

Whole-of-life Cost Calculator Worked Example Explanatory Notes - Cladding

Procurement name	<i>Whole-of-life Cost Calculator worked example - Cladding</i>
Procurement type	<i>Construction</i>
Contact	<i>Colin, Procurement Manager</i>

1 Scenario

Your agency has engaged a contractor to design and construct a new building. In the contract, the contractor is required to use the Whole-of-Life Cost Calculator to assess major design and construction decisions. The contractor has identified three façade options that meet the sustainable building requirements outlined by your agency in the contract.

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 Cladding procurement options

Options	Option 1 – Recycled aluminium	Option 2 – Stone with timber ornamentation	Option 3 – Recycled modular panels
Description	This option features a modular design that uses recycled aluminium as the primary body material for the wall cladding, combined with a composite façade.	This option features a structural stone base, with Forest Stewardship Council (FSC) certified timber used as an ornamental addition to the façade.	This option features a modular design that uses panels made from up to 70% post-consumer recycled material, combined with other lightweight, sustainable natural materials that are easy to install.
Option useful life	10 years	15 years	10 years

Cladding is assumed to cover both the interior and exterior of the building, using appropriate styles and material finishes for each. To streamline this worked example, it is assumed that all cost differences between internal and external claddings (such as additional weather protection and paint for external cladding) are averaged into a single cost figure applied across the entire building.

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 use case against the provided examples.

Construction services for capital projects with significant ongoing operating costs	Lighting solution				For capital infrastructure projects, please refer to NSW Decarbonising Infrastructure Delivery Policy and its measurement and guidance tools. However, this template could be used for part of a capital infrastructure project such as determining the optimal lighting solution.
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The cladding matches the ‘Construction services’ example (Row 17), which is rated as ‘somewhat appropriate’. Given that the options involve varying levels of maintenance and show significant differences in acquisition costs, it is appropriate to use the calculator to assess these options.

2.2 Step 2 – General parameter update

Move to the ‘General parameters’ sheet next 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 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	11

Rows 20 and 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 ²	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 electric	kg CO2-E / kWh	0.73
Source: DCCEEW Australian National Greenhouse Acc		
Year (FY starting)	Year	01-Jul-2401-Jul-2501-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, Current year/Jun-2024 5	139.40
Index factor for carbon values		1.00
Placeholder value. See instructions		
Year (FY starting)	Year	01-Jul-2401-Jul-2501-Jul-26
Carbon emissions value per tonne	AUD, \$, indexed to 2024	\$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	Recycled aluminiumStone with timber ornamentationRecycled modular panels
Type of procurement	Category	ConstructionConstructionConstruction
Useful life of product	Years	101510

Rows 14 to 16 – Each option requires a unique title (as listed in Table 1), and the procurement type is classified as construction. Options 1 and 2 include durable structural elements with an expected useful life of 10 to 15 years. In contrast, Option 3 is not expected to have the same longevity due to its lighter weight and material composition. However, its modular design allows for easier to repair of any damaged or degraded sections. Based on this, the builder has estimated that Option 3’s useful life could be extended to 10 years with some repairs during the latter half of its life.

Note: While the goods 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, and another requires only 1 year for procurement but has a 5-year operational life, the calculation period would be 6 years. In this example, all options are estimated to have a 1-year acquisition period, and the shortest useful life is 10 years. Therefore, the total

calculation duration is set to 11 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	Percentage cost method
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Row 19 – Two key factors influence the choice of acquisition method in this worked example.

- 1. The costs can be clearly separated into different cost categories (e.g., supply, installation, etc.).
- 2. Assuming that Option 3’s useful life can be extended through periodic repairs, allocating total estimated cost across its lifespan may provide a more accurate WOLC assessment.

To determine the best method, the acquisition cost table below was created. 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 Error! Reference source not found..

Table 2 Acquisition cost breakdown

	Option 1	Option 2	Option 3
Design and planning cost (service cost)	\$10,000		
Total size (sqm)	276		
Panel cost (per sqm)	\$74.60	\$150.25	\$52.00
Material supply cost	\$20,589.60	\$41,469.00	\$14,352.00
Installation cost	\$24,000.00	\$50,000.00	\$18,000.00
Lifetime repairs (sqm)	\$0	\$0	100

	Option 1	Option 2	Option 3
Cost per repair	\$0	\$0	\$1,720.00
Area replaced per repair (sqm)	\$0	\$0	10
Total repair cost (other cost)	\$0	\$0	\$17,200.00*
Total acquisition cost	\$54,589.60	\$101,469.00	\$59,552.00

*These costs could be classified as maintenance and entered into the calculator as a maintenance event, as shown in section Step 6 – Maintenance costs. However, because the repairs in this example are directly related to the product’s useful life, they have been included as part of the acquisition cost. That said, they could alternatively be treated as maintenance events without affecting the calculator’s final outputs. Be sure to review the calculator’s input fields and observe how costs are reflected to determine the most appropriate approach for similar cases.

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.

While supply and installation for Options 1 and 2 occur in different years, splitting the costs using the percentage method would provide little added value in the calculation. Therefore, applying the total cost method is appropriate for these options. For Option 3, repairs are expected to occur between years 6 and 10, but the actual volume and timing of the repairs are unknown. In this case, spreading the cost over years 6 to 10 using the percentage method is the preferred approach.

Move to Rows 21 to 50

b.i Percentage cost method

Supply cost	\$, AUD		\$14,352.00
Installation cost	\$, AUD		\$18,000.00
Service cost	\$, AUD		\$10,000.00
Other costs (e.g. insurance, fees, interest, transition out costs).	\$, AUD		\$17,200.00
Effective acquisition cost (includes end-of-life stage costs)	\$, AUD		\$69,509.06
Year 1 - base year (current financial year)			42%
Year 2			33%
Year 3			0%
Year 4			0%
Year 5			0%
Year 6	%		3%
Year 7			5%
Year 8			9%
Year 9			5%
Year 10			3%

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	\$, AUD
Acquisition cost Year 7	
Acquisition cost Year 8	
Acquisition cost Year 9	
Acquisition cost Year 10	

\$30,589.60	\$51,469.00	
\$24,000.00	\$50,000.00	

For **Options 1 and 2**, the design and planning and material costs occur in year 1, and the installation costs occur in year 2.

For **Option 3**, the repairs cost – representing approximately 25% of the total cost – is distributed across years 6 to 10, with repairs peaking in year 8. The proportion of costs relating to supply and service (42%) are grouped together and applied to year 1. The proportion of costs relating to installation cost (33%) is applied in year 2.

Rows 52 to 61 – These rows provide an ‘effective’ acquisition cost for each year, factoring in cost escalation over time. For year 1 specifically, they also account for 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
Electricity usage in operation stage	kWh, p.a.
Proportion of renewable electricity used in operation stage	Per cent
Electricity cost	\$, AUD / kWh
Renewable energy electricity cost premium	\$, AUD / kWh
Lease payment per annum	\$, AUD
Operating cost per annum (excluding electricity usage)	\$, AUD
Re-occurring annualised fees and charges (e.g., rent; excluding electricity usage)	\$, AUD

Year 2	Year 2	Year 2
0	0	0
\$0.00	\$0.00	\$0.00
\$0.00	\$0.00	\$0.00
\$0.00	\$0.00	\$0.00

Row 65 – All options are assumed to become operational in year 2, following their installation. Year 2 is therefore set as the starting year for all options.

Row 67 to 70 – No electricity is used in the operation of the cladding; therefore, Row 67 contains zeros, and the remaining rows in this section are left blank.

Row 72 to 74 – There are no lease payments as no equipment or facilities are leased, and these options incur no operational costs or recurring fees. Note that all cleaning costs are included under maintenance costs.

3.4 Step 6 – Maintenance costs

Move to Row 76

d Maintenance stage

Maintenance event 1: name	<i>Text label</i>
Maintenance event 1: start year	<i>First year of maintenance</i>
Maintenance event 1: frequency of occurrence	<i>No. of years between occurrences</i>
Maintenance event 1: cost per occurrence	<i>\$, AUD</i>

	Timber façade repair	Inspections
	Year 9	Year 6
	Every 20 years	Every 1 years
	\$7,073.45	\$1,000.00

Option 2 has a single maintenance event at the mid-point of its life, during which the timber façade elements are restored or repaired to their original condition. The material cost is estimated at 5% of the original price, with additional labour costs to cover the repairs.

Option 3 involves a regular maintenance event from year 5 of operations (equivalent to year 6 in the calculator). These events involve assessing the façade for damage to the underlying layers to determine sections requiring repairs, incurring minor labour costs.

Move to Row 98

Provision for general annual maintenance (e.g., unforeseen breakages)

\$, AUD

\$2,200.00	\$1,500.00	\$2,200.00
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Option 1's aluminium backing is expected to reduce maintenance needs over its useful life through improved durability and resistance to abrasions. Conversely, the softer façade is more prone to scratches and will need to be re-finished in sections each year to maintain its protection. A small labour cost has been included to cover this maintenance.

Option 2 requires minimal maintenance throughout its lifespan due to the durable natural materials. The stone component only requires routine cleaning, which does not incur additional costs. The timber is protected by a finish that prevents mould and rot. The risk of any meaningful damage to the cladding is minimal due to the stone's durability, and any timber damage will be fixed during the mid-life maintenance event. A small annual maintenance cost has been included to account for power washing the building's exterior to maintain the appearance of the cladding.

Due to its less durable nature, **Option 3** requires more careful cleaning. While the material is not 'soft', contact with other surfaces may cause abrasions that may require minor repairs throughout the year. There is also the risk of mould growing where the finish has worn away or been breached. Similar to Option 1, the façade will need to be re-finished in sections to maintain its protection, incurring a similar annual maintenance cost.

3.5 Step 7 – End of life costs

Move to Row 100

e End-of-life stage

Cost of disposal	<i>\$, AUD</i>
Realised value of components	<i>\$, AUD</i>
Residual value	<i>\$, AUD</i>

\$24,000.00	\$50,000.00	\$18,000.00
\$6,176.88	\$29,028.30	\$0.00
\$0.00	\$33,823.00	\$0.00

Row 102 – Based on market research, reclamation and recycling of the materials at end of life is assumed to have the same cost as installation.

Row 103 – Options 1 and 2 retain a proportion of value at end of life. For Option 1 this is assumed to be 30% of material value. Option 2 assumes 70% if the stone is well cared for. Option 3 is assumed to have minimal realised value.

Row 105 – Option 2 has a calculated residual asset value because it has additional useful life remaining after the calculation period of 11 years. For more information see step 9.

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 -E p.a., tonnes, total	3.65	6.07	0.63
Operation stage carbon dioxide equivalent emissions (non-renewable electricity usage)	CO ₂ -E, tonnes, annualised	0.00	0.00	0.00
Operation stage carbon dioxide equivalent emissions (excluding electricity usage)	CO ₂ -E, tonnes, annualised	0.00	0.00	0.00
Maintenance event 1: carbon dioxide equivalent emissions	CO ₂ -E p.a., tonnes, annualised		0.30	0.00
Maintenance event 2: carbon dioxide equivalent emissions	CO ₂ -E p.a., tonnes, annualised			
Maintenance event 3: carbon dioxide equivalent emissions	CO ₂ -E p.a., tonnes, annualised			
Maintenance event 4: carbon dioxide equivalent emissions	CO ₂ -E p.a., tonnes, annualised			
General annual maintenance carbon dioxide equivalent emissions	CO ₂ -E p.a., tonnes, annualised	0.01	0.00	0.01
End-of-life stage carbon dioxide equivalent emissions	CO ₂ -E p.a., tonnes, annualised	0.00	0.00	0.00

Row 109 – Acquisition-stage carbon estimates have been determined for each option based on available data:

- Option 1: The recycled aluminium used is assumed to contain 90% recycled content, with carbon rate of 2 kg CO₂-e per kg of aluminium. With a 3 mm thick aluminium backing (equivalent to 5.4 kg per square metre), this results in 10.8 kg CO₂-e per square metre. An additional 20% is added to account for the composite façade layer.
- Option 2: Desktop research indicates that natural stone has a carbon rate of 22 kg CO₂-e per square metre.
- Option 3: Primarily made from recycled and other natural materials, Option 3 is assumed to have a carbon rate similar to plasterboard – approximately 2 kg CO₂-e per square metre – reflecting the low emissions associated with recycled content and minimal processing.

In addition to the material cost, the protective finishes used in Options 1 and 3 must also be considered. Using paint as a proxy (with a carbon rate of 2.8 CO₂-e per litre), and assuming 100 ml of finish per square meter, this adds approximately 0.077 tonnes of CO₂-e to each of these options.

While installation times vary between options, the emissions associated with installation are assumed to be negligible in comparison to material emissions.

Row 112 – This is zero across all options as there are no operational activities.

Row 114 – For Option 2, emissions from maintenance (e.g. replacement of timber) are calculated as 5% of the original material cost, consistent with the cost approach. For Option 3, inspection-related emissions are assumed to be negligible.

Row 118 – For Options 1 and 3, it is assumed that the entire façade is re-finished once during the ten-year useful life. An equivalent emission value is estimated using the carbon rate of paint

(2.8 kg CO₂-e per litre) and an estimated application of 100 ml of finish per square meter. Option 2 is assumed to have negligible annual maintenance emissions.

Row 120 – All materials are assumed to be recycled at end of life. Removal and transport of the material to a recycling facility is assumed to generate negligible emissions compared to the product's upfront emissions.

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 Calculations sheet

The 'Calculations' 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 'Calculations' 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' cells I34 to I38 against 'Calculations' rows 246 to 250 to confirm the later year acquisition costs are correct.
- **Maintenance events:** Compare 'Option specific inputs' cell H81 against 'Calculations' cell O167 to confirm the maintenance event shows up.
- **Carbon emissions:** Compare 'Option specific inputs' cell G118 against 'Calculations' row 116 to confirm the carbon emissions are occurring annually after year 1 (as year 2 is the start of operations).

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		Recycled aluminium	Stone with timber ornamentation	Modular recycled waste
Type of procurement	Category		Construction	Construction	Construction
Useful life of product	Years		10	15	10
Calculation duration	Years		11	11	11
Total acquisition cost	\$, AUD	Discounted, Escalated	\$63,483	\$111,057	\$64,256
Total operation cost	\$, AUD	Discounted, Escalated	\$0	\$0	\$0
Total maintenance cost	\$, AUD	Discounted, Escalated	\$17,672	\$17,141	\$22,091
Total residual value	\$, AUD	Discounted, Escalated	\$0	\$22,425	\$0
Net cost	\$, AUD	Discounted, Escalated	\$81,154	\$105,772	\$86,348
Total economic cost of carbon (if relevant)	\$, AUD	Undiscounted, Escalated	\$501	\$901	\$124
Total tonnes of CO2-equivalent emissions	Tonnes		4	6	1
Net cost ranking	Rank		1	3	2
Total economic cost of carbon ranking (if re.	Rank		2	3	1
Total tonnes of CO2-equivalent emissions ran	Rank		2	3	1

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

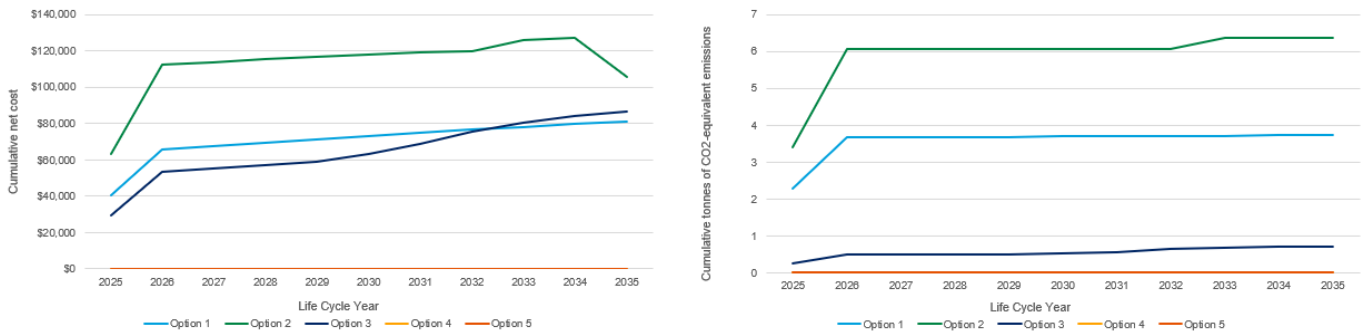
Rows 12 to 15 – These rows show the key descriptive details for each option.

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 3 have similar total acquisition costs, though Option 3 is slightly higher. Row 19 shows that Option 2 has the lowest maintenance costs. Row 20 shows the residual value, which is positive for Option 2. 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. Option 3 has the highest carbon emissions. Note that as the cost of carbon is an economic value, it is never subject to financial discounting.

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 1 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.

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:

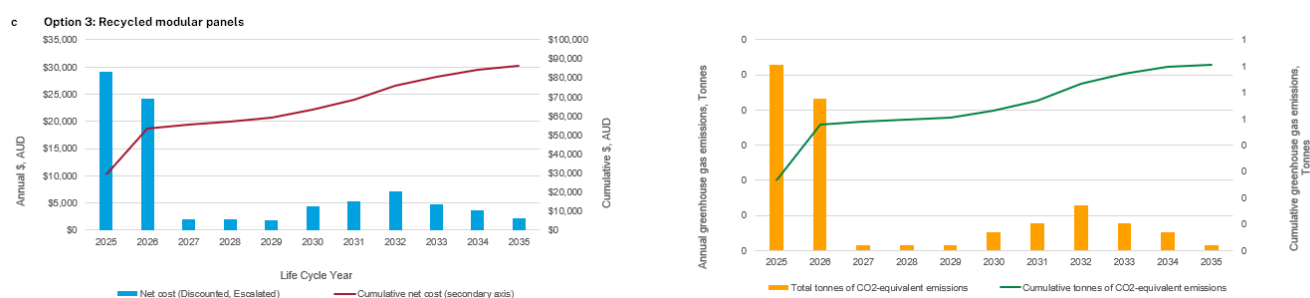
- Across the entire life cycle period, there is a gradual growth for all options due to maintenance costs.
- Year 1 (2025) represents only design and material costs; it is not part of the useful life period for any option.
- Year 2 (2026) marks the start of installation, leading to a significant increase in costs for all options. Option 2's cost increases at twice the rate of the other two options.
- In the first four years of operation, Option 1 and 3 show similar cost growth. However, from Year 6 (2030), Option 3 begins to rise more steeply due to the start of annual inspections.
- Year 8 (2032) sees a spike for Option 2, corresponding to its scheduled mid-life maintenance event.
- Between Years 8 and 9, Option 3's cumulative cost overtakes Option 1's, making it the more expensive option from Year 9 onward.
- Between Years 10 and 11, there is a drop in the net cost for Option 2, despite there being no change in operation and maintenance costs. This reduction reflects the treatment of residual value:
 - Option 2 has a longer useful life than the 11-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 2's apparent cost, as it reflects the benefit of not needing to replace the cladding immediately after Year 11.
- In the final year (2035), Option 1 has the lowest WOLC of all three options.

Cumulative tonnes of emissions graph

This graph shows the cumulative emissions associated with each option across the procurement lifecycle (acquisition, operation, and maintenance) on a year-by-year basis.

In years 1 and 2, the higher upfront carbon of stone gives Option 2 the highest carbon emissions. The ongoing maintenance of Options 1 and 3 generates a small carbon cost due to the paint used, however this does not result in material impact. The addition of the repair work from year 6 onwards adds additional emissions to Option 3 but again has a minimal impact. Overall, there are no changes to the rankings compared to the year 2, with Option 2 remaining the highest impact. Note that unlike for the financial comparison, there is no reduction in Option 2's carbon impact from residuals due to its longer useful life.

Move to Row 32



Switch status: Escalation on, discounting on

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 3 in Row 36 — 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. Large acquisition costs in 2025 and 2026, reflect the purchase of materials and installation. The small columns from 2027 to 2029 represent the initial low maintenance costs, followed by increased costs from 2030 onward due to inspections and cladding replacements. 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.

The right-hand graph similarly features two y-axes: annual carbon emissions (primary axis) and cumulative emissions (secondary axis). Year 2 shows a high emissions value due to the upfront carbon of materials and finishes used during manufacturing. However, because the acquisition costs are spread across years 1 and 2, the emissions are also split proportionally. As a result, Year 1 shows higher carbon emissions than Year 2, even though manufacturing emissions would technically occur in Year 2. This split occurs regardless of whether the percentage or total cost method is used for acquisition, as can be seen from the split also shown in Option 2's graphs in Row 35.

While this means the timing of carbon emissions shown in the graph does not exactly match the real-world emissions timeline, it does not materially impact this analysis. The total carbon figures and the calculated economic cost of carbon remain accurate and valid for comparison.

5.2 Step 10 – Switches

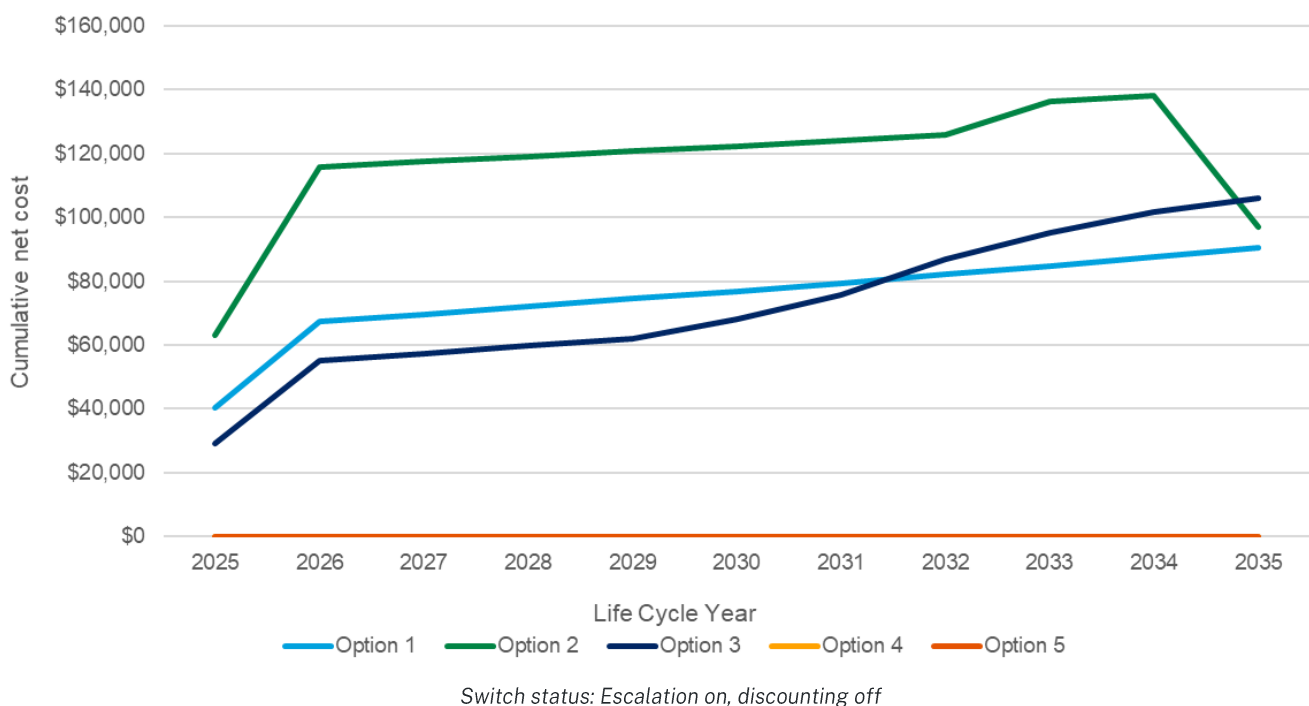
This section requires switching between the ‘General parameters’ and ‘Results’ sheets.

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 are three key points of interest in this view, where discounting is switched off.

First, the cost of Option 3 overtakes the cost of Option 1 earlier. 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 has higher ongoing costs in the later years of the calculation period, it ‘benefits’ more from discounting.

Second, Option 2 becomes cheaper than Option 3. Option 2 has a high residual value, which acts as a negative cost in Year 11. When the residual value is no longer discounted, it has a greater impact in reducing total cost, leading to a lower overall WOLC.

Third, without discounting, Option 1 still has the lowest WOLC.

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

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