

NEM2025 Program

August 2022

A Gate 1 business case for the NEM2025 reform program





Distribution

- Reform Delivery Committee

This Document Identification

- Project/program code: Various
- Project/program name: NEM2025
- Title: Gate 1 Business Case for the NEM2025 Program
- Version: 1
- Release date: 30/08/2022
- Notes: last change 30/08/2022

Purpose

This Gate 1 business case sets out the two delivery options for the NEM2025 Program and recommends a preferred option based on cost estimates appropriate for a Gate 1 and a qualitative benefits assessment.

Version Release History

Version	Issue Date	Author	Details
0.1	17/06/2022	Reform Delivery (NEM2025)	Draft for feedback
1	31/08/2022	Reform Delivery (NEM2025)	Final

Executive Summary

Reform priorities to support the transition

In July 2021, the Energy Security Board (ESB) released its final recommendations for the redesign of the National Electricity Market (NEM) as part of their Post 2025 Project. The ESB made recommendations in four 'reform pathways' that will fundamentally change many aspects of today's electricity systems and markets:

1. Resource Adequacy Mechanisms;
2. Essential System Services and Ahead Scheduling;
3. Integration of DER and Flexible Demand; and
4. Transmission and Access.

The ESB recognised that its recommendations required modernising of critical market systems and business process and that there were risks regarding critical data needs. The ESB has addressed these data risks through the development of a Data Strategy that will support the reforms.

Energy Ministers agreed to progress the majority of the ESB's reform recommendations while seeking further advice on the design of a Capacity Mechanism and Congestion Management Mechanism by the end of 2022. In parallel with further design work progressing on these two initiatives, the ESB's Post 2025 Project has now moved into delivery phase. AEMO will play a crucial role, with industry, in delivering many of the recommended reforms in the NEM. The market bodies – AEMO, the Australian Energy Market Commission (AEMC) and the Australian Energy Regulator (AER) – made a commitment to work closely with industry to develop an integrated regulatory and IT roadmap (the 'NEM Reform Implementation Roadmap' or Roadmap) to deliver the IT system and business processes together. This commitment was made in recognition of the co-ordinated effort required in delivering the reforms and to support ongoing transparency, prioritisation and program management by all stakeholders.

AEMO has commenced work to scope the program that needs to be delivered to meet the obligations under the reforms. AEMO has worked closely with the ESB and industry on these planning activities and will continue to do so for the duration of the implementation of the reforms.

The ESB's case for change

The ESB completed a high-level, indicative assessment of the likely benefits that could be delivered by each of the four reform pathways.¹ This assessment identified that the benefits of the reforms are an order of magnitude greater than the costs of implementation.

The ESB's case for change noted the implementation costs should be considered in perspective of these likely benefits and in the context where the transition will incur unavoidable costs for the sector regardless of whether the recommended reforms are implemented. The reform pathways – and the NEM2025 implementation program – provide an opportunity to manage those costs through appropriate market design and implementation planning. The reform program can support a more efficient and effective transition and deliver the necessary security,

¹ Energy Security Board, <https://esb-post2025-market-design.aemc.gov.au/32572/1629945809-post-2025-market-design-final-advice-to-energy-ministers-part-b.pdf>

reliability, and price outcomes needed for the anticipated scale of change from the forecast levels of large- and small-scale renewable energy in the NEM.

The ESB also noted that implementing the reforms can provide benefits beyond the energy sector. A planned transition to net zero emissions will benefit customers because energy prices will be driven by zero fuel costs. As electricity becomes cheaper, there will be greater incentive for other sectors of the economy to electrify. Facilitating an efficient transition in the energy sector therefore paves the path for the broader economy to decarbonise and enable economic benefits to all consumers.

Scope and pathways

AEMO has worked with industry and stakeholder representatives comprising the Reform Delivery Committee (RDC) to identify the suite of initiatives aligned with the ESB’s four reform pathways to be included in AEMO’s NEM2025 Program. Specifically, AEMO and the RDC determined the initiatives selected for inclusion in the NEM2025 Program based on the initiative:

- Having multi-participant implementation actions; and
- Requiring investment in IT systems or business processes across AEMO and/or market participants.

In total, 33 initiatives were identified including those AEMO has identified as strategic or foundational ‘pre-requisite’ initiatives to enable the reform initiatives to be delivered. Twenty-two of the 33 initiatives are covered by this Gate 1 business case. Eleven initiatives have been excluded at this stage for the reasons outlined in Table 1.

Ongoing policy work may determine additional initiatives are to be included in the Program at a later date or conversely may result in certain initiatives being removed from the Program. The scope of the NEM2025 Program will be reviewed and updated as needed as policy, regulatory and market design certainty is progressively defined. Impacts to the NEM Reform Implementation Roadmap and overall costs will need to be assessed as and when scope changes. To manage this issue and risk, a change process has been discussed and agreed with industry, see Section 3.3.

Table 1 NEM2025 initiative reconciliation

Category	ESB reform area	AEMO project #	Initiative name	Covered / not covered by this business case
Core NEM2025	DER	P2265	Integrating Energy Storage	Covered by this business case.
		P2268	Flexible Trading Arrangements- (Model 2)	Covered by this business case.
		P2269	Scheduled Lite	Covered by this business case.
		P2270	Dynamic Operating Envelopes	Covered by this business case.
		P2271	Distribution Local Network Services	Covered by this business case.
		P2272	Turn-up Services	Covered by this business case.
		P2273	DER Data Hub and Registry Services	Covered by this business case.
		P2275	DER Operational Tools	Covered by this business case.
	ESS	P2277	Operating reserves	Covered by this business case.
		P2278	Primary Frequency Response Incentive Arrangements	Covered by this business case.

Category	ESB reform area	AEMO project #	Initiative name	Covered / not covered by this business case
		P2267	Fast Frequency Response	Covered by this business case.
		P2284	Operational Security Mechanism (OSM)	Covered by this business case.
	T&A	N/A	System Strength (Planning)	This initiative is led by Transmission Network Service Providers. AEMO and the RDC agreed to include it in scope for the Roadmap. However it is not covered by this business case.
		P2274	Congestion Management Mechanism	Not included in this business case due to scope/design uncertainty. Process to add this initiative already in progress.
	RAMS	P2276	Increased MTPASA Information	Covered by this business case.
		N/A	Capacity Mechanism	Not included in this business case due to scope/design uncertainty. Process to add this initiative already in progress.
Data Strategy	Data Strategy	P2266	Electric Vehicles	In NEM2025 Program scope but not covered by this business case due to scope/design uncertainty.
		P2285	Data Services	
		P2287	Bill Transparency	
		TBD	Network Visibility	
AEMO Foundational	N/A	P2286	Business Rules Engine	Removed from NEM2025 Program scope and added to Operational Technology Roadmap (OTR) Program.
		P2262	Identity and Access Management (IDAM)	Covered by this business case.
		P2264	Industry Data Exchange	Covered by this business case.
		P2283	SCADA Lite	Covered by this business case.
		P1934	Operational Decision-Making Tools	Removed from NEM2025 Program scope and added to Operations Technology Roadmap (OTR) Program.
		P2160	Operational Data Store	Removed from NEM2025 Program scope and added to OTR Program.
		P2263	Forecasting Platform Uplift	Removed from NEM2025 Program scope and added to OTR Program.
AEMO Strategic	N/A	P2062	Portal Consolidation	Covered by this business case.
		P2279	FRC Target State	Covered by this business case.
		P2051	Consolidated Master Data Repository (Foundation Expansion)	Covered by this business case.
		P2280	Dispatch Target State	Covered by this business case.
		P2281	Bids/Offer Target State	Covered by this business case.
		P2282	Constraints Target State	Covered by this business case.

Two delivery Roadmap pathways were developed in consultation with industry to deliver these initiatives. Both options have the same scope but differ in the bundling, sequencing and timing of delivery:

- **Option 1: Regulatory-led:** This option enables ‘day 1’ capabilities by delivering the core functional elements of the NEM2025 reforms built on top of existing systems. After the core reform elements are delivered, additional effort is required as and when AEMO progresses to new systems, so functionality deployed is enabled in those new systems; and

- **Option 2: Strategic:** This option sets the foundations for scalability and future-proofing of systems by undertaking a series of pre-requisite projects upfront on which reform capability is built. This ensures investments keep pace with rapid transition by delivering capabilities and support functions beyond 'day 1'.

Industry consultation and feedback

The two Roadmap pathways were released for broader industry consultation on 27 April 2022. Stakeholders were asked to provide feedback on the grouping, sequencing and prioritisation of the various initiatives, and to gauge support for pursuing the Strategic pathway (Option 2) to implement the reforms. The consultation process included a forum held on 11 May 2022. Stakeholder feedback was received by the consultation close date of 20 May 2022. The feedback (refer to Appendix A1 for a summary) has informed this business case and will also inform the next version of the Roadmap, the preferred implementation pathway and grouping, prioritisation and sequencing of the initiatives.

There were seven key themes in the feedback provided by stakeholders:

- Consideration of long-term market direction is considered prudent but does not translate to direct support for the strategic pathway;
- Systems changes should be scheduled and batched with reforms that have higher certainty;
- Cost benefit analysis of the longer term and less certain reforms should support more material investment in replacing or updating foundational systems;
- There is a need for transparency on the impact on NEM fees over the short, medium and longer term;
- An incomplete roadmap undermines its intent and all recommended reforms such as the Capacity Mechanism and the Congestion Management Mechanism should be included in the Roadmap;
- Flexibility should be retained in the overall sequencing and prioritisation, particularly in the early stages of the reform process; and
- Implementation timeframes were considered ambitious and may not allow for sufficient contingency for delays.

To address most of the key themes in the feedback from stakeholders, the NEM2025 Program proposes to adopt a hybrid pathway complemented by a stage gate process. This approach commits to Option 1 (Regulatory-led pathway) to undertake mandatory and no regrets initiatives in a timely way. It also sets the NEM2025 budget envelope to allow for the full scope of Option 2 (Strategic pathway) but imposes investment disciplines whereby draw-down is subject to a progressive commitment process informed by rule changes and the stage gate process.

The stage gate process is undertaken for all initiatives that are part of NEM2025 scope, to manage uncertainty and provide for appropriate implementation disciplines. The stage gate process for AEMO strategic/foundation initiatives will include cost benefit analysis and industry consultation.

This process provides a mechanism to address concerns regarding the risk of investment in replacing or updating foundational systems for reforms with policy, regulatory and/or design uncertainty. The process will allow for industry consultation on the impacts of the reforms and support required, and could also address concerns relating to limiting the potential for market-based solutions by identifying potential alternative solution options. AEMO is developing further detail on the governance process around the stage gate approach, the role of the RDC and how the NEM2025 program will interact with governance processes for related rule change proposals or non-rule based initiatives.

The NEM2025 Program also provides for integrated solution design work as the next phase of the planning process that commences immediately upon the Program's initiation. This integrated design approach is to be undertaken across the Program and includes work specifically required for the stage gate process. This approach can address stakeholder recommendations to schedule and batch system changes with reforms that have higher certainty and clear scope and design.

Regarding the other key themes:

- AEMO notes the AEMC rule change process provides for a cost benefit assessment against the National Electricity Objective prior to making a final determination and in certain instances the AEMC will review the outcomes from the reform against those assessed at the time of making a determination. AEMO will continue to work with market bodies to support this assessment and the rule change process as required;
- AEMO has not developed an indicative impact on participant fees as there are a number of initiatives that have been excluded from this business case (for example, the Capacity Mechanism and the Congestion Management Mechanism) as there is not yet sufficient information to meaningfully inform cost estimates. Therefore, modelling the impact of the full NEM2025 suite of reforms to participant fees at this stage would lead to an incomplete and misleading view of impacts; and
- AEMO note stakeholder concerns regarding the exclusion of Capacity Mechanism and Congestion Management Mechanism from version one of the Roadmap. AEMO has since included placeholders for both of these initiatives. These initiatives are not covered in this business case but have been identified as a stage gate themselves that would go through the stage gate process.

Program costs

Updated Program cost estimates and cash flows over a 10-year evaluation period from 1 July 2022 were developed for both pathway options accounting only for the initiatives covered by this business case listed above and not all initiatives within the NEM2025 Program.² The remainder of this business case uses the term 'Program' to mean those initiatives covered by this business case unless the context indicates reference to the broader NEM2025 Program.

The cost estimates target a +/- 40% level of accuracy to account for the early stage of estimation, the policy and design uncertainty that remains for some of the reform initiatives (and the corresponding increasing complexity and scope risks) and other risks such as delivery delays. This provides a range within which the Program's costs are expected to lie. Further refinements of costs will be undertaken as the program progresses aligned with the stage gates.

The total Program costs in nominal and net present cost (NPC) terms are set out in the following table.

Note that the table below, as well as financial tables in the body of the document, shows the mid-point of the range for convenience of presentation. The range is set out in the table below.

² Cost estimates were previously provided in the ESB's Final Advice, at <https://esb-post2025-market-design.aemc.gov.au/32572/1629944958-post-2025-market-design-final-advice-to-energy-ministers-part-a.pdf>. The cost estimates in this business case are an update to those original estimates, taking into consideration a clearer understanding of scope for pre-requisite initiatives, or assumed scope for uncertain reforms, where possible.

Table 2 Estimated total Program costs for each Option*^Λ

Cost component	Option 1: Regulatory-led (\$m)	Option 2: Strategic (\$m)
Total capital costs (Note: scope of estimates does not include CM, CMM and Data Strategy, refer body of report for detail.)	\$310 - \$440	\$250 - \$350
Ongoing costs ⁴	\$150 - \$210	\$170 - \$240
Total Program costs	\$460 - \$650	\$430 - \$600
Net Present Cost	\$360	\$350

* Numbers rounded for reporting purposes. Full details included in the body of the report.

^Λ Range represents the mid to high range of the estimates (including the 40% contingency amount) for those initiatives covered under this business case as this represents a more realistic outcomes for delivery costs. NPC mid-point shown for comparison purposes.

Option 1 is estimated to have a nominal total Program cost range of \$460 million to \$650 million (\$360 million in NPC (mid-point)). Option 2 is estimated to have a nominal total Program cost range of \$430 million to \$600 million (\$350 million in NPC (mid-point)). Of these total program costs, \$310 million to \$440 million are the estimated upfront capital costs for Option 1 and \$250 million to \$350 million are the estimated upfront capital costs for Option 2 respectively.

For comparison, the early estimates undertaken by AEMO in 2021 to deliver the ESB reforms estimated capital costs in the range of \$250 million to \$330 million (excluding Data Strategy initiatives).

Option 2 has a lower cost, reducing the burden on participants, consumers and AEMO primarily because, under Option 2:

- Most initiatives (except three with immediate regulatory deadlines) are designed and delivered from the beginning based on target state systems, thus reducing the implementation effort across the program; and
- The overall program implementation period runs over a shorter timeframe, thus reducing delivery overheads such as program management costs.

Adopting a hybrid pathway approach preserves these benefits subject to individual initiatives passage through the stage gate process.

Qualitative benefits

Option 2 results in a periodic cadence of releases which is transparent to industry.⁵ This periodic cadence also means that shared system impacts are considered and provide cost efficiencies through optimised implementation effort. The resulting program optimisation seeks to minimise disruption to industry and supports a more structured approach to balancing delivery and ‘business as usual’ initiatives.

Implementing foundational technology architecture and frameworks supports future anticipated capability needs and helps to remove industry pain-points. For example, delivering a consolidated portal would reduce the

³ Note costs exclude finance charges. Finance charges to be accounted for as part of the Stage 2 consultation assessing the participant fee impacts of the NEM2025 Declared Project.

⁴ Ongoing costs are assumed to commence from the end of the implementation period for each Work Package until the end of the Program.

⁵ While release cadence is critical to managing delivery under any delivery option and AEMO – both for its and industry’s benefit – would seek to establish periodic release cadence where possible, such cadence opportunities are prioritised and easier to plan under Option 2. This is because Option 1 is regulatory-led and assumes that a release will be required to align with the rules’ effective date. Where possible, other initiative releases will be aligned with these dates but there could be scenarios where effective dates (and therefore releases) occur within a period shorter than the desired period cadence.

requirement to interact through different access points, that currently results in an inconsistent, fragmented and duplicated user experience when accessing AEMO's market systems. The introduction of new markets and the anticipated increase in volume of participants means more participants would be exposed to such existing pain points.

The energy transition is rapidly transforming the system and markets. Accordingly, delivering reforms through future state systems supports scalability and facilitates faster and more flexible adaptation as new markets mature and continue to change the energy landscape. This also limits the number of investments that may be required in the future and reduces implementation inefficiencies through re-work and retro-fitting reforms once new systems are implemented at a later date under Option 1.

Based on an assessment of the Program costs alone, the preferred option further outlined in this business case is Option 2. AEMO consider this option is best supported by a stage gate approach described above for key strategic or foundational initiatives (those that would be deferred to a later date under Option1) and/or those initiative with significant uncertainty. This business case outlines the costs for Option 2 and sets out the case for a budget envelope for its full scope, subject to the stage gate process as a draw-down mechanism. The business case funding envelope does not include the initiatives known to be on the horizon but that are not covered by this business case. Specifically, the Congestion Management Mechanism, Capacity Mechanism, and Data Strategy related initiatives. There remains too much policy and design uncertainty to effectively cost estimates these initiatives – even at a high level. These reform initiatives will go through the stage gate process once clearer design information is available to enable a more informed assessment, scoping, and cost estimate. This will include following the Program governance process to seek approval to extend the funding envelope to include these reform initiatives as appropriate. The stage gate mechanism is discussed further below.

Both pathway options have industry and delivery challenges

Both pathway options create significant demands upon AEMO and industry for delivery. The challenges arise through both options but are amplified under Option 2 because it comprises more initiatives that would be implemented concurrently.

These challenges include but are not limited to uncertainty and/or complexity of scope of individual initiatives, industry wide resourcing constraints and the overall, ambitious timeline to implement the NEM2025 reforms.

While Option 2 remains the preferred approach because of the lower costs and qualitative benefits, its challenges regarding uncertainty and stakeholder feedback means a hybrid pathway complemented by a stage gate approach to implementation is required.

The change management process

Given the uncertainty and/or complexity of individual initiatives that make up the NEM2025 Program and the high likelihood of incremental or material changes in scope or timelines as policy or designs are finalised, a change management process has been proposed for the NEM2025 Program. This change management process acknowledges the inevitability that policy and rules changes will occur through the policy/rule making process, and that these changes will have implementation impacts for scope, timeline and cost. The change management process seeks to understand the potential implementation impacts of these changes, ensuring the Roadmap and overall forecast costs remain up to date and to help inform decision-makers on potential approaches or solutions to those impacts.

The change management process targets those material changes emerging from the policy/rules making process including introduction of new initiatives, changes in scope and/or timeline changes. In this context, a material change refers to:

- A change in scope that impacts on the complexity of the initiative, leading to a higher or lower level of complexity rating under the Roadmap (e.g. moves the complexity from Medium to Large, or Medium to Small). This type of change will impact timeline and cost; or
- A change in timeline that impacts the implementation timing of the initiative, requiring an adjustment of two (2) months or more. This threshold is selected as an adjustment of two months or more is likely to lead to the implementation timing moving into a different implementation window.

Note that this is a general principle for assessing the materiality of a change, and the specific circumstances of the change will be reviewed where necessary to assess materiality.

The process provides for engagement with the RDC and relevant market bodies, the completion of an impact assessment and standing quarterly review process. All changes are to be assessed against a baseline comprising the current version of the Roadmap, initiative briefs, cost estimates, and participant impact assessments.

This analysis, when required, will form part of the basis of the stage gate approach discussed further below.

The stage gate approach

The challenges and risks of Option 2 mean that a 'set and forget' funding strategy that establishes a multi-year overall fixed budget is not appropriate for the Program, particularly due to the policy and regulatory, and therefore scope uncertainty. Accordingly, this business case proposes to adopt a hybrid pathway complemented by a stage gate process. This approach commits to Option 1 (Regulatory-led pathway) to undertake mandatory and no regrets initiatives in a timely way. It also sets the NEM2025 budget envelope to allow for the full scope of Option 2 (Strategic pathway) but imposes investment disciplines whereby draw-down is subject to a progressive commitment process informed by rule changes and the stage gate process.

The stage gate process is undertaken for all initiatives that are part of NEM2025 Program scope, to manage uncertainty and provide for appropriate implementation and investment disciplines.

This business case therefore outlines the costs for Option 2 and covers a budget envelope for the full NEM2025 scope but draw-down is subject to a progressive commitment process informed by rule changes and the stage gate process.

The stage gate process will be applied for all initiatives that are part of NEM2025 scope, to manage uncertainty and provide for appropriate implementation disciplines. It will also be applied to reform initiatives – Congestion Management Mechanism, Capacity Mechanism, and Data Strategy – that are not covered by this business case (and its funding envelope). Accordingly, once more information is available to inform scoping and cost estimates, AEMO will follow the Program governance process to identify changes to scope, timeline and forecast costs to include these additional reforms. This approach provides a mechanism to manage the uncertainty and establishes appropriate investment discipline. Stage gate checkpoints will occur after:

- An initiative has been properly scoped with a high-level design, and where participant consultation has been undertaken (where relevant) to determine industry impacts and support; and
- An initiative has been planned, including cost and resources, the timeline on the roadmap has been confirmed, and its deliverability has been confirmed.

Six stage gate checkpoints have been identified, at this stage, noting that flexibility to rearrange may be required subject to reform developments in relation to scope and timing. Importantly, each stage gate is not a prosecution of the reform / policy itself but rather an assessment of the activities and approach to ensure effective delivery.

Table 3 Stage gates

Stage Gate	Initiative	Description	Anticipated timing (calendar)	Actor responsible for action
-	Initial Business Case (this document)	Presents the holistic view and sets overall budgetary envelope subject to a draw-down mechanism.	Q3 2022	AEMO endorsement, informed by stakeholder views.
1	Immediate Reforms	Mandatory Initiatives for 2022 Rules Determinations. IESS, FFR, MT-PASA, PFR and OSM	Q3 2022	AEMO, informed by stakeholder views.
2	Capacity Mechanism and Congestion Management Mechanism	Stage Gate 2A: Capacity Mechanism Stage Gate 2B: Congestion Management Mechanism Separated due to possible different policy timelines for each initiative.	Subject to policy makers' timing	Government and/or ESB where relevant determines the need for the mechanisms and the form of the model. As part of the mobilisation and delivery of the initiatives within the stage gate, funding commitments will be made in accordance with AEMO's defined investment approval processes and supported by the mandate from the legislation/rule change. RDC role: <ul style="list-style-type: none"> • Policy development: advice on implementation approach/timing for overall roadmap. • Final Determination (or equivalent): Implementation mobilisation advice.
3	Strategic pre-requisites	Stage Gate 3A: Identity & Data bundle: IDA, IDX (noting pre-existing participant consultation should be leveraged), CoMASTR and Portal Consolidation. Stage Gate 3B: Dispatch Bundle (including dispatch, constraints and bids/offers target state). Stage Gate 3C: FRC target state. Integrated design, plan and cost/benefit to be prepared, industry engagement to be conducted.	Q1 2023 Q3 2022 Q1 2023	AEMO, informed by stakeholder views. RDC role: Advisory on whether/when and how the initiative proceeds.
4	DER Flexible Demand and Marketplace (Project 3, Work Package 3)	Stage Gate 4: Turn-up services, DOEs, DER Data Hub & Registry services, Distribution/local network services and potentially DER Operational Tools. Scope is subject to change once Policy/Trials complete (impacting budget, timeline and responsibilities). Co-ordinated approach with DNSPs may be valuable, to ensure roles are clear and scope for each role is defined.	Mid 2023	AEMO, informed by evidence base of industry trials (e.g. ARENA trials such as Project EDGE), and subject to input and support from industry. AEMO will only implement roles and responsibilities that apply to AEMO and which have been agreed by industry and mandated via the rule change process. Overall implementation responsibilities need to be coordinated across the relevant impacted participants who hold

Stage Gate	Initiative	Description	Anticipated timing (calendar)	Actor responsible for action
				responsibilities for the related functions. For example, many of these reforms will be DNSP-led, working with aggregators. RDC role: <ul style="list-style-type: none"> Policy development: advice on implementation approach/timing for overall roadmap; and Final Determination (or equivalent): Implementation mobilisation advice.
5	Next Reforms	Mandatory initiatives for 2023 Rules Determinations. FTA2, Scheduled Lite & SCADA Lite, OR	Indicative mid/late 2023, subject to Rules timing	AEMO, informed by stakeholder views. RDC role: <ul style="list-style-type: none"> Policy development: advice on implementation approach/timing for overall roadmap; and Final Determination (or equivalent): Implementation mobilisation advice.
6	Data Strategy	The four reform initiatives for the Data Strategy (Data Services, Bill Transparency, Electric Vehicles, Network Visibility) are at an early conceptual policy and stakeholder consultation phase. As such, it is not possible to make an informed cost estimate that properly takes into account responsibilities, timeline, and design. Commitment (approval to proceed) to enable mobilisation of project ready for execution.	Indicative Mid 2023 (subject to policy development)	The ESB determines the design for the different elements of the strategy. AEMO's internal program governance approves the spend to implement (supported by the mandate from the legislation/rule change). RDC role: <ul style="list-style-type: none"> Once high-level Policy work complete: advice on implementation approach/timing for overall roadmap; and RDC role Final Determination (or equivalent): Implementation mobilisation advice.

NEM2025 Program

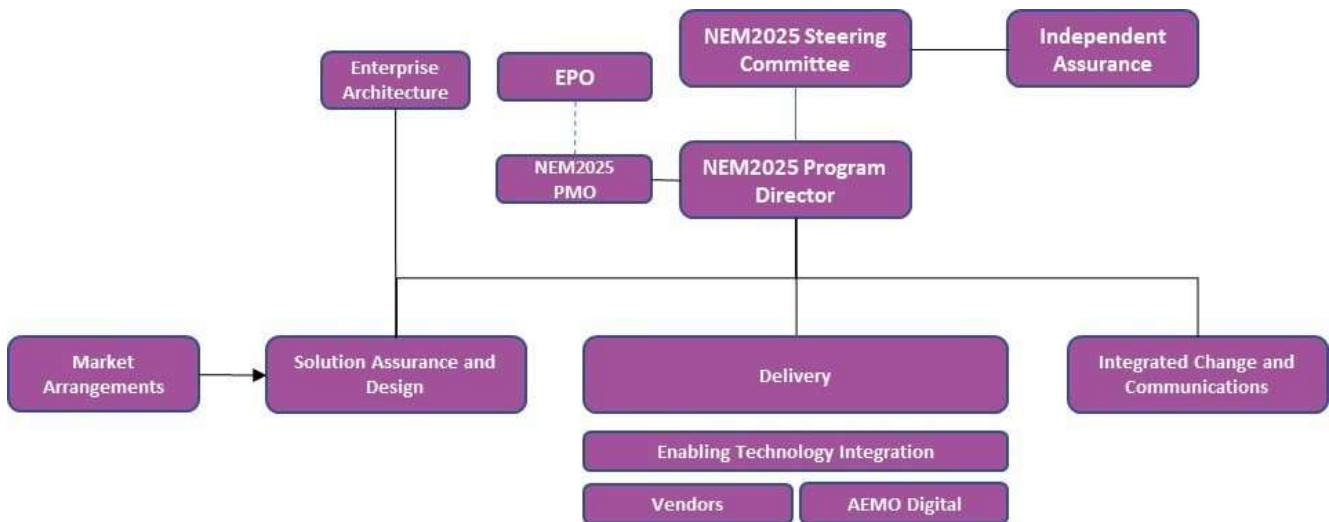
AEMO has established the NEM2025 Program to deliver the NEM2025 reform initiatives. The delivery structure supporting the NEM2025 Program caters for either pathway (Option 1 or Option 2) and has been designed with scale in mind. AEMO commenced early planning activities in relation to the NEM2025 Program in 2021. For the purposes of this business case, it is assumed the Program will formally run over a period of approximately 5 years, commencing in July 2022.

The NEM2025 Program will be a large, complex program. A number of important governance and delivery elements will apply to the Program to guide its delivery. An initial NEM2025 Program structure has been developed to embed these governance and delivery elements, aligned with AEMO's Enterprise Portfolio Office (EPO) processes. Key governance and delivery features of the NEM2025 Program will be:

- Standardisation through the Enterprise Portfolio Office;
- A NEM2025 Program Management Office (PMO) function;

- Vendor and commercial management;
- Solution Assurance and Design built into the Program delivery structure;
- Integrated business and technology resources forming delivery teams; and
- A dedicated change and communication team.

Figure 1 NEM2025 Program delivery structure



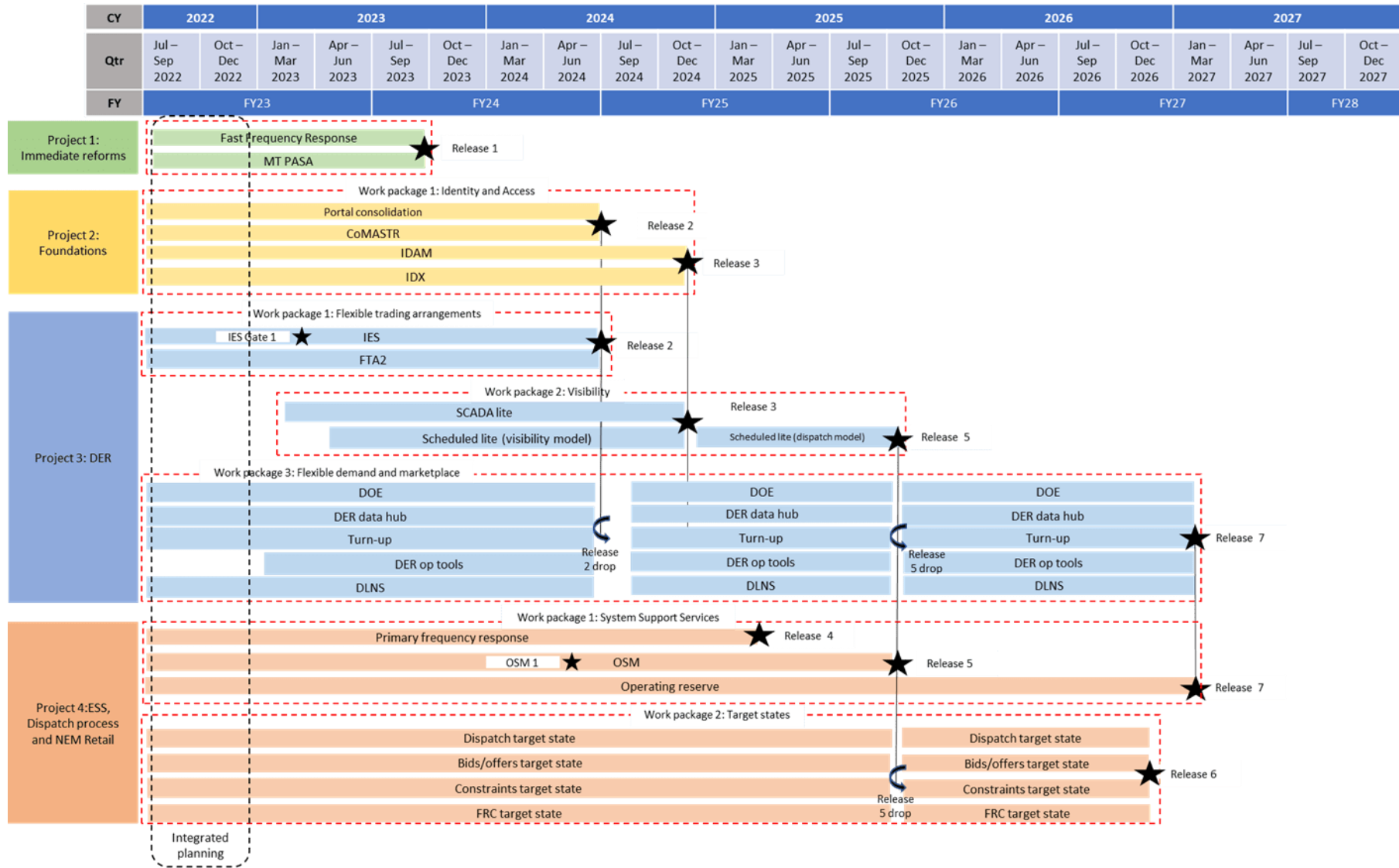
The Program will be delivered through a series of Work Packages, with each Work Package representing a logical bundling of the 22 in-scope initiatives. Delivery of the Work Packages has been sequenced to consider impacts on AEMO’s systems and business functions, industry’s capacity to absorb the level of change triggered by the Program and other significant projects that are occurring within AEMO. This delivery structure complements the stage gate process as it can be applied to individual initiatives or to Work Packages. The pre-requisite scoping and high-level design, consultation, and planning process for the approval mechanism allows for initiatives to be de-coupled from a Work Package if required, and for Work Packages to be reconsidered if synergies and impacts change or evolve.

The Program delivery timeline for Option 2 (including only the initiatives covered in this business case) appears in Figure 2.

Given the scale of the NEM2025 Program, deliverability is a key issue that needs to be considered. Deliverability of the NEM2025 Program will be aided by:

- Choice of delivery model which will be aligned to the scope of each Work Package;
- Use of appropriate third-party delivery partners aligned with the delivery model;
- Undertaking an integrated design phase in close consultation with industry;
- Proactive and collaborative industry engagement and facilitation to support industry readiness throughout the Program;
- Dedicated Program Director and project managers for each Work Package; and
- Backfilling AEMO roles and prioritisation of resources.

Figure 2 NEM2025 Program timeline





Next steps

This Gate 1 business case outlines the estimated funding envelope needed to deliver the initiatives of the NEM2025 Program based on their current known scope as detailed in the Roadmap and as covered in this business case for Option 2. Subject to endorsement to proceed, the NEM2025 Program team will continue to work closely with industry to refine the optimal delivery of the Program through an integrated planning phase and supporting change management process to develop more accurate scope and cost estimates for the Program. This more detailed analysis will form the basis of the stage gate checkpoints.

This stage gate approach is the proposed framework to guide the process for drawing down funds from the Program funding envelope as each Work Package commences. Specifically, approval and draw-down of the funds for each work package is subject to a progressive commitment process informed by rule changes and the stage gate process and will also require funding approval by the AEMO investment committee and Board. As a result, approval and draw down of funds will only be sought at the time when sufficient certainty exists.



Contents

1	Reform priorities to support the transition	17
1.1	Background	17
1.2	Scope of ESB's NEM2025 market design work	17
1.3	Planning undertaken by AEMO to implement ESB's Post 2025 reform recommendations	18
2	Options assessment	22
2.1	The ESB's case for change	22
2.2	Development of options to deliver the ESB's post 2025 reforms	22
2.3	Options considered	23
2.4	Options cost analysis	29
2.5	Indicative participant fee impact	31
2.6	Options indicative resource analysis	31
2.7	Options benefits analysis (qualitative)	32
2.8	Program risks and delivery challenges	34
2.9	Preferred option	35
3	The NEM2025 Program	36
3.1	NEM2025 Program objectives	36
3.2	NEM2025 Program implementation roadmap	37
3.3	NEM2025 Program governance and delivery	37
4	NEM2025 Program financial analysis	42
4.1	Financial analysis approach	42
4.2	Financial analysis	45
4.3	Sensitivity and scenario analysis	48
5	The change journey	50
5.1	NEM2025 Program stakeholders	50
A1.	Summary of industry feedback on roadmaps	51

1 Reform priorities to support the transition

1.1 Background

In August 2017, the ESB was established by the nation's Energy Ministers to coordinate implementation of recommendations from the Independent Review into the Future Security of the National Electricity Market (Finkel Review).

The ESB reports to the Energy National Cabinet Reform Committee (ENCRC) which consists of the Energy Ministers from the Commonwealth, States and Territories and is designed to work together in pursuit of national energy reforms. The ENCRC was established to replace the former Council of Australian Governments (COAG) Energy Council.

In March 2019, the ESB was tasked by the former COAG Energy Council to advise on a long-term, fit-for-purpose national electricity market design. The request recognised the problems faced by the current NEM design because of technology and market changes during the past 20 years, as well as proposed changes for the future. The ESB dubbed the program of work the 'Post 2025 Project'.

1.2 Scope of ESB's NEM2025 market design work

In July 2021, the ESB released its final recommendations to Ministers for the redesign of the NEM. The ESB made nine key recommendations. The recommendations are divided into four key areas:

1. Resource Adequacy Mechanisms;
2. Essential System Services and Ahead Scheduling;
3. Integration of DER and Flexible Demand; and
4. Transmission and Access.

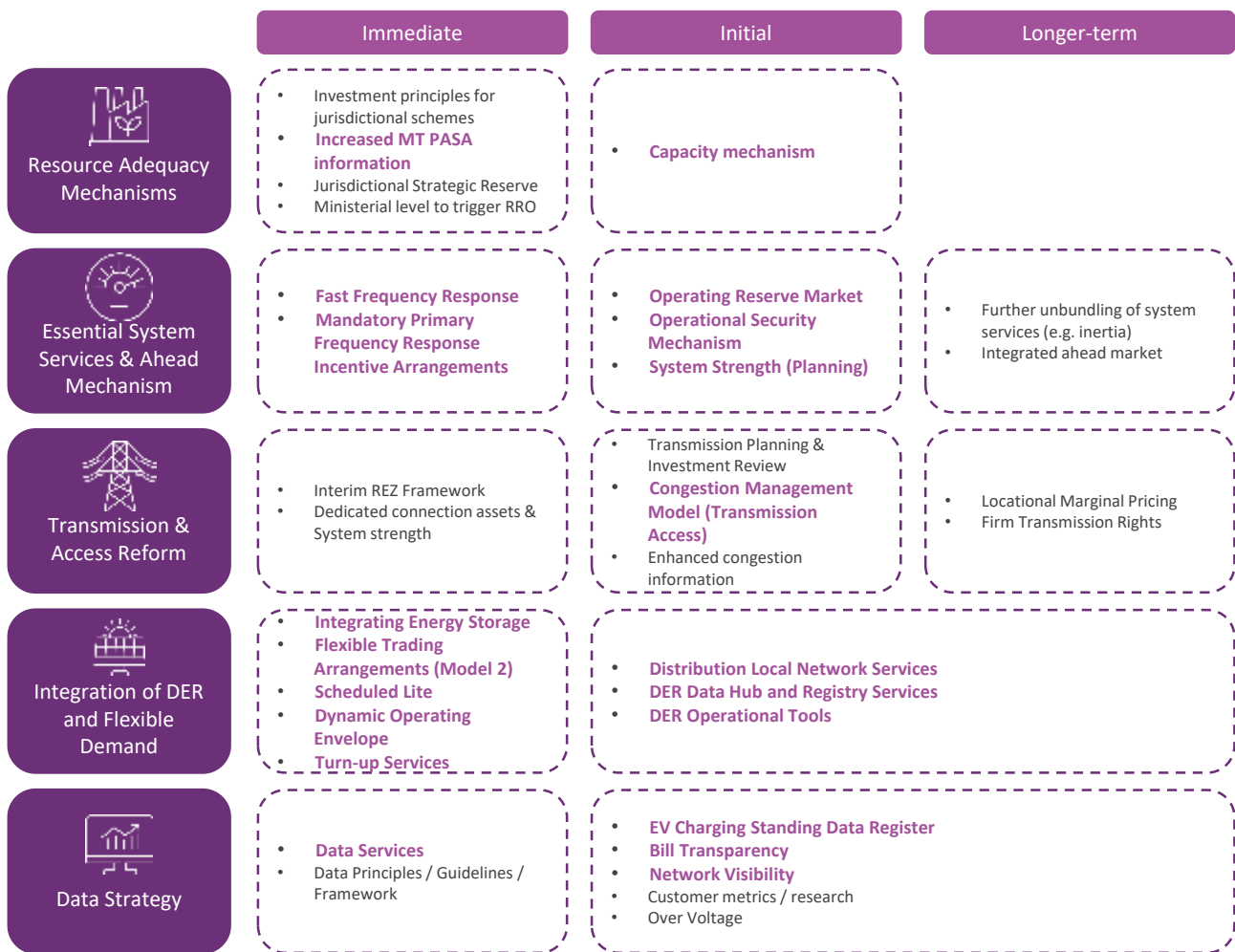
The ESB identified three different time horizons – immediate, initial and longer-term – to provide its view of when each recommended reform initiative should be implemented (see Figure 3).

The ESB also recognised that its recommendations required modernising critical market systems and business process and that there were risks regarding critical data needs. The ESB has addressed these data risks through the development of a Data Strategy that will support the reforms.

Energy Ministers agreed to progress the ESB's reform recommendations while seeking further advice on a Capacity Mechanism, and Congestion Management Mechanism by the end of 2022. Whilst the ESB has responsibility for overseeing progressing some market design elements, AEMO will play a crucial role, with industry, in delivering many of the recommended reforms in the NEM. The market bodies made a commitment to work closely with industry to develop an integrated regulatory and IT roadmap (the 'NEM Reform Implementation Roadmap' or Roadmap) to deliver the IT system and business processes together. This commitment was made in recognition of the regulatory burden of delivering the reform and to support ongoing transparency, prioritisation and program management by all stakeholders.

1. Reform Priorities to support the transition

Figure 3 Summary of ESB Post 2025 market design recommendations



1.3 Planning undertaken by AEMO to implement ESB's Post 2025 reform recommendations

AEMO has undertaken a series of planning activities to understand the scope and scale of the ESB's Post 2025 Project, which has informed development of this business case. This included:

- Identifying the business capabilities AEMO will need in order to act as the system and market operator in a reformed environment;
- Identifying the suite of initiatives aligned with the ESB's four reform pathways that need to be undertaken by AEMO to deliver the business and technology capabilities needed; and
- Working with industry through the Reform Delivery Committee (RDC) to start considering the scope and delivery options for the reforms.

AEMO established the RDC with the support of the AEMC and the AER. The RDC consists of nominees from the market bodies (AEMC, AER, ESB), market participants, consumer representatives, and representatives of the renewable energy, demand management and energy efficiency industry sectors. The RDC is chaired by AEMO. Its purpose is to facilitate deep and effective collaboration across the industry to develop a Roadmap for the reforms.

AEMO has identified:

1. Reform Priorities to support the transition

- 50 existing, new or enhanced reform-related business capabilities that are needed to successfully operate as the system and market operator post 2025;
- 20 core initiatives to deliver those capabilities aligned with ESB's reforms. These are initiatives that are directly needed to deliver one or more reform; and
- 13 'pre-requisite' initiatives⁶ to enable the core initiatives to be delivered. Pre-requisite initiatives are classified as either:
 - 'Foundational': initiatives considered to be a hard pre-requisite or co-requisite for the core initiative that if not delivered, would jeopardise delivery of one or more core initiatives, or
 - 'Strategic': initiatives where system uplift is required at some time in the future and AEMO concluded that this life-cycle type investment should be brought forward and delivered in the same timeframes as the reforms.

Eleven of the 33 initiatives originally identified have not been included in the scope of this business case for the following reasons:

- The Congestion Management Mechanism initiative within the Transmission and Access reform pathway has been excluded for now due to variability in the options being considered making it not possible to accurately estimate costs at this stage. AEMO continues to work closely with the ESB on this reform and will update later versions of the Roadmap to include this initiative;
- The introduction of a Capacity Mechanism was one of the ESB's reforms within the Resource Adequacy Mechanism reform pathway, but was not included in the original estimates as a foundational initiative given policy uncertainty about its scope and timing. The ESB have been instructed by ENCR to develop a detailed design of the capacity mechanism by the end of 2022. AEMO continues to work closely with the ESB on this reform and will update later versions of the Roadmap to include this initiative;
- The four initiatives specifically related to the ESB's Data Strategy have not been included at this stage as these initiatives only have policy commitment to the design phase;
- Four 'pre-requisite' initiatives (Operational Decision-Making Tools, Operational Data Store, Business Rules Engine, and Forecasting Platform Uplift) have been excluded as they will now be delivered by AEMO's Operational Technology Roadmap (OTR) Program. In that respect, they become dependencies for the NEM2025 Program rather than being delivered by the NEM2025 Program. NEM2025 reform initiatives will build on the architecture delivery by OTR for specific uses cases as required; and
- System strength planning was agreed to be delivered by TNSPs.

The Roadmap is intended to be an iterative 'living' document. As more certainty on reforms, including the Capacity Mechanism, becomes available, the intent is to update the Roadmap accordingly. However, the Capacity Mechanisms early conceptual policy stage, means it is difficult to calculate an effort and cost estimate, even for a Gate 1 business case.

The initiatives initially in scope for the NEM2025 Program and included in version 1 of the Roadmap were agreed with the RDC through a series of workshops held in December 2021. These workshops included discussions to ensure the proposed initiatives were well understood. The initial prioritisation work resulted in

⁶ Four additional pre-requisite initiatives were identified but were already in progress so have not been included.

1. Reform Priorities to support the transition

the version 1 of the Roadmap being published. The RDC's Interim Terms of Reference sets out that AEMO will work with the RDC and stakeholders to review and update the Roadmap as required.⁷

A summary of the current scope (equating to 22 initiatives) that is considered within this business case appears in Table 4.

Table 4 NEM2025 Program initiatives

Category	ESB reform area	AEMO project #	Initiative name	Covered / not covered by this business case
Core NEM2025	DER	P2265	Integrating Energy Storage	Covered by this business case.
		P2268	Flexible Trading Arrangements- (Model 2)	Covered by this business case.
		P2269	Scheduled Lite	Covered by this business case.
		P2270	Dynamic Operating Envelopes	Covered by this business case.
		P2271	Distribution Local Network Services	Covered by this business case.
		P2272	Turn-up Services	Covered by this business case.
		P2273	DER Data Hub and Registry Services	Covered by this business case.
		P2275	DER Operational Tools	Covered by this business case.
	ESS	P2277	Operating reserves	Covered by this business case.
		P2278	Primary Frequency Response Incentive Arrangements	Covered by this business case.
		P2267	Fast Frequency Response	Covered by this business case.
		P2284	Operational Security Mechanism (OSM)	Covered by this business case.
	T&A	N/A	System Strength (Planning)	This initiative is led by Transmission Network Service Providers. AEMO and the RDC agreed to include it in scope for the Roadmap. However, it is not covered by this business case.
		P2274	Congestion Management Mechanism	Not included in this business case due to scope/design uncertainty. Process to add this initiative already in progress.
RAMS	P2276	Increased MTPASA Information	Covered by this business case.	
	N/A	Capacity Mechanism	Not included in this business case due to scope/design uncertainty. Process to add this initiative already in progress.	
Data Strategy	Data Strategy	P2266	Electric Vehicles	In NEM2025 Program scope but not covered by this business case due to scope/design uncertainty.
		P2285	Data Services	
		P2287	Bill Transparency	
		TBD	Network Visibility	
Pre-requisite – Base	N/A	P2286	Business Rules Engine	Removed from NEM2025 Program scope and added to OTR Program.
		P2262	Identity and Access Management (IDAM)	Covered by this business case.
		P2264	Industry Data Exchange	Covered by this business case.
		P2283	SCADA Lite	Covered by this business case.
		P1934	Operational Decision-Making Tool	Removed from NEM2025 Program scope and added to OTR Program.

⁷ https://aemo.com.au/-/media/files/stakeholder_consultation/working_groups/other_meetings/reform-delivery-committee/reform-delivery-committee-settled-interim-terms-of-reference.pdf?la=en

1. Reform Priorities to support the transition

Category	ESB reform area	AEMO project #	Initiative name	Covered / not covered by this business case
		P2160	Operational Data Store	Removed from NEM2025 Program scope and added to OTR Program.
		P2263	Forecasting Platform Uplift	Removed from NEM2025 Program scope and added to OTR Program.
Pre-requisite - Strategic	N/A	P2062	Portal Consolidation	Covered by this business case.
		P2279	FRC Target State	Covered by this business case.
		P2051	Consolidated Master Data Repository (Foundation Expansion)	Covered by this business case.
		P2280	Dispatch Target State	Covered by this business case.
		P2281	Bids/Offers Target State	Covered by this business case.
		P2282	Constraints Target State	Covered by this business case.

AEMO has prepared a separate document⁸ that provides a brief description of each of the reform initiatives and is available via the RDC section of the AEMO website. For each initiative, it outlines:

- An understanding of the problem statement;
- Objective;
- Scope;
- Value/benefit;
- Key relationships, risks and assumptions;
- Key risks;
- High-level assessment of AEMO and participant impacts; and
- Estimated timeline.

⁸ NEM Reform Implementation Roadmap Initiative Briefs, available from https://aemo.com.au/-/media/files/stakeholder_consultation/working_groups/other_meetings/reform-delivery-committee/nem-2025-implementation-roadmap--initiative-briefs.pdf?la=en&hash=050682860B56F94913AAF1CA99129D58

2 Options assessment

2.1 The ESB's case for change

The ESB completed a high-level assessment to provide an indication of the benefits that could be delivered by each reform pathway.⁹ The assessment included selecting key reforms from each pathway to distinguish between a no-reform scenario where the trends and challenges faced by the current state NEM continue with no change) and a reform scenario which assumed the intent of the reforms recommended is delivered through the reforms. The assessment also considered the direct implementation costs to AEMO of key reforms. The assessment did not consider other costs such as those to market participants.

The intent of the high-level assessment was to understand the order of magnitude of benefits in order to facilitate consideration of the direct costs of the reforms relative to the benefits. While this assessment provided illustrative estimates of both costs and estimates, the case for change was nonetheless strengthened by an indication that the benefits of the reforms are an order of magnitude greater than the likely costs of implementation.

The ESB's case for change noted the implementation costs should be considered in perspective and in the context where the transition will incur unavoidable costs for the sector regardless of whether the recommended reforms are implemented. For example, with respect to the DER and flexible demand reforms, the ESB notes that industry is expected to incur costs to manage DER under the no-reform scenario but are likely to be greater without the reforms to integrate new technologies. Meanwhile, the reforms enable a flexible system better placed to optimise the benefits that could emerge from new technologies. The reform pathways – and the NEM2025 implementation program – provide an opportunity to manage costs through appropriate market design and implementation planning. The reform program can support a more efficient and effective transition and deliver the necessary security, reliability, and price outcomes needed for the anticipated scale of change from the forecast levels of large- and small-scale renewable energy in the NEM.

The ESB also noted that implementing the reforms can provide benefits beyond the energy sector. A planned transition to net zero emissions will benefit customers because energy prices will be driven by zero fuel costs.¹⁰ As electricity becomes cheaper, there will be greater incentive for other sectors of the economy to electrify. Facilitating an efficient transition in the energy sector therefore paves the path for the broader economy to decarbonise and enable economic benefits to all consumers.

2.2 Development of options to deliver the ESB's post 2025 reforms

The reforms driven by the ESB's final advice to Energy Ministers reflect the transformation needed in the NEM to maintain system security and stability as well as derive the benefits and value from rapidly changing technologies in our power system. The reforms also present a broader opportunity to lay the foundations of future capabilities that will be needed as the system and market evolves and matures over time. As a result, there are a number of pathways that could be followed to deliver the initiatives that will operationalise the reforms.

⁹ Energy Security Board, <https://esb-post2025-market-design.aemc.gov.au/32572/1629945809-post-2025-market-design-final-advice-to-energy-ministers-part-b.pdf>

¹⁰ Energy Security Board, <https://esb-post2025-market-design.aemc.gov.au/32572/1629944958-post-2025-market-design-final-advice-to-energy-ministers-part-a.pdf>

To narrow down the possible options, the following factors were used to identify options to bundle and sequence delivery of the initiatives:

- ESB indicative reform dates;
- Technology solutions and dependencies;
- Functional relationships;
- Alignment with AEMO’s target state architecture; and
- Feedback from industry engagement and impact assessment.

However, it is important to note that this is an initial view, and that uncertainties regarding market design, final rule change determinations and effective dates means these bundling opportunities may need to change over time. Additionally, as reforms such as, but not limited to, the Congestion Management Mechanism and Capacity Mechanism become more certain and are incorporated into the scope of the Program (as applicable), their bundling, sequencing and Program impacts will need to be considered.

2.3 Options considered

2.3.1 Option descriptions

AEMO worked closely with industry to develop two initial Roadmap pathways to deliver the in-scope reforms.

Table 5 Option descriptions

	Option 1: Regulatory-led	Option 2: Strategic
Description	<ul style="list-style-type: none"> • Enables ‘day 1’ capabilities by delivering the baseline functional elements of the NEM2025 reforms built on top of existing systems; • Focuses on a limited scope initially (based on the needs to deliver ESB reforms) and does not consider co-ordination of regulatory and IT changes and therefore shared system impacts and minimising the number of system releases; • Strategic enabling technology solutions such as consolidating frameworks and platform uplifts to existing systems are deferred to commence after 2025, once most reforms have been delivered; • The reforms would be delivered by building on existing system frameworks and platforms, even those nearing the end of technical life. As these systems need to be replaced, new markets and processes implemented through the reforms will need to be migrated/integrated into future systems at a later point in time; and • Most reforms are delivered by the end of 2025. 	<ul style="list-style-type: none"> • Accounts for those system investments that will be required at some time in the future, but should be considered now in the context of the reforms. It sets the foundations for scalability and future-proofing of systems ensuring investments keep pace with rapid transition by delivering capabilities and support functions beyond ‘day 1’; • Shared system impacts are considered, the number of scheduled releases are reduced, and the foundational technology architecture and frameworks are established for future anticipated capability needs and removal of industry pain-points; • This pathway includes foundational target state technology developments related to identity and access, and operational systems and tools. It also includes two large-scale and complex target state implementation initiatives relating to the uplift of the core Dispatch and Short-Term Market Operational (Dispatch, Bids/Offers, Constraints) platforms, and the consolidation of the NEM Retail Market technology and process framework (FRC); and • The delivery date for some reforms may extend beyond the assumed regulatory deadline. The roadmap limits the number of these instances and

2. Options Assessment

Option 1: Regulatory-led	Option 2: Strategic
	the length of a proposed extension will be subject to as yet undefined rule change effective dates.

Both options have the same scope of reforms being delivered, but differ in the bundling, sequencing and timing of delivery. Both options also include the strategic or foundational initiatives, except they are being delivered as pre-requisites under Option 2 and at a later date in Option 1. They are included in the scope for Option 1 even though they are not delivered as pre-requisites because these initiatives will need to be implemented by AEMO not long after the reforms are implemented as legacy systems reach their end of technological life and to ensure AEMO maintains the capabilities needed to support existing statutory responsibilities and functions, and that frameworks and markets are established by the reforms, as the energy transition continues. Accordingly, AEMO will need to invest in these initiatives for the NEM.

With the scope of the reforms defined, logical groupings (called Work Packages) of the in-scope initiatives for this business case have been developed. The proposed sequencing and delivery of initiatives under both options appears in the table and figures below. Highlighted rows in the table reflect those initiatives that have different delivery timelines between the options.

Table 6 Comparison of options bundling and sequencing

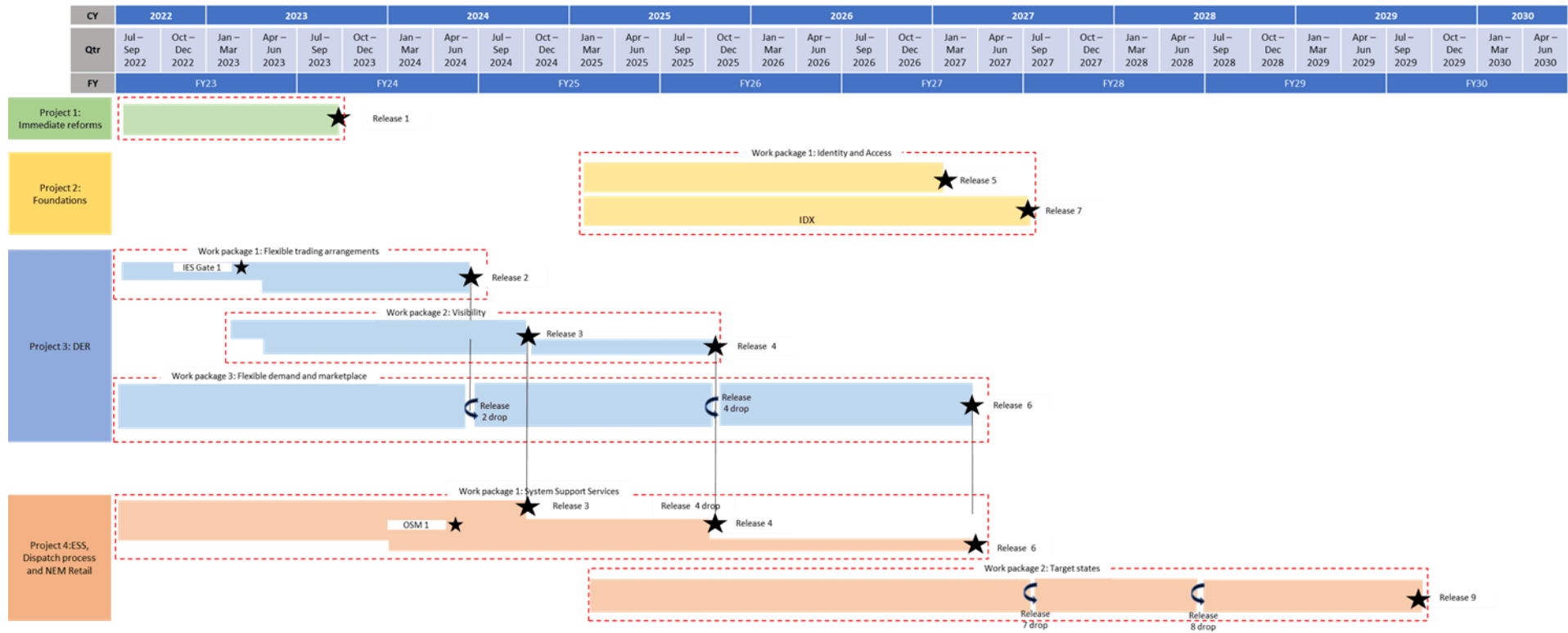
Project	Work Package	Initiatives	Ref	Option 1: Regulatory-led Release	Option :2 Strategic Release
Project 1: Immediate Reforms	WP1: Immediate Reforms	Fast Frequency Response	P2267	R1	R1
		Increased MTPASA Information	P2276	R1	R1
Project 2: Foundations	WP1: Identity and Access	Portal Consolidation	P2062	R5	R2
		Consolidated Master Data Repository (Foundation Expansion)	P2051	R5	R2
		Identity and Access Management (IDAM)	P2262	R7	R3
		Industry Data Exchange	P2264	R7	R3
Project 3: DER	WP1: Flexible Trading Arrangements	Integrating Energy Storage	P2265	R2	R2
		Flexible Trading Arrangements (Model 2)	P2268	R2	R2
	WP2: Visibility	Scheduled Lite	P2269	R3, R4	R3, R5
		SCADA Lite	P2283	R3	R3
	WP3: DER Flexible Demand and Marketplace	Dynamic Operating Envelopes	P2270	R6	R7
		Distribution Local Network Services	P2271	R6	R7
		Turn-up Services	P2272	R6	R7
		DER Data Hub and Registry Services	P2273	R6	R7
		DER Operational Tools	P2275	R6	R7
Project 4: ESS and Future System Strength	WP1: Frequency Control, Security and Reserves	Primary Frequency Response Incentive Arrangements	P2278	R3	R4
		Operational Security Mechanism (OSM)	P2284	R4	R5
		Operating Reserves	P2277	R6	R7

2. Options Assessment

Project	Work Package	Initiatives	Ref	Option 1: Regulatory-led Release	Option :2 Strategic Release
	WP2: Target States	FRC Target State	P2279	R9	R6
		Dispatch Target State	P2280	R9	R6
		Bids/Offers Target State	P2281	R9	R6
		Constraints Target State	P2282	R9	R6

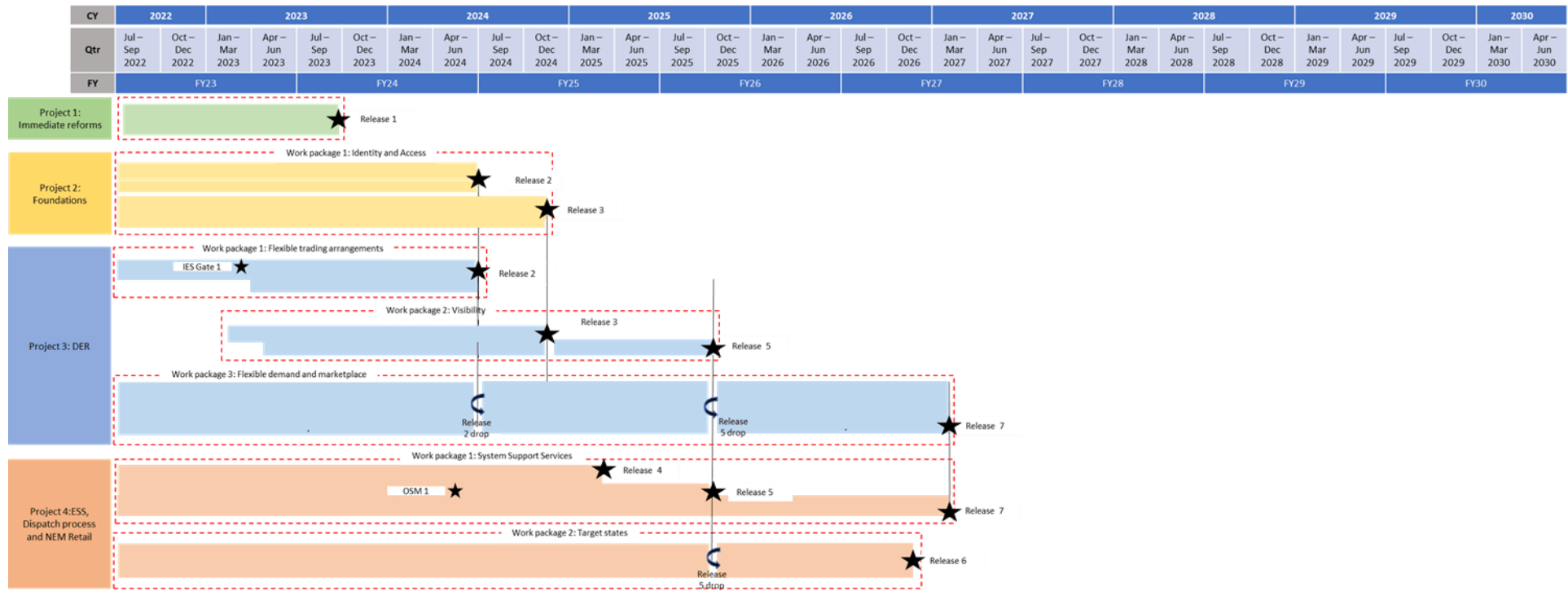
2. Options Assessment

Figure 4 Option 1: Regulatory-led delivery schedule



2. Options Assessment

Figure 5 Option 2: Strategic delivery schedule



2. Options Assessment

It can be seen from the above that the key differences between Option 1 and 2 are:

- Option 1 is delivered over a longer timeframe as pre-requisite projects are delivered after the core reform initiatives have been delivered;
- Option 2 has a more periodic cadence of releases (approximately six-monthly)¹¹; and
- Option 2 has less releases (seven compared to nine releases in Option 1).

Stakeholder feedback

An initial version of the Roadmap showing the two options was prepared in collaboration with the RDC and released for broader industry consultation to seek feedback and to gauge support for pursuing the Strategic pathway (Option 2) to implementing the reforms. Stakeholder feedback was received by the consultation close date of 20 May 2022. This feedback (refer to Appendix A1 for a summary of the feedback and how the concerns raised will be addressed) has informed this business case and will also inform the next version of the Roadmap, the preferred implementation pathway and grouping, prioritisation and sequencing of the initiatives.

There were seven key themes in the feedback provided by stakeholders:

- Consideration of long-term market direction is considered prudent but does not translate to support for the strategic pathway;
- Systems changes should be scheduled and batched with reforms that have higher certainty;
- A cost benefit analysis should support more material investment in replacing or updating foundational systems;
- There is a need for transparency on the impact on NEM fees over the short, medium and longer term;
- An incomplete roadmap undermines its intent and all recommended reforms such as the Capacity Mechanism and the Congestion Management Mechanism should be included in the roadmap;
- Flexibility should be retained in the overall sequencing and prioritisation, particularly in the early stages of the reform process; and
- Implementation timeframes were considered ambitious and may not allow for sufficient contingency for delays.

To address the concerns raised by stakeholders, the Program will establish the stage gate process outlined in section 3.3. This process provides a mechanism to manage the concerns regarding uncertainty raised by stakeholders and supports appropriate governance and investment discipline. This leaves implementation of the preferred Option 2 as a viable approach while ensuring the mandatory and no regrets initiatives are committed at a minimum.

Participant impact assessment

AEMO, via the RDC, provided industry and stakeholders with an opportunity to submit a participant impact assessment assessing each of the core reforms. To date, AEMO has received assessments from Energy Networks Australia (ENA), Australian Energy Council (AEC) and the Energy Efficiency Council. The participant impact assessments received indicated general alignment with the current assessment of complexity across the majority of initiatives. Key differences were identified in relation to the following

¹¹ While release cadence is critical to managing delivery under any delivery option and AEMO – both for its and industry's benefit – would seek to establish periodic release cadence where possible, such cadence opportunities are prioritised and easier to plan under Option 2. That's because Option 1 is regulatory-led – this assumes that a release will be required to align with the rules' effective date. Where possible, other initiative releases will be aligned with these dates but there could be scenarios where effective dates (and therefore releases) occur within a period shorter than the desired period cadence.

2. Options Assessment

initiatives: Increased MT PASA Information (AEC), FTA Model 2 and Scheduled Lite (ENA). AEMO has since held separate meetings with the ENA and AEC, as well as AEMO's consumer forum since publishing version 1 of the Roadmap. These meetings provided an opportunity for AEMO to clarify and expand upon the participant impact assessment. Potential changes resulting from these discussions are to be factored into the Roadmap and therefore implementation pathway via the change management process outlined in Section 3.3.

AEMO remains interested and open to understanding in further detail the impacts to participants associated with each of the reforms. This understanding will support AEMO and the RDC's assessment of the bundling, sequencing, and prioritisation of the initiatives. The intent is to incorporate additional feedback received from participants into subsequent versions of the Roadmap as required.

2.4 Options cost analysis

Program costs and net present cost (NPC) analysis were undertaken on both pathway options. As the Gate 1 business case is a pre-market business case, the costs of undertaking the Program as outlined in this document are based on a number of estimates and benchmarks. This business case is targeting a +/-40% accuracy.

Estimates of the following costs were included in the analysis:

- Program governance;
- Program management;
- Change management;
- Incidental costs;
- Initiative implementation costs (plan, design, build, test, deploy and provide hypercare support of solutions, as well as any relevant procedure and business process changes and effort to support industry readiness);
- Upfront technology costs; and
- Ongoing costs (licence fees and other support costs).

Program costs were estimated over a period of 10 years beginning 1 July 2022.

From a costing perspective, the key differences between Option 1 and Option 2 are that Option 1:

- Has higher Program governance, Program management and Change management costs reflective of the fact that the Program implementation phase runs over a longer period (i.e. additional 30 months) than in Option 2;
- Requires additional implementation effort due to inefficiencies associated with:
 - Challenges created by legacy systems: In Option 1, the reforms are delivered onto legacy systems, some of which are nearing end of life and for which it is costly and difficult to apply rapid fixes and enhancements. This is likely to result in additional challenges and effort to build the reforms onto these legacy systems. This additional effort applies to the initiatives which are delivered within the same timeframes under both Options; and
 - Retrofitting functionality: By the time the reforms are implemented onto legacy systems under Option 1, some of these systems will be at their end of life. At some point, these systems will need to be replaced with the future state architecture. When this occurs the capabilities and functionalities required by the reforms will need to retrofit into the new

2. Options Assessment

systems and result in duplicated effort. This duplication will occur across various elements of delivery, including the need to mobilise uplift initiatives and project teams, design, build, updating internal and external processes, and industry readiness. This additional effort applies to the initiatives which are delayed under Option 1.

Option 1 includes costs for the strategic initiatives being delivered as pre-requisites under Option 2 even though they are not delivered as pre-requisites in Option 1. These initiatives will need to be implemented by AEMO not long after the reforms are implemented as legacy systems reach their end of technological life and to ensure AEMO maintains the capabilities needed to support existing statutory responsibilities and functions, and the frameworks and markets established by the reforms, as the energy transition continues. Therefore, as AEMO will need to invest in these costs for the NEM, the costs need to be reflected in order to compare the two options appropriately.

Option 1 is estimated to have a nominal total Program cost of \$465 million (\$364 million in NPC). Option 2 is estimated to have a nominal total Program cost of \$425 million (\$347 million in NPC). Of these total program costs, \$313 million and \$252 million are the estimated upfront capital costs for Option 1 and 2 respectively.

With a +/- 40% level of uncertainty, the total Program costs over the 10-year period for Option 1 range from \$279 million to \$650 million, and for Option 2 range from \$255 million to \$596 million. The range for the upfront capex for Option 1 is \$188 million to \$438 million, and for Option 2 it is from \$151 million to \$353 million.

For comparison, the early estimates undertaken by AEMO in 2021 to deliver the ESB reforms estimated capital costs only in the range of \$250 million to \$330 million.

A summary of the cost outcomes for both options appears in the table below.

Table 7 Options cost comparison¹²

Cost component	Option 1: Regulatory-led	Option 2: Strategic
Program governance	\$8	\$4
Program management	\$15	\$9
Change management	\$26	\$19
Incidental costs	\$5	\$4
Initiative implementation (all Work Packages)	\$227	\$190
Upfront technology costs	\$32	\$26
Total capital costs	\$313	\$252
<i>Total capital costs with 40% uncertainty increase</i>	<i>\$438</i>	<i>\$353</i>
<i>Total capital costs with 40% uncertainty decrease</i>	<i>\$188</i>	<i>\$151</i>
Ongoing costs¹³	\$152	\$174
<i>Ongoing costs with 40% uncertainty increase</i>	<i>\$212</i>	<i>\$243</i>
<i>Ongoing costs with 40% uncertainty decrease</i>	<i>\$91</i>	<i>\$104</i>
Total Program costs	\$465	\$425
<i>Total Program costs with 40% uncertainty increase</i>	<i>\$650</i>	<i>\$596</i>
<i>Total Program costs with 40% uncertainty decrease</i>	<i>\$279</i>	<i>\$255</i>
NPC	\$364	\$347

¹² Note costs exclude finance charges. Finance charges to be accounted for as part of the Stage 2 consultation assessing the participant fee impacts of the NEM2025 Declared Project.

¹³ Because Option 2 has a shorter implementation duration (relative to Option 1), it has a longer period of operation over the 10 year model period which results in Option 2's ongoing operating costs looking higher than Option 1. The ongoing costs per annum are comparable in both options.

2.5 Indicative participant fee impact

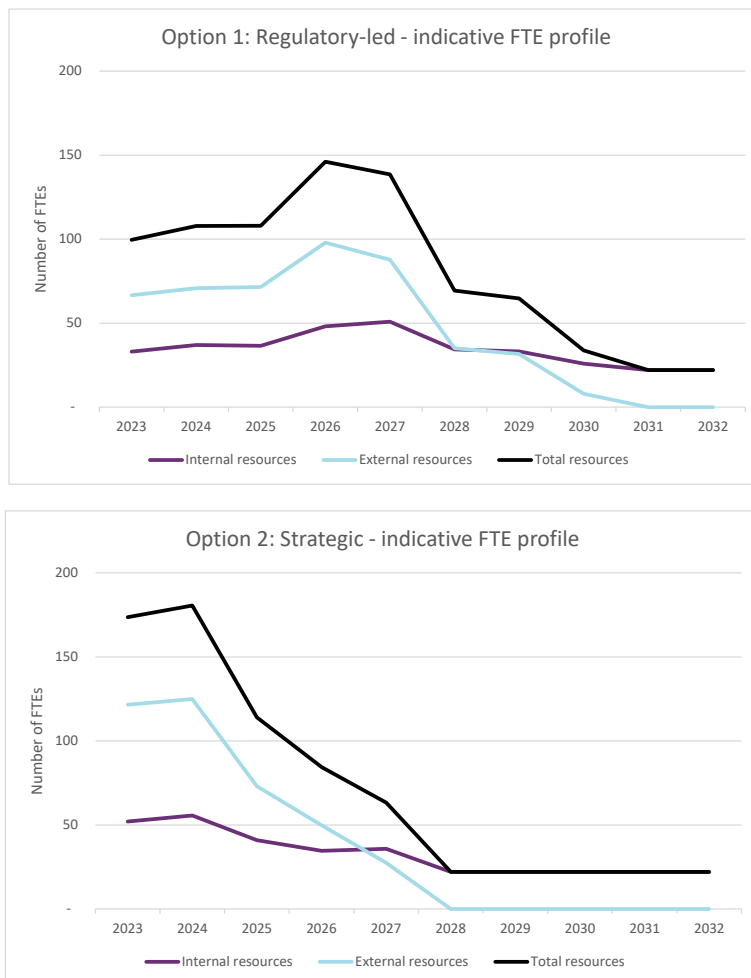
Whilst this business case provides estimates of the Program costs, as noted above there are a number of initiatives that have been excluded (for example, the Capacity Mechanism and the Congestion Management Mechanism costs) as there is not yet sufficient information to meaningfully inform cost estimates. Therefore, modelling the impact of the full NEM2025 suite of reforms to participant fees at this stage would lead to an incomplete and misleading view of impacts.

Further, while the assessment presented above provides for a whole of life cycle cost assessment using a simple discounted cashflow model approach, the calculation of participant fee impacts will require the consideration of additional items such as finance charges to provide for a complete view. This will be undertaken as part of the Stage 2 consultation on the NEM2025 Declared Project.

2.6 Options indicative resource analysis

Based on the effort estimates of each option, high level analysis was undertaken to assess the number of resources needed to deliver the program. Because Option 1 is run over a longer duration, it has a less peaky resource profile. To deliver the Program, AEMO will need a combination of internal and external resources. Both resource types are necessary to meet the capability needs of such a large-scale Program. AEMO anticipates using external resources to ramp up delivery through vendors and consultants where necessary.

Figure 6 Indicative FTE profiles



2.7 Options benefits analysis (qualitative)

Benefits have not been quantified for this Gate 1 business case, however a qualitative description of benefits associated with each option appears in the table below. Cells shaded in green reflect the option that performs better against the qualitative benefit.

Table 8 Summary of qualitative benefits for each option

Qualitative benefit	Option 1: Regulatory-led	Option 2: Strategic
Scalability	Will enable the minimum capabilities required to support the reforms. Given the rapid transition, it could mean that systems are unable to meet changing needs shortly after the reforms are delivered. This would not only require uplifting the systems and duplicating effort, but it could also pose risks that industry is not adequately prepared to meet the challenges to the system presented by a rapid transformation.	Implementing foundational target state technology architecture in Option 2 supports future anticipated capability needs and helps remove industry pain-points. The energy transition is rapidly transforming the system and markets. Delivering reforms through future state systems supports scalability and facilitates faster and more flexible adaptation as new markets mature and continue to change the energy landscape. This limits the number of investments that may be needed in future. This flexibility to adapt to future changes facilitates the extent to which Option 2 can deliver reforms through technical infrastructure that can support capabilities beyond those required for 'day 1'. However, the scope of certain reform initiatives is nonetheless limited to enabling 'day 1' needs. This includes the DER Marketplace initiatives to enable dynamic operating envelopes and DER Operational Tools. Nonetheless, while the needs enabled may be 'day 1' scope, delivering the initiatives through foundational target state systems means it will be more efficient to scale when needed.
Program optimisation	Option 1 places less consideration on shared system impacts and future state technology efficiencies in order to deliver reforms as quickly as possible using legacy systems. While Option 1 has a reduced number of initiatives running concurrently, it does require more releases over the duration of the Program. This potentially negates any benefits obtained from the reduced number of initiatives as a result of increased disruption from an inconsistent cadence and higher number of releases.	Option 2 results in a periodic cadence of releases which is transparent to industry. This periodic cadence also means that more consideration can be given to shared system impacts to minimise the number of times 'the hood is opened up' for impacted systems. Leveraging synergies can also reduce duplication of delivery effort, avoiding the need for system changes to first implement reforms onto legacy systems and then to upgrade and migrate to new systems later, as is required in Option 1. The resulting program optimisation minimises disruption to industry and supports a more structured approach to balancing delivery and 'business as usual' initiatives. This also enables participants to manage and plan their roadmaps and investments for the energy transition.
Removing industry pain points	Option 1 does not remove the industry pain points and associated operational and administrative inefficiencies in as timely a manner.	The future state architecture seeks to remove industry pain points of being required to interact through different access points, causing an inconsistent, fragmented and duplicated user experience when accessing AEMO's systems. For example, it will enable participants active in different processes and/or markets to provide one update for organisational data rather than multiple times through different applications and by engaging with multiple AEMO business units. It also creates operational efficiencies for AEMO in activities needed to support the performance of its functions, such as data collection, validation and analysis. This has the cascading effect of also reducing operational and administrative burden for participants.
Managing industry uncertainty	Option 1 has lower need to make an educated guess on what the future reforms look like. This enable a focus on building components that are appropriate and less likely to be stranded.	Option 2 does require deploying some based solutions ahead of reforms being completely articulated.

2. Options Assessment

Qualitative benefit	Option 1: Regulatory-led	Option 2: Strategic
Deliverability	Option 1 has Program implementation running over a longer period which stretches the resource effort over a longer period and hence requires fewer FTEs at any given point in time relative to Option 2. This may enhance deliverability of the Program. It also enables the delivery of the reforms to be decoupled from the pre-requisite technology uplift, which can de-risk the reform delivery.	Option 2 has a more ambitious up-front scope and may mean that reforms have a higher risk of delivery due to: <ul style="list-style-type: none"> Higher need for resources (from both AEMO and industry participants) at any given point in time; and More complex project delivery as a result of multiple projects running concurrently within the NEM2025 Programs, as well projects outside the NEM2025 Program. This can be mitigated by the delivery model selected by the Program.

Various qualitative benefits from Option 2 outlined above – namely, scalability, program optimisation, and removing industry pain points – are delivered through earlier and concurrent implementation of the foundational initiatives deferred under Option 1. Specifically, these are the initiatives in Project 2, Work Package 1 relating to Identify and Access, and the target state initiatives in Project 4, Work Package 2 – Dispatch, Constraints, Bids/Offers, and FRC Target State.

At this stage it is not practicable to secure reliable and meaningful industry-wide cost data to quantify participant impacts. The cost difference outlined in this business case between the two options with regard to deferring the implementation of these initiatives arises through Program governance and management, and change management costs and additional and duplicated implementation effort due to inefficiencies related to delivering reforms onto legacy systems, retrofitting functionality. These were discussed earlier in section 2.4.

The qualitative benefits from implementing these initiatives concurrently with reforms are outlined below.

Table 9 Summary of qualitative benefits of Option 2 for participants

Work Package	Description of qualitative benefits for participants
P2 WP1: Identity and Access: <ul style="list-style-type: none"> Identity and Access Management Industry Data Exchange Portal Consolidation Consolidated Master Data Repository (Foundation Expansion) 	<ul style="list-style-type: none"> This inter-related work program will enable capabilities for a consolidated user interface and user management experience that will facilitate a consistent user experience. As the transition facilitates more participants (existing and new) being active in various markets and processes, this initiative will enable a one-stop service, including for managing users, and user roles and rights; Similarly, a consolidated master data repository will improve the Participant user experience by consolidating data contained within multiple applications storing data in silos. This means participants will be able to access a single source of truth for all of their data; Providing a single source of truth also reduces the need for a Participant active in different process and/or markets to provide organisational data multiple times through different applications. Participants will be able to provide one update that will map across various AEMO applications and remove the need for participants to engage with multiple AEMO business units; Consolidated systems and data exchange standards will lower entry barriers for new participants and accelerate the delivery of the reforms' objectives by facilitating the development and maturity of the markets in the transition; It also provides benefits to incumbent participants by delivering streamlined process and supporting speed of innovation and potential new business opportunities that result in overall efficiency in a rapidly changing energy landscape, and operational (e.g. time and administrative) efficiencies; and These initiatives enhance the ability to flexibly and quickly adapt to market developments that result in overall efficiency in the fast-paced transformation the sector is experiencing, and which is expected to continue.
P4 WP2: Target States (Dispatch, Constraints, and Bids/Offers)	<ul style="list-style-type: none"> Adopting modern delivery frameworks improves the ability to deliver changes to these mission critical platforms, an activity that will be increasingly required as the energy transition continues; This results in value through reduced sunk enhancement costs to systems nearing their end of technical life; and

Work Package	Description of qualitative benefits for participants
P4 WP2 Target States (FRC)	<ul style="list-style-type: none"> Bringing forward the implementation of the core platforms – already planned due to it been close to end of life – strengthens the benefits of avoiding sunk technology costs. Unifying interface protocols and methodologies removes duplication efforts for participants. It also enables easier market changes through reduced dependencies on code changes. This reduces the time and effort needed to implement Procedure changes and enables third-parties to provide system solutions at lower prices; A consolidated FRC platforms enables visibility of all markets data in one system and utilising the same toolsets. This creates operational efficiencies that will enable AEMO to manage interactions with participants more efficiently; and As the reforms support the transition and development and maturity of new markets, these operational efficiencies will benefit both incumbent and new participants.

2.8 Program risks and delivery challenges

Both pathway options create significant demands upon AEMO and industry for delivery. The challenges arise through both options but are amplified under Option 2 because it comprises more initiatives that would be implemented concurrently. While Option 2 remains the preferred approach because of the lower costs and qualitative benefits, its challenges regarding uncertainty and stakeholder feedback means a stage gate approach to implementation is required.

The NEM2025 Program will also develop and maintain a risk register (covering deliverability and other risks) using AEMO's EPO approach.

Table 10 Deliverability challenges

Area	Description
Scope and timing	<ul style="list-style-type: none"> Reform uncertainty: Changes to policy and rules scope and market designs will impact on known and not-yet-known initiatives, increasing Program scope and/or complexity; Capacity Mechanism and Congestion Management Mechanism initiatives: These are not included in the original versions of the roadmaps and will add to the resource load and have not been estimated in terms of dollars and Pre-requisite initiatives: While there is a sound and logical narrative for pre-requisites, stakeholder feedback from consultation on version 1 of the roadmap indicates many stakeholders are not convinced all pre-requisite initiatives are needed.
Resourcing	<ul style="list-style-type: none"> AEMO has a series of concurrent internal projects competing for resources to deliver various projects; Participants projects will also be completing for resources to assist with delivery of their reform programs; and External resourcing support can be acquired, and with the right partner can assist in leveraging business and technical SMEs. However, this is finite, and the demands on SMEs is high under both Options. Further, with inflation, a tight labour market and disrupted supply chains, there is a potential that external resourcing may prove difficult to lock in at the rates budgeted.
Ambitious timeline	<ul style="list-style-type: none"> The roadmap has little contingency for delays and limited allowance for significant issues. This would result in cascading issues if or when (part of) the Program runs into difficulty; Almost all reform implementations require a period for 'bedding-in' post go-live, including enhancements that are important and crucial but deferred to post go-live in the interests of meeting the date. Current timeline does not include an allowance for this, and the next implementation is due within 6 months. This will be a particular challenge between October and March releases due to the summer period; and The roadmap does not take account of participant development timelines, it assumes the development can be done within the existing AEMO timelines – noting that participant development necessarily has to lag AEMO.

2.9 Preferred option

Option 2, a Strategic pathway, has a lower cost, reducing the burden on participants, consumers and AEMO over the 10-year assessment period. This is primarily because under Option 2:

- Initiatives are designed and delivered from the beginning based on target state systems, thus reducing the implementation effort across the program;
- The overall program implementation period runs over a shorter timeframe, thus reducing delivery overheads such as program management costs; and
- The approach facilitates and prioritises periodic cadence of releases transparent to industry. This periodic cadence also means that shared system impacts are considered and provide cost efficiencies through optimised implementation effort.¹⁴

Option 2 also provides the following key qualitative benefits:

- Establishes the foundations for scalability and future-proofing of systems ensuring investments keep pace with rapid transition and can flexibly adapt to deliver capabilities and support functions beyond 'day 1' when needed;
- Shared system impacts are considered, and synergies are leveraged to reduce duplication of delivery effort and disruption;
- Regular cadence of releases and reduced number of scheduled releases provides consistency for industry. This reduces disruption to industry and supports a better balance with 'business as usual' initiatives;
- Reforms will be delivered into future state systems to the extent possible which avoids duplication of effort and disruption caused by migrating and retrofitting that would otherwise be needed at a later date if initiatives were implemented through legacy systems. It also supports industry in managing their own transition roadmaps and investments; and
- The foundational technology provided via the 'pre-requisite initiatives removes existing industry pain-points. This has the additional benefits of improving operational and administrative efficiencies for participants.

Having considered stakeholder feedback, the proposed approach is a hybrid pathway complemented by a stage gate process. The Regulatory-Led option is proposed ensuring mandatory reforms are delivered in a timely way. The NEM2025 budget envelope includes the full scope of the Strategic option, but draw-down is subject to a progressive commitment process informed by rule changes and the stage gate process.

The stage gate process is undertaken for all initiatives that are part of NEM2025 scope, to manage uncertainty and provide for appropriate implementation disciplines. The stage gate process for AEMO strategic/foundation initiatives will also include cost benefit analysis and industry consultation.

The remainder of this business case describes how AEMO proposes to deliver the program of work in line with the proposed Hybrid Pathway (the 'NEM2025 Program') and more detailed view of program costs.

¹⁴ While release cadence is critical to managing delivery under any delivery option and AEMO – both for its and industry's benefit – would seek to establish periodic release cadence where possible, such cadence opportunities are easier to plan under Option 2. That's because Option 1 is regulatory-led – this assumes that a release will be required to align with the rules' effective date. Where possible, other initiative releases will be aligned with these dates but there could be scenarios where effective dates (and therefore releases) occur within a period shorter than the desired period cadence.

3 The NEM2025 Program

3.1 NEM2025 Program objectives

AEMO has delivered many large reform-driven programs of work. However, the NEM2025 Program represents the most comprehensive reform package sought to be implemented since the NEM's inception in 1998. As a result, it needs careful planning and high levels of industry engagement to be successful.

The key objectives of the NEM2025 Program are to:

- **Work collaboratively with industry:** While AEMO will ultimately be responsible for delivering the NEM2025 Program, the Program will be run with high levels of industry engagement. In particular, the Program aims to provide industry with a clear forward view of the periodic deployments of capability aligned with the ESB's reform timelines. This will assist industry with their own planning and delivery activities to be ready for each reform as it is operationalised;
- **Deliver effective solutions:** The Program will work closely with ESB and industry to ensure the solutions that are developed meet the ESB's reform objectives and are aligned with AEMO's target state architecture; and
- **Deliver as efficiently as possible:** The NEM2025 Program will be structured to be delivered as efficiently as possible. This will be realised through the optimal bundling and sequencing of projects within the Program, and where possible identifying and driving out costs through solution design and implementation, as well as through Program governance and management that continually monitors Program costs.

Figure 7 NEM2025 Program objectives

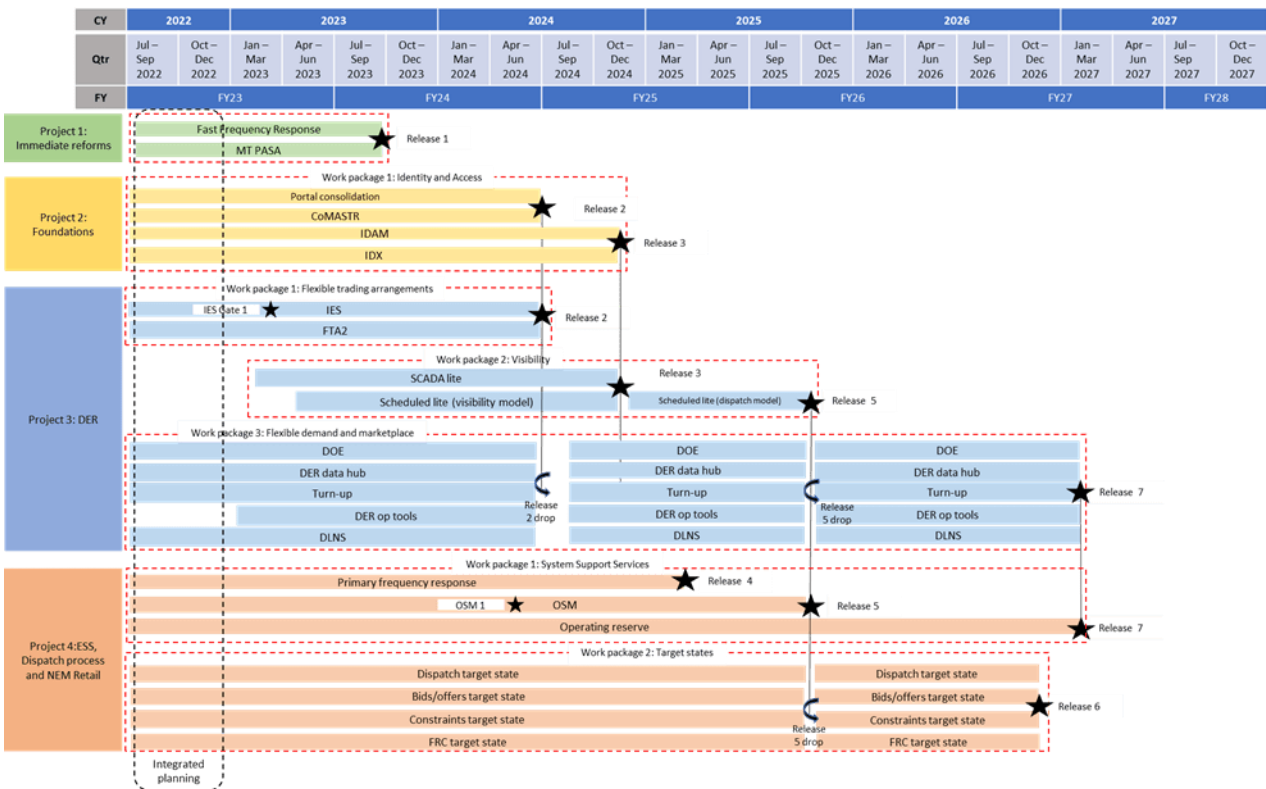


3.2 NEM2025 Program implementation roadmap

For delivery purposes, initiatives have been bundled into logical Work Packages, with each Work Package having one or more ‘drops’ of capability over the duration of the NEM2025 Program.

A candidate implementation plan for the NEM2025 Program has been constructed in line with Option 2 (and only includes the initiatives covered by this business case). This sequencing has been used for the purposes of the financial analysis in this Gate 1 business case. However, it will continue to be worked on with input from the market through an integrated planning phase.

Figure 8 NEM2025 Work Package sequencing



3.3 NEM2025 Program governance and delivery

The NEM2025 Program will be a large, complex Program. As a result, a number of important governance and delivery elements will apply to the Program. The proposed structure of the NEM2025 Program appears below.

3. The NEM2025 Program

Figure 9 NEM2025 Program delivery structure

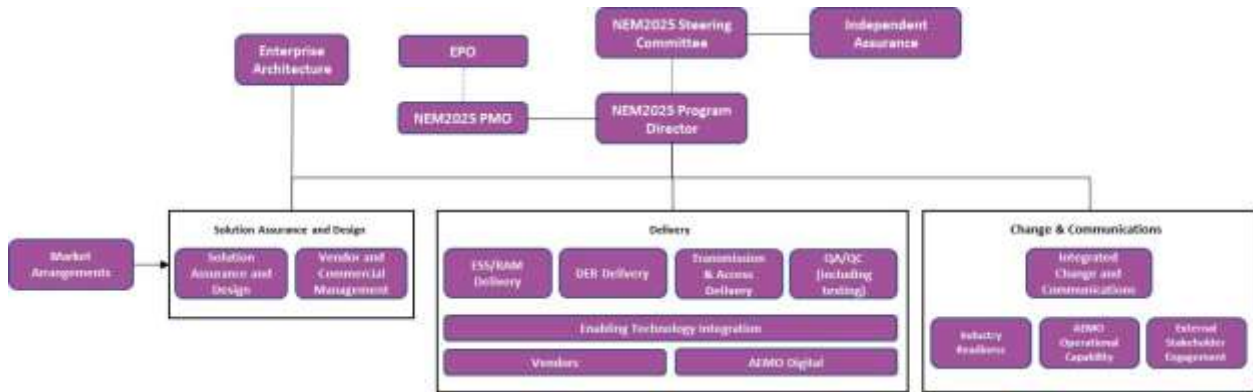


Table 11 Summary of Program delivery roles and responsibilities

Program role	Summary of responsibilities
NEM2025 Steering Committee	<ul style="list-style-type: none"> Executive-level body which oversees the NEM2025 program and has decision-making authority within the bounds set by the Investment Committee and Board.
Executive Program Sponsor	<ul style="list-style-type: none"> Accountable for achieving business outcomes, delivering benefits and accepting risks and operating costs of the program; and Facilitates engagement with relevant AEMO teams to ensure collaboration and information sharing.
Independent Assurance	<ul style="list-style-type: none"> Independent third party engaged to provide periodic assessments of Program health; and Reports to NEM2025 Steering Committee.
EPO	<ul style="list-style-type: none"> Facilitates, support and governs the program and project management standards, methodologies, processes and tools mandated across AEMO, and will be applied on NEM2025 Program. The EPO provides an independent review and assessment across the broader enterprise Portfolio and facilitates investment decision making through several key governance & investment forums. The EPO will ensure the projects move appropriate through the EPO stage gate processes.
NEM2025 Program Director	<ul style="list-style-type: none"> Day-to-day responsibility for running the NEM2025 Program; and Reports to NEM2025 Steering Committee.
NEM2025 PMO	<ul style="list-style-type: none"> Enables the program and project management function in alignment with the EPO standards, tools and methodologies for the NEM2025 Program; and Undertakes functions such as Program reporting, Program budget tracking, risk and issue register maintenance and Steering Committee pack preparation and minuting.
Solution Architecture and Design	<ul style="list-style-type: none"> Provides the overarching alignment of business and technology strategic outcomes through roadmaps, architectures and transformational change impact management; Also provides the sequencing and integrated release planning of design and delivery; and Includes Business Design Authority, Architecture Design Authority and Change Approval Board.
Vendor and Commercial Management	<ul style="list-style-type: none"> Supports the program in the procurement and ongoing management of vendors including performance and execution to contract.
Delivery	<ul style="list-style-type: none"> Combined teams (business, AEMO digital and partner vendors) responsible for developing requirements and designing delivery to meet reforms, updating policies and procedures, and delivering technology changes.
Change and Communications	<ul style="list-style-type: none"> Internal communications and change management including training and embedment; External communications; and Industry readiness.

The change management process

Given the uncertainty and/or complexity of individual initiatives that make up the NEM2025 Program and the high likelihood of incremental or material changes in scope or timelines as policy or designs are finalised, a

3. The NEM2025 Program

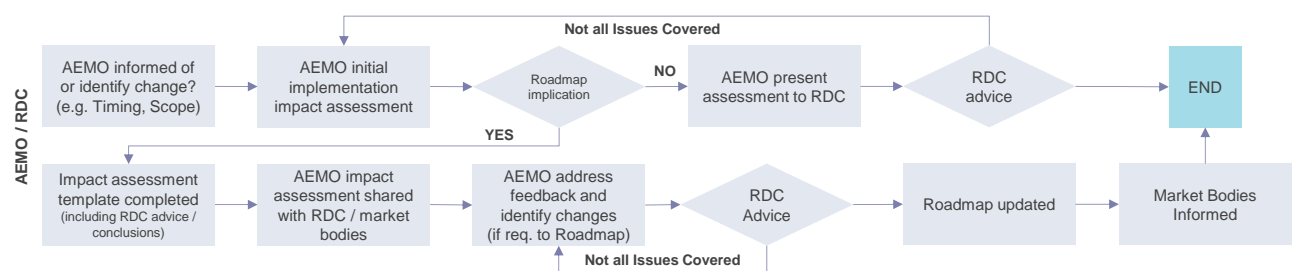
change management process has been proposed for the NEM2025 Program (see Figure 10). This change management process seeks to understand the potential impacts associated with proposed changes captured via the Roadmap and to help inform decision-makers on potential approaches or solutions to those impacts.

The change management process targets those material changes from the policy and rules process including introduction of new initiatives, changes in scope and/or timeline changes. A material change refers to:

- A change in scope that impacts on the complexity of the initiative, leading to a higher or lower level of complexity rating under the Roadmap (e.g. moves the complexity from Medium to Large, or Medium to Small). This type of change will impact timeline and cost; or
- A change in timeline that impacts the implementation timing of the initiative, requiring an adjustment of two (2) months or more. This threshold is selected as an adjustment of two months or more is likely to lead to the implementation timing moving into a different implementation window.

The process provides for engagement with the RDC and relevant market bodies, the completion of an impact assessment and standing quarterly review process. All changes are to be assessed against a baseline comprising the current version of the Roadmap, initiative briefs, cost estimates, and participant impact assessments.

Figure 10 Indicative Change Management Process



This analysis, when required, will form part of the basis of the stage gate approach discussed further below.

The stage gate approach

The challenges and risks resulting from policy and regulatory uncertainty (and therefore scope uncertainty) means that a 'set and forget' funding strategy that establishes a multi-year overall fixed budget in not appropriate for the Program. Accordingly, this business case proposes to adopt a hybrid pathway complemented by a stage gate process. This approach commits to Option 1 (Regulatory-led pathway) to undertake mandatory and no regrets initiatives in a timely way. It also sets the NEM2025 budget envelope including the full scope of Option 2 (Strategic pathway) where draw-down is subject to a progressive commitment process informed by rule changes and the stage gate process.

The stage gate process will be applied for all initiatives that are part of NEM2025 program scope, to manage uncertainty and provide for appropriate implementation disciplines. This approach will also be applied to initiatives / reforms that are part of the NEM2025 scope but not yet covered by this business case (and its funding envelope) such as the Capacity Mechanism and Congestion Management Mechanism. Accordingly, once more information is available to inform scoping and cost estimates, AEMO will follow the Program governance process to seek an extension of the funding envelope to include these additional reforms. This approach provides a mechanism to manage the uncertainty and establishes appropriate investment discipline. Stage gate checkpoints will occur after:

3. The NEM2025 Program

- An initiative has been properly scoped with a high-level design, and where Participant consultation has been undertaken (where relevant) to determine industry impacts and support; and
- An initiative has been planned, including cost and resources, the timeline on the roadmap has been confirmed, and it has been confirmed as deliverable overall.

Six stage gate checkpoints have been identified, at this stage, noting that flexibility to rearrange may be required subject to reform developments in relation to scope and timing. Importantly, each stage gate is not a prosecution of the reform / policy itself but rather an assessment of the activities and approach to ensure effective delivery.

Table 12 Stage gate checkpoints

Stage Gate	Initiative	Description	Anticipated timing (calendar)	Actor responsible for action
-	Initial Business Case (this document)	Presents the holistic view and sets overall budgetary envelope subject to a draw-down mechanism.	Q3 2022	AEMO endorsement, informed by stakeholder views.
1	Immediate Reforms	Mandatory Initiatives for 2022 Rules Determinations IESS, FFR, MT-PASA, PFR and OSM	Q3 2022	AEMO, informed by stakeholder views.
2	Capacity Mechanism and Congestion Management Mechanism	Stage Gate 2A: Capacity Mechanism Stage Gate 2B: Congestion Management Mechanism Separated due to possible different policy timelines for each initiative.	Subject to policy makers' timing	Government and/or ESB where relevant determines the need for the mechanisms and the form of the model. As part of the mobilisation and delivery of the initiatives within the stage gate, funding commitments will be made in accordance with AEMO's defined investment approval processes and supported by the mandate from the legislation/rule change. RDC role: <ul style="list-style-type: none"> • Policy development: advice on implementation approach/timing for overall roadmap; and • Final Determination (or equivalent): Implementation mobilisation advice.
3	Strategic pre-requisites	Stage Gate 3A: Identity & Data bundle: IDA, IDX (noting pre-existing participant consultation should be leveraged), CoMASTR and Portal Consolidation. Stage Gate 3B: Dispatch Bundle (including dispatch, constraints and bids/offers target state). Stage Gate 3C: FRC target state. Integrated design, plan and cost/benefit to be prepared, industry engagement to be conducted.	Q1 2023 Q3 2022 Q1 2023	AEMO, informed by stakeholder views. RDC role: Advisory on whether/when and how the initiative proceeds.
4	DER Flexible Demand and Marketplace (Project 3, Work Package 3)	Stage Gate 4: Turn-up services, DOEs, DER Data Hub & Registry services, Distribution/local network services and potentially DER Operational Tools. Scope is subject to change once Policy/Trials complete (impacting budget, timeline and responsibilities).	Mid 2023	AEMO, informed by evidence base of industry trials (e.g. ARENA trials such as Project EDGE), and subject to input and support from industry. AEMO will only implement roles and responsibilities that apply to AEMO and which have been agreed by industry

3. The NEM2025 Program

Stage Gate	Initiative	Description	Anticipated timing (calendar)	Actor responsible for action
		Co-ordinated approach with DNSPs may be valuable, to ensure roles are clear and scope for each role is defined.		<p>and mandated via the rule change process.</p> <p>Overall implementation responsibilities need to be coordinated across the relevant impacted participants who hold responsibilities for the related functions. For example, many of these reforms will be DNSP-led, working with aggregators.</p> <p>RDC role:</p> <ul style="list-style-type: none"> • Policy development: advice on implementation approach/timing for overall roadmap; and • Final Determination (or equivalent): Implementation mobilisation advice.
5	Next Reforms	Mandatory initiatives for 2023 Rules Determinations. FTA2, Scheduled Lite & SCADA Lite, OR	Indicative mid/late 2023, subject to Rules timing	<p>AEMO, informed by stakeholder feedback.</p> <p>RDC role:</p> <ul style="list-style-type: none"> • Policy development: advice on implementation approach/timing for overall roadmap; and • Final Determination (or equivalent): Implementation mobilisation advice.
6	Data Strategy	The four reform initiatives for the Data Strategy (Data Services, Bill Transparency, Electric Vehicles, Network Visibility) are at an early conceptual policy and stakeholder consultation phase. As such, it is not possible to make an informed cost estimate that properly takes into account responsibilities, timeline, and design. Commitment (approval to proceed) to enable mobilisation of project ready for execution.	Indicative Mid 2023 (subject to policy development)	<p>The ESB determines the design for the different elements of the strategy.</p> <p>AEMO's internal program governance approves the spend to implement (supported by the mandate from the legislation/rule change).</p> <p>RDC role:</p> <ul style="list-style-type: none"> • Once high-level Policy work complete: advice on implementation approach/timing for overall roadmap; and • RDC role Final Determination (or equivalent): Implementation mobilisation advice.

4 NEM2025 Program financial analysis

4.1 Financial analysis approach

A financial model has been developed to estimate the costs associated the NEM2025 Program. Reflective of the fact the model has been developed for this Gate 1 Business Case (which is developed prior to market engagement), it is necessarily based on a number of key assumptions and benchmark data, particularly in relation to NEM2025 Program scope, duration, the level of internal versus external resourcing to deliver the Program and the associated labour rates.

The financial model has been designed to deliver estimates that are considered to be at a target +/-40% level of accuracy to account for an increase or decrease in Program costs as a result of changes to the assumed scope and complexity of reforms with policy and design uncertainty. If this business case is endorsed, the assumptions will be further validated through the stage gate checkpoints and process. That process will occur after an initiative has been properly scoped with a high-level design, Participant engagement has determined the impacts and support required (where relevant) and the initiative has been planned, including costs and resources, and the timeline to implement and overall deliverability has been confirmed.

A change to the key assumptions underpinning the NEM2025 Program financial model could result in significant deviation from the estimated Program costs. For example, the assumptions include the number of initiatives covered by this business case, the Work Package commencement and end dates, and financial assumptions such as discount rate, escalation rates and internal and external labour rates. Underpinning the costs for each Work Package is an estimate on the implementation effort based on complexity sizes. If scope or design were to change to the extent an amendment of the complexity size was required, this would significantly change the implementation effort and cost calculation.

4.1.1 Cost categories

Table 11 provides a summary of the cost categories quantified in this business case, what is included in each cost category, and the methodology used to quantify each cost category.

Table 13 Cost categories and quantification methodology

Cost category	Intended cost coverage	Methodology
Program Governance costs	<ul style="list-style-type: none"> • Program Steering Committee • Program Assurance Partner 	<ul style="list-style-type: none"> • Program Governance costs were determined by applying a benchmark rate to the implementation costs for each Work Package. These benchmarks are based on a sample of large-scale transformation Programs, globally in the electricity sector, with a significant technology component at core; • Program Governance costs were allocated between internal resources and external resources costs using industry benchmarks; and • Program Governance costs were assumed to be capitalised into the Program costs and therefore treated as capex.
Program Management costs	<ul style="list-style-type: none"> • NEM2025 Program Director • Program Management Office • Vendor and Commercial management • Program Delivery Partner • Risk management 	<ul style="list-style-type: none"> • Program Management costs were determined by applying a benchmark rate to the implementation costs for each Work Package; • Program Management costs were allocated between internal resources and external resources costs using industry benchmarks; and • Program Management costs were assumed to be capitalised into the Program costs and therefore treated as capex.

4. NEM2025 Program financial analysis

Cost category	Intended cost coverage	Methodology
Change Management costs	<ul style="list-style-type: none"> Organisational change management including change impact assessment, business readiness, training; and External stakeholder engagement and communications. 	<ul style="list-style-type: none"> Change Management costs were estimated by applying benchmark rates to the implementation costs for each Work Package; Change Management costs were allocated between internal resources and external resources costs using industry benchmarks; and Change Management costs were assumed to be capitalised into the Program costs and therefore treated as capex.
Incidental costs	<ul style="list-style-type: none"> Travel Other Program incidentals 	<ul style="list-style-type: none"> Incidental costs were estimated by applying a benchmark rate to the implementation costs for each Work Package; and Incidental costs were assumed to be non-labour costs capitalised into the project costs and therefore treated as capex.
Initiative Implementation costs	<ul style="list-style-type: none"> For each initiative: <ul style="list-style-type: none"> Plan Design Build Test Deploy Support Procedure and business process changes associated with the initiative, and effort to support industry readiness. 	<ul style="list-style-type: none"> Implementation costs form the basis of several other Program costs, hence there is a more detailed overview of the approach and methodology used to estimate implementation costs in section 4.1.2; and Data cleansing and migration costs were assumed to be part of the design, build, test and deploy phases of implementation phase costs.
Upfront technology costs	<ul style="list-style-type: none"> Upfront technology costs 	<ul style="list-style-type: none"> Upfront technology costs incurred as part of the implementation of Work Packages and were calculated as a percentage of the implementation costs for each Work Package; An additional percentage was applied to the Work Packages that will use meter data because accessing and processing that data increases costs. The impacted Work Packages were identified through the system impact heatmap and include those that impact Retail systems (CATS); and Upfront technology costs were assumed to be non-labour costs capitalised into the project costs and therefore treated as capex.
Ongoing costs	<ul style="list-style-type: none"> Non-labour costs such as ongoing annual licence and cloud fees Internal labour support costs 	<ul style="list-style-type: none"> Licence and cloud fees will be an annual fee payable by AEMO to vendors and are calculated as a percentage of the implementation costs for each Work Package. The model assumes a bundled 'software as a service' annual fees akin to a subscription model is paid by AEMO to vendors for each Work Package; An additional percentage was applied to the Work Packages that will use meter data because accessing and processing that data increases costs. The impacted Work Packages were identified through the system impact heatmap and include those that impact Retail systems (CATS); Internal labour support costs include any costs for additional employees required as additional operational business support staff and digital staff for the new systems; and Ongoing costs (both labour and non-labour) were assumed to start from the completion of the implementation phase for each Work Package and considered as ongoing expenses and therefore treated as operational expenditure.

4.1.2 Calculation methodology

Much of the NEM2025 Program cost relates to the initiative implementation costs, covering system implementation and business process/procedure changes. Therefore, the implementation cost for each initiative was estimated based on its complexity (being one of very small, small, medium, large or very large). The table below describes the factors taken into consideration when assigning a complexity rating to each initiative.

Table 14 Complexity considerations

Complexity Rating	Work Type	Systems	Functions	Integration	Data	Users	Infrastructure	Scale of change ¹⁵	Industry involvement
Very Small	Metadata / Simple configuration / Strategy	One or two (existing)	One or two	None	Little to none	Few	Existing / SaaS	Small	Little to none
Small	Configuration	One or two (existing)	One or two	Little to none	Little to none	Few	Existing / SaaS	Small	Little
Medium	Configuration & Customisation	Several (existing or new)	Several	Several	Moderate volumes	Many	Existing and New	Medium	Some
Large	Configuration & Customisation	Many (existing and new)	Many	Several	High volumes	Many	Existing and New	Large	Large
Very Large	Configuration & Customisation	Many (existing and new)	Many and/or mission critical	Many	High volumes	Many	Existing and New	Large	Extensive

Using a combination of the types of resources, the estimated number of resources and the estimated number of days effort, a total effort estimate was calculated for each complexity rating as summarised in the table below.

Table 15 Effort estimate by complexity rating

Complexity rating	Plan	High level design	Detailed design	Procedures	Build	Test	Deploy	Support	Total
Very Small	24	32	72	24	90	50	20	30	342
Small	35	91	135	54	170	128	30	60	703
Medium	128	162	420	196	480	320	120	140	1,966
Large	338	612	1,200	600	1,200	720	285	300	5,255
Very Large	476	798	2,050	2,788	4,300	2,100	540	1,140	14,192

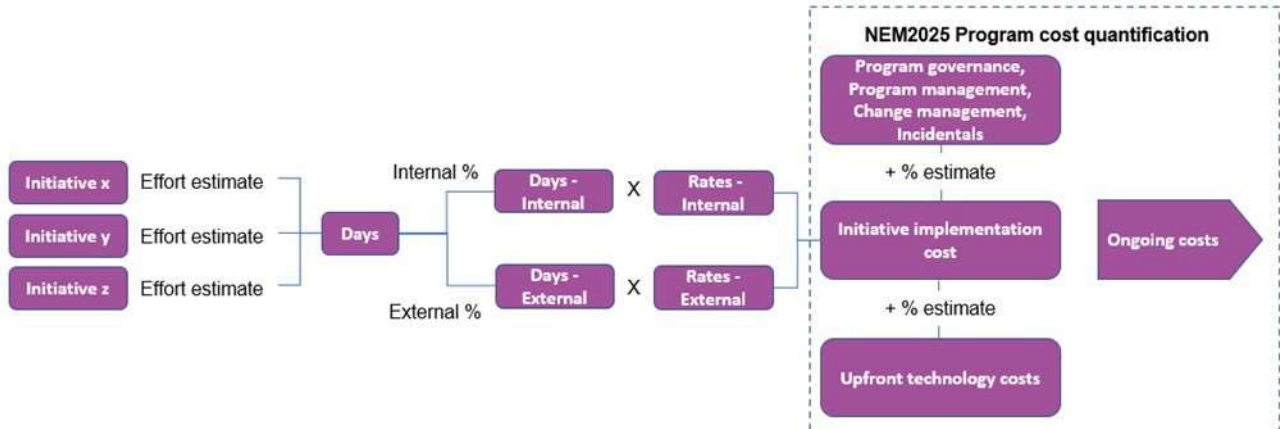
The total effort required for each initiative (based on the complexity rating assigned to the initiative) was then allocated between internal (AEMO) and external resources (covering delivery partners such as software vendors and system integrators) using industry benchmarks. These industry benchmarks were stress tested against other large-scale projects delivered by AEMO, including 5-Minute Settlements and Wholesale Demand Response. The industry benchmarks were adjusted (increased) to account for AEMO's unique role in the consultation process to update procedures and guidelines, and its role in facilitating industry readiness for such a large-scale reform program. Adjusting the industry benchmarks was necessary because the effort associated with these additional responsibilities performed by AEMO was not otherwise accounted for.

The cost for the internal and external labour was then estimated by applying the respective labour rates for internal and external resources sourced from AEMO (a project financial tracking template that includes a summary of resources, tiers and rates) and electricity industry benchmarks respectively. This provided a total cost estimate for the implementation costs for each initiative within the Program.

The costs of the other elements of the Program (e.g. program governance, program management, change management, incidental costs, upfront technology costs and ongoing costs) were estimated based on a combination of bottom-up estimates and benchmark data. The process is summarised in the figure below.

¹⁵ Scale of change includes internal process documents and external Procedures and Guidelines.

Figure 11 NEM2025 Program costing overview



4.2 Financial analysis

The NEM2025 Program is assumed to commence on 1 July 2022. Costs for each Work Package are modelled from the commencement of the implementation phase of each Work Package and over a 10-year Program evaluation period ending on 30 June 2032.

Over the life of the Program, the NEM2025 Program is estimated to cost \$425 million in nominal terms (\$347 million in NPC). This consists of upfront capital expenditure of \$252 million in nominal terms (59% of the total Program cost) and ongoing operating expenses over the life of the Program is \$174 million in nominal terms.

Table 16 Total Program costs (\$M)

Work Package	Real	Nominal	NPC
P1 WP1: Immediate Reforms	\$12	\$14	\$11
P2 WP1: Identity and Access	\$83	\$92	\$76
P3 WP1: Flexible Trading Arrangements	\$59	\$65	\$54
P3 WP2: Visibility	\$33	\$37	\$30
P3 WP3: DER Flexible Demand and Marketplace	\$32	\$36	\$29
P4 WP1: Frequency Control, Security and Reserves	\$50	\$58	\$46
P4 WP2: Target States	\$109	\$124	\$100
Total Program costs	\$379	\$425	\$347
<i>Total Program costs with 40% uncertainty increase</i>	<i>\$530</i>	<i>\$596</i>	<i>\$485</i>
<i>Total Program costs with 40% uncertainty decrease</i>	<i>\$227</i>	<i>\$255</i>	<i>\$208</i>

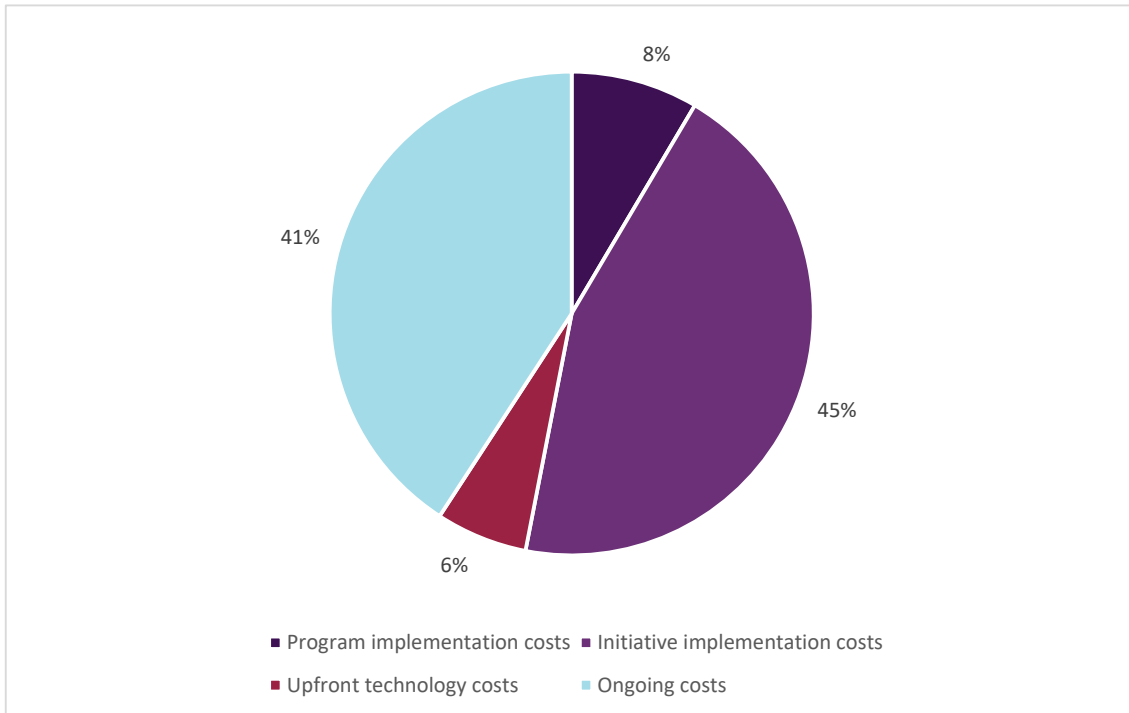
4. NEM2025 Program financial analysis

The Program cost breakdown by cost category is set out in table below, with the percentage split shown in Figure 11.

Table 17 Total Program costs by cost category (Nominal, \$M)

Work Package	Program implementation costs	Initiative implementation costs	Upfront technology costs	Ongoing costs	Total Program costs
P1 WP1: Immediate Reforms	\$1	\$4	\$0	\$8	\$14
P2 WP1: Identity and Access	\$7	\$38	\$6	\$42	\$92
P3 WP1: Flexible Trading Arrangements	\$5	\$27	\$4	\$28	\$65
P3 WP2: Visibility	\$3	\$17	\$2	\$14	\$37
P3 WP3: DER Flexible Demand and Marketplace	\$3	\$18	\$2	\$13	\$36
P4 WP1: Frequency Control, Security and Reserves	\$5	\$26	\$3	\$23	\$58
P4 WP2: Target States	\$11	\$59	\$9	\$45	\$124
Total	\$36	\$190	\$26	\$174	\$425

Figure 12 Total Program cost split



Approximately 45% of the total Program costs relate to initiative implementation, 8% to Program implementation (covering items such as Program governance, Program management, change management), 6% to upfront technology costs, and the remaining 41% are ongoing costs out 10 years.

The forecast split of Program costs between operating and capital expenditure appears in Figure 13, while Figure 14 shows the split between internal and external costs.

Figure 13 Operating versus capital expenditure

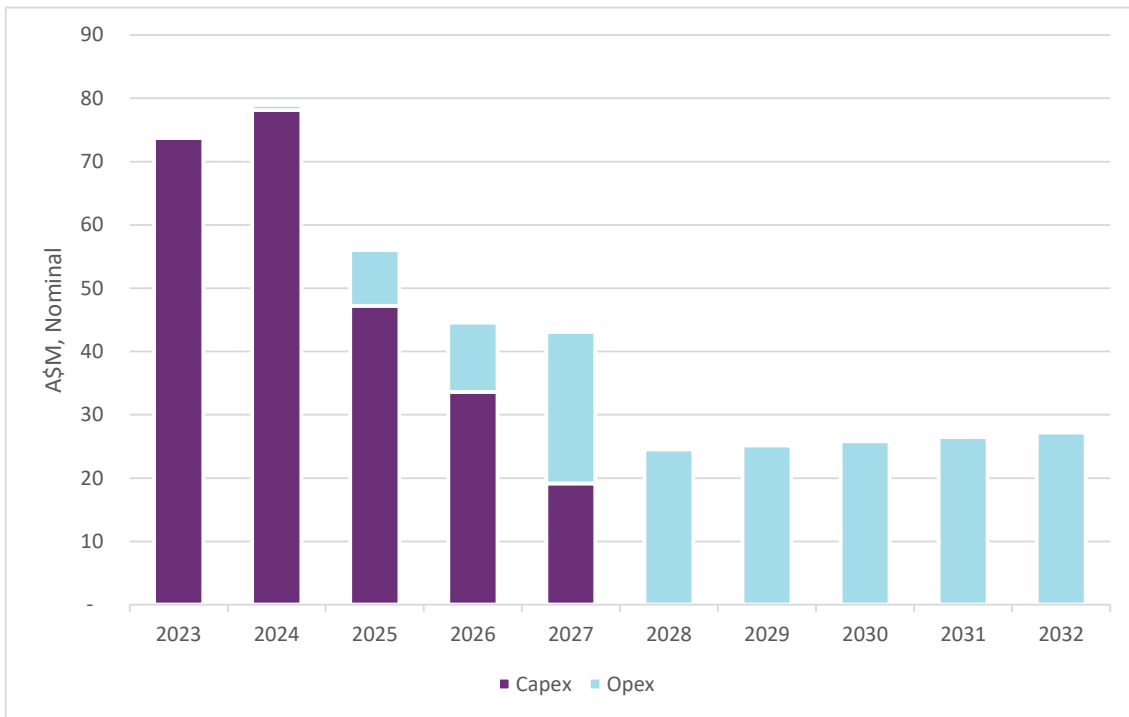
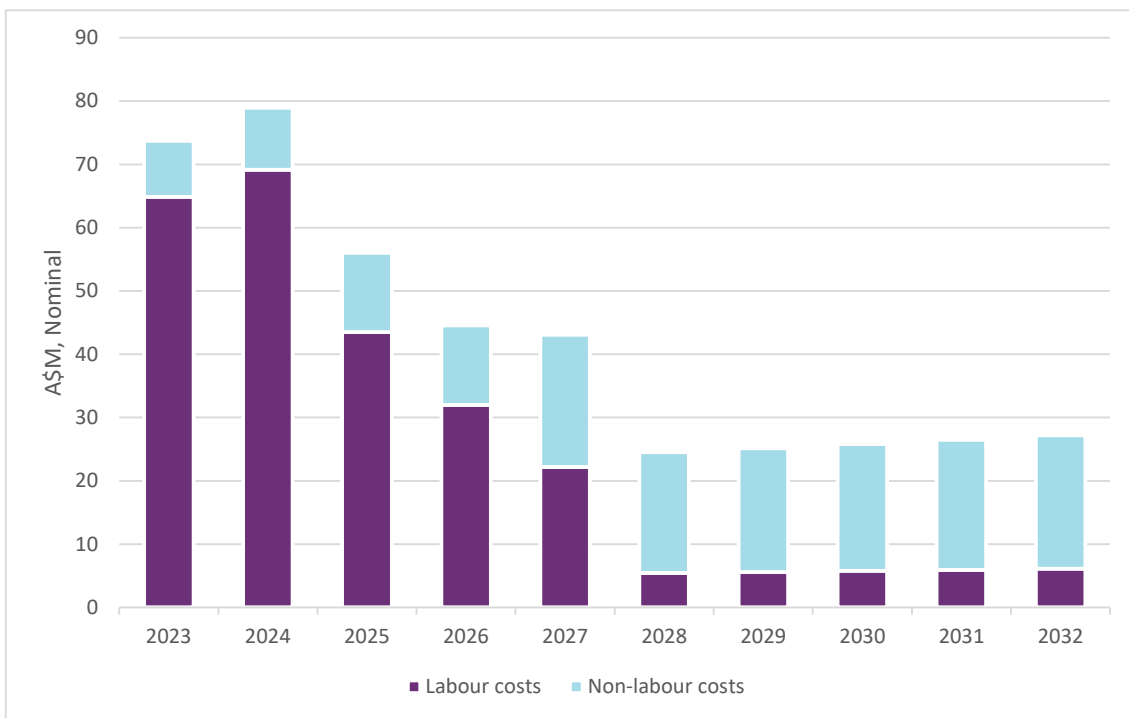


Figure 14 Labour versus non-labour Program costs



The bulk of Program costs are labour costs (61% of the total Program cost). The non-labour costs are primarily driven by ongoing annual fees for standard system maintenance, system upgrades and defect fixes and cloud and meter data usage costs.

4.3 Sensitivity and scenario analysis

Three scenarios have been developed to test the impact on the NEM2025 Program cost and benefits:

- An increase or decrease in non-controllable costs elements of the Program (costs other than internal AEMO labour costs).
- An increase or decrease in the discount rate.
- Extended Program delivery assuming all Work Packages take an extra year to deliver (effort estimate of the additional year is pro rated based on the original delivery timeframe for each Work Package).

The impacts for Option 2 are outlined in the sections below.

4.3.1 Increase or decrease in non-controllable costs

If the non-controllable costs of the NEM2025 Program (defined as costs other than AEMO internal labour) were to increase by 5%, the impact on the Program NPC is as follows:

Table 18 Non-controllable costs increased by 5%

Work Package	NPC (\$M)	\$M change to Base Case	% change to Base Case
P1 WP1: Immediate Reforms	\$12	\$0.5	4%
P2 WP1: Identity and Access	\$81	\$5	6%
P3 WP1: Flexible Trading Arrangements	\$58	\$3	6%
P3 WP2: Visibility	\$32	\$2	6%
P3 WP3: DER Flexible Demand and Marketplace	\$30	\$2	5%
P4 WP1: Frequency Control, Security and Reserves	\$48	\$2	5%
P4 WP2: Target States	\$106	\$6	6%
Total	\$367	\$20	6%

If the non-controllable costs of the NEM2025 Program were to decrease by 5%, the impact on the Program NPC is as follows:

Table 19 Non-controllable costs decreased by 5%

Work Package	NPC (\$M)	\$M change to Base Case	% change to Base Case
P1 WP1: Immediate Reforms	\$11	-\$0.5	-4%
P2 WP1: Identity and Access	\$72	-\$5	-6%
P3 WP1: Flexible Trading Arrangements	\$51	-\$3	-6%
P3 WP2: Visibility	\$29	-\$2	-5%
P3 WP3: DER Flexible Demand and Marketplace	\$27	-\$2	-5%
P4 WP1: Frequency Control, Security and Reserves	\$44	-\$2	-5%
P4 WP2: Target States	\$94	-\$6	-6%
Total	\$327	-\$19	-6%

4.3.2 Increase or decrease in discount rate

If the discount rate was to increase by 2%, the impact on the Program NPC is as follows:

4. NEM2025 Program financial analysis

Table 20 Discount rate increased by 2%

Work Package	NPC (\$M)	\$M change to Base Case	% change to Base Case
P1 WP1: Immediate Reforms	\$11	-\$1	-7%
P2 WP1: Identity and Access	\$72	-\$5	-6%
P3 WP1: Flexible Trading Arrangements	\$51	-\$3	-6%
P3 WP2: Visibility	\$28	-\$2	-7%
P3 WP3: DER Flexible Demand and Marketplace	\$27	-\$2	-8%
P4 WP1: Frequency Control, Security and Reserves	\$42	-\$4	-8%
P4 WP2: Target States	\$92	-\$7	-7%
Total	\$322	-\$24	-7%

If the discount rate was to decrease by 2%, the impact on the Program NPC is as follows:

Table 21 Discount rate decreased by 2%

Work Package	NPC (\$M)	\$M change to Base Case	% change to Base Case
P1 WP1: Immediate Reforms	\$12	\$1	7%
P2 WP1: Identity and Access	\$82	\$6	7%
P3 WP1: Flexible Trading Arrangements	\$58	\$4	7%
P3 WP2: Visibility	\$33	\$2	8%
P3 WP3: DER Flexible Demand and Marketplace	\$31	\$2	9%
P4 WP1: Frequency Control, Security and Reserves	\$50	\$4	9%
P4 WP2: Target States	\$108	\$9	9%
Total	\$374	\$28	8%

4.3.3 Extended Program delivery

If all Work Packages took an extra year to deliver, additional effort and costs would incur. Assuming the effort estimate of the additional year is proportional to the original delivery timeframe for each Work Package, the impact on the Program NPC is as follows:

Table 22 Extra year of delivery

Work Package	NPC (\$M)	\$M change to Base Case	% change to Base Case
P1 WP1: Immediate Reforms	\$16	\$5	44%
P2 WP1: Identity and Access	\$100	\$23	30%
P3 WP1: Flexible Trading Arrangements	\$76	\$21	39%
P3 WP2: Visibility	\$38	\$8	26%
P3 WP3: DER Flexible Demand and Marketplace	\$33	\$4	13%
P4 WP1: Frequency Control, Security and Reserves	\$50	\$5	10%
P4 WP2: Target States	\$114	\$14	14%
Total	\$426	\$79	23%

5 The change journey

5.1 NEM2025 Program stakeholders

5.1.1 Reform Delivery Committee

AEMO established the RDC to facilitate deep and effective collaboration across the industry to develop the Roadmap for the reforms. The RDC will continue to play an important role to:

- Provide input on opportunities to reduce overall cost to AEMO and industry;
- Identify risks and share emerging issues that may impact on the implementation of reforms and require changes to the Roadmap; and
- Review and update the baseline Roadmap as needed.

5.1.2 Broader stakeholder engagement

A NEM2025 Program Industry Engagement Forum Structure is required to facilitate transparent and effective engagement with industry stakeholders. This aims to ensure industry providers and other external stakeholders are actively involved in the process of translating policy and rules into projects, sequencing, and providing advice and feedback to optimise design and delivery.

The NEM 2025 Industry Engagement Forum Structure has been drafted by the NEM 2025 Program and Stakeholder Relations Team and will be co-designed with the Reform Delivery Committee to ensure the committees, consultative forums, focus group and working groups are appropriate to the needs of the NEM2025 Program and industry stakeholders.

Given the large number of internal and external stakeholders, and to ensure that there is effective and coordinated engagement, a stakeholder relationship owner system will be applied by the NEM2025 Program. Building bilateral relationships between relationship owners and stakeholders will help to establish and build trust and facilitate two-way communications with stakeholders. Relationship owners each have a role in leading internal and external engagement, monitoring, and reporting on stakeholder sentiment.

A1. Summary of industry feedback on roadmaps

AEMO published an information paper and the two roadmap options for industry and stakeholder consultation in April 2022.¹⁶ The table below summarises key themes from the feedback received and how these have been addressed.

Table 23 Summary of key themes from industry feedback

Key theme	Description	How this has been or will be addressed
Consideration of long-term market direction is considered prudent but does not translate to support for the strategic pathway.	<ul style="list-style-type: none"> Some stakeholders supported the approach to invest in market systems that consider long-term market direction where possible. However, generally that did not translate to support for the strategic pathway due to the risk of 'locking-in' significant investment in new centralised market systems to support reforms that are not well defined and ultimately may not be required. That would result in stranded assets and higher costs borne by consumers. Stakeholders also raised concerns that developing centralised solutions limits the potential for market-based solutions that can be developed and provided by external providers. 	<ul style="list-style-type: none"> The NEM2025 Program will adopt a stage gate process. This approach commits to Option 1 to undertake mandatory and no regrets initiatives. A stage gate process will be applied for initiatives in Option 2 that are deferred under Option 1, and those with significant uncertainty. This approach provides a mechanism to address stakeholder concerns about investing in systems to support reforms that are not well defined. A stage gate checkpoint will occur after an initiative has been properly scoped with a high-level design, and following industry consultation to determine industry impacts and support. This engagement process could also address concerns relating to limiting the potential for market-based solutions by identifying potential alternative solution options. Furthermore, and as part of the engagement strategies, we will need to strategically discuss solutions to deliver the reform to both take cost out of end-to-end processes so these opportunities are not missed as they were during previous processes such as 5MS and others.
Scheduling and batching systems changes with reforms that have higher certainty.	<ul style="list-style-type: none"> Stakeholders favoured an approach where changes to systems are scheduled and batched to support reforms with higher certainty and clearly defined scope and design. 	<ul style="list-style-type: none"> The NEM2025 Program includes integrated solution design work as the first phases of the planning process that commences immediately upon the Program's initiation.

¹⁶ <https://aemo.com.au/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/reform-delivery-committee>

A1. Summary of industry feedback on roadmaps

Key theme	Description	How this has been or will be addressed
	<ul style="list-style-type: none"> This is on the basis that it supports a 'no regrets' approach since the reforms' directions are clear and it accelerates the delivery of the reforms' benefits. 	<ul style="list-style-type: none"> This integrated solution design work is undertaken across the Program and includes work specifically required for the stage gate process. This approach can address stakeholder recommendations to schedule and batch systems changes with reforms that have higher certainty and clear scope and design.
<p>Cost benefit analysis of the longer term and less certain reforms should support more material investment in replacing or updating foundational systems.</p>	<ul style="list-style-type: none"> A proper assessment of the costs and benefits of each of the longer-term and less certain reforms should precede and inform any material investment on foundation system changes enabling those reforms. This approach also allows industry trials designed to test the cost benefits of approaches (particularly trials relevant to implementing DER integration reforms, such as Project EDGE) to complete and inform the policy and design of related initiatives. Stakeholders considered these trials should be allowed to demonstrate a clear path forward for the industry as a whole before implementing new systems. 	<ul style="list-style-type: none"> The policy and regulatory processes (such as the AEMC rule change process) includes an assessment against the National Electricity Objective. AEMO will continue to work with market bodies to support the rule change process as required.
<p>Transparency on the impact on NEM fees over the short, medium and longer term.</p>	<ul style="list-style-type: none"> Stakeholder supported the approach to estimate and compare the whole of life cycle costs of the two pathways. However, they requested transparency on how that translates to NEM fees to better enable them to assess the cost impact to their business. 	<ul style="list-style-type: none"> An assessment will be undertaken as part of the NEM Declared Project consultation process.
<p>An incomplete roadmap undermines its intent.</p>	<ul style="list-style-type: none"> Some stakeholders raised concerns that exclusion of the Congestion Management Mechanism and the Capacity Mechanism from the roadmap undermines its purpose to provide industry with transparency; Once these reforms are introduced by the AEMC, it could disrupt early parts of the roadmap. These stakeholders acknowledged the difficulty in identifying the full range of system impacts and dependencies for these reforms but suggested an estimate of the impact is preferable than excluding them. 	<ul style="list-style-type: none"> AEMO will include the Capacity Mechanism and Congestion Management Mechanism in version 2 of the roadmap. These initiatives are not covered in this business case but have been identified as a stage gate that would go through the stage gate process.

A1. Summary of industry feedback on roadmaps

Key theme	Description	How this has been or will be addressed
Flexibility should be retained.	<ul style="list-style-type: none"> Stakeholders suggest that an element of flexibility in the overall sequencing and prioritisation needs to be retained, particularly in the early stages of the reform process. This was noted as being necessary due to the pace of the policy and regulatory process and market evolution, and the ambitious implementation dates. This process means it's likely that additional rule changes and system requirements will emerge before the roadmap is complete. 	<ul style="list-style-type: none"> The roadmap is intended to be a living document that will be reviewed regularly and updated as necessary. The stage gate process will support this intent because it involves checkpoints occurring after initiatives with uncertainty have been planned, their timeline on the roadmap and overall deliverability has been confirmed. If market bodies introduce additional reforms that need to be incorporated into the NEM2025 Program, the stage gate process could be adapted to accommodate them into the Program.
Ambitious timeframes.	<ul style="list-style-type: none"> Some stakeholders were concerned the implementation timeframes were too short and did not allow for sufficient contingency for delays. One stakeholder suggested that for all initiatives, a minimum of 12 months following the publication of final rules, should be provided for implementation. Once the final rules provide greater clarity, this could be reassessed and shortened after consultation with stakeholders. This was raised as a risk to industry with respect to system readiness, testing windows, on-time delivery, costs, and cascading delay impacts for dependent initiatives. This could lead to a broader risk of system and market failures and timely and effective delivery of the overall reform program. 	<ul style="list-style-type: none"> Stakeholder concerns about implementation timeframes, particularly for reforms with policy and regulatory uncertainty (i.e. those for which the rule changes process has not yet started or remains at the draft determination stage) are noted and should be addressed through the stage gate process. The intent of this process is to manage uncertainty by establishing the checkpoints that require an initiative to be properly scoped, Participant consultation, properly planned, including costs and resources, and the timeline and overall deliverability to be confirmed.