry to upgrade the aseXML schema even if the Participants do not have any procedural impact to the changes.
Opportunities in the Future	• Near real-time visibility of critical market transactions. • Enhanced security for data exchange and centralised access management. • Improved speed to market of business and regulatory changes. • Improved management of higher volumes of market data. • Improve developer experience. • Harmonised data exchanges between participants and AEMO market systems • Improved customer outcomes. • Better transparency of future maintenance costs for data exchange systems • Unified data exchange standards across markets, fuels and jurisdictions.
For AEMO to consider	• Event-based solution - Markets using AEMO-provided integrated data model (NEM) incur less cost than those not using (Gas or WEM). • Alternate data consumption pattern - Consumption of query able & interoperable data in a simple & standard way. • B2M and B2B systems integrated to provide operational and industry efficiency, reducing resources, time and cost involved in delivering the service.

IDX Objectives

IDX solution will provide industry standardized channels, protocols, and capabilities to provide a seamless integration of data exchange.

Lower Barriers to Entry

Reduce Costs

Improve Speed to Market

Framework for Enhanced and consistent data security exchange

Support Innovation

AEMO's journey for future sector reforms will include the introduction of new integration channels, patterns, protocols and payload formats to simplify and uplift the way data is exchanged between AEMO and the industry.

PC Industry Pain Points Summary

Industry Pain Points Workshop session:

User Experience

- **Disparate portals:** AEMO's browser services are exposed over a disparate range of portals that require uses to switch between multiple URLs and maintain multiple credentials. The user experience for portals is also inconsistent across different markets and domains.

- **Cross browser compatibility**: Browser standards should be supported for endpoints and different devices e.g., Chrome, Safari, IE, Edge, mobile devices

Cost & Complexity

- Maintenance of the disparate portals is costly (e.g., costs associated with training users and support costs).

Training, Support and Documentation

- Inadequate resources for **training, support, and documentation** was highlighted. Participants struggle with unclear and scattered documentation, inadequate support from AEMO, and a lack of comprehensive knowledge of the portals.

Future Needs and Capabilities

- **Personalisation features:** Currently there are inadequate personalisation features available on the portal (e.g., participants cannot create shortcuts to access web applications per their requirements).

PC Objectives

PC solution will provide a consistent and unified user experience and empower self-service.

Unified Portal Experience

IDAM Integration

Enhanced Security

Foundation and Strategic Initiative Alignment

Enhanced Self-Service Capabilities

AEMO's journey for future sector reforms will entail the introduction of a unified portal experience

Addressing challenges strategically

Energy Market Investment

Investment expenditure has been earmarked to support NEM Reform and the transition to a modern energy system. We are at a pivotal juncture: whether to allocate these resources **strategically** to provide a secure and fit-for-purpose technology foundation to deliver better consumer outcomes, or to take a **tactical, reactive and fragmented** approach, which carries the inherent risk of heightened complexity and increasing implementation and operational expenses.

Long Glide Path

The strategic allocation of investment will facilitate the acceleration of upcoming reforms, for example DER, Scheduled Lite, while establishing a resilient foundation to ensure compliance with SOCI regulations. This includes fortifying infrastructure and implementing scalable technology to enhance the security of the energy market.

The provision of transitional support capability over an extended sunset timeframe provides participants the **flexibility** to opt-in to new capabilities, enabling them to effectively manage their transition within a timeframe that aligns with their individual priorities.

Addressing these pivotal challenges is a means to optimise security and operations. It positions the industry at the forefront of *market adaptability* and *innovation* within the dynamic energy landscape.

Operational Efficiency

Modernization enhances operational efficiency and streamlines processes.

Security Compliance

Compliance with contemporary security standards and SOCI is assured.

Market Agility

Strategic foundation enables rapid adaptation at lower cost to evolving market demands and new service offerings.

Enhanced User Experience

User engagement and satisfaction are elevated through seamless, consistent and secure interactions.

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3.Options Considered

Options Development

We identified two main options which "bookend" the many possible options available: A tactical "minimum compliance" Option 1 and the target state solution Option 2a. Other available hybrid options could be finessed during Delivery.

- Highest implementation cost
- Lowest ongoing costs
- Addresses pain points

Strategic

Option 0:
Do Nothing

Option 2a:
Strategic target
state

Option 2b:
Moderated
strategic target
state

Lowest implementation cost
Highest ongoing costs
Least addressed pain points

Tactical

Option 1: Minimum
Security
Compliance

Option	Description
Option 0 – Do Nothing	We conducted a risk assessment against current system landscape & found this option unacceptable – our SOCI compliance obligations **would not be met** & cyber risks are **unacceptably high.** This option has therefore been discounted from further analysis.
Option 1 – Minimum Security Compliance	This option addresses the most egregious security risks from Option 0 and puts in controls to address the remaining risks.
Option 2b – Strategic target state moderated by IDX payload (retains asexml)	This option arose during industry consultation as a potential hybrid option that dilutes the full benefits of target state in order to reduce estimated costs. It does not address all industry pain points.
Option 2a – Strategic target state	This is the strategic target future state, as collaboratively designed with industry to address identified industry pain points, enable deliverability of future reforms and materially address security risks.

While there are many hybrid options that could be considered reflecting different scope parameters, to simplify the analysis of the business case we considered options representing the minimum and maximum scope.

As the target state sets a 'high' bar in terms of cost, it is anticipated there is only upside should opportunities to rationalise or change scope be identified during Delivery, especially during the Design and Consultation phases.

Business Case Options Overview

IDAM	Option '0' Do Nothing	Option 1 Minimum security compliance	Option 2a Strategic Target State

IDX	Option '0' Do Nothing	Option 1 Minimum security compliance	Option 2 Strategic Target State

Option 2a
Strategic Target State

Option 2b
Target state moderated by retention of legacy IDX payloads

PC	Option '0' Do Nothing	Option 1 Minimum security compliance	Option 2a Strategic Target State

Charting Future Success: Business Case Options

Option 0: Do Nothing

AEMO considered the most extreme tactical option of doing nothing and performed a risk assessment against it – assuming that existing platforms will continue to be used in their current form.

A consequence of this approach is our SOCI compliance obligations starting on August 2024 would not be met under this Option.
Likewise, this option does not provide any foundational capability to support Energy Transition nor other energy markets No Industry pain points are addressed under this option.

Given the above, this option is untenable for both AEMO and the industry.

Option 1: Minimum security compliance

IDAM:
- MVP focused on addressing legislatively-driven requirements such as SOCI and AESCSF to enhance the security posture

IDX:
- Enhance data exchange cyber controls, addressing legislatively-driven requirements

Portal Consolidation:
- Integrating IDAM MVP to address legislatively-driven requirements

Option 2: Strategic Target State

Establish Foundational capability for energy transition and industry-driven priorities

IDAM:
- A phased investment approach delivering a holistic IDAM capability as defined in an agreed target state.

IDX:
- **Option 2a:** A phased investment approach delivering IDX channels/protocols and payload formats as defined in an agreed target state.
- **Option 2b:** A phased investment approach delivering IDX channels/protocols and retain current payload formats for the legacy services.

Portal Consolidation:
- A phased investment approach delivering a holistic Portals functionality as defined in an agreed target state.

IDAM — Align to the Target State

IDX
- **Option 2a**: IDX channels/protocols and payload formats
- **Option 2b***: Strategic target state moderated by IDX payload

PC — Align to the Target State

*Any new Business service (e.g., DER) will align to the IDX target state channels and payload formats

Scope of Option 1

As a market operator, AEMO is subject to security regulatory obligations under the Commonwealth Security of Critical Infrastructure Act (SOCI). **Option 1 aims** to build an MVP focussed on uplifting the security posture addressing legislative-driven requirements such as SOCI, AESCSF. Option 1 focuses on transitioning the services of the **NEM market only**.

Indicative* Scope of Option 1

In Scope	Out of Scope
IDAM	**IDAM**
✓ **Implement Multi-Factor Authentication** (MFA) to enable two-step authentication for the browser services	✗ **Consolidation of identity and entitlement stores** within AEMO
✓ Enhance self-certification management process	✗ **De-duplication of user accounts**
	✗ Support for **identity federation**
IDX	✗ **Self-servic**e (for signup, password reset)
✓ **Enhance the security of the data exchange**:	✗ **Advanced data sharing** capabilities
a) Move from FTP to SFTP for file-based transfer	
b) Move to OAuth for API interactions	**IDX**
• Basic Auth to OAuth	✗ Standing up **foundational capabilities** for upcoming reforms
• API keys to OAuth	✗ Transition of the interfaces from other markets and fuels
• Cert-based to OAuth	
c) Deliver **secure solution for large file transfer** e.g. MSATS snapshot reports	**PC**
	✗ Browser services will not be internet-enabled
PC:	
✓ Enhance **existing browser services to integrate with IDAM** to address legislative requirements	
✓ **Retire standalone MSATS browser** URL, now available in Markets Portal	

Currently, **AEMO is undertaking a risk assessment as a part of cyber strategy development to identify the risk related to inadequate security governance and cyber security posture. Option 1 scope is an indicative scope and will be finalised once the risk assessment is completed*

Strawman Timeline for Option 1

Calendar years	2023	2024				2025				2026				2027				2028	2029	2030
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			

Tranche 0: PC foundational

The Consolidated Portal utilises an IDAM solution for authentication.

Tranche 0: IDAM Foundational phase

IDAM, PC, IDX Business Case approved

New Service Account Credentials AuthN & AuthZ mechanisms for Data Exchange

Tranche 0a: Build Base IDX + AEMO Gateway Software

Industry Consultation

Tranche 0b: Pilot

Tranche 1: Wholesale

Tranche 2: Retail

- **Option 1 aims** to build an MVP focussed on uplifting the security posture addressing legislative-driven requirements.
- IDAM tranche 0 will deliver Multi-factor authentication (MFA) and an enhanced self-certification management process by uplifting the legacy services.
- IDX Tranche 0 will be integrated with IDAM and will move to SFTP for file-based transfer and OAuth for API interactions to enhance the security of data exchange
- **Retail Tranche Pre-requisite:** Participants must have an OAuth provider
- In option 1, Tranche 3 (Retail non-B2B) has been incorporated in Tranche 2

Legend | Foundational Tranche | Transitional Tranche | Pre-prod | Prod | Industry Testing | Milestone

Full Scope of Option 2

AEMO has received an industry-wide agreement to unify Identity and Access Management platforms, as well as Data Exchange patterns and protocols across all jurisdictions, markets, and fuels. However, it is important to note that the transition to the target state will only pertain to the NEM services. This business case outlines the costs associated with developing the target state applicable to all fuels and markets, but the transition will only be for the NEM business services.

New upcoming initiatives leverage the target/transition state protocols and patterns. Migration of interfaces beyond the scope of NEM reform will be implemented via other business reforms.

IDAM Scope Option 2a

- Define & implement target state identity and access management solution
- Implement mandatory cybersecurity uplifts (such as SOCI) and advanced security capabilities such as identity federation, context-based authentication
- Unify the identity and entitlement management stores within the NEM and lay the foundation to extend this capability to other markets such as Gas and WEM through other market initiatives
- De-duplicate / consolidate the user accounts, providing the capability to use a single account to access business functions across multiple markets
- Build Organisation Hierarchy
- Enhance data-sharing capabilities to provide advanced data-sharing permissions
- Enhance Participant Admin experience e.g. Assign multiple PIDs to a role minimising creating duplicate roles at an organisation level when an organisation has multiple PIDs
- Basic and advanced Identity & Entitlement Management Governance & Assurance

IDX Scope Option 2

- Enhance data exchange cyber controls implementing the legislative driven requirements and obligations such as SOCI, AESCSF
- Define and implement target state channels, protocols, patterns and payload standards
- Unify the data exchange mechanisms across markets and fuels. Define the unified data exchange mechanisms for future Reforms
- AEMO data exchange software is enhanced to provide data exchange mechanisms that are defined in the target state architecture; minimising the gateway development costs for the industry covering all the channels that are defined in the target state architecture
- Transition the current state NEM interfaces to target state; sunset after an industry agreed timeframe
- NEM Retail & Wholesale payload formats for the existing interfaces align to the target state payload standards i.e. JSON payload structure
- Future Reform initiatives leverage the target state patterns & standards including the payload formats i.e. implements JSON payload structure

PC Scope Option 2a

- Enable a single pane of glass; providing a pathway for future unification across fuels and markets
- Implement the capabilities defined in target state architecture e.g. self-serve capabilities, personalised features
- Enable browser services to be accessible via the internet
- Single identity for various browser services/web apps
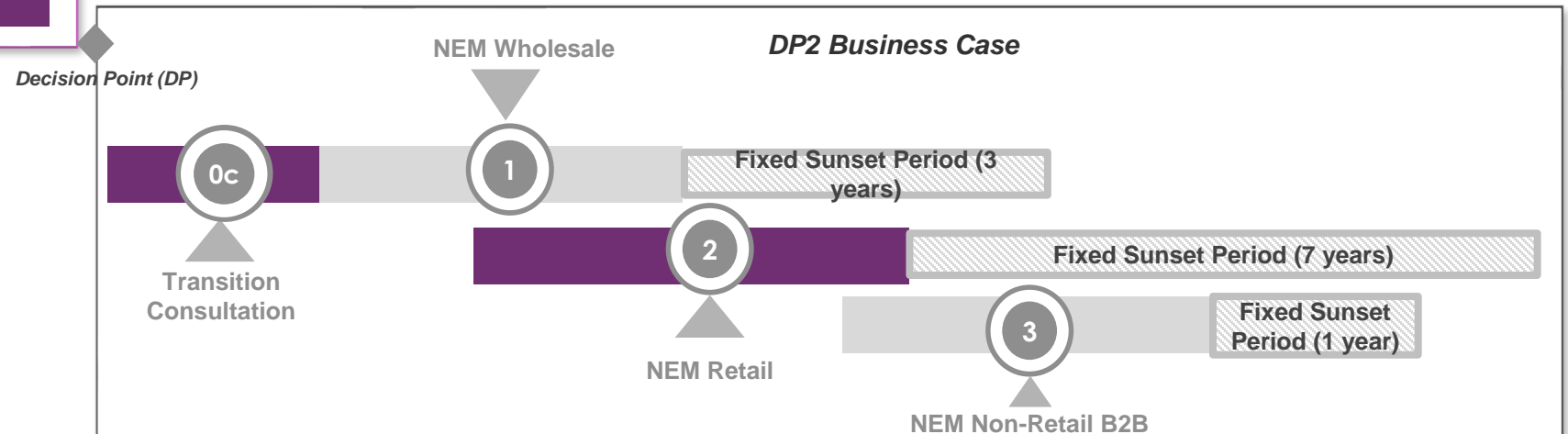- Unify the user experience
- Enhance user documentation

NEM reform initiatives may change their timeline, could be removed or new reforms could be added. Where this occurs, an assessment will be made for impact to the roadmap for these 3 initiatives

Phased Investment for IDX Option 2 Scope

Initial View: IDX Transition Strategy

This Business Case

Foundational Phase: AEMO foundational Build — 0a

Foundational Phase: Consultation & Pilot Lite — 0b

IDX Phased Investment: To facilitate a deferred IDX Transition decision point, we have divided what was previously Tranche 0b into **two components** – a minimum **Tranche 0b** and a **Tranche 0c**. The total scope has not changed, rather the scope has been divided to enable a clear DP2. The approach for the new minimum Tranche 0b is to target only minimum (1 per domain) business services for pilot, define minimal schema required for the design to be understood in principle, and "AEMO-led" framing of strawman for discussion, in order to provide cost and effort efficiencies for participants.

Decision Point (DP)

DP2 Business Case

NEM Wholesale

0c — Transition Consultation

1 — Fixed Sunset Period (3 years)

2 — Fixed Sunset Period (7 years)

NEM Retail

3 — Fixed Sunset Period (1 year)

NEM Non-Retail B2B

Revised Scope IDX Option 2

To address participants' concerns around reform roadmap congestion, AEMO has split the scope of IDX option 2 into two components: **IDX Foundation** and IDX Transition. The total scope has not changed, rather the scope has been divided to enable a clear Decision Point 2.

This Business Case — IDX Foundation

Tranche 0a: AEMO foundational Build

1. In consultation with the industry, define target state channels, protocols, patterns for the upcoming reforms to leverage
2. Implement foundational infrastructure
3. Enhance data exchange cyber controls implementing the legislative driven requirements and obligations such as SOCI, AESCSF
4. Define and implement technical standards for the upcoming reforms to leverage (the actual business function schemas would be defined as part of the reforms that leverage IDX)

What does the Industry need to do?

1. Contribute subject matter expertise to business and technical working group to build the foundation
2. Review and approve business requirements developed by IDX working groups
3. Engagement on readiness and testing approach

Tranche 0b: Consultation & Pilot Lite

1. In consultation with the industry, define the scope of the pilot lite
2. AEMO data exchange software is enhanced to provide data exchange mechanisms that are defined in the target state architecture; minimising the gateway development costs for the industry covering all the channels that are defined in the target state architecture
3. Implement pilot lite

What does the Industry need to do?

1. Agree on pilot lite business functions and success metrics
2. Choose if to implement/upgrade AEMO Gateway software
3. Set up participant pilot lite capability
4. Conduct pilot; share findings with IDX working group(s)

AEMO will propose a process and timeframe outside of this business case to progress a further investigation into the scope and timeline for transitioning existing business services for providing an input to DP2 Business Case

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DP2 Business Case — IDX Transition

Tranche 0c: Transition Consultation

1. Define the IDX roadmap (timeline for transitioning existing business services, sunset timeframes, etc)
2. In consultation with the industry, define any extensions to target state channels, protocols, patterns to onboard the legacy services
3. Define the target state payload for legacy services (e.g., Option 2a vs Option 2b)
4. In consultation with the industry, define the scope of the pilot
5. Implement the pilot

Tranche 1-3: Transition Existing Services

1. Extension of the IDX infrastructure capacity to support the onboarding of legacy business services
2. Transition the current state NEM interfaces to target state; sunset after an industry agreed timeframe

Revised Strawman Timeline for Option 2

Calendar years	2023	2024				2025				2026				2027				2028				2029	2030	2031	2032	2023	2034	2035
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Sunset Years						

Portal Consolidation

- Tranche 0: PC Foundational phase
- Tranche 1: Advanced capabilities
- Tranche 2: Internet Enabling
- Tranche 3: Internet Enabling
- Tranche 4: Internet Enabling

The Consolidated Portal utilises an IDAM solution for authentication.

IDAM

DP1

- Tranche 0: IDAM Foundational phase
- Tranche 1a: Progressive migration
- Tranche 1b: Enable Entitlement management capabilities
- Tranche 2a: Advanced capabilities
- Tranche 2b: Retire

New Service Account Credentials AuthN & AuthZ mechanisms for Data Exchange

Enable Identity and Entitlement Management

This Business Case : Full scope of IDAM and PC, IDX Foundation only.

IDX

Decision Point 1: This business case

- Tranche 0: IDX Core Foundational Phase
- Tranche 0a: Build Base IDX + AEMO Gateway Software
- Tranche 0b: Foundation consultation
- Tranche 0b: Pilot - Lite

DP2*

- Tranche0c: Wholesale Define schemas, business endpoints
- Tranche0c: Retail Define schemas, business endpoints
- Tranche 0c: Pilot - Build — Pre-Prod — Prod
- Tranche 1: Wholesale — Pre-Prod — Prod — Wholesale Sunset Period (3 years)
- Tranche 2: Retail — Pre-Prod — Prod — Retail Sunset Period (7 years)
- Tranche 3: Non-Retail B2B — Pre-Prod — Prod — Sunset Period (1 year)

***Decision Point 2:** The timeline for activities listed within DP2 Business Case: IDX Transitional would be finalised as part of the business case associated with DP2*

DP2 Business Case: IDX Transitional scope only*

Legend

| This Business Case Scope | DP2 Business Case Scope | Pre-prod | Prod | Industry Testing | Milestone |

IDX Option 2a vs 2b

Option 2b is the IDX target state moderated by the retention of the Legacy payloads. This option arose during industry consultation as a potential hybrid option that dilutes the full benefits of the target state to reduce estimated costs

IDX Option 2b

The scope of Option 2b is similar to that of Option 2a as it involves building a foundational framework. However, in Option 2b, the NEM Retail & Wholesale payload formats for the existing interfaces will not align with the target state payload standards. This means that the existing NEM Retail interfaces will continue to use aseXML, and the NEM Wholesale interfaces will continue to use AEMOCSV formats.

Future reform initiatives will leverage the target state patterns and standards, including the payload formats.

Descriptions	Option 2A	Option 2B
IDX: Foundation Build	Identical Scope for Option 2A & 2B	
IDX: Target State Data Definitions	Identical Scope for Option 2A & 2B	
IDX: Data Exchange Mechanisms (e.g. Security, Channels, Protocols) for legacy interfaces	Identical Scope for Option 2A & 2B	
IDX: Payload Formats for legacy interfaces	Aligns to Target State Definitions	Retains Legacy Payload Formats

Option 2b: Key Call Out

The foundational tranches for both IDX Option 2a and Option 2b would remain the same, but IDX Transition would change. Legacy services however remain on the existing aseXML payload in Option 2b.

This option was costed in detail from AEMO's perspective to understand potential cost savings attributed to the reduced delivery scope. Very limited responses were received on reduction in industry costs.

We note further that this option does not address the full suite of Industry pain points reducing intangible benefits, note these further reference opportunities to reduce industry cost over time.

Decision on the transition of the legacy services is deferred to Decision point 2 **Q4 2025**

4.Financial Assessment

Summary: This Business Case

		IDAM		IDX		PC		This Business Case	
		Option 1	Option 2a	Option 1	Option 2a/2b (Foundation)	Option 1	Option 2a	Option1	Option 2a
AEMO	Implementation cost	$4M	$21M	n/a	$20M	<1M	$6M	$5M	$47M
	Cost[2] impact to support DER, PQ Data (No foundation)	$3M	$0	$7M	$0	n/a	n/a	$10M	$0
	Cost[3] impact to future NEM reforms in absence of foundation	$11M	$0	$22M	$0	n/a	n/a	$33M	$0
	Delta operational cost[1] to support new capabilities and legacy services	$2M	$6M	n/a[4]	n/a[4]	$1M	$1M	$3M	$7M
	Total cost of ownership (12 years for IDX, 7 years for IDAM & PC)[1]	**$20M**	**$27M**	**$29M**	**$20M**	**$2M**	**$7M**	**$51M**	**$54M**
Industry	Implementation cost	$2M	$35M	n/a	~$65M[6] *(seeking feedback)*	<$1M	$13M	$3M	~$113M
	Cost[2] impact to support DER, PQ Data (No foundation) Cost[3] to support new reforms other upcoming NEM Reform initiatives (in absence of foundation)	Costs expected but unquantified	$0	~$94M[2,3]	$0	n/a	n/a	> ~$94M[2,3]	$0
	Delta operational cost5 to support new capabilities and legacy services	*unquantified*	*unquantified*	n/a	n/a	*unquantified*	*unquantified*	*unquantified*	*unquantified*

All estimates have an uncertainty range of +/- 40%

1. *All estimates are incremental cost to the projected current baseline*
2. *Whilst the cost of implementing DER Data Hub and PQ data are covered in those reforms, there is an assumption in those costs that foundational capability would be in place. This cost impact category relates to the cost impacts incurred in the event that foundational capability would not be in place*
3. *The energy transition will require an increasing volume, diversity and frequency of data exchange between a wider cohort of energy stakeholders to sustain new market processes. Leveraging the estimated impacts for the upcoming reforms, we anticipate a cost impact on the future budgeted NEM program if the foundational capability was not available, estimated at 10% for data exchange, and 5% for identity management.*
4. *IDX foundation does not result in a net delta to operational cost noting that new NEM reforms will be responsible for assessing any uplift requirements for their own projects and the uplift to legacy services will be assessed at* ***Decision Point 2***
5. *Industry submissions haven't quantified savings for Delta operational cost*
6. *Based on industry participant cost breakdown received on an earlier scope statement, 1:1 interactions, and AEMO's ratio of Foundation to Transition, noting that AEMO has the bulk of work in Foundation. AEMO welcomes industry feedback*

Summary: Full Investment (including DP2 Transition)

		This Business Case (IDAM, PC, IDX Foundation)		DP2 Business Case: IDX Transition of the legacy services			Full Investment		
		Option 1	Option 2a	Option 1	Option 2a	Option 2b	Option1	Option 2a	Option 2b
AEMO	Implementation cost	$5M	$47M	$10M	$31M	$22M	$15M	$78M	$69M
	Cost[2] impact to support DER, PQ Data (No foundation)	$10M	$0	n/a	n/a	n/a	$10M	$0	$0
	Cost[3] impact to future NEM reforms in absence of foundation	$33M	$0	n/a	n/a	n/a	$33M	$0	$0
	Delta operational cost[1] to support new capabilities and legacy services	$3M	$7M	$6M	$18M	$18M	$9M	$25M	$25M
	Total cost of ownership (12 years for IDX, 7 years for IDAM & PC)[1]	**$51M**	**$54M**	**$16M**	**$49M**	**$40M**	**$67M**	**$103M**	**$94M**
Industry	Implementation cost	$3M	~$113M *(seeking feedback)[5]*	$73M	$184M	$109M	$76M	$297M	$222M
	Cost[2] impact to support DER, PQ Data (No foundation) Cost[3] to support new reforms other upcoming NEM Reform initiatives (in absence of foundation)	~$94M[2,3]	$0	n/a	n/a	n/a	> ~$94M[2,3]	$0	$0
	Delta operational cost[4] to support new capabilities and legacy services	*unquantified*	*unquantified*	*unquantified*	*unquantified*	*unquantified*	*unquantified*	*unquantified*	*unquantified*

All estimates have an uncertainty range of +/- 40%;

1. *All estimates are incremental cost to the projected current baseline*
2. Whilst the cost of implementing DER Data Hub and PQ data are covered in those reforms, there is an assumption in those costs that foundational capability would be in place. This cost impact relates to the costs estimated in the event that foundational capability would not be in place
3. The energy transition will require an increasing volume, diversity and frequency of data exchange between a wider cohort of energy stakeholders to sustain new market processes. Leveraging the estimated impacts for the upcoming reforms, we anticipate a cost impact on the future budgeted NEM program if the foundational capability was not available, estimated at 10% for data exchange, and 5% for identity management.
4. *Industry submissions haven't quantified savings for Delta operational cost*
5. *Based on industry participant cost breakdown received on an earlier scope statement, 1:1 interactions, and AEMO's ratio of Foundation to Transition, noting that AEMO has the bulk of work in Foundation. AEMO welcomes industry feedback*

4.1 AEMO Implementation Costs

Estimation Approach for Option 2

Scaling factor for Option 1

Total Implementation Cost Summary

IDAM Implementation

IDX Implementation Cost

Portal Consolidation Implementation Cost

AEMO Cost Estimation Approach: Option 2a

The **AEMO Implementation Costs** (Investment Costs) for the IDX, PC and IDAM initiatives are based on the agreed scope for Option 2a. We completed a bottom-up estimate for each component and validated against (where available) comparable internal and international projects.

Scope of implementation estimate

Project Management					
Design	Industry Consultation	Build	Functional Testing	Industry Testing Support	Legacy system decommissioning
Architecture	Procurement and Licensing	Infrastructure	Non-Functional Testing (including Penetration Testing)		
Change Management					
Release and Environment Support					

Updated AEMO Cost Estimation Approach: Option 1

For Option 1, the **AEMO Implementation costs** (Investment Costs) for the IDX, IDAM and PC initiatives have been estimated using a scaling of the Option 2a estimate based on the following assumptions:

IDAM

	Cost scaling	Assumption
Tranche 0	30%	• Definition of patterns and potential build/license of capability of existing products
Tranche 1a	0%	• User accounts remain in existing identity stores
Tranche 1b	0%	• No new entitlement capabilities deployed
Tranche 2a	0%	• No advanced capabilities deployed
Tranche 2b	0%	• No decommission

IDX

	Cost scaling	Assumption
Tranche 0a	• 20% (of AEMO Gateway cost) • 50% of Option 2a IC • $3M stand alone cost	• To enhance existing PdrBatcher/ Participant batcher to enable SFTP capability. • To define deployable OAUTH and sFTP patterns • To build MFT and OAUTH capabilities
Tranche 0b	10%	• Security design and transition planning and consultations
Tranche 1	15%	• Move to sFTP and Oauth, regression and industry testing
Tranche 2	20%	• Move to sFTP • Basic Auth, API keys and cert based to Oauth • Regression and industry testing
Tranche 3	0%	• No change

PC

	Cost scaling	Assumption
Tranche 0	20%	• Security updates only
Tranche 1	0%	• No change
Tranche 2	0%	• No change

AEMO Total Implementation Costs Summary

This Business Case

	IDAM		IDX		PC	
	Option 1	**Option 2a**	**Option 1**	**Option 2a/2b (Foundation)**	**Option 1**	**Option 2a**
AEMO Implementation Cost	$4M	$21M	n/a	$20M	< $1M	$6M

Total Investment

	IDAM		IDX (Foundation + Transition)			PC	
	Option 1	**Option 2a**	**Option 1**	**Option 2a**	**Option 2b**	**Option 1**	**Option 2a**
AEMO Implementation Cost	$4M	$21M	$10M	$51M	$42M	< $1M	$6M

Notes:
- These estimates have an uncertainty **range of +/- 40%.**
- AEMO's implementation cost estimates have been triangulated using a bottom-up resourcing approach, a top-down effort-based approach and a comparison against similar projects.
- **This Business case** costs are associated with the implementation of the IDAM, IDX and PC initiatives. This Business Case IDX costs are to establish foundational capabilities and doesn't include transition of legacy services.

AEMO IDAM Implementation Cost

This Business Case

Foundational Phase
Build and Implement base identity and access management solution

Identity Management
*Enable new identity management capabilities and **progressively migrate users***

Decommission
Retire legacy systems

0   **1a**   **1b**   **2a**   **2b**

Entitlement Management
Enable new entitlement management capabilities

Advanced Capabilities
Enable advanced capabilities like data sharing, context-based authentication and periodic audit and compliance reports

Implementation Cost by Tranche

Option	Tranche 0	Tranche 1a	Tranche 1b	Tranche 2a	Tranche 2b	TOTAL
Option 1	$4.2M	-	-	-	-	**$4.2M**
Option 2a	$14M	< $1M	< $1M	$5.8M	< $1M	**$21M**

These estimates have an uncertainty **range of +/- 40%.**

AEMO IDX Implementation Cost

This Business Case

Foundational Phase: AEMO foundational Build — 0a

Foundational Phase: Consultation & Pilot Lite — 0b

0c — Transition Consultation and Pilot

NEM Wholesale — 1

Fixed Sunset Period (3 years)

2 — NEM Retail

Fixed Sunset Period (7 years)

3 — Non-Retail B2B

Fixed Sunset Period (1 year)

Implementation Cost by Tranche

Option	Tranche 0a	Tranche 0b-Foundation	This Business Case IDX Total		Tranche 0c-Transition	Tranche 1	Tranche 2	Tranche 3	DP2 Business Case IDX Total		TOTAL
Option 1	-	-	-	**+**	$10M	-	-	-	10M	**=**	$10M
Option 2a	$16M	$4M	$20M		$9M	$5.4M	$14M	$2.2M	$30.6M		$51M
Option 2b	$16M	$4M	$20M		$5M	$4.4	$11M	$1.5M	$22M		$42M

These estimates have an uncertainty **range of +/- 40%.**

AEMO Portal Consolidation Implementation Cost

This Business Case

Based on the Industry feedback

0 — **Foundational Phase**
Internet-facing consolidated portal framework built

1 — **Advanced Capabilities**
Enable advanced capabilities such as self-service and personalisation features

2 — **Consolidation and Internet Enabling**
- Market Info
- Intermittent Generation
- GSA (Registered Participants)

3 — **Consolidation and Internet Enabling**
- EMMS-Settlements
- Forecasting and Planning-Demand side Participation

4 — **Consolidation and Internet Enabling**
- DERR (Potential to be bundled with upcoming NEM Reform)

Implementation Cost by Tranche

Option	Tranche 0	Tranche 1	Tranche 2	Tranche 3	Tranche 4	TOTAL
Option 1	< $1M	-	-	-	-	**< $1M**
Option 2a	$2.3M	$1.3M	$1.0M	$1.0M	< $1M	**$6.2M**

These estimates have an uncertainty **range of +/- 40%.**

4.2 Industry Implementation Costs

Summary of responses

Extrapolation Methodology for Option 2

Scaling factor for Option 1 and Option 2b

Extrapolated Industry Cost

Summary of responses

- **Thirteen** responses were received for Option 2/2a however **two** of those did not have sufficient information to be included in cost extrapolation. Cost coverage has been received for all industry participant types allowing a median cost to be determined noting all outlier costs have been included.

- **Two** responses were received for IDX Option 2b and **two** responses were received for Option 1:
    - While these costs were included in the costing for those specific organisations, there wasn't sufficient data available to determine median values across participant types so the scaling estimation methodology has been applied for the rest of industry.

- No responses identified a net impact to operational cost nor provided a view on quantitative operational or market change cost avoidance

- For IDX, one response indicated an intent to leverage the AEMO gateway software. Noting the existing footprint of the AEMO gateway software, particularly in wholesale, it is expected there will be a significant volume of deployments of the updated software.

Participant Implementation Cost – Updated extrapolation methodology for Option 2a

Step 1:
Allocate organisations to "participant types"

Step 2:
Take the median implementation cost of each participant type

Step 3:
Allocate a number of active organisations per participant type

Step 4:
Multiply by the number of active participants of that type
+
Discrete participant costs

Type	Definition
Distributor	Has an LNSP role in the NEM, does not provide Contestable Metering Services
Contestable Metering Service Provider	Has an MDP, MPB, MPC role in the NEM, does not have an LNSP role.
Large Gentailer	>1.3 M NMIs
Medium Gentailer	100K to 1.3M NMIs
Small Retailer / Gentailer	< 100K NMIs
Distributor and Contestable metering service Provider	Has an LNSP role in the NEM and operates a contestable metering services business
Independent Generators	Independent generator, does not have a Retail market role

Median Implementation Cost = Midpoint (or the average of two midpoints if number of submissions are even) of the implementation costs submitted by participants*

*Following updated submissions and one-on-one sessions a move to the median from average has been proposed as more cost-reflective, allowing outlier submissions to be included in the total industry cost however not factored into the median calculation for their respective participant type

Type	Total No
Distributor	-
Metering Services	-
Large Gentailer	-
Medium Gentailer	-
Small Retailer / Gentailer	-
Distributors and Contestable metering services**	-
Generators**	-

Total Implementation Cost for a participant type =
Median Implementation cost × # of active organisations * +
Discrete participant submission costs

Noting the revised approach to determining a median cost, the median will be applied to participants who fit within the median profile or who have not provided an individual submission. Participants with discrete submissions will have their submitted costs included.

Updated Participant Cost Estimation Approach - Option 1

Option 1 Scaling Methodology

		Cost scaling	Assumption
IDAM	Tranche 0	20%	Industry Consultation for defining patterns and protocols. Agree on the transition strategy for MFA
	Tranche 1a	5%	User accounts enrolment for MFA
	Tranche 1b	0%	No new entitlement capabilities deployed
	Tranche 2a	0%	No advanced capabilities deployed
	Tranche 2b	0%	No decommission

		Cost scaling	Assumption
IDX	Tranche 0a	20%	Industry Consultation for move to SFTP and OAuth Establish updates for data exchange capability such as implementing OAuth Provider, OAuth client capability and SFTP Pilot testing
	Tranche 0b		
	Tranche 1	40%	Move to SFTP and OAuth, regression and industry testing
	Tranche 2	40%	Move to SFTP and OAuth, regression and industry testing
	Tranche 3	0%	No change

		Cost scaling	Assumption
PC	Tranche 0	15%	Security updates only
	Tranche 1	0%	No Portal movement
	Tranche 2	0%	No Portal movement

Option 2b Scaling Methodology

Step 1: Calculate Scaling factor

$$\text{Scaling factor} = \frac{\Sigma(Response\ to\ 2b)}{\Sigma(Response\ to\ 2a)}$$

Step 2: Calculate Scaling factor

$$\text{Total 2b Cost} = \Sigma\ (total\ 2a) * Scaling\ factor$$

Assumptions

- Based on participant feedback and detailed option 1 scope related to implementing OAuth provider, there has been an increase in the IDX scaling factor for Tranche 0a and 0b

- Based on participant feedback, the increase in cost scaling for IDX Tranche 1 and Tranche 2 is due to participants identifying regression and bilateral industry testing as key activities.

- Option 1 broadly reflects implementation on the agreed effective change date, without the extended sunset approach of Option 2, reducing the opportunity to leverage market or internal changes.

Industry Implementation Cost Extrapolation*

This Business Case

	IDAM		IDX Foundation		PC	
	Option 1	Option 2a	Option 1	Option 2a/2b	Option 1	Option 2a
Industry Implementation Cost[2]	$2M	$35M	n/a	~$65M[1] *(seeking feedback)*	< $1M	$13M

This Business Case + DP2 Business Case -- Total Investment

	IDAM		IDX (Foundation + Transition)			PC	
	Option 1	Option 2a	Option 1	Option 2a	Option 2b	Option 1	Option 2a
Industry Implementation Cost	$2M	$35M	$73M	$249M	$174M	< $1M	$13M

Notes:

These estimates have an uncertainty **range of +/- 40%.**

1. Based on industry participant cost breakdown received on an earlier scope statement, 1:1 interactions, and AEMO's ratio of Foundation to Transition, noting that AEMO has the bulk of work in Foundation. AEMO welcomes industry feedback
2. This Business case costs are associated with the implementation of the IDAM, IDX and PC initiatives. This Business case IDX costs are to establish the foundational capabilities and don't include the transition of the legacy services.

*Detailed calculations are in Appendix F

4.3 AEMO Operational Costs

Operational Cost Categories

Operational Cost for This Business Case

Operational Cost for Foundation and Transition

AEMO Operational Costs Categories

The **AEMO Operational Costs** for the IDX, PC and IDAM initiatives are based on the agreed scope for Option 2. We completed a bottom-up estimate for each component and validated against (where available) comparable internal and international projects.

Scope of Operational estimate

Support	Licensing (COTS)	Software Maintenance (COTS)	Software Support and Maintenance (AEMO developed)	Security Compliance	Infrastructure
First point of contact, Support Hub/Service Desk Application/Infrastructure support teams. External service provider or vendor support costs.	Licence cost to use the software for prescribed period.	Cost to upgrade Commercial Off The Shelf (COTS) software. This category includes the cost to maintain and manage the software i.e. bug fixes.	Cost to support AEMO Developed software. This category includes the cost to upgrade and support/maintain the software.	Costs to perform security compliance; such as auditing, testing, and any software tools.	Costs related to both physical and compute resources required to support new capability and / or transactional volumes.

AEMO Operational Costs: This Business Case

Total Operational Cost delta to support foundational capabilities: This Business Case

	IDAM		IDX (Foundation)			PC	
	Option 1	**Option 2a**	**Option 1**	**Option 2a**	**Option 2b**	**Option 1**	**Option 2a**
Foundational Total delta operating cost	$2M	$6M	n/a	n/a	n/a	$1M	$1M

Looking across the scope of this Business Case, operational costs have been forecast for the foundational investment phase:

- Portal Consolidation - similar operational costs required for Option 2a including its additional capabilities and internet-enabled portals, compared to the minimal cyber security uplift provided by Option 1.
- IDAM – Option 2a for IDAM introduces additional capabilities identified by the target state not provided under Option 1; costs include parallel operation prior to decommissioning of legacy capability.
- IDX – delta operational costs are net neutral for foundational capability, noting NEM Reforms leveraging the foundation will assess relevant volume drivers and associated costs for support.

Notes:
- *All estimates have an **uncertainty range of +/- 40%;***
- *Operational costs reflect the delta or change to existing operational costs for the provision of current market services*
- *IDAM, IDX Foundation and PC operational costs have been assessed over 7 years (2024-2030)*

AEMO Operational Costs: This Business Case + DP2 Business Case

Total Operational Cost delta: This Business Case + DP2 Business Case (Foundation and Transition)

	IDAM		IDX			PC	
	Option 1	Option 2	Option 1	Option 2a	Option 2b	Option 1	Option 2
Foundational Total delta operating cost	$2M	$6M	n/a	n/a	n/a	$1M	$1M
Transitional Total delta operating cost	n/a	n/a	$6.1M	$17.7M	$17.7M	n/a	n/a

Looking out beyond This Business Case to include the DP2 Business Case, operational costs have been forecast to support transition of legacy services

- IDAM and PC delta costs are all taken up in the foundational investment phase
- IDX introduces operational cost deltas to support the transition of legacy services (Wholesale, Retail and Transmission)
- IDX Option 2a and 2b have equivalent delta cost impacts as they leverage the same technology platforms, deltas are driven by:
  - The progressive shift of transaction volumes applied to the new technology stack able to meet SOCI obligation and support target state capabilities
  - The requirement to continue to operate legacy services in parallel across the multi-year sunset period
- It is expected that the completion of foundation will further validate and identify opportunities to consolidate and or reduce operating cost deltas to support transition
- IDX Option 1 costs largely driven by the requirement for an MFT solution

Notes:
- *All estimates have an **uncertainty range of +/- 40%;***
- *Operational costs reflect the delta or change to existing operational costs for the provision of current market services*
- *IDAM and PC operational costs have been assessed over 7 years (2024-2030), while IDX has been assessed over 12 years covering the sunset period (2024-2035)*

4.4 Industry Operational Costs

Industry Operational Cost

Industry Operational Cost

- While opportunities for industry cost savings have been qualitatively identified and referenced under the industry pain points addressed by the target state, participants have been unable to quantify these opportunities across the three initiatives.

- Submissions on operational cost have not identified a delta resulting from the target state and have therefore been assessed as net neutral for this business case.

- Factoring these two elements above, it is reasonably expected that there will be an overall ongoing net cost reduction to the industry to operate the market and deliver future initiatives once the IDX, IDAM and Portal Consolidation foundation is in place.

4.5 Costs Impact on Upcoming Reforms

Cost impact on upcoming reforms

Cost Impact on upcoming Reforms

AEMO	IDAM Option 1	IDAM Option 2a	IDX Option 1	IDX Foundation	PC Option 1	PC Option 2a
Cost impact to support upcoming (DER, PQ Data) in absence of foundation[1]	$3M	$0	$7M	$0	n/a	n/a
Costs impact to future NEM reforms in absence of foundation[2]	$11M	$0	$22M	$0	n/a	n/a

Notes:
1. Whilst the cost of implementing DER Data Hub and PQ data are covered in those reforms, there is an assumption in those costs that foundational capability would be in place. This cost impact relates to the costs estimated in the event that foundational capability would not be in place.

2. The energy transition will require an increasing volume, diversity and frequency of data exchange between a wider cohort of energy stakeholders to sustain new market processes. Leveraging the estimated impacts for the upcoming reforms, we anticipate a cost impact on the future budgeted NEM program in the event that the foundational capability was not available, estimated at 10% for data exchange, and 5% for identity management.

5. Options Assessment

AEMO

Assessment Categories

AEMO has defined the following categories for assessing the Business Case options. These categories have been defined in line with the Objectives defined and agreed with the Industry for IDAM, IDX and PC

Unified Identification and Authorisation
IDAM will create a unified identification, authentication and authorisation mechanism, enhancing security and compliance across the industry.

Greater Scalability and Adaptability
IDAM solution will provide greater scalability across the industry. Without the solution, future reform implementation will be slower and have a higher implementation cost implications.

Improved User Experience
IDAM will provide a consistent and unified user experience for IDAM, IDX, PC and other future initiatives.

Enhanced Security and Compliance
Deliver on SOCI obligations such as risk management program and Enhance Cyber Security Obligations. Meet modern security best practices.

Effective Auditing and Reporting
Enhance self-service auditing and reporting capabilities to support industry's governance and compliance requirements.

Resilience and Speed
Ensure redundancy, fault tolerance, flexibility, adaptability, and rapid recovery to meet security requirements and minimise operational disruptions.

AEMO's journey for future sector reforms will entail the introduction of a unified identity and access management framework

Lower the barriers to entry for new Market Participants

Reduced operational costs for industry, AEMO and future industry reforms.

Improved speed to market, e.g. by addressing the schema change pain points.

Provide the framework for Enhanced and consistent data security exchange

Support innovation and potential new Market data flows

AEMO is embarking on a journey for future sector reforms, which will entail the introduction of new integration channels, patterns, protocols and payload formats to simplify and uplift the way data is exchanged between Market Participants and AEMO

Enable a unified portal experience

Provide integration with the enterprise identity management and user authentication solution

Implement framework and roadmap for transition and implementation

Enhance self-service capabilities

Residual Security Risk

Deliverability of Future reforms

Cost to Deliver

Operational Cost

Addressing Industry Pain points

Framework for Assessing Business Case Options

Assessment Categories	Description	Assessment Metric
Residual Security Risk	This category assesses the risk that remains in the landscape even after meeting all the minimum legislative security controls and compliance.	**Maturity level** • Level 1 – Reactive and inconsistent • Level 2 – Minimum capability addressing only fundamental requirements applied to technologies and processes • Level 3 –Defined and Proactive: Align to strategic target state for the new business services only. Current services are not transitioned. • Level 4 – Strategic, current NEM landscape transition with some legacy footprints: to optimise the cost-benefit realisation • Level 5 - Strategic, current NEM landscape fully transitioned to target state: aligned to the needs of the future reforms
Deliverability of Future reforms	The energy transition is rapidly transforming the system and markets. This category assesses the speed, scalability and flexibility to implement future reforms as new markets mature and continue to change the energy landscape.	
Addressing Industry Pain points	This category evaluates for addressing industry pain points for ongoing operational cost, unifying data exchange mechanisms across markets, security controls, improved efficiency, system reliability and user experience.	
Cost to Deliver	Immediate implementation cost and cost to deliver future reforms	**Immediate implementation cost** : $$ value **Cost to deliver future reforms** • Cost for confirmed initiatives: $$ value • Cost for likely initiatives: % of total cost
Operational Cost	Ongoing operational cost for foundational and strategic initiatives.	**Delta Operational Cost for new capabilities and legacy services**

5.1 IDAM Options Assessment

Residual Security Risk

Deliverability of Future Reforms

Industry Pain Points

Cost to Deliver

Operational Cost

IDAM - Residual Security Risk

Higher levels of integration across the value chain have increased the complexity of the overall security landscape, as well as the impact of a potential cyber-attack. It has been observed globally that there is an increasing impact if there is a security breach, and the possibility of breaches are increasing significantly.

While **all options will meet the minimum compliance requirements**, **Option 2a would have lower residual security risk than Option** 1 owing to
- Enhanced security controls
- reduced attacked surface area by avoiding fragmented solutions

Description	Likelihood		Rationale	
	Option 1	Option 2a	Option 1	Option 2a
Enhanced Security Controls (e.g. Multi Factor Authentication (MFA), Context-based authentication)	2	5	**Legacy with limited security controls** Option1 would retain legacy identity and access management systems which may still have vulnerabilities that can be exploited. However, controls will be implemented to mitigate the vulnerabilities that are required to meet the minimum legislative requirements	**Designed to inherently follow security best practices** Strategic target state architecture is designed to improve security posture by inherently following security best practices right from the design process, thus reducing vulnerabilities.
Security - Attack surface area	1	5	**Wider attack surface area** When there is a lack of foundation and standardised framework, it leads to a broader attack surface area and increases the risk of implementing security changes. With future initiatives implementing a siloed framework, the attack surface area becomes larger and larger as more initiatives are implemented.	**Narrower attack surface area** By avoiding fragmented solutions, the focus is on implementing component-based and industry-standard architecture; and integrated through reusable services. In Option 2a, we are keeping the attack surface narrow with a standardised framework and unified identity and entitlement management systems

IDAM - Deliverability of Future Reforms

Deliverability of future reforms would be significantly improved with the availability of foundational frameworks (Option 2a) owing to reduced speed to market, providing more flexibility and being inherently secure by design.

Description	Rating		Rationale	
	Option 1	Option 2a	Option 1	Option 2a
Speed to Market	2	5	**Uplift to legacy platforms** Future reform programs may have localised implementation, with new identity and access management capabilities for new business services. This would lead to an increased design, build and testing time, thus slowing delivery.	**Foundational capabilities available** The standardised IDAM platform would provide foundational capabilities for new reform initiatives. It would reduce Industry consultation, design, build and testing time, thus expediting the implementation of new initiatives
Flexibility and Innovation	2	5	**Uplift to legacy platforms** New reform initiatives may need bespoke and disparate IDAM platforms to be implemented in silo to support evolving use cases. This would add to the list of disparate solutions, increase the complexity further and lead to duplicated investment	**Availability of strategic foundation** The availability of a strategic foundation facilitates flexible adaptation as the technical infrastructure supports capabilities that are required beyond 'day 1'. New initiatives can therefore leverage the strategic investment without a need to duplicate capabilities.
Secure by design	2	5	**Uplift of legacy platforms** Option 1 reflects a reactive rather than secure-by-design approach to meeting security requirements. The security measures and considerations will have to be retrofitted into the disparate systems, thus adding to the technical debt. This option tends to align to the principle of 'Secure by Risk Analysis'	**Secured-by-Design in principle** Option 2a would be "Secure by design" - security measures and considerations would be incorporated from the outset of the development process, making the system inherently secure, reducing the likelihood of vulnerabilities and minimizing the need for additional security patches or fixes later in the lifecycle.

IDAM - Industry Pain Points

Option 1 would meet mandatory cyber requirements would not address any other industry paint point captured in consultation with the industry.
Option 2a would address most of the industry pain points.

Rating		Rationale	
Option 1	Option 2a	Option 1	Option 2a
2	5	• This option will not address most of the pain points captured in consultation with industry as it does not unify the disparate identity and access management systems • Existing availability targets on current legacy platforms to remain, and the introduction of additional capabilities to meet MVP requirements. This will not improve system resilience and reliability, and the introduction of new initiatives and services will increase the risk of existing systems not meeting their availability targets without each initiative also investing in system uplifts.	This option addresses all pain points captured in consultation with industry: • **Unifying the identity and entitlement management stores** within the NEM and laying the foundation to extend this capability to other markets such as Gas and WEM through other market initiatives • **De-duplicating / consolidating the user accounts**; providing the capability to use a single account to access business functions across multiple markets • Enforce stricter authentication and authorisation process for person and system accounts using secured patterns • Enhancing data sharing capabilities to provide **advanced data sharing** permissions • **Enhancing Participant Admin experience** • Providing **advanced Identity & Entitlement Management Governance & Assurance** • **Increased Resilience -** Increased availability targets, and a hybrid Cloud/On-Prem services model, significantly mitigates the risk of outages and ensures reliable alternatives should there be failures. This reduces the risk of impact to the operation of the market, or lost opportunities.

Industry Key Pain Points

| 1. *Multiple credentials* required to access different AEMO systems (System & Person accounts) | 2. Lack of integration between Participant's Organisation and AEMO Identity store *(Federation)* | 3. Inability to *automate user offboarding*, resulting in unauthorised access and security risks | 4. Lack of *pre-defined entity catalogue and role catalogue* | 5. Need for *Multi-factor authentication* to enhance security | 6. Inadequate *self-service capabilities* Password reset | 7. Lack of *reporting capabilities* for PAs to conduct periodic assessments |

IDAM - AEMO Implementation Cost

While the Implementation cost of IDAM Option 2a is greater than that of Option 1, having a foundational framework proves to be beneficial in the long run. Building foundational capability in a strategic way builds capability that we know can be significantly leveraged in two upcoming reforms (DER Data Hub and Metering Services Framework Review), and that we can reasonably assume will be utilised in future reforms.

Immediate Implementation Cost

	Option 1	Option 2a
AEMO Implementation Cost *(+/- 40%)*	$4M	$21M

Cost to Deliver Future Reforms

	Option 1	Option 2a
Cost impact to implement a subset of DER Data Hub and PQ Data that relate to identity management	$3M	$0
Cost impact to deliver IDAM framework for likely initiatives* *(currently on the implementation roadmap)*	$11M	$0

Option 1	Option 2a
Additional Cost Cost to deliver new initiatives under Option 1 would be significantly higher as future reforms would not have foundational capabilities to leverage, these initiatives will require its own identity and access management capabilities. This results in a cost impact for Option 1.	**No Additional Cost** Building foundational capability in a strategic way builds capability that we know can be significantly leveraged in two upcoming reforms (DER Data Hub and MSFR), make the cost to deliver Identity and Access management capabilities practically 0.
Additional Cost Cost to deliver new initiatives under Option 1 would be significantly higher as future reforms would not have foundational capabilities to leverage, initiatives will require their own identity and access management capabilities. This results in a cost impact for Option 1.	**No Additional Cost** Building foundational capability in a strategic way builds capability that we can reasonably assume will be utilised in future reforms making the cost to deliver Identity and Access management capabilities practically 0.

Note:
*The energy transition will require an increasing volume, diversity and frequency of data exchange between a wider cohort of energy stakeholders to sustain new market processes. On this basis we consider that 5% of the costs of future budgeted NEM2025 program (~$220M) would relate to identity management.
Option 1 investment will further be required to be replicated across other energy markets at additional cost, where Option 2 provides an extensible framework to support those markets

IDAM - AEMO Operational Cost

IDAM provides ongoing additional benefits over legacy system, and the foundation and new capabilities built will provide ongoing value compared to Option 1. Additional saving will be possible once other markets transition from their legacy to the IDAM solution.

Operational Cost

	Option 1	Option 2a
AEMO Operational Cost *(+/- 40%)*	$2M	$6M

Future View

	Option 1	Option 2a	Option 1	Option 2a
Cost impact of supporting legacy services	$1.5	$2M	- Additional cost to support MFA for all participants, without the option for participants to federate and be able to manage their own identities. - Legacy identity solution for market systems remains in place - Ongoing costs for future initiatives around consultation, design and build of Identity and Access management solutions.	- Legacy systems incur ongoing costs during progressive migration + Project savings with IDX Target State in place for future initiatives
Steady state (Annual)	$0.4M	$1M	As per Option 1	- New Identity Management System introduces additional running costs + Decommission of legacy identity systems reduced costs and security exposure + Project savings with IDX Target State in place for future initiatives
Cost impact of annual schema changes	N/A			

5.2 IDX Options Assessment

Residual Security Risk

Deliverability of Future Reforms

Industry Pain Points

Cost to Deliver

Operational Cost

IDX - Residual Security Risk

Higher levels of integration across the value chain have increased the complexity of the overall security landscape, as well as the impact of a potential cyber-attack. It has been observed globally that there is an increasing impact if there is a security breach, and the possibility of breaches are increasing significantly.

While **all options will meet the minimum compliance requirements**, **Option 2a and 2b would have lower residual security risk than Option** 1 owing to
- the use of new channels and protocols that align with best cybersecurity practices
- the reduced attacked surface area by avoiding fragmented solutions

#	Risk Description	Rating			Rationale behind rating		
		Option 1	Option 2a	Option 2b	Option 1	Option 2a	Option 2b
1	**Security – Channels and Protocols**	2	5	5	**Multiple patterns ad protocols** Participants and AEMO will still have to navigate multiple authentication processes (different authentication pattern for each channel), integration patterns and protocols, all of which come with associated costs and complexities.	**Unified standardised channels and protocols following cybersecurity best practices and compliance** Unified channels and protocols defined in Options 2a and 2b would adhere to the cybersecurity obligations & best practices	
2	**Security - Attack surface area**	2	5	5	**Wider attack surface area** When there is a lack of foundation & standardised framework and the integration systems for different markets are not unified, it leads to a broader attack surface area and increases the risk of implementing security changes. With future initiatives implementing siloed solutions, the attack surface area becomes larger and larger as more initiatives are implemented.	**Narrow attack surface area** By avoiding fragmented solutions, the focus is on implementing unified component-based and industry-standard architecture; and integrated through reusable interfaces. In Option 2a and 2b, we are keeping the attack surface narrow with unified systems and a standardised framework	

IDX - Deliverability of Future Reforms

Deliverability of future reforms would be significantly improved with the availability of foundational frameworks (Option 2a and Option 2b) owing to reduced speed to market, providing more flexibility and being inherently secure by design covering introduction of new business functions and enhancing the current business functions. Option 2b is a little less flexible than Option 2a due to the complexity associated with aseXML and hence the speed to market would be relatively lower.

#	Description	Rating			Rationale behind rating		
		Option 1	Option 2a	Option 2b	Option 1	Option 2a	Option 2b
1	Speed to Market	1	5	4	**Uplift to legacy platforms** Future reform programs will be implemented locally, with new channels and protocols for new business services. This would lead to an increased industry consultation, implementing siloed solutions, design, build and testing time, thus slowing delivery	**Foundation capabilities available** The standardised platform with pre-defined channels and protocols would provide foundational capabilities for new reform initiatives. It would reduce Industry consultation, design, build and testing time, thus expediting the implementation of new services	**Foundation available, retained legacy payloads** For new business services: Like Option 2a, new business functions will leverage the target patterns, standards and payload formats. For existing services: speed to market would be more than that of Option 2a due to the aseXML pain points captured in discovery workshops
2	Flexibility and Innovation	1	5	4	**Uplift to legacy platforms** Will enable the minimum capabilities required. Future reforms would require uplifting the systems in silo requiring duplicated efforts and could also pose risks that current systems are not prepared to meet the rapid transformation & innovation.	**Availability of a strategic foundation** The availability of a strategic foundation facilitates flexible adaptation as the technical infrastructure supports capabilities that are required beyond 'day 1'.This limits duplicated investments and efficient delivery of reforms to adapt to future	**Availability of a strategic , retained legacy payloads foundation** Similar to option 2a but Option 2b is a little less flexible due to the complexity associated with retaining and extending the existing business services on legacy payloads such as aseXML
3	Secure by design	2	5	5	**Uplift of legacy platforms** Reflects a reactive rather than secure-by-design approach to meet security requirements. The security measures and considerations will have to be retrofitted into disparate systems, thus adding to the technical debt. This option tends to align to the principle of 'Secure by Risk Analysis'	**Secured-by-Design in principle** Options 2a and 2b would be "Secure by design" - security measures and considerations would be incorporated from the outset of the development process, making the system inherently secure, reducing the likelihood of vulnerabilities and minimizing the need for additional security patches or fixes later in the lifecycle.	

IDX – Industry Pain Points

Option 1 would meet minimum cyber requirements but would not address majority of industry pain points captured in consultation with the industry.
Option 2a would address most of the industry pain points.
Option 2b will address majority of the industry pain points but the pain points related to payload (e.g. aseXML) for the existing interfaces will not be addressed in this option

Rating			Rationale		
Option 1	Option 2a	Option 2b	Option 1	Option 2a	Option 2b
1	5	4	• This option won't address most industry pain points, as it doesn't standardise data exchange channels, protocols, and payload formats. • Existing availability targets on current legacy platforms to remain, and the introduction of additional capabilities to meet MVP requirements. This will not improve system resilience and reliability, and the introduction of new initiatives and services will increase the risk of existing systems not meeting their availability targets without each initiative also investing in system uplifts.	This option will address most of the pain points captured in consultation with industry. Key highlights of the solution are: • **AEMO data exchange software will be enhanced** to provide **data exchange mechanisms** that are defined in the **target state architecture;** thereby providing a reusable gateway software across multiple Participants • Current state NEM interfaces would be transitioned to the target state. NEM Retail & Wholesale **payload formats for the existing interfaces align to the target state payload standards** • **Increased Resilience**: Increased availability targets, and a hybrid Cloud/On-Prem services model, significantly mitigates the risk of outages and ensures reliable alternatives should there be failures	Same as option 2a except the payload pain points (in specific aseXML) for the existing interfaces will not be addressed in this option. • **Increased Resilience**: Same as Option 2a

Industry Key Pain Points

1. **Multiple patterns for the same regulated** transactions across markets; creating unnecessary complexity.

2. **Lack of consistent standards across Markets / Fuels / Jurisdictions**

3. **Mandatory schema updates (when the Participants are not impacted by the Procedural change) are costly**

4. **Participants currently have no option to configure the priority of processing the outbound messages**

5. **Inconsistent authentication and de-centralised authorisation**

6. **Management of multiple channels & patterns, most of which have had zero uptake e.g. pull APIs**

7. **Lack of clear data exchange roadmap** for future capabilities. **Need for improved speed to market** of business and regulatory changes

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IDX – AEMO Implementation Cost

While the AEMO Implementation cost of IDX Option 2a and 2b is greater for than that of Option 1, having a foundational framework proves to be beneficial in the long run. Building foundational capability in a strategic way builds capability that we know can be significantly leveraged in two upcoming reforms (DER Data Hub and Metering Services Framework Review), and that we can reasonably assume will be utilised in future reforms.

Immediate Implementation Cost

	Option 1	Option 2a	Option 2b
AEMO Implementation Cost *(+/- 40%)*	$10M	$51M	$42M

Cost to Deliver Future Reforms / Rationale

	Option 1	Option 2a	Option 2b	Option 1	Option 2a	Option 2b
Cost impact to implement a subset of DER Data Hub and PQ Data that relate to identity management	$7M	$0	$0	**Additional Cost** Cost to deliver new initiatives under Option 1 would be significantly higher. Future reforms would not have foundational capabilities to leverage on and every new initiative will implement their own patterns, channels, protocols We have chosen to represent these as costs for Option 1, rather than a saving for Option 2.	**No Additional Cost** Building foundational capability in a strategic way builds capability that we know can be significantly leveraged in two upcoming reforms (DER Data Hub and MSFR), make the cost to deliver data exchange framework practically 0.	**No Additional Cost** Same as Option 2a
Cost impact to deliver data exchange framework for likely initiative* *(currently on the implementation roadmap)*	$22M	$0	$0	**Additional Cost** Cost to deliver new initiatives under Option 1 would be significantly higher. Future reforms would not have foundational capabilities to leverage on and every new initiative will implement their own patterns, channels, methodologies.	**No Additional Cost** Building foundational capability in a strategic way builds capability that we can reasonably assume will be utilised in future reforms making the cost to deliver data exchange framework practically 0.	**No Additional Cost** Building foundational capability in a strategic way builds capability that we can reasonably assume will be utilised in future reforms making the cost to deliver data exchange framework practically 0.

*The energy transition will require an increasing volume, diversity and frequency of data exchange between a wider cohort of energy stakeholders to sustain new market processes. On this basis we consider that 10% of the costs of future budgeted NEM2025 program (~$220M) would relate to data exchange

IDX – AEMO Operational Cost

Additional capabilities introduced by IDX and the foundation built will provide ongoing savings compared to Option 1.

Operational Cost

	Foundation (This Business Case)			Transition (DP2 Business Case)		
	Option 1	Option 2a	Option 2b	Option 1	Option 2a	Option 2b
AEMO Operational Cost *(+/- 40%)*	N/A	N/A	N/A	$6.1M	$17.7M	$17.7M

AEMO Operational Cost / **Rationale**

	Option 1	Option 2a	Option 2b	Option 1	Option 2a	Option 2b
Cost impact of supporting legacy services	$6.1M	$3.4M	$3.4M	- Additional costs for MFT solution to replace existing FTP channel - Continued costs for future initiatives around consultation, design and build of data exchange solutions	- Additional operational costs from supporting both the IDX Target State and Legacy data exchange systems.	As per Option 2a
Steady state (Annual)	$0.5M	$1.8M	$1.8M	- Legacy systems remain with added complexity + Lower cost than Option 2	+ Decommission of legacy systems post sunset + Project savings with IDX Target State in place for future initiatives	As per Option 2a
Cost impact of annual schema changes	No saving	$100K p.a. *(saving)*	No saving	- Continued costs to maintain legacy schema and payloads	+ Saving from the decommissioning of legacy payloads	- Continued costs to maintain legacy schema and payloads

5.3 Portal Consolidation Options Assessment

Residual Security Risk

Deliverability of Future Reforms

Industry Pain Points

Cost to Deliver

Operational Cost

PC - Residual Security Risk

Higher levels of integration across the value chain have increased the complexity of the overall security landscape, as well as the impact of a potential cyber-attack. It has been observed globally that there is an increasing impact if there is a security breach, and the possibility of breaches are increasing significantly.

While **all options will meet the minimum compliance requirements**, **Option 2a would have lower residual security risk than Option** 1 owing to
- the adoption of Zero Trust principle
- Increased cyber resilience of browser services

Description	Likelihood		Rationale	
	Option 1	Option 2	Option 1	Option 2
Zero Trust	2	5	**Tactical Uplift** Option 1 would tactically uplift existing browser services only to integrate with IDAM to address legislative security requirements.	**Adopt Principle of Zero Trust** Option 2 would adopt the principle of Zero Trust, requiring users to be authenticated, authorized, and continuously validated for security configuration and posture before being granted or keeping access to applications and data.
Cyber Resilience of exposed end points	2	5	**Mandatory security requirements only** Option 1 would enhance existing browser services to integrate with IDAM, but no other security improvements would be made	**Increased Cyber Resilience** Option 2 would further tighten security by aligning all portal-based interactions with IDX API standards

PC - Deliverability of Future Reforms

Deliverability of future reforms would be improved with the availability of foundational frameworks (Option 2a) owing to reduced 'speed to market', providing more flexibility and being inherently secure by design.

Description	Rating		Rationale	
	Option 1	Option 2	Option 1	Option 2a
Speed to Market	2	5	**Uplift to legacy platforms** New browser applications may be either delivered as a new and independent URL or incorporated into one the legacy portals where possible.	**Availability of strategic foundation** New browser applications can be delivered into the target state portal framework and inherit all the standards and useability features embedded in the target state portal framework.
Flexibility and Innovation	2	5	**Uplift to legacy platforms** New browser applications may be constrained by the technology base of existing legacy portals in terms of their ability to introduce new technical capability	**Availability of strategic foundation** New browser applications can leverage modern technical web application stacks which are supported by the target state portal framework
Secure by design	2	5	**Uplift to legacy platforms** New browser applications delivered as a new and independent URL will need to re-implement all the best practice security controls.	**Availability of strategic foundation** New browser applications can be delivered into the target state portal framework and inherit all the security features embedded in the target state portal.

Portal Consolidation - Industry Pain Points

Option 1 would meet mandatory cyber requirements would not address any other industry paint point captured in consultation with the industry.
Option 2a would address most of the industry pain points.

Rating		Rationale	
Option 1	**Option 2a**	**Option 1**	**Option 2a**
2	5	• This option will not address most of the pain points captured in consultation with industry • Existing availability targets on current legacy platforms to remain, and the introduction of additional capabilities to meet MVP requirements. This will not improve system resilience and reliability, and the introduction of new initiatives and services will increase the risk of existing systems not meeting their availability targets without each initiative also investing in system uplifts.	This option will Addresses most of the pain points captured in consultation with industry: • Enables a **single pane of glass**; providing a **pathway for future unification across fuels and markets** • Implements the capabilities defined in target state architecture e.g. **self-serve capabilities, personalised features** • Enables browser services to be **accessible via internet** • **Single identity** for various browser services/web apps • **Unifies the user experience** • **Enhanced user documentation** • Addresses most of the pain points captured in consultation with industry. • **Increased Resilience:** Increased availability targets, and a hybrid Cloud/On-Prem services model, significantly mitigates the risk of outages and ensures reliable alternatives should there be failures. This reduces the risk of impact to the operation of the market, or lost opportunities.

Industry Key Pain Points

1. AEMO's browser services are exposed over **a disparate range of portals that require uses to switch between multiple URLs and maintain multiple credentials**

2. The **user experience for portals is also inconsistent** across different markets and domains.

3. **Maintenance** of the disparate portals **is costly** (e.g., costs associated with training users and support costs)

4. Lack of **cross browser compatibility**

5. **Lack of for personalisation features** (e.g., participants cannot create shortcuts to access web applications per their requirements).

6. Inadequate *self-service capabilities* Password reset

PC - AEMO Implementation Cost

While the AEMO Implementation cost of PC Option 2a is greater for than that of Option 1, having a foundational framework proves to be beneficial in the long run.

Immediate Implementation Cost		
	Option 1	Option 2a
AEMO Implementation Cost *(+/- 40%)*	<$1M	$6M

Cost to Deliver Future Reforms			Rationale
	Option 1	Option 2a	Option 1 and Option 2a
Cost impact to implement a subset of DER Data Hub and PQ Data that relate to identity management	N/A	N/A	No cost impact on upcoming reforms has been identified with the building of a foundational framework for portals.

However, as described in an earlier slide, the deliverability of future reforms would be improved with the availability of foundational frameworks owing to reduced 'speed to market', providing more flexibility and being inherently secure by design |
| Cost impact to deliver IDAM framework for likely initiatives* *(currently on the implementation roadmap)* | N/A | N/A | |

PC - AEMO Operational Cost

Portal Consolidation provides a unified portal for participants and users, delivering an uplifted framework for current and future market portals that is more secure. The enablement of internet access to portals will also lower the barrier of entry for participants to use those portals.

Operational Cost	Option 1	Option 2a
AEMO Operational Cost *(+/- 40%)*	$1M	$1M

Future View	Option 1	Option 2a	Rationale	
			Option 1	Option 2a
Cost impact of supporting legacy services	$1M	$1M	- Increased support and maintenance costs for the cybersecurity uplifted portal framework	- Increased costs to support and maintain new portal framework and the web enabled portals
Steady state (Annual)	$0.15M	$0.25M	- No additional capabilities delivered	+ Unified NEM Market portals and framework enabling a single pane for participants and portals users. + The internet enablement of Portals allows for a lower barrier of entry for smaller participants.
Cost impact of annual schema changes	N/A			

6. Recommendation

Full Investment Assessment Summary

Recommendation

Upcoming Reforms – Leveraging Synergies

Assessing Options against key drivers

AEMO has conducted a high-level assessment of options using five categories to determine the potential benefits of these initiatives. The assessment included both qualitative and quantitative measures and considered the direct implementation costs to AEMO, its operational costs, and the cost impact due to the absence of a foundational phase in the upcoming reforms.

AEMO assesses that **Option 2 is superior to Option 1** in (i) addressing security requirements, (ii) enabling future reforms to be delivered and (iii) addressing identified industry pain points.

	Addressing Residual Security Risk*	Deliverability of Future Reforms*	Addressing Industry Pain points*
Identity and Access Management — Option 1 / Option 2a			
Industry Data Exchange — Option 1 / Option 2a / Option 2b			
Portal Consolidation — Option 1 / Option 2a		NA	

(Bar charts showing 0%–100% scales for each cell)

Key Notes

Addressing Residual Security Risk
- Option 1 partially addresses a set of security pain points. It still retains a large surface area of multiple identity systems, multiple data exchange protocols and technologies, and multiple entry points to AEMO's web presence.
- Option 2 takes a strategic, *'secure by design'* view to identity management, data exchange and portal access needs. It *unifies* platforms and protocols, thereby reducing our attack surface area

Deliverability of Future reforms
- Option 1 does not provide a holistic platform to support upcoming NEM2025 Reforms with respect to identity management and data exchange. As immediate examples, DER Data Hub and the requirement for Power Quality data from the Metering Services Review would need to be developed independently under Option 1.
- Option 2 for IDAM and IDX is explicitly designed to provide this leverageable foundational capability

Addressing Industry Pain Points
- Option 2 was scoped in collaboration with industry to fully address identified industry pain points.
- Option 1 addresses some security pain points but otherwise does not address these pain points at all

Legend:
- Option 1
- Option 2a
- Option 2b

Percentages are derived from individual option ratings in relation to the overall score – please refer to 'option assessment' section for more details

Recommendation Summary

Compelling drivers exist to develop new foundational capability across IDAM, IDX and PC areas. Given short term reform roadmap congestion & need for fiscal prudency, _AEMO recommends a phased investment approach for IDX_ to address critical security needs, support near-term NEM reforms, provide flexibility for the future & address priority industry pain points.

	RECOMMENDATION	RATIONALE
Identity and Access Management	**PROCEED** with a Strategic target state, AEMO investment of **$21M** over 2 years	• Address key security vulnerabilities and reduce attack surface area – identity management is the most impactful "weak link" in the cyber security chain • Manage expected increase in identities for management: DERs, small generators • AEMO TCO cost differential of **$7M**, & total Industry costs of **$35M** are smaller than the potential cost and customer impact of security breaches
Industry Data Exchange	**PROCEED** with a Strategic target state Foundation phase, AEMO investment of **$20M** over 2 years **DEFER** decision on Transition phase to Q4 2025.	• As the grid becomes digitised, data exchanged is increasing in volume, frequency and requires lower latency • IDX Foundation phase represents an efficient and unified implementation of data exchange capabilities across multiple reforms requiring it (AEMO costs are **$20M** compared to **$29M** if done initiative by initiative, and if participant cost ratios are similar, then total industry costs would be **~$65M** compared to ~**$94M** if done piece-meal) • Migrating legacy services is difficult to assess at this stage given the cost uncertainty and value uncertainty. Deferring the decision point on migrating legacy services – IDX Transition phase – allows for more certainty on cost and value estimates and more information to guide optimising the transition approach.
Portal Consolidation	**PROCEED** with a strategic target state, AEMO investment of **$6M** over 2 years	• Portal Consolidation Strategic target state delivers benefits to address identified industry pain points for a cost of **$6M** for AEMO and **$13M** for industry • Reduces AEMO's attack surface area in the most common 'entry point' for bad actors

Upcoming Reforms –Leveraging Synergies

What is the cost to industry to implement Metering Services Framework, and DER data hub, if IDX **is** in place, compared to IDX **not** being in place?

DER Data Hub

- IDX Target State platform delivers industry-agreed integration patterns, protocols and payload standards. The base platform will be built taking in the needs of the current environment and future reforms that also include the requirements of the DER Data Hub
- DER Data Hub will leverage the base platform, standards, channels, patterns, guard-rails, payload formats, decision tree etc to develop the business services without the need to build new target state capabilities
- DER Data Hub will also leverage the target state Identity and Access Management solution, target state authentication and authorisation mechanisms, advanced data sharing capabilities and advanced security features; aligning with the requirements of legislative compliance. The project is not required to build new IDAM capabilities
- DER Data Hub User Interface will be built on the enhanced portal framework that can be internet-enabled and leverage the framework and patterns defined by the Portal Consolidation Target state

With the above key considerations, the DER Data Hub project will be able to leverage all the base capabilities and patterns that IDX, IDAM and PC define, thereby adding the costs required to build/uplift the required infrastructure, run industry consultations and define the deployable patterns under option 1

Basic PQ Data – Review of the regulatory framework for metering services

The following critical considerations are needed for the exchange of basic PQ data
- Considering the volumes, frequency and size of the PQ data that needs to be exchanged; it requires an uplift to the data exchange platform that will be addressed in the IDX Foundational phase; meeting the requirements of the PQ data exchange
- Enhanced capacity and threshold management framework to manage the additional volumes that will be introduced by PQ data exchange.
- Enhanced stop file processing will be implemented in the IDX Foundational phase that is required to manage the exchange of non-critical data over the critical B2B transactions. The metering Services Framework project will be able to leverage this process to efficiently exchange PQ data without impacting the exchange of other critical B2B transactions such as Service Orders

IDX Foundational components reduce a significant cost profile associated with the implementation of Basic PQ data in Legacy IDX. We estimate additional cost for the actual change implementation under option 1 due to IDX Foundation being unavailable.

Key considerations

- Leveraging synergies to the foundational capabilities will help reduce duplication of delivery effort, avoiding the need for system changes to first implement these initiatives and reforms onto legacy systems and then to upgrade and migrate to new systems later.

- This also minimises disruption to industry and supports a more structured approach to balancing delivery and investments for the rapid energy transition.

7. Risk Assessment

Risk Assessment

Risk Assessment

Risk assessment analysis focuses on the risks on transition and achieving the strategic target state
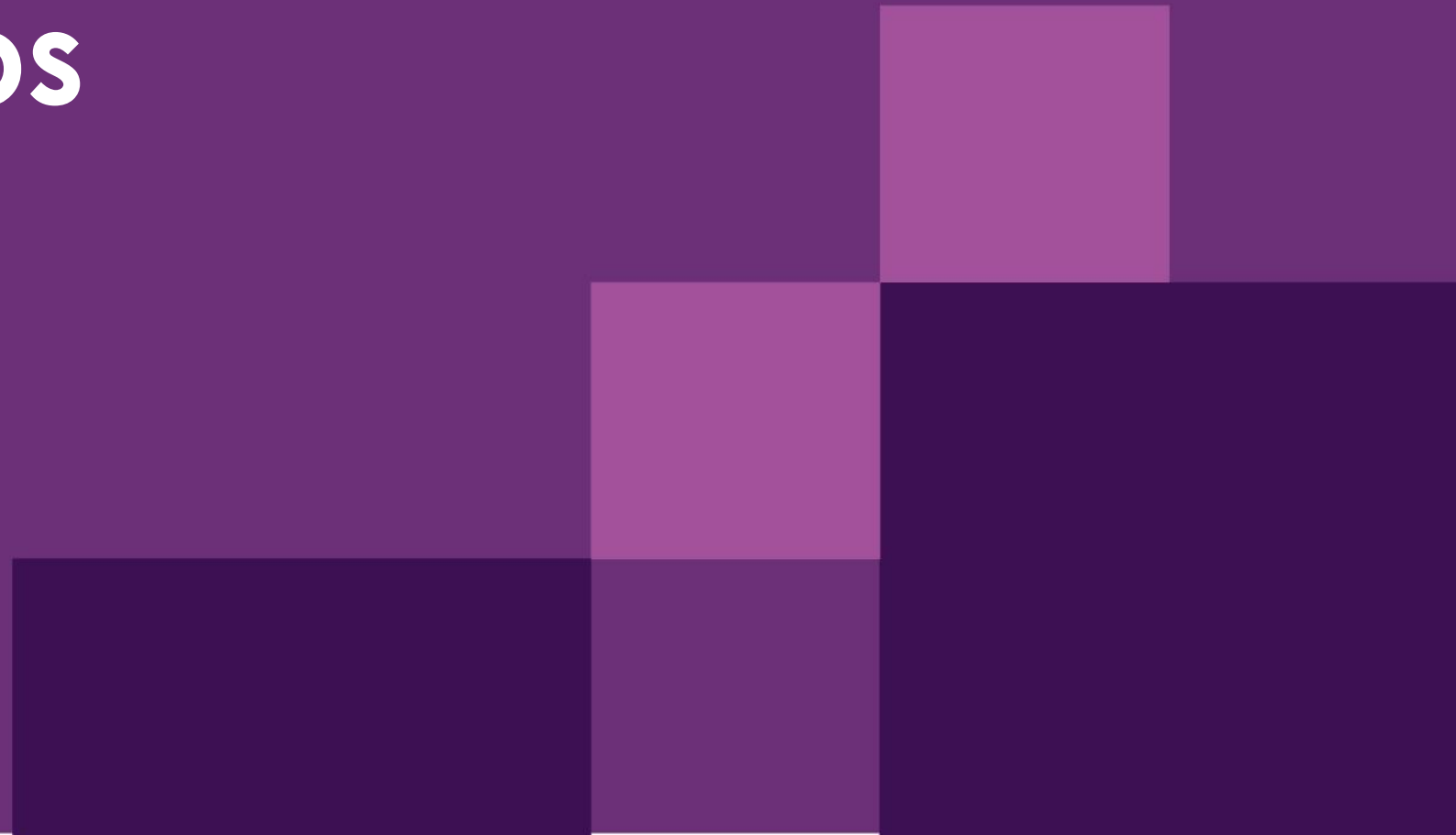
Risk #	Risk Description	Rating (Option 0)	Potential Mitigants (Option 1 and Option 2)	Residual Risk Rating (Option 1)	Residual Risk Rating (Option 2)
1	If foundational capabilities for IDX/IDAM/PC are not established before embarking on subsequent and other future reforms: **Impact** • New market services proposed by NEM Reform Program, and subsequent program may be compromised due to lack of identified fit-for-purpose capability.		**Option 1:** • Option 1 wouldn't provide any upfront foundational capabilities. This option will follow a reactive approach where upcoming reforms will have localised implementation. **Option 2:** • AEMO will implement foundational capabilities to support future reforms for a faster and more flexible adaptation as the market matures and the energy landscape changes. • The timeline of the implementation of these foundational capabilities underpinning v3 NEM Reform Implementation program. This allows participants to plan and manage their investment and roadmap for the energy transition • AEMO ensure the rationale for a target state is fully considered to balance implementation cost against whole-of-life costs, benefits and security considerations		
2	If AEMO and Industry systems are not ready to meet SOCI compliance and do not follow cybersecurity best practices: **Impact** • Existing services have been identified to have known vulnerabilities and lack support for modern authentication and authorisation requirements, which are needed to comply with AESCSF SP1 requirements, which in turn is required to meet new industry obligations introduced under the SOCI Act		**Option 1:** • AEMO uplifts existing NEM platforms to meet the minimum cybersecurity legislative requirements. Option 1 reflects a reactive rather than secure-by-design • Additional work will be required to identify an alternate approach to SOCI compliance for existing services and across other energy markets **Option 2:** • The strategic target state architecture is underpinned by the secure-by-design principle to improve security posture by inherently following security best practices right from the design process, thus reducing vulnerabilities		
3	If upcoming reforms add extra scope **Impact** • Changes to policy and rules, scope and design for the upcoming reforms will impact IDAM/IDX/PC, resulting in increasing scope uncertainty and/or cost		**Option 1:** • AEMO will enable a focus on building components that are required 'Day 1" and are less likely to be stranded. This option has a lower need to make a guess on the upcoming scope of the reforms **Option 2:** • Implement strategic foundational target state architecture that supports scalability and facilitates faster and more flexible adaption as the energy market undergoes a rapid transformation.		

Legend: Low Impact | Medium Impact | High Impact | Critical Impact

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Risk Assessment

Risk assessment analysis focuses on the risks on transition and achieving the strategic target state

Risk #	Risk Description	Rating (Option 0)	Potential Mitigants (Option 1 and Option 2)	Residual Risk Rating (Option 1)	Residual Risk Rating (Option 2)
4	If Upcoming reforms do not leverage the full capability of IDAM/IDX/PC **Impact** • If the full suite of capabilities in IDAM/IDX/PC are not utilised by future reforms, making investments upfront in implementing them may not be worthwhile		**Option 1:** • No upfront investment in the foundational capabilities reduces the risk of regret cost for upfront implementation. **Option 2:** • Implementing strategic foundational target state architecture upfront poses the risk of regret cost, mitigated through identification of immediate use cases under DER and Metering Services Review.		
5	If the industry and AEMO experience resource and management time congestion/constraints, due to a series of initiatives competing for resources to deliver various projects within in NEM Reform Implementation Program: **Impact** • Deliverability of the upcoming reforms and meeting timelines may be compromised		**Option 1** Implement the minimum capabilities to meet the legislative security requirements meaning requires fewer FTEs at any given point in time relative to Option 2a. **Option 2** • Implement a strategic target state using a **Phased investment approach** to enable a more structured approach for the management of option 2 ambitious up-front scope and need for resources reducing duplication of delivery efforts and cost • Ensure a collaborative approach with the industry to a robust and detailed transition strategy and roadmap, aligning the industry's requirements with considerations of the industry's concerns • The establishment of the strategic and foundational platforms reduces the work required for other reforms in the longer term		
6	If critical existing market functions are impacted due to post go live defects in the system changes implemented **Impact** • May impact customers or market functions (e.g. bidding, retail connections)		**Option 1** • Less of an impact because there are less changes. **Option 2** • This risk has been addressed through inclusion of a staged approach including consultation on design, a pilot, industry testing and an extended sunset window throughout which current market services remain available		

Low Impact	Medium Impact	High Impact	Critical Impact

8. Next Steps

Next steps

Intended process

Beyond the Business Case

Next Steps: FaSI Workshop & Draft Business Case Submissions

- Consultation with industry remains ongoing. This package of materials will form the basis for ongoing consultation in early 2024.

- Opportunity for participants to review Draft Business Case Package and provide submissions on the proposed recommendations, particularly IDX staging, along with industry costs and benefits.
  - Submissions to Draft Business Case Package sought by 9 February 2024.

- The next stage of industry briefings will commence with a FaSI Working Group session on 22 January 2024.

- AEMO will be undertaking more detailed engagement through 1-on-1 briefing sessions with industry.

Ask of FaSI FG

- Work with your organisation to ensure the right people are involved to review the draft business case package, including your Executive Forum representatives.

- Consider any feedback on package of materials, particularly AEMO recommendations

- Contact AEMO to participate in one-on-one sessions in January/February 2024 – NEMreform@aemo.com.au

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Intended process: Business Case

This process is guided by the NEM Reform investment governance framework, agreed with the Reform Delivery Committee and published in September 2022*:

- ❖ AEMO to put forward a recommended option.
- ❖ Broad industry support will be sought following conclusion of industry workshops.
- ❖ Industry views will inform AEMO internal governance.

2023   **2024**

| AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR |

Executive forum briefing (23 Aug)

Published draft costs

Industry workshops (cost & method)

Executive forum briefing

Publish draft business case information pack

Industry workshops (business case)

Request for industry support

Program Consultative Forum briefing

Timing is indicative. Additional engagement with Executive forum members to be informed by industry matters raised.

Legend: ● AEMO publishes materials   💡 Feedback due   ▯ Forum/workshop/survey

Beyond the business case

- IDAM, IDX and Portal Consolidation is the first set of Foundational & Strategic initiatives to progress through the governance process.
- Given the significant industry wide investment in time and effort into the assessment, AEMO will conduct a review of lessons learnt in Q2 2024 following finalisation of the business case.
  - AEMO will invite industry participation and comment into this process.

AEMO welcomes FaSI FG members views on the scope and approach to this review.

Likely review points

- What has worked?
- What might we do differently?
- Aspects:
  - Time commitment
  - Resolution, clarity and quality of outputs
  - Opportunities to provide views and seek clarification

Please reach out

NEMReform@aemo.com.au

AEMO | NEM Reform Foundational & Strategic Initiatives Focus Group

AEMO

AUSTRALIAN ENERGY MARKET OPERATOR

Appendix A

Heads of Power

Heads of power

- Reform initiatives sit with the AEMC or Energy Ministers

- Strategic and Foundational initiatives sit with AEMO.

- IDX, IDAM and PC have been identified as Strategic and Foundational initiatives.

- AEMO have committed to engaging with industry for assessment, including the development of business case, prior to proceeding in accordance with the governance framework established for the Program available at the following link: NEM Reform Implementation Roadmap Governance (aemo.com.au)

Appendix B

IDAM Target State

IDX Target State

Portal Consolidation Target State

IDAM Target State Conceptual Architectural Design

Approach for managing service accounts (locally managed and participant managed) can be found in slides 95 and 96 respectively

IDX Target State Conceptual Architectural Design

- Target state concepts are summarised in the following conceptual diagram.
- This target state conceptual overview is the basis for IDX transition planning and the business case.
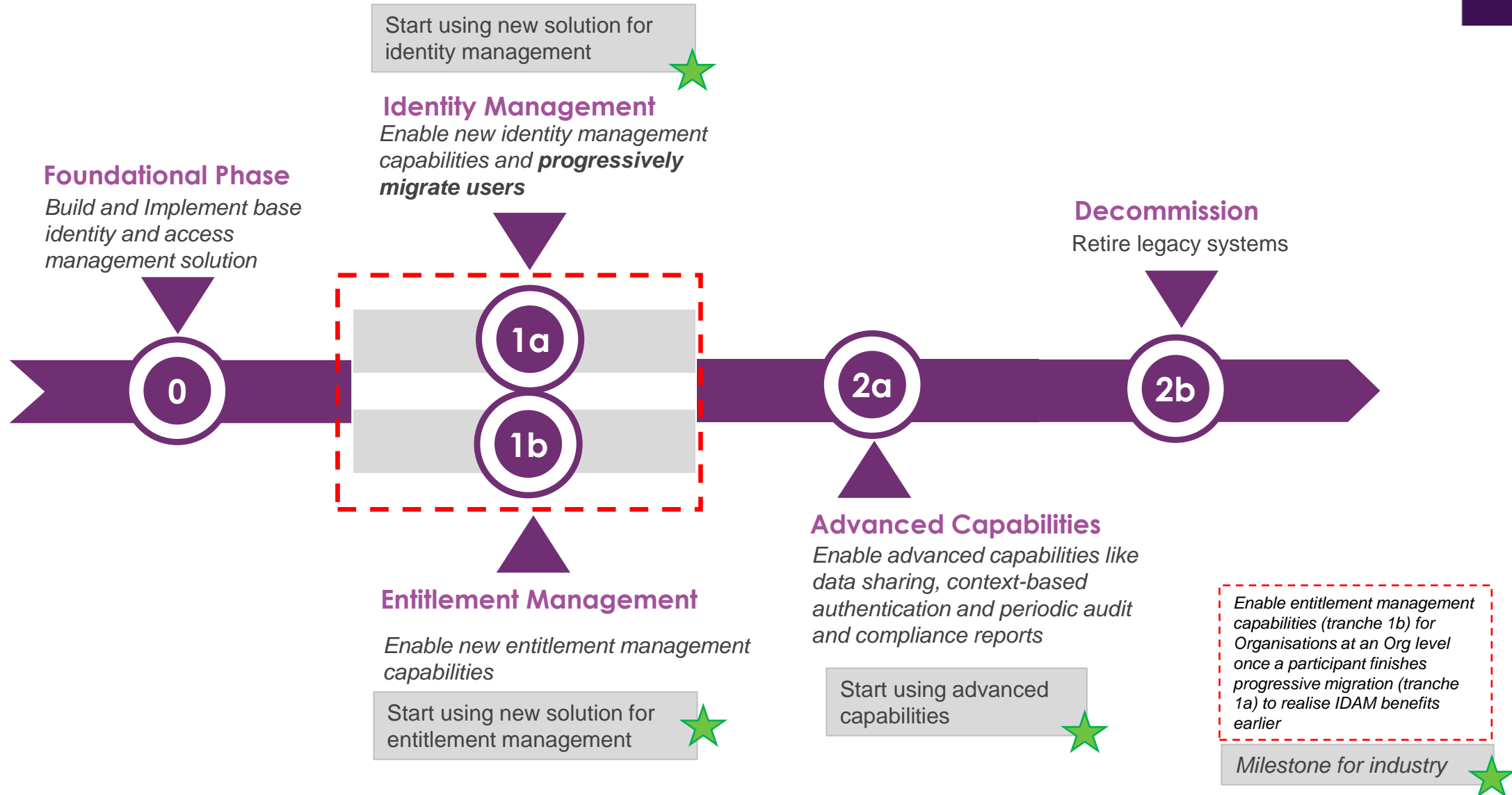
Portal Consolidation Capability View

Appendix C

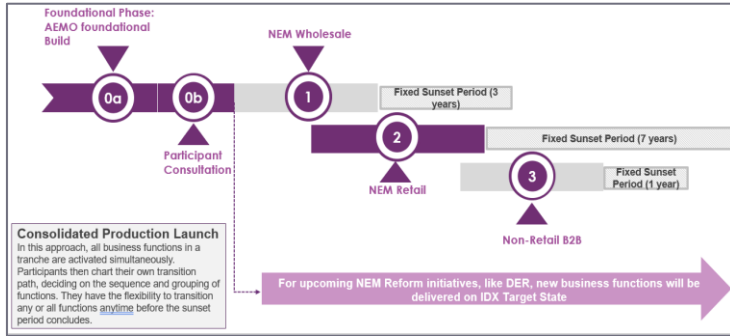IDAM Transition Strategy

IDX Transition Strategy

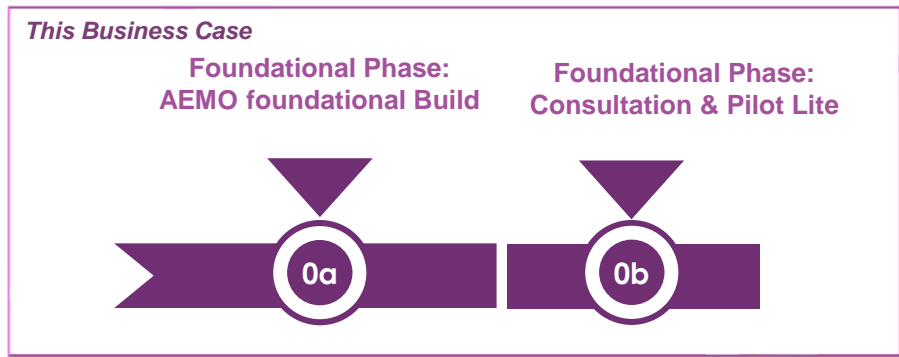Portal Consolidation Transition Strategy

IDAM Transition Tranches Overview

AEMO IDX Implementation Cost
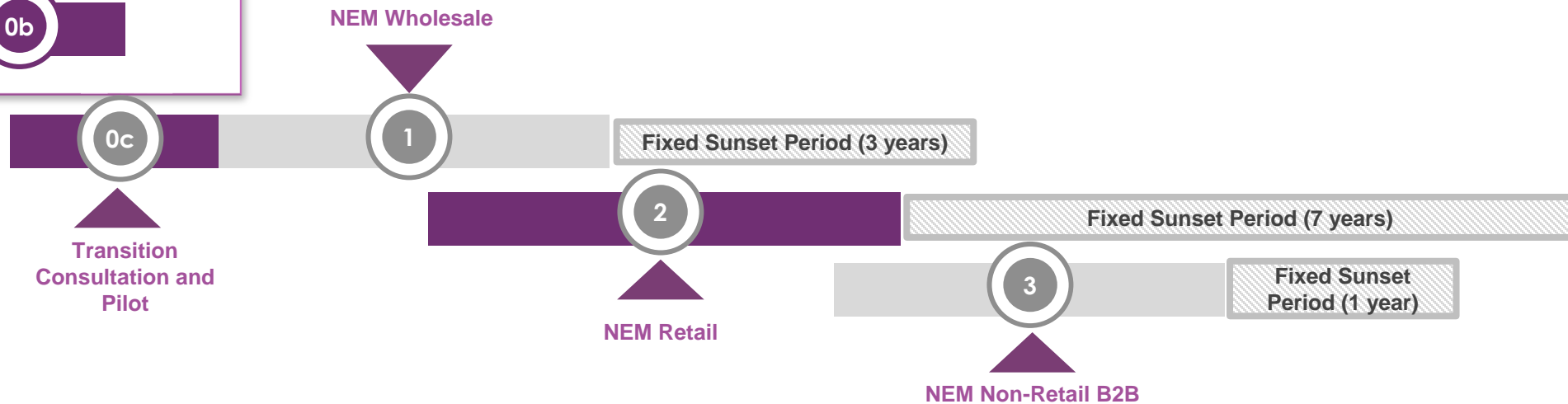

Initial IDX Transition strategy

This Business Case

Foundational Phase: **AEMO foundational Build**

Foundational Phase: **Consultation & Pilot Lite**

0a   0b

IDX Proposed Phased Investment Transition strategy

NEM Wholesale

0c   1   Fixed Sunset Period (3 years)

Transition Consultation and Pilot

2   Fixed Sunset Period (7 years)

NEM Retail

3   Fixed Sunset Period (1 year)

NEM Non-Retail B2B

Portal Consolidation Transition Tranches Overview

On the basis of the Industry feedback

0 — **Foundational Phase**

Internet-facing consolidated portal framework built

1 — **Advanced Capabilities**

Enable advanced capabilities such as self-service and personalisation features

2 — **Consolidation and Internet Enabling**
- Market Info
- Intermittent Generation
- GSA (Registered Participants)

3 — **Consolidation and Internet Enabling**
- EMMS-Settlements Forecasting and Planning-Demand side Participation

4 — **Consolidation and Internet Enabling**
- DERR (Potential to be bundled with upcoming NEM Reform)

Upcoming NEM Reform initiatives.
(Data Interchange-Performance Monitor will be addressed by IDX)

Web applications which received more than 50% "Yes" vote for moving to the internet, have been included in tranches 2-4.

Appendix D

Comparing Capabilities delivered by Options

IDAM Capabilities – Comparing Options

Key Capabilities	Option 1	Option 2
Enhanced cyber controls	✔	✔
Advanced cyber controls		✔
Organisation based (Establish Organisation Hierarchy)		✔
Enhanced Identity Management (e.g. de-duplicate person accounts)		✔
Enhanced Entitlement Management (e.g. Assign roles to multiple PIDs)		✔
Self-Serve		✔
Federated Identity		✔
Data sharing extensions		✔
Enhanced identity and entitlement assurance processes		✔
Future unification across fuels and markets		✔

Considerations

Option 1

- Will address **only legislatively-driven security requirements and** no other industry **pain point** would be addressed.
- **No foundational framework will be** established for the upcoming reforms leading to increased **siloed** Industry Consultation, Design, Build and Testing times

Option 2

- Option 2 will address **key industry pain points** and enhance security posture by **enabling the agreed target state capabilities**
- **Reduce complexity** by providing single credential access, which in turn will pave the way for future unification across fuels and markets.

IDX Capabilities – Comparing Options

Key Capabilities	Option 1	Option 2a	Option 2b
Enhanced cyber controls (e.g. API AuthN/AuthZ mechanisms, secured data transfers)	✔	✔	✔
Define Target State Channels, Protocols, Patterns & Standards		✔	✔
Uplift AEMO Data Exchange Environment		✔	✔
Enhanced AEMO Gateway Software implementing IDX Target State Patterns		✔	✔
Define Business Endpoints for transitioning the current Business Functions		✔	✔
Define & Build Target State Payload Schemas & Transformations for current Business Functions		✔	
Transition Wholesale Business Functions to Target State		✔	✔
Transition Retail & Non-Retail B2B Business Functions to Target State		✔	✔
New Reforms and/or New Business Functions	Projects Define Patterns	Implements IDX Target State Patterns and payload formats	Implements IDX Target State Patterns and payload formats
Future unification across fuels and markets		✔	Partial

Considerations

Option 1
- Option 1 will enhance Data Exchange **cyber controls**, addressing legislatively-driven requirements.
- **No other industry pain points** will be addressed.
- No foundational framework will be established for the upcoming reforms leading to increased **siloed** Industry Consultation, Design, Build and Testing times

Option 2a
- Option 2a will address key industry pain points aligning them to target state **channels/protocols, standards, patterns and payload formats**
- **Reduced complexity** by limiting the diversity of the payload formats for data exchange

Option 2b
- Option 2b will address key industry pain points aligning to target state **channels/protocols, standards and patterns, but will not** address pain points relating to the **legacy monolithic schema**
- **Increased complexity** by retaining legacy payload formats in existing business services

IDX Options 2a & 2b

For the transition of the legacy interfaces, below are two target state options proposed for costing.

Characteristics	Option 2a: Align to target State channels/protocols and payload formats		Option 2b: Align to target state channels/protocols and retain the current payload formats	
Market	Retail	Wholesale	Retail	Wholesale
Definition	• Adopt business-function-specific schemas and endpoints. • Transitioning Retail B2B and B2M to modular schemas aligned with modern payload standards. • Implementing unified IDX schemas across all AEMO fuels, markets, and domains. • Transition the wholesale AEMO CSV formats to the target state payload standards and formats		• Adopt business-function-specific endpoints (to be further assessed during design phase) • Continue using the aseXML (Retail) and AEMO CSV (Wholesale) schema concepts as it is in production today • n & n-1 transformation managed at the time of the Participant pulling the message from outbound queue based on request header parameters	
Transactional Message Format	JSON (New)	JSON (New)	Existing aseXML	Outbound: Existing AEMO CSV Inbound: Existing JSON
Bulk Data Format	AEMO CSV (New)	Existing AEMO CSV	Existing Miscellaneous CSV formats	Existing AEMO CSV
Inquiry Services	Use a modern open-source query language such as GraphQL services using JSON format.	Use a modern open-source query language such as GraphQL serviced using JSON format.	• No inquiry services introduced for existing services • Opportunities to support GraphQL for new services in Retail	Opportunities to support GraphQL for Wholesale current business functions
MDMF	Retired (Deprecated)	N/A	Retained	N/A
MDFF Interval	AEMO CSV (New)	N/A	Existing NEM12	N/A
MDFF Basic	Existing NEM13	N/A	Existing NEM13	N/A

For both options, any new business service (e.g. DER) will align to the industry agreed IDX target state channels and payload formats

Portal Consolidation Capabilities – Comparing Options

Key Capabilities	Option 1	Option 2
Enhanced cyber controls	✓	✓
Enhanced self-service features		✓
Enhanced personalisation features		✓
Internet enabling selected browser services		✓
Future unification across fuels and markets		✓
Single user identity for browser services		✓
Consolidated browser and device standards		✓
Unified user experience standards		✓
Enhanced user documentation		✓

Considerations

Option 1

- Option 1 will **only integrate IDAM MVP** to individual browser services endpoints to address **legislatively-driven requirements.**
- No **other industry pain point would be addressed**

Option 2

- Option 2 will address **key industry pain points** and enhance security posture by **enabling the agreed target state capabilities**
- **Enable single pane of glass** by providing a pathway for future **unification across fuels and markets**

Appendix E

Costing Assumptions

Option 1: Assumptions

- IDX: All existing services will retain their current payload formats, channels and protocol endpoints

- IDX: Any new reform initiatives will be required to define and implement channels, patterns, protocols and payload formats on a case-by-case basis (given no foundational capability)

- IDX: AEMO supplied software for participants will continue with separate wholesale (Pdrbatcher) and retail (participant batcher) data exchange products.

- IDX: Sunset periods associated the transition to security uplifted endpoints will be agreed with industry in the design phase

- PC: All existing portal endpoints will be retained and there will be no new internet enablement of browser services.

- IDAM: All existing person and non-person accounts will remain in the existing identity repositories

Option 2a & 2b: Common Assumptions

- The operating model of markets will retain centrally managed identity and data hub services.

- A High-level conceptual design is sufficient detail to inform the business case, detailed design will be factored into tranche delivery plans

- Foundational tranches will make target state capabilities available for up-coming NEM reforms initiatives to leverage these capabilities.

- New NEM services delivered post the completion of the IDX foundation will leverage the new protocols, patterns and payloads. Services in this context are the equivalent of introducing a new transaction group (such as DER). Change within a transaction or addition of a transaction to an existing transaction group would be enabled on legacy protocols within the sunset period as well as on the new protocols once the associated tranche is delivered.

- NEM reform initiatives may change their timeline, could be removed or new reforms could be added. Where this occurs, an assessment will be made for impact to the roadmap for these 3 initiatives

Option 2a & 2b: Common Assumptions

- AEMO gateway software will still consolidate wholesale (Pdrbatcher) and retail(Participant batcher) data exchange products

- NEM reform initiatives may change their timeline, could be removed or new reforms could be added. Where this occurs, an assessment will be made for impact to the roadmap for these 3 initiatives

- Governance process for procedures and protocols will remain with their existing governing bodies with regard oversight and coordination of updates to enable the transition

- Opportunities for further procedural improvement and / or transactional enhancement in NEM Retail would be assessed in detailed design, the business case will remain conservative and not assume these outcomes.

Option 2a: Assumptions

- JSON will leverage strong types to provide transactional validation. AEMO will continue to provide validation extensions (as currently available in EVM) to capture procedural level transactional compliance (not involving data look up). The combination of these validations will be equivalent to the current aseXML schema validation and EVM validation capabilities provided to participants.

- All non csv based B2B and B2M transactions will move from aseXML to JSON involving definition of new JSON schema on a broadly 'like for like' basis to simplify support for backwards compatibility across the sunset timeframe.

- NEM13 CSV will be maintained however delivered using the IDX protocols and patterns (not embedded in aseXML) given the die on the vine approach in the market to basic metering. All other CSV payloads will move to the new AEMO CSV to be defined within the detailed design phase. Note the AEMO supplied gateway will provide conversion capability for all NEM Retail and Wholesale transactions within the sunset period and the conversion routines as at the end of the sunset period will be available should a participant wish to continue to maintain these if there was a subsequent timepoint. Changes are assumed to be confined to aligning to the new payload format on a 'like for like' basis to simplify support for backwards compatibility across the sunset timeframe. Opportunities for improvement beyond this would be assessed in detailed design however not accounted for at this time.

- Existing JSON payloads may require minor refactoring to comply with industry-agreed payload standards and schemas.

Option 2b: Assumptions

- Existing NEM Retail and Wholesale services will be made available under the new foundational IDX channels and protocols. Existing payloads will be retained with no change

- IDX channels and protocols and IDAM identity patterns in alignment with an IDX target state presented to the industry

Financial Assumptions

- All estimates have an uncertainty range of +/- 40%; All estimates are inflation/CPI excluded;

- Whilst the cost of implementing DER Data Hub and PQ data are covered in those reforms, there is an assumption in those costs that foundational capability would be in place. This cost impact relates to the costs estimated if foundational capability would not be in place

- The energy transition will require an increasing volume, diversity and frequency of data exchange between a wider cohort of energy stakeholders to sustain new market processes. Leveraging the estimated impacts for the upcoming reforms, we anticipate a cost impact on the future budgeted NEM program if the foundational capability was not available, estimated at 10% for data exchange, and 5% for identity management

- IDX Option 1 implementation cost has been added to the DP2 business case as this is related to the tactical uplifts required for the legacy services and not establishing the foundation phase

- IDX foundation does not result in a net delta to operational cost noting that new NEM reforms will be responsible for assessing any uplift requirements for their own projects and the uplift to legacy services will be assessed at Decision Point 2

Appendix F

Industry Cost Extrapolation – Detailed Calculation

Extrapolated Industry Costs

Initiative	Type	Size	# of organisations	Median	Total* Option 2a	Scaling factor calculation Total* Option 1
IDAM	Distributor	N/A	8	$1.4M	$15M	<$1M
	Metering	N/A	7	<$1M	$5.5M	<$1M
	Gentailer	Large	3	<$1M	$1.2M	<$1M
	Gentailer	Medium	10	<$1M	$9.4M	<$1M
	Retailer	Small	10	<$1M	<$1M	<$1M
	DB+M	N/A	3	<$1M	$2.6M	<$1M
	Independent Generator	N/A	10	<$1M	$1.0M	<$1M
	TOTAL:				$35M	$2M
PC	Distributor	N/A	8	<$1M	$6.8M	<$1M
	Metering	N/A	7	-	-	-
	Gentailer	Large	3	<$1M	$1.3M	<$1M
	Gentailer	Medium	10	<$1M	$2.1M	<$1M
	Retailer	Small	10	<$1M	<$1M	<$1M
	DB+M	N/A	3	$1.0M	$3.0M	<$1M
	Independent Generator	N/A	10	-	-	-
	TOTAL:				$13M	<$1M

* Total cost includes cost estimates submitted by discrete participants

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Extrapolated Industry Costs

Initiative	Type	Size	# of organisations	Median	Total* Option 2a	Total* Option 1	Total* Option 2b
IDX	Distributor	N/A	8	$7.1M	$91M	$26M	$63M
	Metering	N/A	7	$4.0M	$28M	$8.0M	$19M
	Gentailer	Large	3	$24M	$71M	$19M	$50M
	Gentailer	Medium	10	$2.8M	$28M	$10M	$20M
	Retailer	Small	10	<$1M	$2.6M	<$1M	$1.8M
	DB+M	N/A	3	$8.8M	$26M	$9.6M	$18M
	Independent Generator	N/A	10	<$1M	$2.0M	<$1M	$1.4M
TOTAL:					$249M	$73M	$174M

Scaling factor calculation

* Total cost includes cost estimates submitted by discrete participants

Appendix G

Risk Assessment Matrix

Risk Assessment Matrix

1. LIKELIHOOD

Likelihood	Probability	Qualitative Description
Almost Certain	>90%	Will occur in most circumstances
Likely	51% - 90%	Can be expected to occur in most circumstances
Possible	11% - 50%	May occur, but not expected in most circumstances
Unlikely	1% - 10%	Conceivable, but unlikely to occur
Rare	<1%	Will only occur in exceptional circumstances

1 - LIKELIHOOD	2 - CONSEQUENCE				
	Immaterial	Minor	Moderate	Major	Extreme
Almost Certain	Medium	Medium	High	Critical	Critical
Likely	Low	Medium	High	Critical	Critical
Possible	Low	Medium	High	High	Critical
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

2. CONSEQUENCE

	Project Delivery	Project Budget	Project Scope	Consequence of the Risk
Extreme	Project will not deliver in time to comply with Regulatory Commitments or materially impact Market Participants.	Cost impact is greater than 30% of the project budget	Will not deliver on the significant components of the project, and directly impact Regulatory Commitments or Market Participants	The project delivery impact of delays to Regulatory or Market Participant Commitments; Extreme excessive costs; scope impact of a solution that does not materially meet the agreed outcomes and affects Regulatory or Market Participant Commitments.
Major	Project delivers late with major impact to the AMEO business with medium impact to regulatory commitments and/or market participants	Cost impact between 20% to 30% of project budget	Will not deliver on the significant components of the project	Project Delivery path critically impacted and schedule contingency is exhausted with business implication (impeding relationships and trust); Major excess costs over project budget; scope impact of a solution that has a material impact on the agreed outcomes.
Moderate	Project delivers late with moderate impact to the AMEO business with low impact to regulatory commitments and/or market participants	Cost impact between 10% and 20% of the project budget	Will deliver all significant components of the project; but will require work arounds or compromises	Project Delivery path critically impacted and schedule contingency is exhausted with no business implication; Moderate excess costs over project budget; significant components of the scoped solution provided, but work arounds or compromises are required.
Minor	Project delivers late with low impact to the AMEO business	Cost impact between 5% and 10% of the project budget	Will deliver all significant components of the project	Project Delivery path is negatively impacted but there is contingency available to absorb; Minor excess costs over project budget; all significant scoped components of the solution will be delivered.
Immaterial	Negligible or no impact on timelines	Cost impact to project less than 5% of the project budget	No material impact to the intended project scope	Negligible or no impact on Project Delivery Schedule; Minimal excess costs over project budget.

Appendix H

Useful links

Useful links

- All reference documents: [Foundational and Strategic Initiatives](#)
- Introductory Documents
    - [IDAM, IDX and PC Introduction](#)
    - [IDAM, IDX, PC Discovery Workshop](#)
    - [IDAM and PC Pain Points](#)
    - [IDX Pain Points](#)
- Target State
    - [IDAM, IDX, PC Target State](#)
    - [AEMO Gateway Software](#)
    - [AEMO Gateway Software use cases](#)
- Transition Strategy: [IDAM, IDX and PC Transition Strategy](#)
- Business Case
    - [Initial Overview](#)
    - [Cost and Method discussion Part 1](#)
    - [Cost and Method discussion Part 2](#)
- SOCI Reference documents: [SOCI](#)