

Whole-of-Life Cost Calculator Worked Example Explanatory Notes –IT Service

Procurement name	Whole-of-life Cost Calculator worked example – IT Service
Procurement type	Service
Contact	Colin, Procurement Manager

1 Scenario

Your agency has been using an outdated stakeholder management software service and is looking to upgrade to a more efficient service that provides enhanced capability. Your team has identified three different procurement options (see Table 1).

As the procurement officer, you have been tasked with assessing the whole-of-life costs (WOLC) of these options using *Template 3 – Whole-of-Life Cost Calculator* of the NSW Government *Guide to Environmentally Sustainable Procurement*, to inform the decision-making process.

Table 1 Software procurement options

Options	Option 1 - Deferral	Option 2 – New system	Option 3 - SAAS
Description	A minor upgrade to an existing service, retaining the current supplier and including a small training component, intended to defer a major upgrade (also with the same supplier) for four years.	Procure a new IT system from a new supplier, which will require significant staff retraining but is expected to be more efficient in the medium to long term.	Procure a new IT system under a Software as a Service (SAAS) model, with a new supplier and some services outsourced to the service provider's staff.
Service useful life	12 years (4 years of existing life + 8 years following the upgrade)	10 years	10 years

Screenshots of the calculator have been provided above the relevant guidance text.

2 General set up

2.1 Step 1 – Review Applicability

Move to the 'Applicability' sheet and review the scenario against the provided examples.

Services, with low potential to impact other operating costs	Cleaning services for facilities				Services contracts may have ongoing expenditure such as for licence renewal fees, staff training, subscription fees or administrative overheads.
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The new IT service aligns with the ‘Services’ example (Row 16), which is rated as ‘somewhat appropriate’. However, this scenario has a high potential to impact the WOLC of the service, as one option includes a large acquisition component, while another has minimal acquisition costs but significant operating costs. Based on this assessment, it is appropriate to use the calculator to evaluate these options.

2.2 Step 2 – General parameter update

Move to the ‘General parameters’ sheet and review the provided parameters.

1. Calculator switches

Discounting switch	See instructions for explanation of discounting.	Discounted
Escalation switch	See instructions for explanation of escalation.	Escalated

For now, the escalation and discounting switches will remain at their default values (escalated and discounted) and will be revisited later in the process (see Step 10).

a Calculation parameters

Base year (FY starting)	Year	01-Jul-25
Duration of calculation (number of years)	Number of years	10

Rows 20 to 22 – Update the base year to align with the current financial year. This value is independent of when the procurement process or operations will begin, as it relates solely to escalation and discounting. Setting the base year to the current financial year ensures that all values are discounted to today’s dollars, with escalation applied only to future years. Note that Row 22 will initially appear blank when filling in a new calculator but will automatically populate when the option’s useful life values are added in the next section.

b Discount and escalation parameters

Year (FY starting)	NSW Treasury economic performance and outlook, Sydney CPI ³	01-Jul-24	01-Jul-25	01-Jul-26	Long term average
Cost escalation	Per cent per annum	3.00%	2.75%	2.50%	2.50%
Financial discount rate	Per cent per annum	6.80%	Placeholder value. See instructions.		

Rows 27 – Review the cost escalation, which reflects the expected increases in costs in the future. If specific cost escalation is unavailable, it is acceptable to use the expected inflation rate. A check against the Sydney consumer price index (CPI), outlined in NSW Treasury’s economic performance and outlook, confirms that the current cost escalation rates are up to date.

Row 29 – Review the discount rate, which represents the financial risk of the project and is based on the weighted average cost of capital (WACC). The default value of 6.8% is based on the midpoint value in IPART’s August 2024 bi-annual WACC update. This rate should be verified against the most recent update from IPART, or a specific project value will be calculated in consultation with NSW Treasury. Refer to the NSW Treasury Guidelines (Appendix C) for further guidance on appropriate rates.

c Carbon parameters

Emissions factor from consumption of purchased or acquired electricity	kg CO2-E / kWh	0.73	Source: Commonwealth DCCEEW Australian National Greenhouse Accounts Factors		
Year (FY starting)	Year	01-Jul-24	01-Jul-25	01-Jul-26	
Carbon emissions value per tonne	AUD \$ 2024, Carbon emissions in the Investment Framework TPG24-34 ⁴	\$130	\$131	\$133	
All groups Australia latest CPI	ABS Australia All Groups CPI, Jun base year/Jun-2024 ⁵	139.40	Placeholder value. See instructions		
Index factor for carbon values		1.00			
Year (FY starting)	Year	01-Jul-24	01-Jul-25	01-Jul-26	
Carbon emissions value per tonne	AUD, \$, indexed to the base year	\$131	\$132	\$134	

Rows 33 to 42 – Carbon parameters are based on the following documents:

- [Carbon emissions in the Investment Framework TPG24-34](#)
- [Federal DCCEEW Australian National Greenhouse Accounts Factors](#)
- [ABS Australia All Groups CPI](#)

Review these documents to ensure the latest figures are used. In this example, no changes were required, and the default values have been retained. Note that the linked sources may be superseded by newer releases.

There are no additional user assumptions to add for this example.

3 Option-specific inputs

3.1 Step 3 – Options

Move to the ‘Option-specific inputs’ sheet.

a Identification

Option title	Text	Deferral	New system	SAAS
Type of procurement	Category	Service	Service	Service
Useful life of product	Years	12	10	10

Rows 14 to 16 – Each option requires a unique title (as listed in Table 1), and the procurement type is classified as a service. It is assumed the business group plans to use the new software for the next ten years. For Options 2 and 3, as a new IT service, the useful life has been set at 10 years. Option 1 includes a four-year deferral followed by a major upgrade, which is assumed to extend the useful life by an additional eight years, resulting in a total useful life of 12 years.

Note: While the services have different useful lives, the calculator sets the calculation period based on the shortest total lifecycle among all options. For example, if one option requires 3 years for procurement and has a 4-year operational life (7 years), and another requires only 1 year for procurement but has a 5-year operational life (6 years), the calculation period would be 6 years. In this example, all options are estimated to have a 0-year acquisition period, and the shortest useful life is 10 years. Therefore, the total calculation duration is set to 10 years, as shown in Row 22 of the ‘General parameters’ sheet. Any additional value from goods with a longer useful life is accounted for as a residual value, which will be explained further in Steps 7 and 9.

3.2 Step 4 - Acquisition costs

Move to Row 18 and 19

b Acquisition stage

The **total cost method** directly inserts the total costs of the acquisition stage per year into the calculation. The **percentage cost method** calculates the percentage cost of acquisition incurred per year based on the total acquisition expenditure.

To allow for easier comparison of options with different useful lives, both methods account for the end-of-life stage costs and end of asset resale revenue by discounting these values and subtracting from the acquisition cost to give an **effective acquisition cost**. The acquisition cost goes up if it costs more to dispose of the asset than what is gained from resale. It goes down if the resale value is higher compared to cost of disposal. The **percentage cost method** distributes this impact across the whole acquisition, whereas for the **total cost method** this impact occurs in the first year only.

The **effective acquisition cost** is a calculated value that is used within the calculator to better compare options across whole of life, whereas the actual acquisition cost is what should be used in further financial assessment.

Please use either the total cost method or the percentage cost method for each option. The calculator will use the total cost method by default.

Total cost method	Total cost method	Total cost method
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Row 19 – Since all three options mainly involve supply costs (in this worked example, this refers to labour, materials, and overhead costs for software development) for the acquisition, the total cost method is chosen because the additional flexibility of the percentage cost method is not required.

Move to Rows 41 to 50

b.ii Total cost method

Acquisition cost Year 1
Acquisition cost Year 2
Acquisition cost Year 3
Acquisition cost Year 4
Acquisition cost Year 5
Acquisition cost Year 6
Acquisition cost Year 7
Acquisition cost Year 8
Acquisition cost Year 9
Acquisition cost Year 10

\$, AUD

\$80,000.00	\$425,000.00	\$140,000.00
\$330,000.00		

In addition to the planning and design costs, this scenario also includes integration, training, data migration and change management costs. It is assumed that all procurement activities are managed by the business group across all three options.

- For Option 1, Year 1 involves only minor costs related to design, hosting and training. In Year 5, there are significantly higher costs for design and planning, documentation updates, as well as training and change management. Although the upgrade cost is lower than a full new build, it remains substantial as it involves a major system overhaul.
- For Option 2, Year 1 incurs a large cost due to the need to design an entirely new system, migrate existing data, and train users on new processes. After this initial phase, no additional costs occur except for ongoing hosting, as all required features are already in place.
- Option 3 requires similar work to Option 1, but with additional training and data migration costs because it involves a new supplier. Since the software platform being procured is already mature and developed, acquisition costs are much lower than Option 2.

Because there is only one input cell per year, these costs should be prepared in an external Excel file and the total cost copied into the calculator once finalised. The costs used in this worked example are shown in Table 2.

Table 2 Acquisition cost breakdown

Cost	Option 1 - year 1	Option 1 - year 5	Option 2	Option 3
Design	\$20,000	\$100,000	\$80,000	\$30,000
Planning	\$20,000	\$50,000	\$70,000	\$30,000
Build	\$20,000	\$150,000	\$175,000	\$0
Training and change management	\$20,000	\$30,000	\$50,000	\$30,000
Data migration	\$0	\$0	\$50,000	\$50,000
Total	\$80,000	\$330,000	\$425,000	\$140,000

Note: The values in this table are hypothetical and based on industry benchmarks. When assessing the WOLC of different options during a procurement process, the cost data entered into the calculator will depend on the stage of procurement. During the planning phase – when details are uncertain – cost estimates should be informed by early market engagement, previous contract data, expert advice or formal cost estimates. In contrast, during the tendering phase, costs should be based on supplier quotes or estimates provided by a qualified quantity surveyor or cost estimator.

Rows 52 to 61 – These rows show the ‘effective’ acquisition cost for each year, including cost increases due to escalation. For Year 1 specifically, this also includes any disposal costs and residual value, ensuring these are included in the calculations regardless of whether the calculation period matches the product’s useful life. Any additional value provided by options that extend beyond the calculation period is captured as a residual value, which is further explained in Steps 7 and 9.

3.3 Step 5 – Operational costs

Move to Row 64

c Operation stage				
Operations start year (insert number only)	First year of operations	Year 1	Year 1	Year 1
Electricity usage in operation stage	kWh, p.a.	1,500	1,500	1,500
Proportion of renewable electricity used in operation stage	Per cent	0%	0%	0%
Electricity cost ^a	\$, AUD / kWh	\$0.18	\$0.18	\$0.18
Renewable energy electricity cost premium	\$, AUD / kWh	\$0.04	\$0.04	\$0.04
Lease payment per annum	\$, AUD	\$0.00	\$0.00	\$0.00
Operating cost per annum (excluding electricity usage)	\$, AUD	\$48,600.00	\$45,000.00	\$0.00
Re-occurring annualised fees and charges (e.g., rent, excluding electricity usage)	\$, AUD	\$5,000.00	\$7,500.00	\$135,000.00

Row 65 – All options will start operations immediately after procurement, so Year 1 is the appropriate starting year for all options.

Row 67 – All three options would be operating a similar style and scale of system. While there may be minor differences based on inefficiencies in older systems or economies of scale in others, the overall variation is expected to be minimal. Therefore, electricity usage in this worked example is assumed to be equivalent across all options. Electricity usage is estimated as a proportion (5%) of each user’s average annual computer energy use (300kWh), multiplied by the number of software users per year (100).

Rows 68 to 70 – Electricity costs and renewable electricity usage should be based on best available information. In this example, average NSW business electricity rates (based on market research) have been used. For future projects, electricity rates from the whole of government electricity contracts should be used to ensure the most accurate costs. No renewable energy has been assumed; however, the current whole of government contract should be referenced to determine the appropriate proportion unless a separate electricity supply contract applies.

Row 72 – There are no lease costs for Options 1 and 2. Leasing costs for Option 3’s software are captured in Row 74.

Row 73 – Operating costs in this worked example include ongoing server hosting and licensing fees. For Option 1, costs are assumed to be 20% higher over the first 4 years due to the use of an older, less efficient system. These have been applied as an average across the entire period. No operating costs are included under Option 3, as all expenses are assumed to be covered in the annual service fee.

Row 74 – Options 1 and 2 require ongoing server hosting fees, with Option 1’s costs being lower due to older software with lower performance requirements. Option 3 incurs a single fee that covers all operational aspects of the service, including ongoing leasing of the system from the provider.

3.4 Step 6 – Maintenance costs

Move to Row 76

Maintenance event 1: name	Text label	Major outage	Major outage	Major outage
Maintenance event 1: start year	First year of maintenance	Year 2	Year 6	Year 6
Maintenance event 1: frequency of occurrence	No. of years between occurrences	Every 10 years	Every 10 years	Every 10 years
Maintenance event 1: cost per occurrence	\$. AUD	\$20,000.00	\$20,000.00	\$0.00
Maintenance event 2: name	Text label	Major outage		
Maintenance event 2: start year	First year of maintenance	Year 8		
Maintenance event 2: frequency of occurrence	No. of years between occurrences	Every 10 years		
Maintenance event 2: cost per occurrence	\$. AUD	\$20,000.00		

Option 1 is assumed to have two major unplanned outage events due to critical system faults: one during the use of the older system, and one during the use of the new system. Option 2 is assumed to have a single unplanned major outage event. The costs of these events are estimated based on similar outage events that have impacted comparable services. While Option 3 is assumed to experience one major outage event, no costs would be passed on, as the service provider would be responsible for resolving the issue under the SaaS model.

Provision for general annual maintenance (e.g., unforeseen breakages)	\$. AUD	\$59,000.00	\$50,000.00	\$0.00
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Row 98 – For an IT service, general annual maintenance costs include general IT support to operate the system, ongoing maintenance of issues that are not considered major events (as described in the above section) and system enhancements. Option 1 in this case has a higher maintenance cost than

Option 2 due to two factors. Firstly, there is a higher maintenance cost in the first 4 years to manage an older system, which has been averaged across the calculation period and is estimated to be 30% higher than costs for Option 2. Secondly, despite the major upgrade, the system is still built on an older base that will require higher maintenance, estimated to be 10% higher than costs for Option 2. For Option 3, the general annual maintenance costs are included in the annual fee of the SaaS model.

3.5 Step 7 – End of life costs

Move to Row 100

e End-of-life stage

Cost of disposal	\$, AUD	\$1,000.00	\$1,000.00	\$1,000.00
Realised value of components	\$, AUD	\$0.00	\$0.00	\$0.00
Residual value	\$, AUD	\$68,333.33	\$0.00	\$0.00

Rows 102 to 105 – It is assumed there are no hardware components procured, and as such, there is no residual value attributed to hardware. A minor disposal cost is allocated across all three options to represent internal IT services required to support the transition off the system at the end of the contract period. However, Option 1 has a calculated residual asset value because it has two years of useful life remaining after the calculation period of 10 years.

3.6 Step 8 – Carbon dioxide equivalent emissions

Move to Row 107

f Carbon dioxide equivalent emissions

Acquisition stage carbon dioxide equivalent emissions	CO ₂ -Ep.a., tonnes, total			
Operation stage carbon dioxide equivalent emissions (non-renewable electricity usage)	CO ₂ -E, tonnes, annualised	1.10	1.10	1.10
Operation stage carbon dioxide equivalent emissions (excluding electricity usage)	CO ₂ -E, tonnes, annualised			
Maintenance event 1: carbon dioxide equivalent emissions	CO ₂ -Ep.a., tonnes, annualised			
Maintenance event 2: carbon dioxide equivalent emissions	CO ₂ -Ep.a., tonnes, annualised			
Maintenance event 3: carbon dioxide equivalent emissions	CO ₂ -Ep.a., tonnes, annualised			
Maintenance event 4: carbon dioxide equivalent emissions	CO ₂ -Ep.a., tonnes, annualised			
General annual maintenance carbon dioxide equivalent emissions	CO ₂ -Ep.a., tonnes, annualised			
End-of-life stage carbon dioxide equivalent emissions	CO ₂ -Ep.a., tonnes, annualised			

Row 109 to 120 – As these options relate to the use of software, there will be no procurement of materials or products. The energy demands and use of renewable energy are also similar across all options. Therefore, it was determined that an assessment of carbon emissions is not required.

Note: As electricity inputs were provided in Step 5, the 'Results' sheet will include some calculations for carbon intensity.

Note: Emissions considered negligible in this calculator, reflect their limited influence on comparative outcomes between options. However, this does not imply that they would be negligible for the purposes of measuring and reporting emissions against baseline emissions or other targets.

4 Calculation sheet

The 'Calculation' sheet contains all the formulas and data used to produce the outputs on the 'Results' sheet. While there are no required inputs on this page, and all comparative results can be viewed on the 'Results' sheet, this sheet may provide some insights into how the outputs are calculated and how costs are distributed year-by-year costs over the calculation period.

Note: The costs on the 'Calculation' sheet are potentially escalated or discounted, which should be considered when checking the cost values. To simplify checks, it is recommended to temporarily turn off escalation on the 'General parameters' sheet prior to performing these checks.

For additional assurance, three spot checks should be performed to minimise the risk of errors. Suggested spot checks for this worked example include:

- **Acquisition costs:** Compare 'Option specific inputs' cell G45 against 'Calculation' cell K35 to confirm the year 5 acquisition cost is correct.
- **Recurring operational fees:** Compare 'Option specific inputs' cell I74 against 'Calculation' row 262 to confirm the recurring operational fee is applied across each year.
- **Residual value:** Compare 'Option specific inputs' cell G105 against 'Calculation' row 76 to confirm the residual value is applied in the final year.

These spot checks are specific to this worked example; users should apply their own judgement to determine bespoke spot checks for each use of the calculator.

5 Outputs

5.1 Step 9 – Results

Move to the 'Results' sheet

The 'Results' sheet provides an overview of the outputs of the calculator once all relevant information has been entered.

1. Statistics

Parameter	Unit	Output Format	Option 1	Option 2	Option 3
Product title	Text		Deferral	New system	SAAS
Type of procurement	Category		Service	Service	Service
Useful life of product	Years		12	10	10
Calculation duration	Years		10	10	10
Total acquisition cost	\$, AUD	Discounted, Escalated	\$360,463	\$425,485	\$140,485
Total operation cost	\$, AUD	Discounted, Escalated	\$450,874	\$441,667	\$1,132,164
Total maintenance cost	\$, AUD	Discounted, Escalated	\$528,005	\$434,768	\$0
Total residual value	\$, AUD	Discounted, Escalated	\$47,207	\$0	\$0
Net cost	\$, AUD	Discounted, Escalated	\$1,292,135	\$1,301,920	\$1,272,649
Total economic cost of carbon (if relevant)	\$, AUD	Undiscounted, Escalated	\$2,289	\$2,289	\$2,289
Total tonnes of CO2-equivalent emissions	Tonnes		11	11	11
Net cost ranking	Rank		2	3	1
Total economic cost of carbon ranking (if relevant)	Rank		1	1	1
Total tonnes of CO2-equivalent emissions ranking	Rank		1	1	1

Rows 10 to 28 – This section provides a direct quantitative comparison of all options.

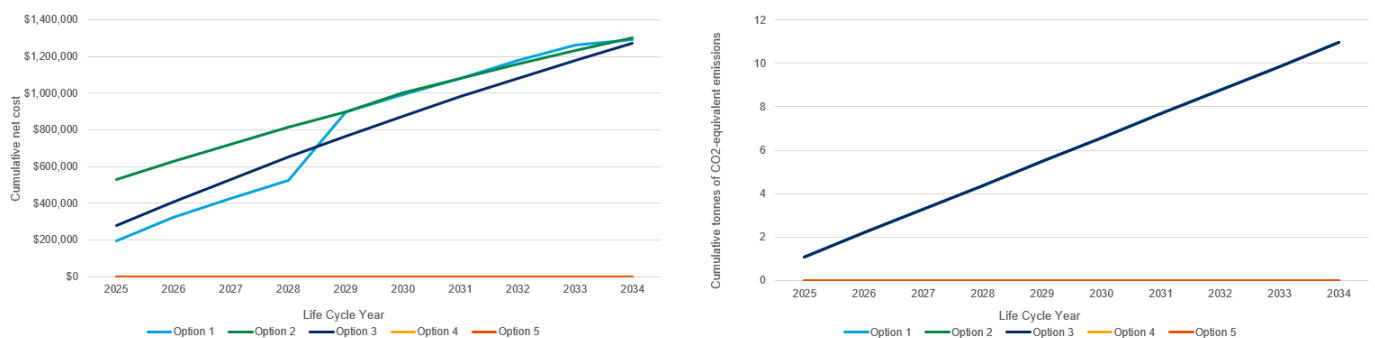
Rows 12 to 15 – These rows show the key descriptive details for each option.

Rows 17 to 21 – These rows summarise the cost information. Column G lists the current state of the switches (see Step 10) on the ‘General parameters’ sheet. These rows allow direct comparison of cost types across options. Row 17 shows that Options 1 and 2 have similar total acquisition costs, while Row 18 shows that Option 3 has nearly triple the operational costs. Row 20 shows the residual value, which is positive for Option 1. However, note that the residual values are subtracted from the net cost (explained in more detail below).

Rows 23 and 24 – These rows provide an overview of the carbon emissions and associated economic cost. However, these values are not relevant to this worked example as they only consider the minor impacts of electricity and all values are equal. Note that as the cost of carbon is an economic value it is never discounted by financial discount rates.

Rows 26 to 28 – These rows show different ways of ranking the options based on net cost, economic cost of carbon, or the total emissions. Option 3 is ranked as the best option in terms of net cost, which is further examined below.

Move to Row 30



Beneath the summary statistics are two comparison graphs. By default, the calculator applies escalation and financial discounting, which expresses all costs in today's (base year) dollars. This allows a like-for-like comparison across options.

The right-hand graph (related to CO₂ emissions) is ignored in this example and the below sections as it does not provide useful information due to the assumption that all the options have the same greenhouse gas emissions.

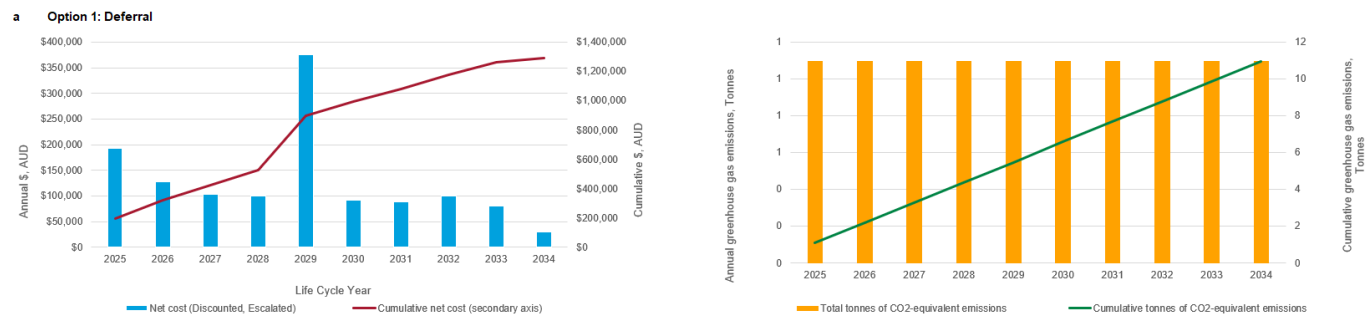
Cumulative net cost graph

This graph shows the cumulative costs (acquisition, operation, maintenance and residual) for each option, year by year. While each year's information is relevant, several key trends stand out:

- Across the entire life cycle period, there is a gradual growth for all options due to operational and maintenance costs.
- In Year 1 (2025), Option 2 has the highest cost, much higher than Options 1 and 3 which are similar in cost. Option 1 has the lowest initial cost due to its smaller initial scope.
- Between Years 4 and 5, there is a large spike in Option 1 because of the major upgrade. Option 1 goes from being the cheapest to the most expensive. Option 3 is now the cheapest.

- Between Years 9 and 10, there is a drop in the net cost for Option 1, despite there being no change in operation and maintenance costs. This reduction reflects the treatment of residual value:
 - Option 1 has a longer useful life than the 10-year calculation period (refer to Rows 14 and 15).
 - To account for its value beyond the calculation period, the calculator applies a residual value (listed in Row 20) in the final year. This adjustment effectively reduces Option 1's apparent cost, as it reflects the benefit of not needing to replace the system for another two years.
- In the final year (2034), Option 3 has the lowest WOLC of all three options.

Move to Row 32



Switch status: Escalation on, discounting on at 6.8 per cent

The charts in this section provide individual breakdowns of each option and how the cumulative graph in Row 30 is developed. To avoid repeating information, only one example — Option 1 in Row 34 — is explored in detail.

The left-hand graph includes two y-axes: annual costs (primary axis) and cumulative costs (secondary axis). The blue columns represent the total annual cost, corresponding to the primary y-axis. There is a smaller acquisition cost in the year 2025, as well as a larger acquisition cost in 2029 which is responsible for the step change. The columns for 2026 and 2032 are slightly higher, representing the years where major maintenance activities are expected. The column for 2034 is much smaller, representing the impact of the residual value on the cost. These annual costs sum up into the red line on the secondary axis, the cumulative total, which is the same line shown in the comparison graph in Row 30.

5.2 Step 10 – Switches

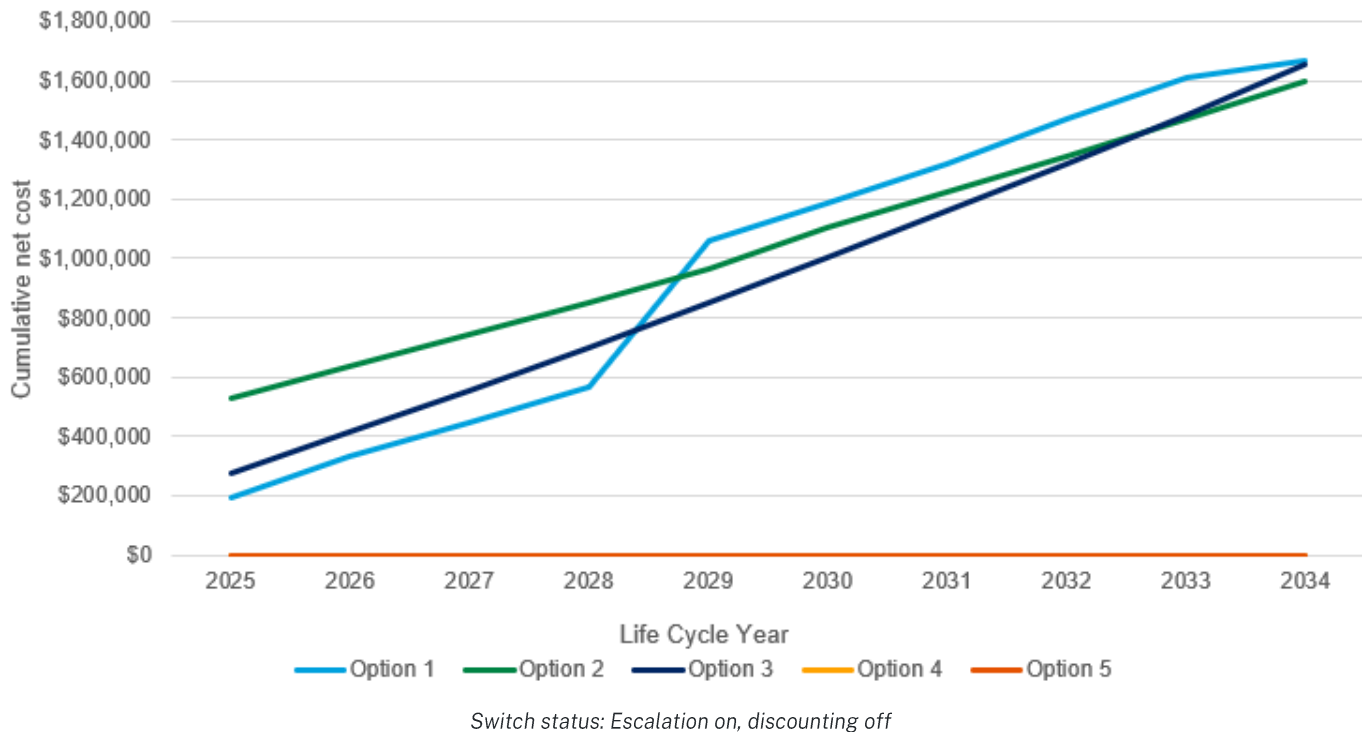
This section requires switching between the 'General parameters' and 'Results' sheets.

All costs shown in the 'Results' sheet (and described in Step 9) are currently in nominal, discounted dollars. This means they are expressed in today's dollars (net present value), which allows for a meaningful comparison of the WOLC of options with different useful life periods.

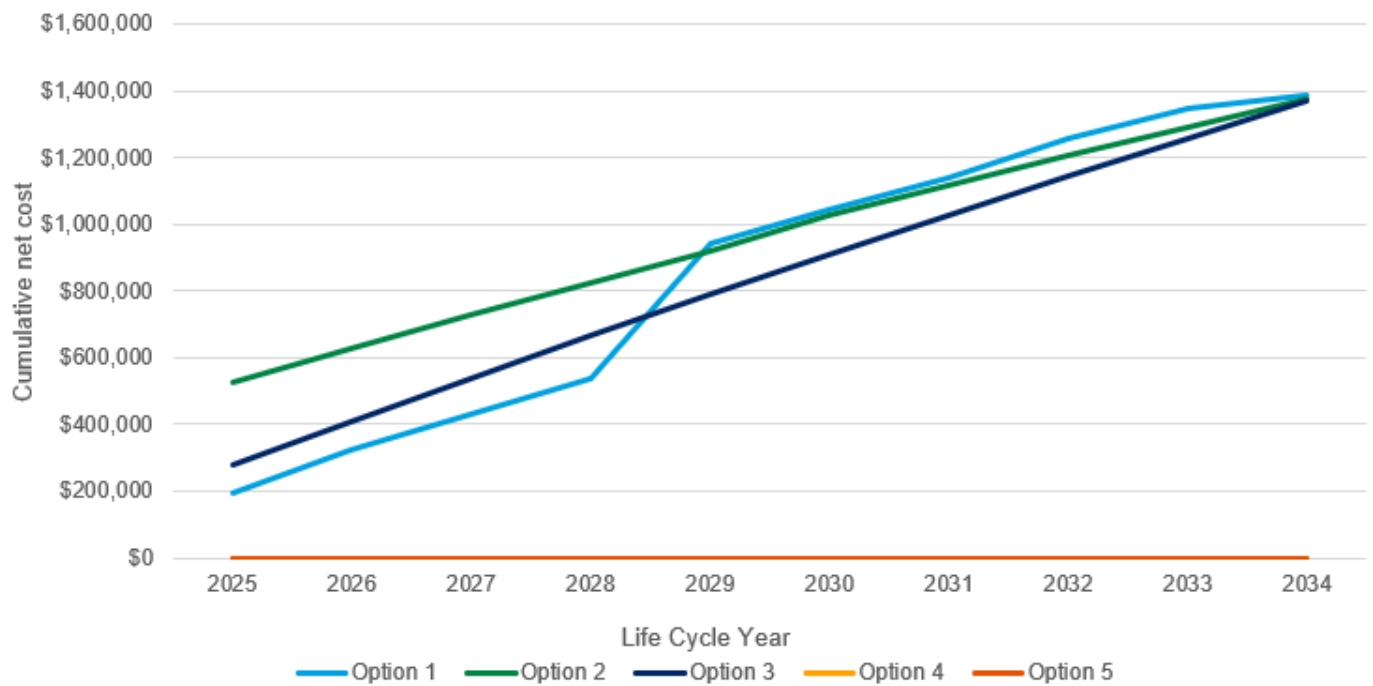
An alternative view is to switch discounting off while leaving escalation on. This approach is useful for preparing inputs into agency budgets, as NSW Treasury requires financial impact statements to be presented in undiscounted terms.

In summary:

- Discounting must be applied when comparing options to understand their full financial implications over their lifecycle.
- Discounting can be turned off when developing inputs for agency budgets, for example, when preparing a financial impact statement.
- Escalation should rarely be turned off, as it reflects expected future cost increases.



There is one key point of interest in this view, where discounting is switched off. First, the lowest net cost option is now Option 2, whereas it was Option 3. This is because discounting reduces future costs more significantly, with later years (e.g. Year 7) being discounted more heavily than earlier ones (e.g. Year 3). Since Option 3's costs are more evenly spread across the calculation period, while Option 2's costs are more front loaded, Option 3 'benefits' more from discounting. This view shows that Option 2 could potentially be the most cost-effective option from a future budgetary perspective.



Switch status: Escalation on, discounting on at 4.8 per cent

To illustrate this further, an additional scenario is considered. In this scenario, there has been a change in debt and equity and a financial discount rate of 4.8% (instead of 6.8%) is now applied to the project.

Updating Row 29 of the 'General parameters' sheet to 4.8%, the 'Results' sheet shows the net cost of all the options are now within \$20,000 of each other.

In this worked example, there is no analysis that requires switching the outputs to unescalated values.

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