Carbon Estimate and Reporting Tool Manual

DMS-SD-100/3.0

Supporting Document – Applicable to Infrastructure and Place

Divisional Management System

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Document History

Version	Date of approval	Doc. control no.	Summary of change
1.0	3 Nov 2016	1380388_7	Rebranded to IP. Previously a standard
2.0	20 Nov 2017	1380388_10	Document is updated to include operation phase carbon emission calculations in the carbon estimation and reporting tool.
2.1	26 Nov 2018		Rebranded to IP
2.2	22 Aug2019	1380388_18	DMS update
3.0	10 Dec 2019	1380388_20	I&P changed to IP. Start date in section 1.5 (p12) is adjusted to reflect project in the future.

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1. Introduction

Within Transport for New South Wales (TfNSW), Infrastructure and Place Division (IP) is responsible for delivering cost-effective and sustainable transport solutions to support the growth of NSW, enhancing its natural and urban environments to provide tangible benefits to customers.

IP delivers a diverse portfolio of projects ranging in type and size. This includes:

- Infrastructure projects – rail, light rail, commuter car parks, station upgrades, etc.
- Fleet procurement – rolling stock, ferries, etc.
- Power supply upgrades.

In addition to project delivery, IP delivers environmental, urban design, heritage, sustainability, property, quality management, safety management and commercial support services.

1.1. Purpose and context

This guideline provides users supporting information to assist with completing the tool.

Development of the Carbon Emissions Reporting Tool (CERT) serves two main purposes:

- To provide consistency in GHG assessment and reporting (i.e. to ensure all projects measure and report emissions in the same way).
- To streamline and simplify the GHG reporting and assessment process for both IP and its supply chain.

Its main objectives are:

- To estimate a project's GHG emissions profile from detailed (SDR) design stage through to construction completion and operation.
- To encourage the investigation and implementation of GHG reduction (mitigation) measures.

The GHG emission sources included in the CERT have been informed by a materiality review undertaken by IP's Sustainability and System's team.

Further support can be obtained by contacting sustainability@transport.nsw.gov.au. TfNSW also welcomes feedback on the tool and encourages its stakeholders to provide comments through use of this email address.

1.1.1. CERT Version 2

This CERT Version 2 (v2) supersedes the previous CERT Version 1 (v1). Users are required to apply CERT Version 2 for all projects commencing after 1/11/2017. Projects currently using CERT Version 1 may choose to use either version.

Key updates to CERT v2 include:

- Updated National Greenhouse Account Factors
- Updated materials emission factors using Australian EPD's where available
- Inclusion of an Operational energy reporting tab
- Inclusion of a Maintenance reporting tab
- Inclusion of additional materials such as timber products and synthetic reinforcement fibres
- Changes to aggregates, asphalt products and steel products
- Inclusion of street tree removal impacts
- Inclusion of revegetation and street tree planting sequestration
- Changes to the mitigation sections.

1.2. Abbreviations and definitions

Acronym / specific term used	Definition
ALCAS	Australian Life Cycle Assessment Society
AusLCI	Australian National Life Cycle Inventory Database
BOQ	Bill of Quantities
CDR	Critical Design Review – refers to completed (100%) detailed design
CERT	Carbon Estimate and Reporting Tool (the 'tool')
EPD	Environmental Product Declaration
FAQs	Frequently Asked Questions
GHG	Greenhouse Gas
GREP	Government Resource Efficiency Policy
GWP	Global Warming Potential
HDPE	High-density polyethylene
IPCC	Intergovernmental Panel on Climate Change
IP	Infrastructure and Place Division
ISCA	Infrastructure Sustainability Council of Australia
IS rating tool	Infrastructure Sustainability rating tool – administered by ISCA.
NGA	National Greenhouse Accounts
NGERS	National Greenhouse and Energy Reporting Scheme
LCA	Lifecycle Assessment
PVC	Polyvinyl chloride
SDGs	TfNSW Sustainable Design Guidelines
SDR	System Design Review – refers to designs that are at least 20% complete
TAGG	Transport Authorities Greenhouse Group

1.3. CERT Overview

The CERT is structured to require input during three key stages of the project (initial/preliminary design – System Design Review; design completion – Critical Design Review; and six-monthly reporting during construction (refer Figure 1).

Defining emissions scopes:

Scope 1: All direct GHG emissions. E.g. emissions generated by the use of diesel fuel by construction plant/equipment; clearing of vegetation.

Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat or steam. E.g. Energy purchased to operate and run plant and equipment, power site offices, etc.

Scope 3: Indirect upstream emissions. E.g. emissions from construction materials; disposal of waste; fuel used to transport materials and waste.

The tool is designed to capture relevant and material Scope 1, 2 and 3 GHG Emissions as identified through an internal IP emissions materiality assessment.

The information entered during each stage of the project informs the next. For example, once the System Design Review (SDR) equivalent (representing approximately 20% design completion) has been completed, this information can then be used to inform the Critical Design Review (CDR) stage which represents the 100% completed design. Following the design stages; reporting is to take place every six months during construction. The tool will automatically show the relevant number of reporting periods to cover the construction duration of your project.

Figure 1 CERT Completion Process

1.3.1. CERT Terminology

Appendix A: CERT Glossary provides a summary of commonly used terminology referenced throughout the tool. A full list of abbreviations is included at the front of this guide.

1.4. CERT Structure

The tool, an Excel spread sheet, has been structured to enable the user to input data across a range of stages, from System Design Review (SDR) – or equivalent design stage – through to construction (at six-monthly intervals).

The tool is structured across six core tabs:

1. **Introduction** (light orange tab) – provides an overview of the background of the tool.
2. **Navigation** (yellow tab) – enables the user to select their relevant input reporting stage (e.g. SDR, CDR, six-monthly periods during construction).
3. **Project detail** (grey tab) – requires the user to input relevant project information, including any project-specific reduction targets, and includes a section for signing off on data validation and approval prior to submission.
4. **Data input** (orange tab) – comprises the core data entry component of the tool. It includes data entry sections and conversion calculators associated with usage and mitigation for: Materials; Energy Use; Waste; Land Use/Vegetation Clearance.
5. **Detailed results** (red tab) – there are two red tabs, both of which provide report summary information including useful tables and graphs. The detailed results tab also provides a breakdown of scope 1 and scope 2 emissions for use towards the ISCA Ene-1 credit.
6. **Dashboard** (red tab) – the dashboard provides a performance summary of the relevant project stages in comparison to a base case (an auto-generated business-as-usual scenario) and analyses performance against project GHG reduction targets.

1.4.1. Hints and tips before you start

There are a number of CERT functions that are common, and therefore featured repeatedly, across the various themes of the tool and throughout the lifecycle of project's assessment (i.e. will appear across SDR, CDR and construction stage reporting). These are captured below.

Updating the CERT across relevant project stages

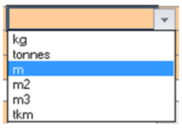
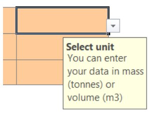
To keep track of the CERT data entries across the respective project stages, it is recommended each version is saved using a unique name. The following naming convention is suggested:

'[tool version] – [project name] – [reporting period] – [submission date]'

For example: 'TfNSW CERT v1 – Newcastle Light Rail – CDR – 30 June 2015'. When reporting against each reporting period, it is recommended the latest version of the file is used and is renamed/updated according to the relevant reporting period.

Data entry cells

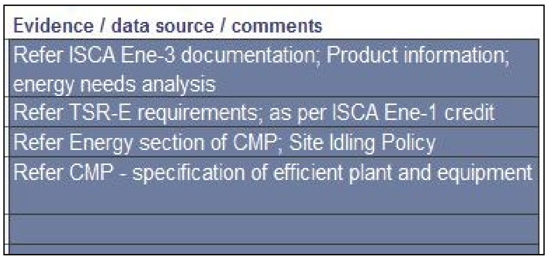
As stated, there are six main tabs within the tool that relate to its completion. Within these tabs are the associated data entry cells that enable the tool user to enter relevant information. The data entry tabs are colour coded as follows:

 	**Orange cells**: represent editable data input cells – the tool user is required to enter information directly into these cells. To avoid error, some cells may have limitations to the values that can be entered. **Orange cells**: When a dropdown is available, a value from the dropdown menu must be selected (or the cell should remain empty if not relevant).
	**Grey cells:** represent non-editable cells. The data in these cells comprise calculations and formulas that are automatically generated by carrying information over from other parts of the tool. I.e. completing the associated emissions calculators will automatically update these cells.
	**Blue cells:** represent editable evidence cells – the tool user is required to enter evidence/data sources/comments to support the information provided
Precast concrete	**Orange underlined text:** Hyperlinked text. Clicking on the hyperlinked text will take the tool user to the relevant section of the CERT for data entry.
	**Pop up notes:** Many data entry cells will show a pop-up note when selected. These notes contain useful information to assist tool users when entering data.

Returning to main entry sheet

Throughout the tool, and in particular on the relevant calculator worksheets, a 'go back' button has been included. This button enables easy navigation between the main data entry sheet and the respective (conversion) calculators. Clicking on the 'go back' button will return the tool user to the main data entry sheet once they have finished completing the calculator section.

Evidence/data source/comments



In both the main data entry section and within the respective (conversion) calculators, tool users are required to complete an evidence/data source/comments box to assist with data verification.

At a minimum, referencing should include the following: 'Document title; Version; Issue date; and, page/section reference'.

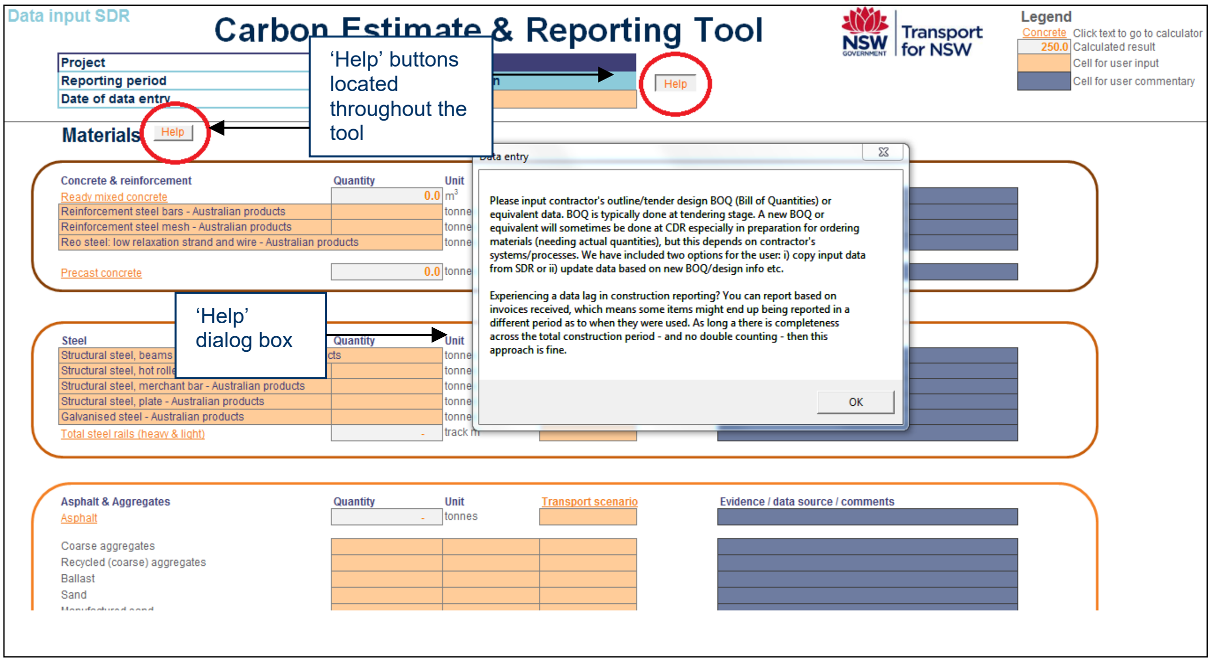
The nominated IP Sustainability Officer will perform spot checks of the supporting evidence. A copy of the page/section must be made available on request. The IP Sustainability Officer may also request confirmation/clarification where a particular data source has not been declared.

The tool user should use their discretion in determining the suitability of evidence. A general rule of thumb is that the evidence identified would clearly link to a) the emission source in question; and b) the volume/quantity stated.

> ***Note***: Evidence information must be completed prior to submitting the tool. If the same comment applies to multiple data entries, either copy and paste the response into the relevant cell; or, reference the comments box that is applicable to the section, i.e. 'As per comments for Ready Mixed concrete calculator'.

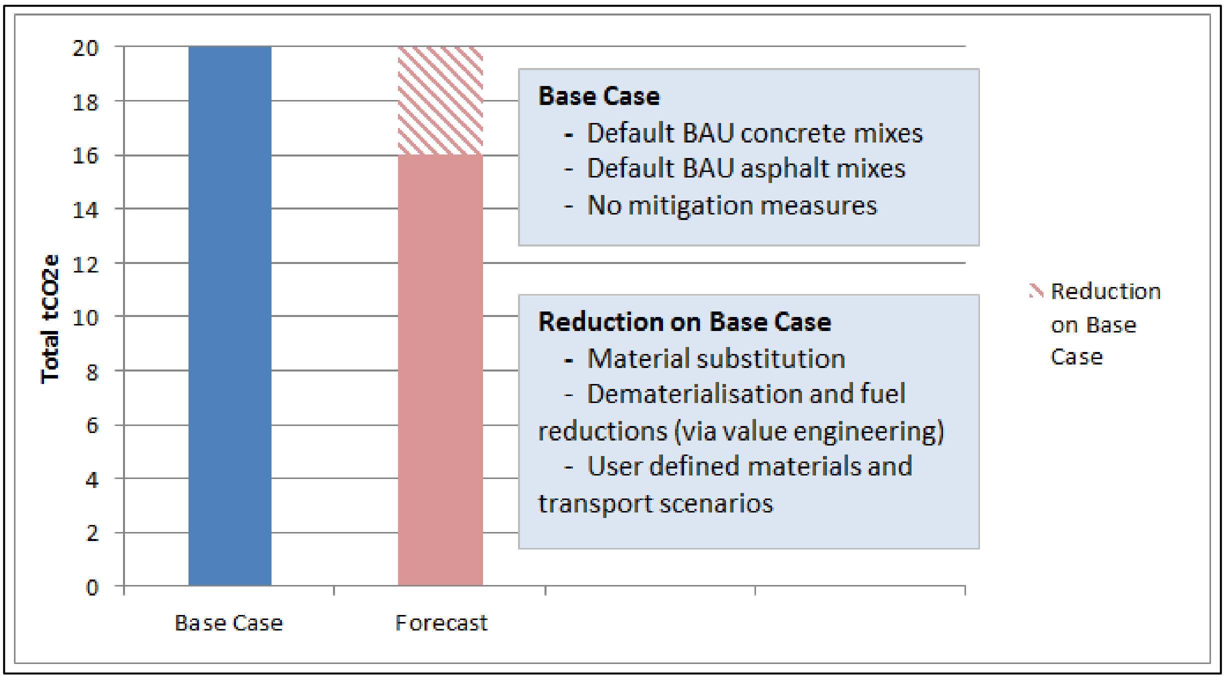
Help function

A series of 'help' buttons designed to provide further assistance with completing the tool are included within the various sections of the CERT. Clicking on these will provide a greater level of clarification, context and examples on how to complete the associated section.



Base Case

The CERT automatically creates a Base Case scenario using BAU assumptions for materials and transport scenarios. The Base Case serves as a point of reference against the forecast design in which the carbon emission reductions can be represented. The diagram below demonstrates the impact of mitigation strategies on the final carbon emissions quantity. Note the total quantities and proportions are for illustrative purposes only, and will vary depending on user input.



Automatic Mitigations

Concrete and Asphalt sections allow the user to enter alternative mix types which are credited with 'Automatic Mitigations'. For example, by entering a Portland Cement Content figure for a concrete strength that is less than or greater than the Base Case Assumption, CERT will automatically apply reduced or increased GHG emissions to the Forecast or Actual Case associated with the difference. Users should not use the 'Mitigation Calculators' to account for any reduced or increased GHG emissions that are associated with using low (or high) carbon concrete or asphalt mixes.

Transport selections will also be awarded automatic Mitigations based on reduced transport GHG emission associated with local procurement.

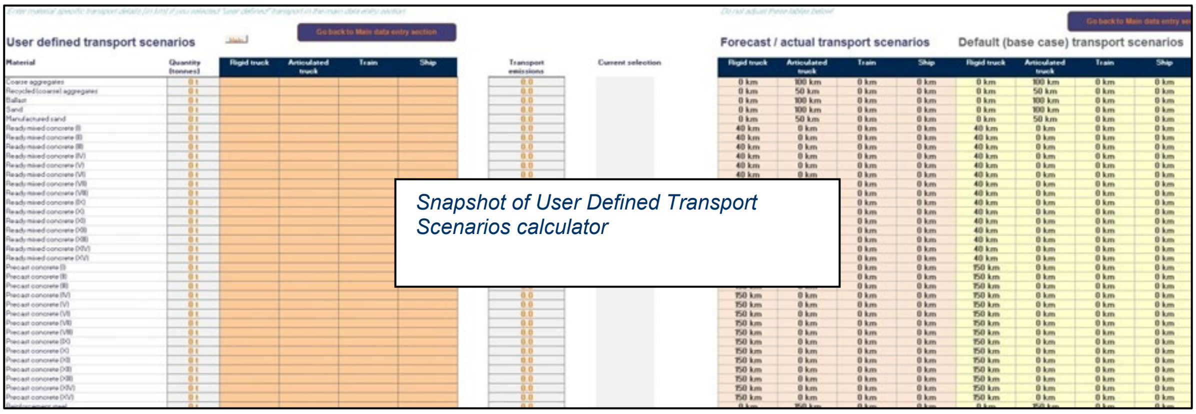
Mitigation Calculators

Users may also utilise the 'Mitigation Calculators' CERT allows users to achieve mitigations beyond the Base Case assumptions for alternative material selection, tree planting, fuel selection, transport and value engineering.

Transport Scenarios Calculator

For all materials used across each stage of the project lifecycle, the tool user is required to select the relevant transport scenario from the orange data input cells. Selection is based on a 'default domestic', 'default imported' or 'user defined' scenario based on transport from the site of manufacture. If details regarding the transport-to-site are not (yet) known, the most relevant default scenario for that material should be used (e.g. default domestic/default imported). When the supplier location is (approximately) known, the tool user should select 'user defined' and complete and/or update the transport calculator (click on 'Transport scenario' to be taken to the transport calculator).

Further information on the emission factors used to determine the transport emissions can be found in the '*Formulas and Background'* tab of the tool.



Entering data

Only data inputs cells can be altered by tool users. All other parts of the CERT have been locked to prevent unintentional loss of functionality.

Tool users can use the 'Tab' key on their keyboard to move to the next data input cell.

Tip: Workshop the tool

Completing the CERT in a workshop environment with a cross section of the Project team may streamline the process and add value in identifying mitigation measures.

Note: Where the transport scenario has not been entered, the tool will automatically revert to default/base case transport scenarios.

Base Case Assumptions: The default transport scenarios have been developed by Energetics and are considered as reasonably conservative estimates of typical material supply. The scenarios capture transportation via the following transport modes:

- Rigid Truck
- Articulated Truck
- Train
- Ship

The default transportation distances depend on material and approximate sourcing location (domestic or imported), and the emissions factors are sourced from the AusLCI database. A summary of the default transport scenarios can be found in Appendix B: Default Transport Scenarios and in the 'Formulas and background' tab in CERT v2.

1.5. Navigation Tab

The CERT requires input at the following stages:

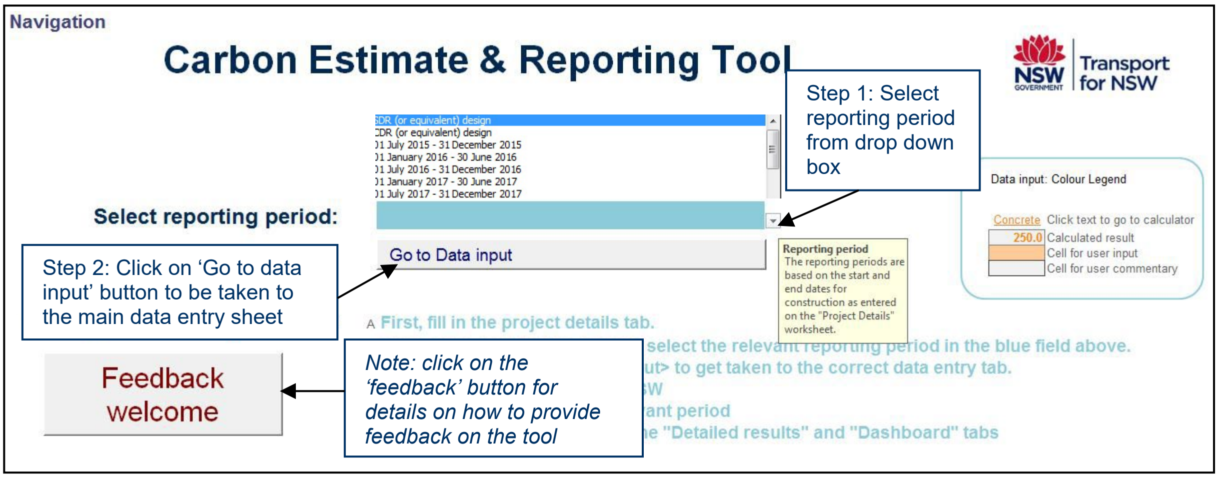
- SDR (or equivalent design) stage (~20% design). Operational Energy, Maintenance may be included at the discretion of the user at the SDR stage
- CDR (or equivalent design) stage (100% design). Operational Energy, Maintenance and inputs must be included at the CDR stage. If the user has completed the Maintenance and Operational energy tabs at SDR, the information must be cleared as it can only be filled out once.
- Six-monthly during construction (the six-monthly reporting periods run from 1 January – 30 June and from 1 July – 31 December. If a construction period starts on 1 June 2020, the first reporting period will show 1 January 2020 – 30 June 2020).

Users are required to complete the Operational Energy and Maintenance Tab information at CDR when sufficient information should be available to inform inputs. Users are not required to report the actual Operational energy and Maintenance performance of the live asset.

The tool is able to cope with projects that cover a construction period of up to five years[1]. To reduce the chance of entering data into the wrong period, a *navigation tab* is included. The navigation tab is where the relevant reporting stage is selected (refer Step 1 in the following figure). Clicking on the 'Go to Data input' button (Step 2) will take the tool user to the appropriate data entry tab.

To switch to the appropriate period for each reporting cycle (SDR, CDR, six-monthly construction) be sure to return to the navigation tab each time. (Refer Section 1.1.2 for guidance on saving different versions of the tool.)

1.5.1. Selecting the relevant project reporting stage



> ***Note***: The 'navigation tab' allows the tool user to select the design stage or construction stage needing to be assessed, hiding the other tabs for ease of use.

The construction start and end dates will determine the number of available six-monthly reporting tabs. As a general rule of thumb, construction includes all project work other than

[1] Please contact IP if your project will have a construction period in excess of five years.

minor works such as: fencing, investigative drilling/excavation; building/road dilapidation; minor access roads; minor adjustments to services/utilities; establishing temporary construction sites; and minor clearing.

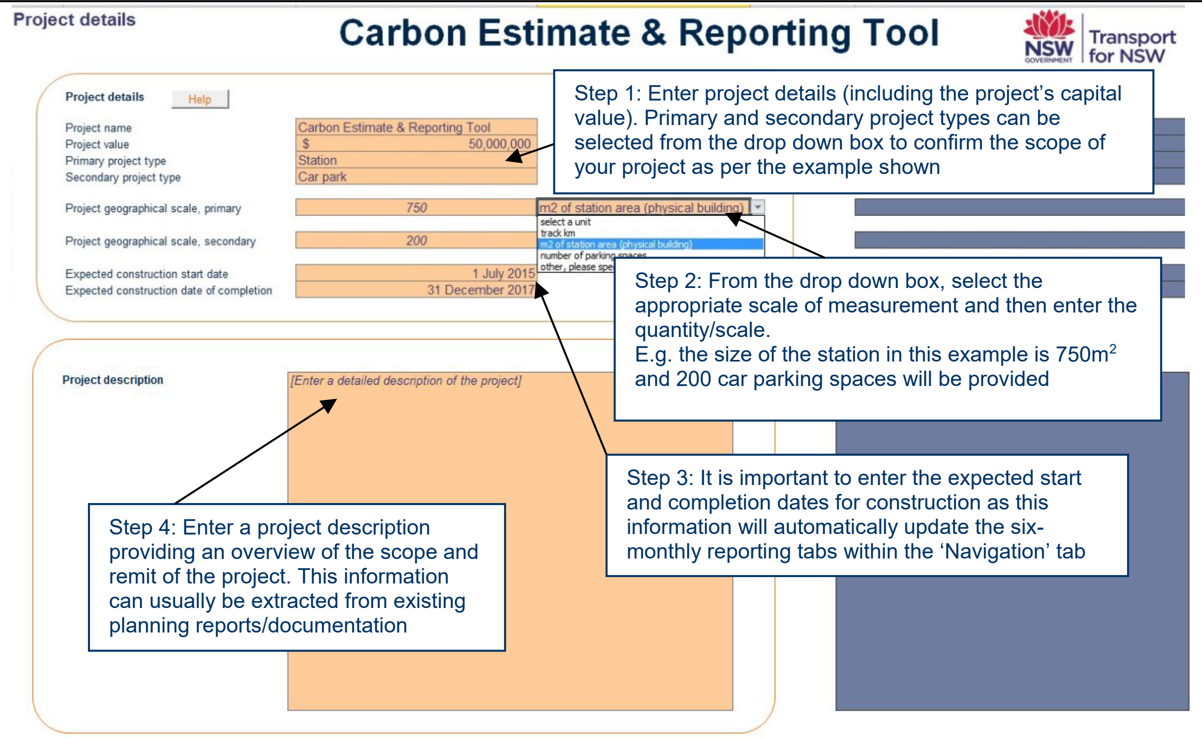
1.6. Project Details Tab

The *project details tab* identifies the project being assessed, provides contact details, ensures any reduction targets are articulated, and provides assurance details (i.e. assessment sign-off).

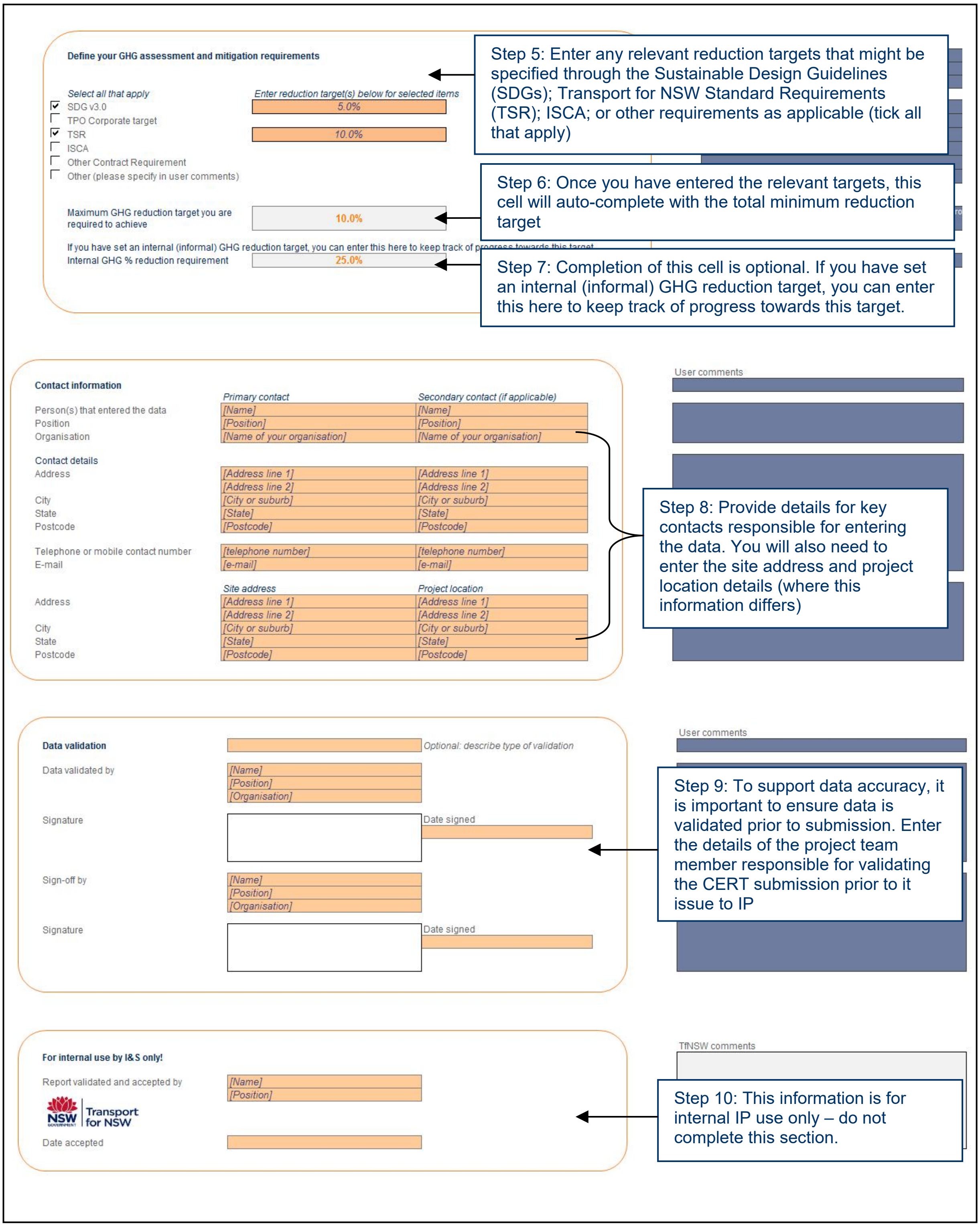
> ***Note***: Information relating to the project's value can be updated at each reporting period as required. This information is collected for internal benchmarking purposes only.

SDR/CDR – data validation (sign off) must be provided by either a cost planner, design manager or other such equivalent with visibility of the cost planning/tender estimate process.

Construction – data validation must be provided by the Construction Manager or equivalent (refer Step 9 below).



Project Details Tab (continued from previous)


Define your GHG assessment and mitigation requirements
Select all that apply
Enter reduction target(s) below for selected items
SDG v3.0
5.0%
TPO Corporate target
TSR
10.0%
ISCA
Other Contract Requirement
Other (please specify in user comments)
Maximum GHG reduction target you are required to achieve
10.0%
Internal GHG % reduction requirement
25.0%
Step 5: Enter any relevant reduction targets that might be specified through the Sustainable Design Guidelines (SDGs); Transport for NSW Standard Requirements (TSR); ISCA; or other requirements as applicable (tick all that apply)
Step 6: Once you have entered the relevant targets, this cell will auto-complete with the total minimum reduction target
Step 7: Completion of this cell is optional. If you have set an internal (informal) GHG reduction target, you can enter this here to keep track of progress towards this target.
Contact information
Primary contact
Secondary contact (if applicable)
Person(s) that entered the data
Position
Organisation
[Name]
[Position]
[Name of your organisation]
Contact details
Address
City
State
Postcode
[Address line 1]
[Address line 2]
[City or suburb]
[State]
[Postcode]
Telephone or mobile contact number
E-mail
[telephone number]
[e-mail]
Site address
Project location
User comments
Step 8: Provide details for key contacts responsible for entering the data. You will also need to enter the site address and project location details (where this information differs)
Data validation
Optional: describe type of validation
Data validated by
[Name]
[Position]
[Organisation]
Signature
Date signed
Sign-off by
Step 9: To support data accuracy, it is important to ensure data is validated prior to submission. Enter the details of the project team member responsible for validating the CERT submission prior to it issue to IP
For internal use by I&S only!
Report validated and accepted by
Date accepted
TfNSW comments
Step 10: This information is for internal IP use only – do not complete this section.

1.7. Data Input tab

The *data input tab* can be accessed manually by clicking on the tab within the tool, or automatically by clicking on the 'Go to data input' button within the *navigation tab*. The following provides detailed guidance on how to complete this section.

> ***Note***: Completing this section of the tool will require referral to the tender estimate, Bill of Quantities (BOQ), or equivalent – i.e. those document/s that were used to price the contractor's tender - based on material types, volumes etc. In some instances there may be gaps in the data. In these instances assumptions will need to be made in order to complete the data. (For example: assumptions may be needed if there are only high level estimates available – such as km rail or m^2 of station area – in these instances a cost planner/s should be consulted.)

As SDR is an early design iteration, it is assumed there will be no, or only minor, changes from the tender estimate through to SDR.

Tip: the SDR assessment is to be submitted at SDR stage however can be based on the tender BOQ.

1.8. SDR Stage: Data Entry

The following steps provide guidance on completing the tool specific to the SDR project lifecycle stage.

1.8.1. Materials

Within the d*ata input tab* the 'materials' section requires information to be entered for the following:

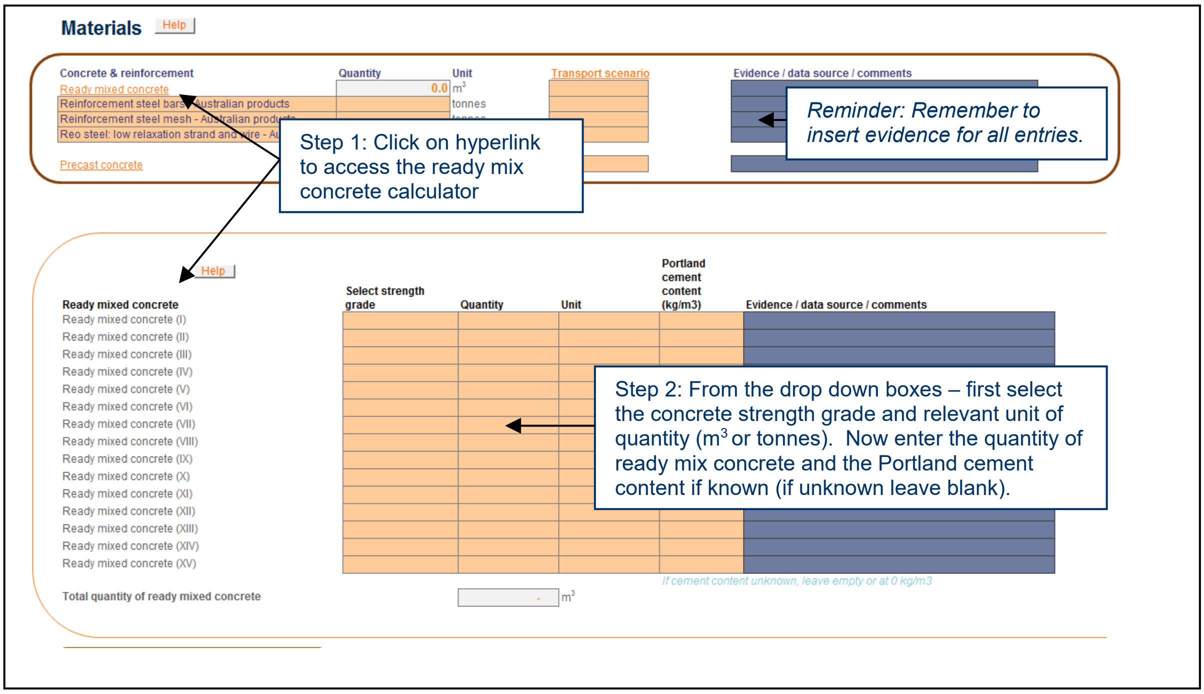
- **Concrete and reinforcement** – ready mixed concrete, pre-cast concrete, reinforcement steel (bar, mesh, strand & wire): refer 2.4.1.1
- **Steel** – structural steel (beams and columns, hot rolled coil, merchant bar, plate); galvanised steel; total steel rails (heavy and light)
- **Asphalt and Aggregates** – asphalt (ten product variations); coarse aggregates; recycled (coarse) aggregates; ballast; sand; manufactured sand, recycled crushed glass
- **Piping** – reinforced concrete pipes; steel pipes and tubes; HDPE pipes; PVC pipes, etc.
- **Timber** – Softwoods/Hardwoods, composites etc
- **Other materials** – i.e. glass; aluminium; ceramics, etc.
- **Additional materials** – any other materials that have not been previously represented and/or captured that are believed to represent ≥5% of the project's total GHG emissions.

1.8.1.1. Concrete and Reinforcement

The following outlines the necessary steps required to complete the concrete and reinforcement data related to ready mixed concrete; precast concrete and reinforcement steel.

Entering ready mixed concrete quantities

The ready mixed concrete calculator allows input of up to 15 different compressive strengths and mix designs (defined by rate of Portland cement content).



***Note*:** Portland cement content is used as a proxy for GHG intensity of concrete. Although other components will have some effect, the chosen approach was considered the most practical way for determining the absolute GHG intensity of concrete.

***Base case assumptions*:** The base case for Portland cement content is embedded in the calculator and based on the following:

- Benchmark quantities of Portland cement (in kg/m^3) for each strength grade
- Concrete density of 2,400kg/m^3
- Water/cement ratio of 0.35
- Remaining materials assumed as coarse aggregates

Refer to Compositions for default ready mix concrete mix compositions

Automatic Mitigation

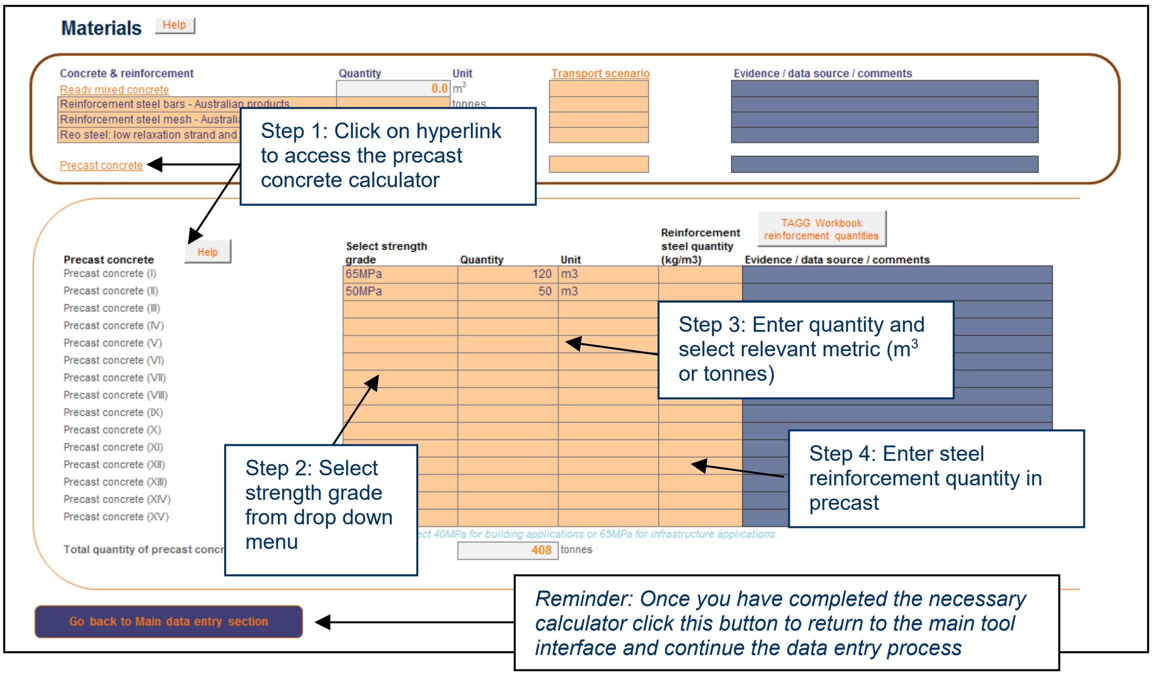
By entering a Portland Cement content figure that is less than or greater than the Base Case Assumption, CERT will automatically apply reduced or increased GHG emissions to the Forecast or Actual Case associated with the difference.

Users should not use the ‘Mitigation Calculators’ to account for any reduced or increased GHG emissions that are accounted for in the Automatic Mitigation in the Concrete Section.

Portland cement rate can be sourced from supplier mix design sheets.

Entering precast concrete quantities

The precast concrete calculator allows up to 15 different compressive strengths and mix designs (namely Portland cement content) to be entered.



Note: In contrast to the ready-mixed concrete calculator, the Portland cement content of precast concrete is estimated based on the strength grade. The reason for this difference in approach is that the exact Portland cement content of precast products could be too difficult to establish for the tool user.

Reinforcement steel incorporated into the precast concrete products should also be entered in this section.

Base case assumptions:

The base case for Portland cement content is embedded in the calculator and based on the following***:***

- Concrete density of 2,400kg/m^3
- Benchmark quantities of Portland cement (in kg/m^3) for each strength grade
- Water/cement ratio of 0.35
- Remaining materials assumed as coarse aggregates

Refer to Compositions for default ready mix concrete mix compositions

Automatic Mitigation

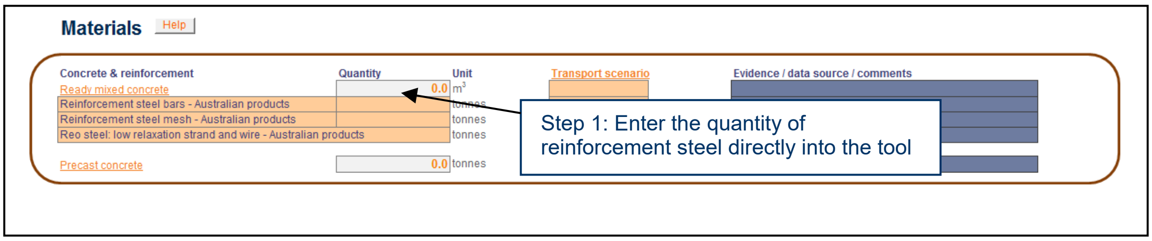
By entering a Portland Cement content figure that is less than or greater than the Base Case Assumption, CERT will automatically apply reduced or increased GHG emissions to the Forecast or Actual Case associated with the difference.

> Users should not use the 'Mitigation Calculators' to account for any reduced or increased GHG emissions that are accounted for in the Automatic Mitigation in the Concrete Section.

Tip: Consult the product supplier/manufacturer for this information.

Reinforcement steel

The quantity of reinforcement steel (bars, mesh, post-tensioning strand and wire) used with ready mixed concrete can be entered directly into the tool. Reinforcement steel embedded in precast concrete should be entered in the precast concrete calculator section.



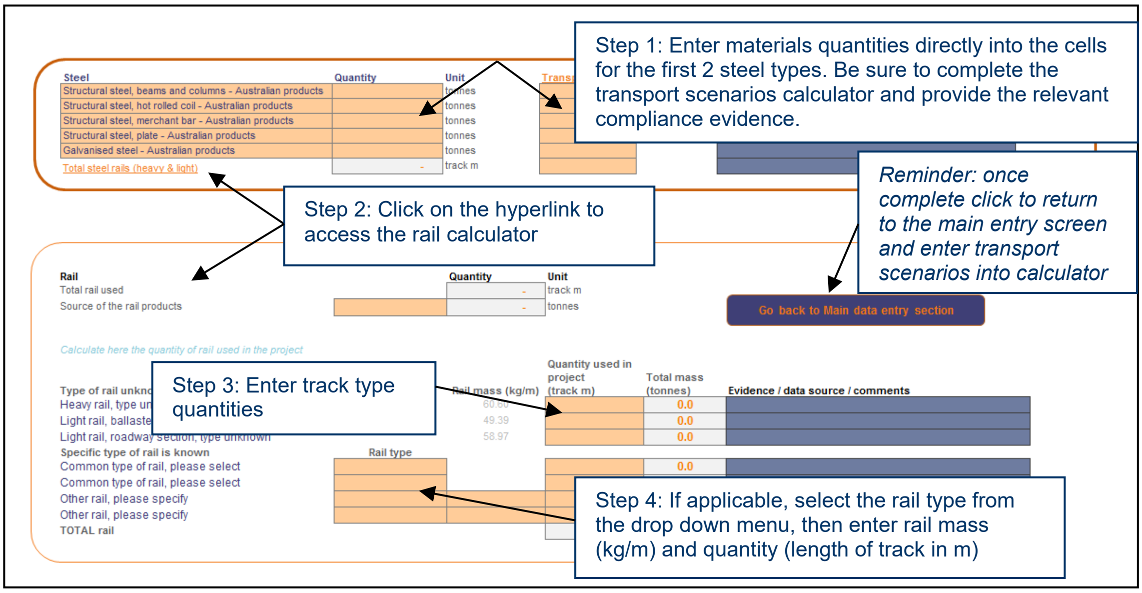
Tip: Reinforcement steel quantity would typically be sourced from the Bill of Quantities.

Mitigation Calculators:

Users should use the Mitigation Calculators to capture mitigations associated with alternative products.

Steel

There are three components that comprise the entries for Steel within the tool. Of these, two ('structural steel and post-tensioned steel' and 'galvanised steel') enable quantities to be directly entered into the relevant data input cells. Only data entry regarding 'total steel rails (heavy & light)' requires use of the relevant calculator.



Tip: Use the empty worksheet tab 'Sheet for notes (Materials)' to record quantities of structural steel and post-tensioning steel before aggregating them into the data input cell.

Tip: Note that the length is expressed in track metres. One track metre consists of two metres of rail. The mass of the rail is expressed in kg/m of single rail (not track metres).

Mitigation Calculators:

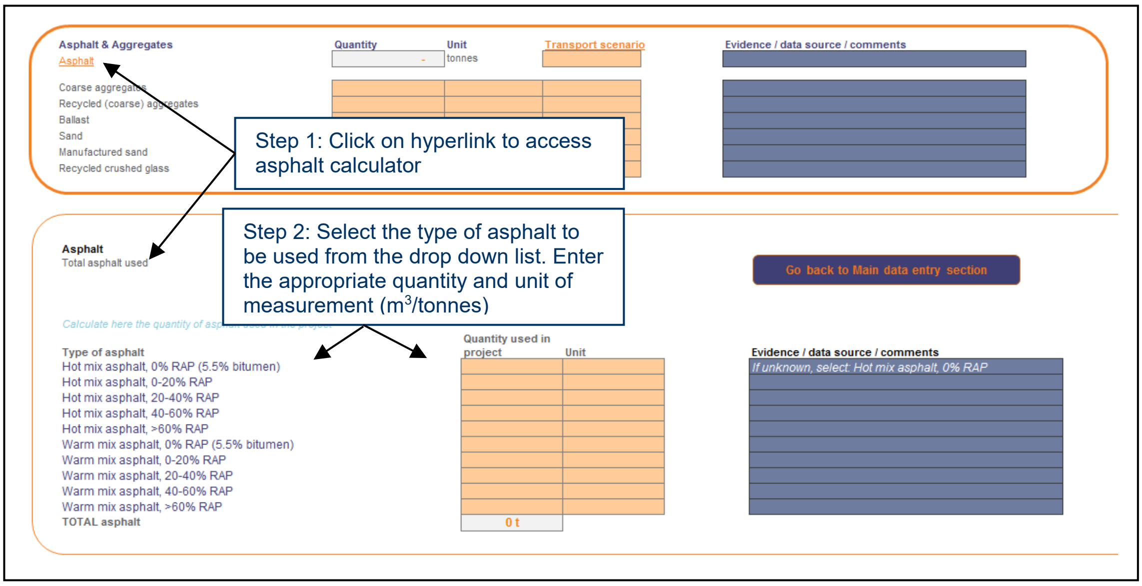
Users should use the Mitigation Calculators to capture mitigations associated with alternative products.

1.8.1.2. Asphalt and Aggregates

This section requires the tool user to enter details for asphalt and aggregates usage. Asphalt information can be entered using the relevant calculator (see Asphalt Step 1 below), whereas aggregates information should be entered directly into the main data entry sheet.

Asphalt

The asphalt calculator allows the tool user to input details on the type of asphalt being used and the unit of measurement (tonnes/m^3) from the drop down list.



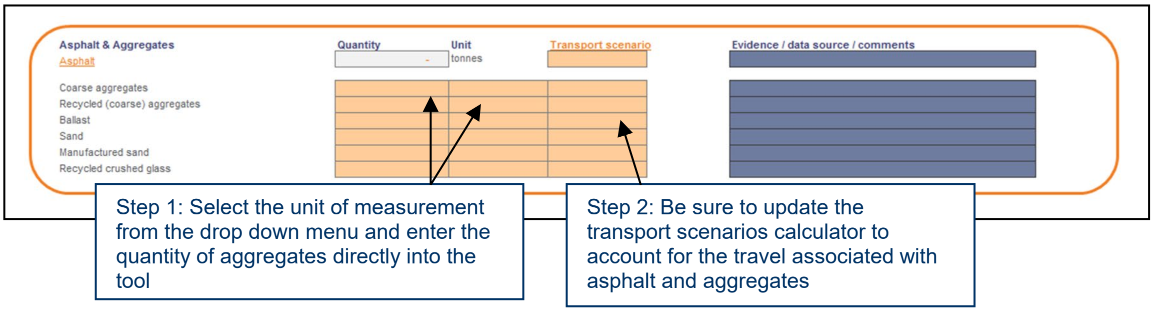
Base case assumptions:

The base case for Asphalt is embedded in the calculator and based on the following*:*

- Warm mix asphalt has a 25% heating energy reduction compared to hot mix asphalt.

Refer to Appendix C: Default Material Mix Compositions for default ready mix concrete mix compositions

Aggregates

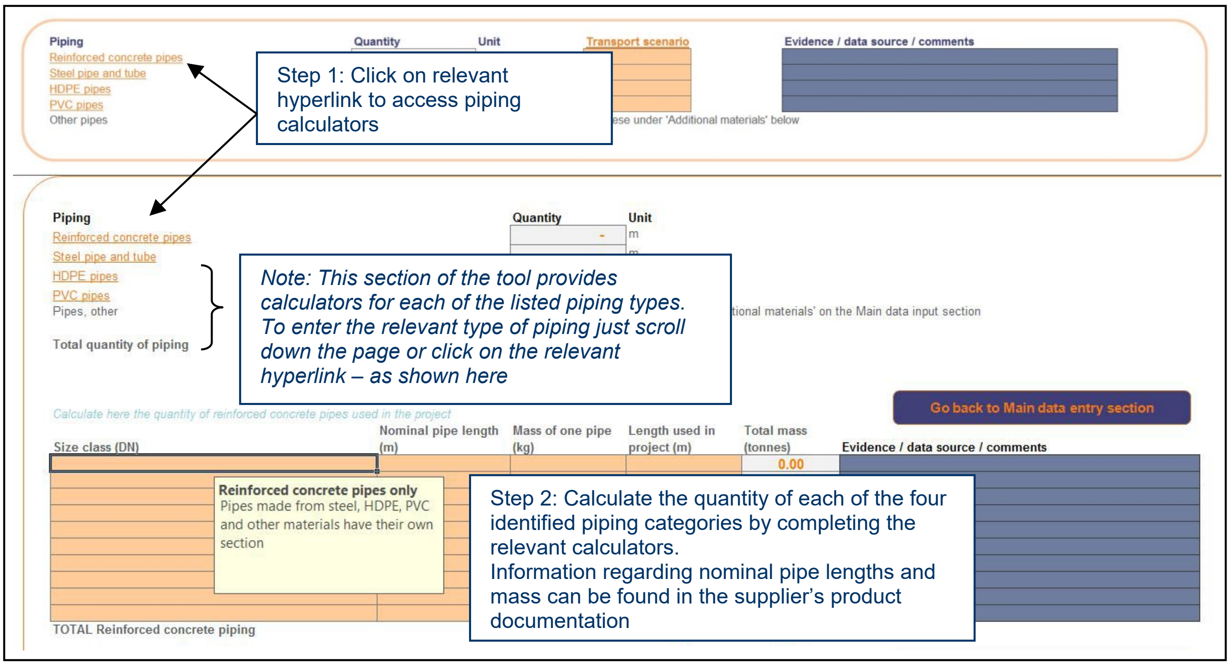


Mitigation Calculators:

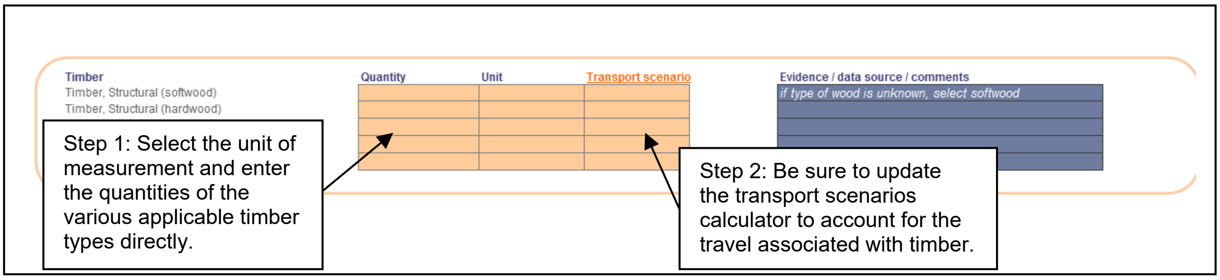
Users should use the Mitigation Calculators to capture mitigations associated with alternative products or value engineering.

1.8.1.3. Piping

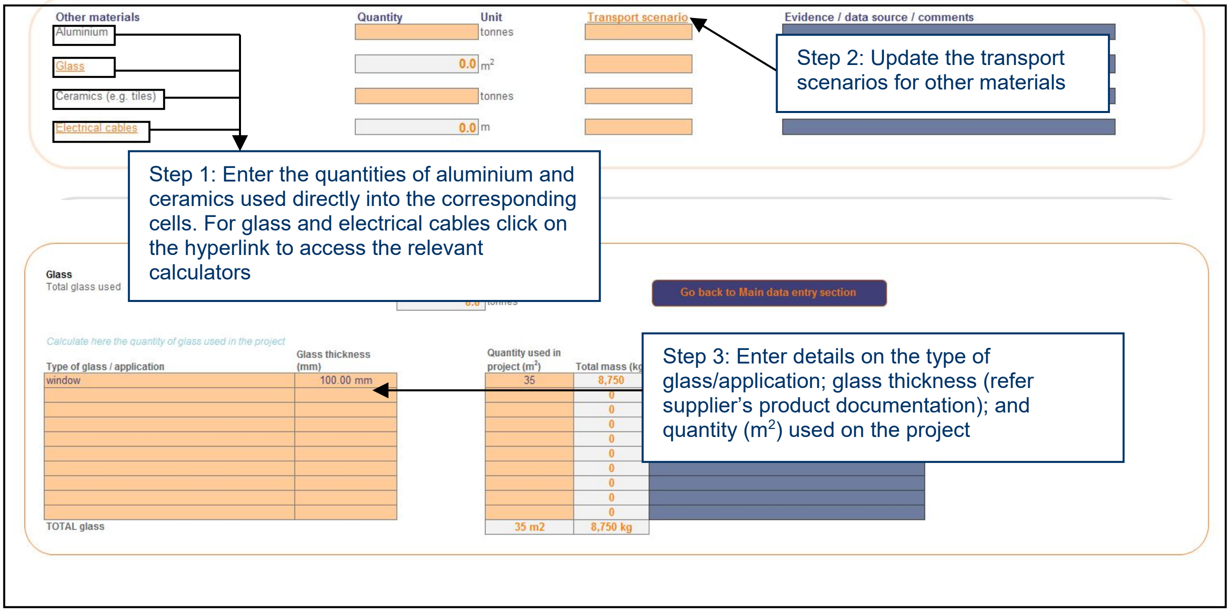
There are a total of four calculators to assist the completion of piping information. The tool user will need to complete these in order to populate the grey cells on the main data entry sheet. Once information on quantity has been entered, the appropriate transport scenarios will need to be completed to complete this section.



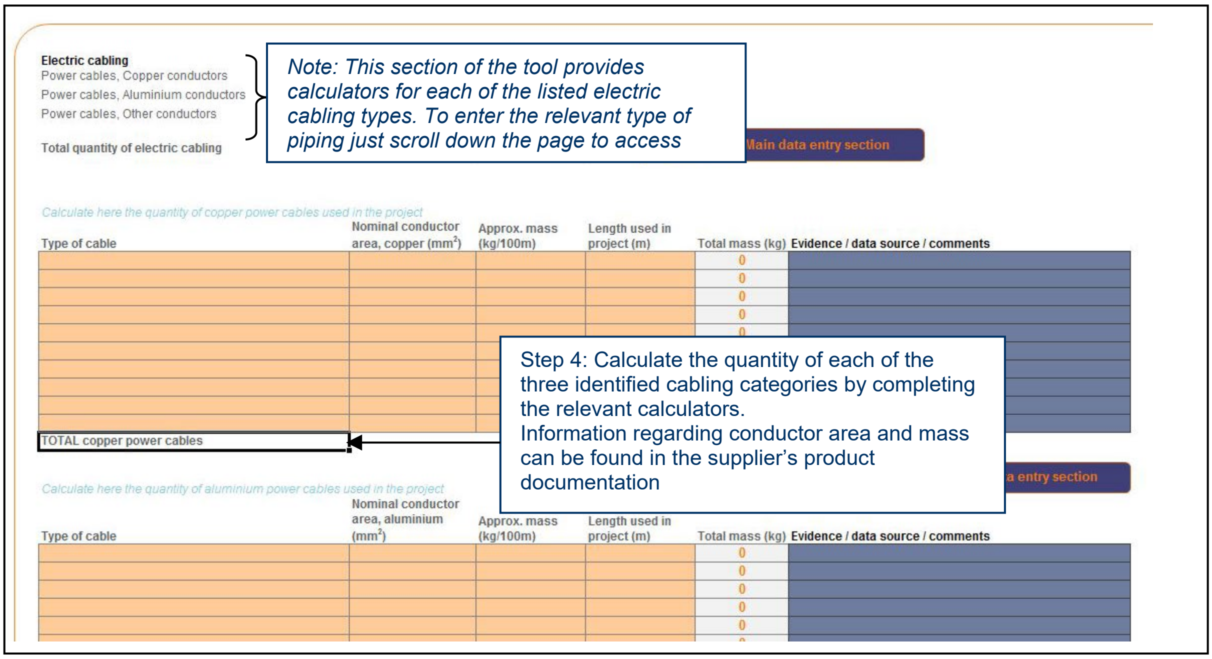
1.8.1.4. Timber



1.8.1.5. Other materials



Other materials (continued from previous)



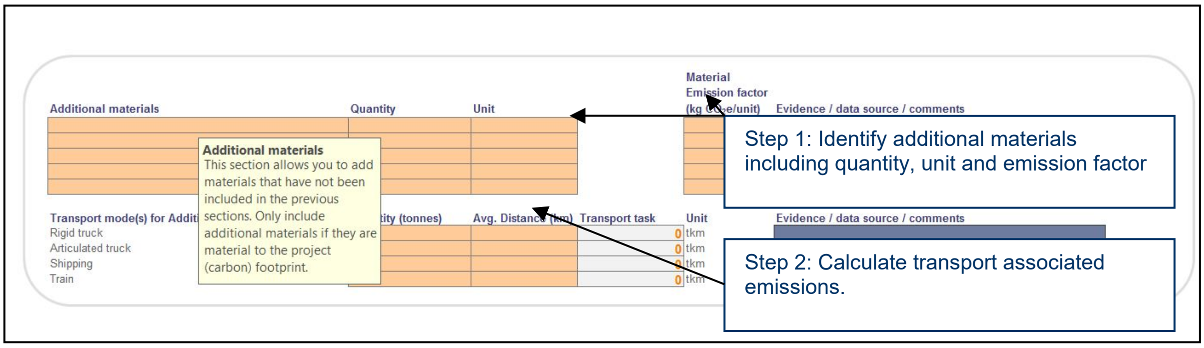
1.8.1.6. Additional materials

For any further materials that may not already be captured, there is an additional area for inclusion. As these will be different across various projects, emission factors for these will need to be sourced and provided by the tool user when completing the section.

Tool users only need to enter data into this section if the additional materials have a significant impact on the project GHG emissions. Small amounts of materials that are not covered elsewhere in CERT do not have to be included.

This section is intended to accommodate materials that were not identified and included in the CERT as a result of IP's materiality assessment and innovative materials (e.g. geopolymer concrete) not typically used on infrastructure projects but could reduce emissions.

> ***Note**: Evidence of emission factors should be provided by suppliers, e.g. through registered Environmental Product Declarations (EPDs), plant or equipment product specifications, or equivalent.*



1.8.2. Materials Mitigation Calculator

The 'materials mitigation Calculator' section seeks to capture and reward opportunities to mitigate the emissions associated with materials. Mitigation measures might include alternative material solutions; optimising design (value engineering), etc.

The main area of difference between the SDR and CDR stage reporting relates to materials mitigation.

During CDR stage the functionality to include design optimisation options (value engineering) is enabled and the user can opt to include user defined mitigation measures (such as recycled material) and/or can use the *change in material quantities* calculator as identified in the example below.

Value engineering has been disabled at the SDR stage, as it is deemed too early in the design stage to claim design changes. Only straightforward material mitigation (i.e. replacing high emissions intensity materials with low emissions intensity materials) is available at SDR stage.

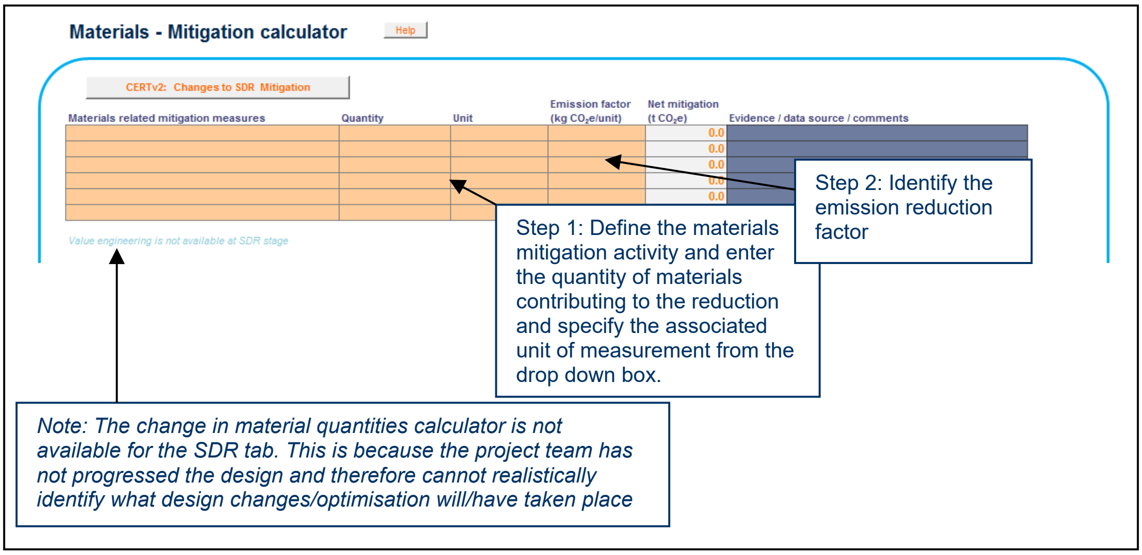
<u>Important note:</u>

Concrete and Asphalt sections allow the user to enter alternative mix types which are credited with 'Automatic Mitigations'. For example, by entering a Portland Cement Content figure for a concrete strength that is less than or greater than the Base Case Assumption, CERT will automatically apply reduced or increased GHG emissions to the Forecast or Actual Case associated with the difference.

Users should not use the 'Mitigation Calculators' to account for any reduced or increased GHG emissions that are associated with changing the mix designs of concrete and asphalt products.

EXAMPLE: In SDR, 50 tonnes of 40 MPa concrete was included in the design. By CDR, the design has been optimised to use 10 tonnes of higher strength 65 MPa concrete to replace 20 tonnes of 40 MPa concrete. As a result overall, dematerialisation has occurred. To capture this, enter both the 40 MPa and 65 MPa concrete details into the materials input section. The 65 MPa concrete should have zero quantity. In the materials mitigation calculator, the user can now replace 20 tonnes of 40 MPa concrete with 10 tonnes of 65 MPa concrete.

***Note**: When entering mitigation data, be sure to check whether the net mitigation is a negative value if you expect a reduction in emissions.*



Tip: The mitigation achieved through 'Reduction in material transport' is calculated automatically based on the user defined scenarios that have been entered.

1.8.3. Energy use

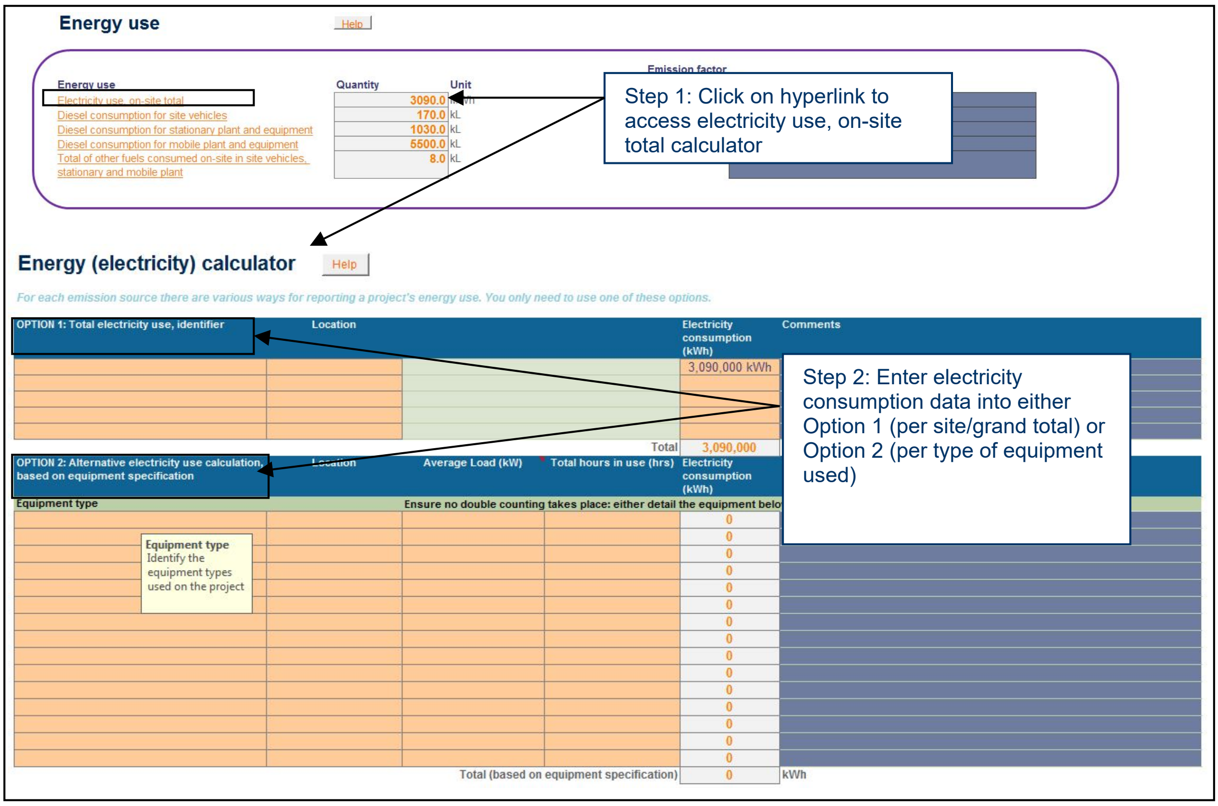
The energy use category comprises of a number of calculators associated with:

- Electricity use – total used on-site
- Diesel consumption for site vehicles
- Diesel consumption for stationary plant and equipment
- Diesel consumption for mobile plant and equipment
- Total usage of other fuels that have been consumed on-site in site vehicles, stationary and mobile plant equipment.

1.8.3.1. Energy – electricity use on-site

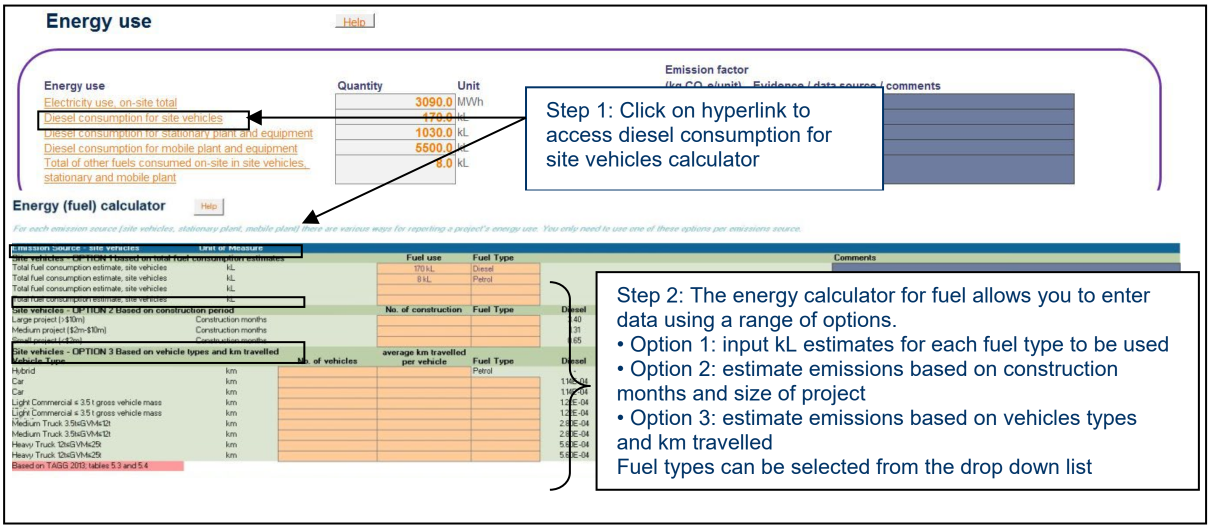
The energy (electricity) calculator provides the tool user with two options for data entry.

> ***Note***: It is important to avoid double counting by using one of the options. However, use of both options may be appropriate where, for example, total electricity use specifically excludes certain plant/equipment and this is known to the tool user.



1.8.3.2. Diesel consumption for site vehicles

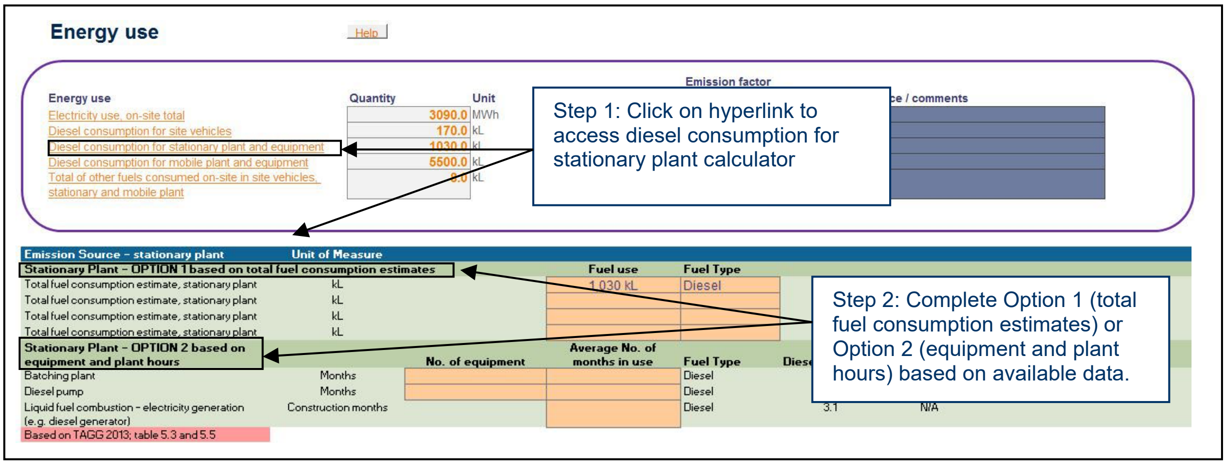
This section provides the tool user with three options for completing the relevant calculator. Options are based on the level of data available.



Note: Contractor site vehicles are not included in the scope of the CERT.

1.8.3.3. Diesel (fuel) consumption for stationary plant

Tool users are provided with two options for uploading relevant data.

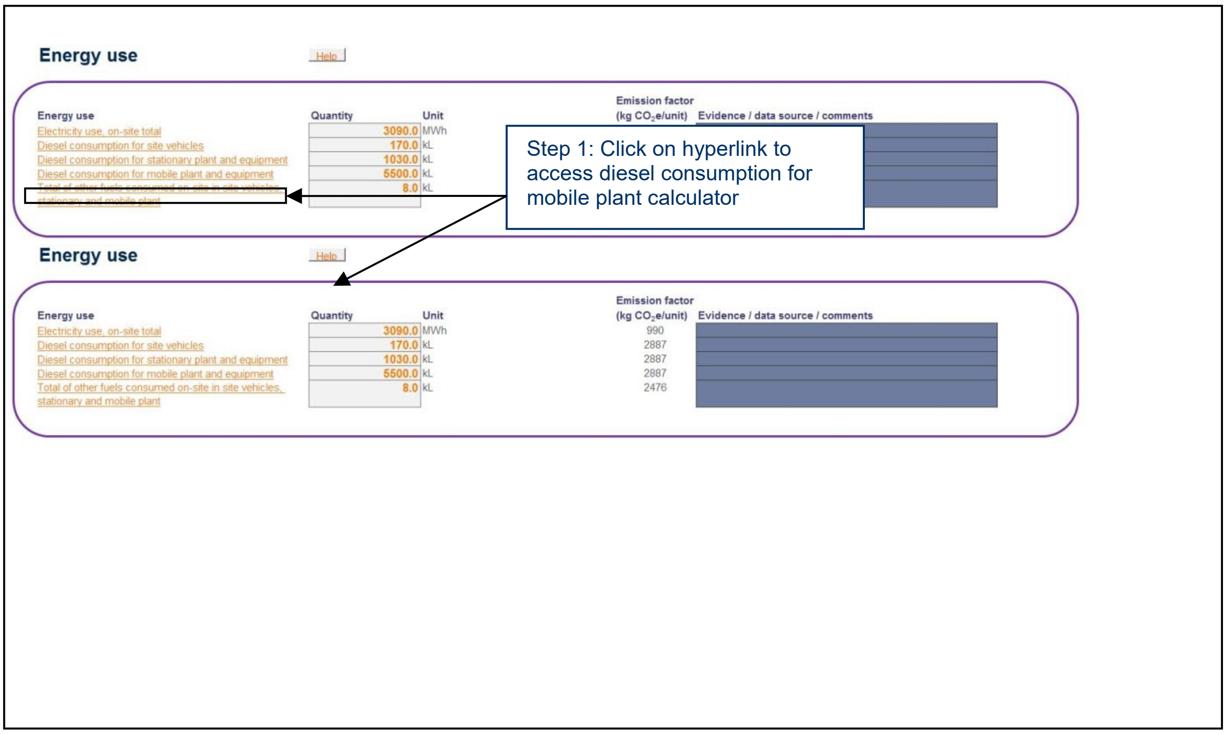


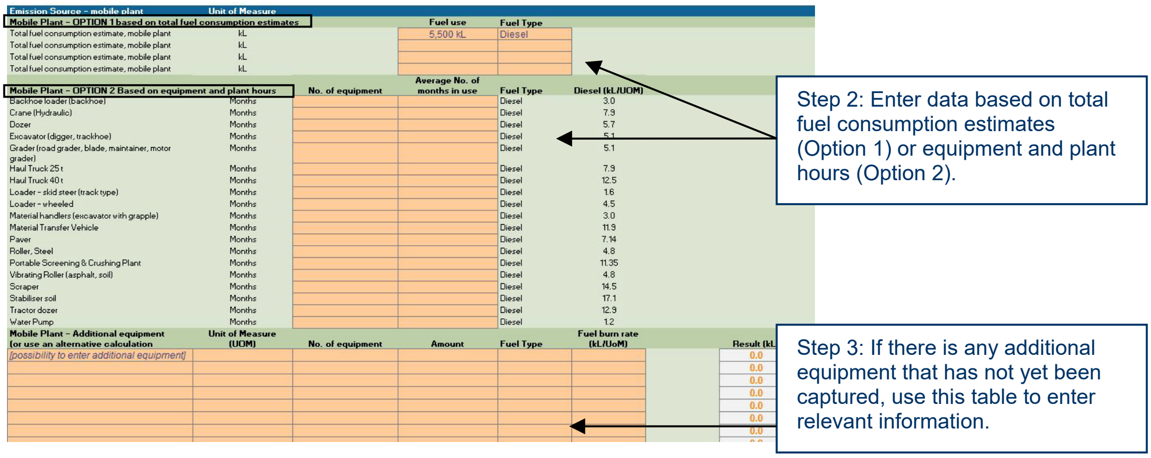
1.8.3.4. Diesel consumption from mobile plant

Tool users are able to enter diesel consumption from mobile plant through two options.

It also provides the tool user the option to include any additional equipment not previously listed.

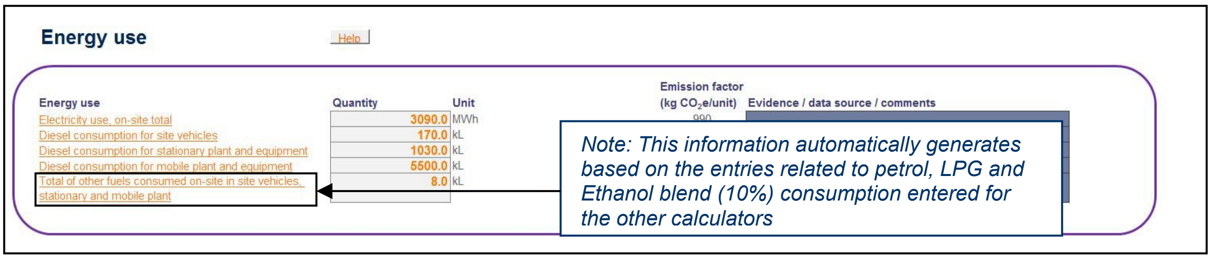
> ***Note:*** It is important to avoid double counting by using one of the options within each energy (fuel) emission source. However, multiple options may be appropriate where for example total fuel use is known for the principal contractor's plant and equipment and dry hire; but for wet hire, assumptions need to be made based on specific equipment types.





1.8.3.5. Total of other fuels consumed on-site in site vehicles, stationary and mobile plant

Within the energy-use calculators, tool users are asked to specify the 'fuel type' from a drop down box listing diesel, petrol, LPG and Ethanol blend (10%) as options. The cell containing 'total of other fuels consumed on-site in site vehicles, stationary, and mobile plant' automatically completes to include all petrol, LPG and Ethanol blend (10%) consumed on-site once the relevant calculators have been updated.



1.8.4. Energy use - mitigation calculator

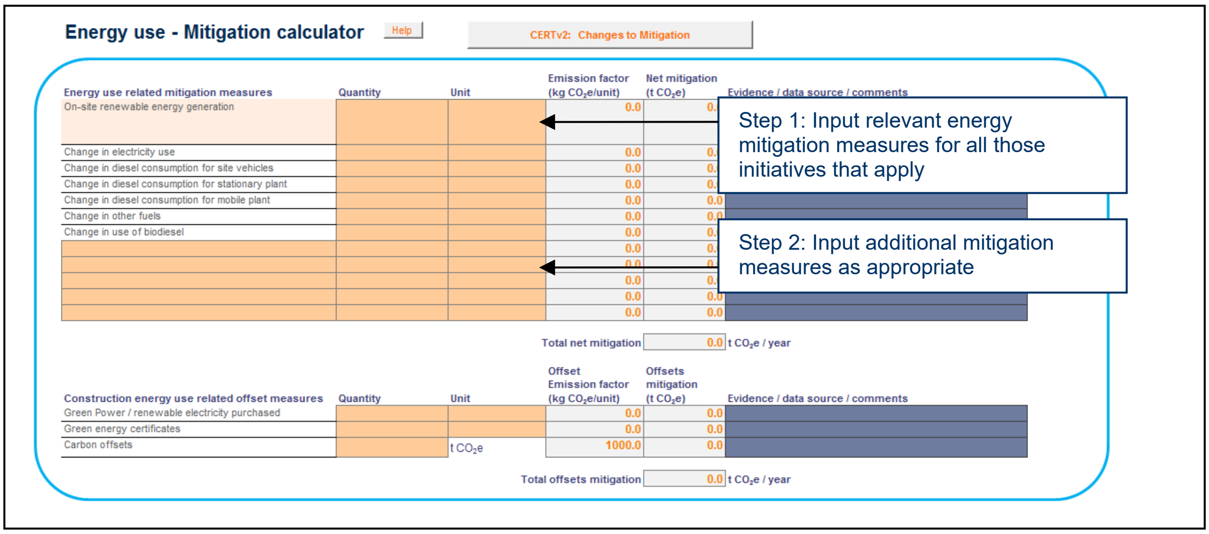
This section enables energy mitigation measures and offsets purchased to be registered for the project. The tool identifies a series of pre-determined energy mitigation areas (e.g. electricity generated on-site, changes in electricity and fuel use, etc.) and also provides the opportunity to capture any other categories that may not be covered by those listed.

It allows the tool user to input relevant information based on energy content (kWh, GJ), fuel use (kL) or percentage reduction.

***Note**: Energy reduction measures must be entered as a negative value. When switching between fuels, enter the replacement fuel as a positive and the avoided fuel as a negative.*

Once the unit of measurement has been selected from the drop-down box, information can be entered directly into the relevant cells.

> ***Note:*** Remember to reference relevant policies and evidence to support the mitigation measures listed. Examples might include a copy of an idling policy; renewable energy generated onsite; specifications outlining the use of efficient plant and equipment etc.



Tip: The emission reduction factor shows as zero until a unit is selected. When the unit is based on a percentage reduction, the emission reduction factor will be determined based on the relevant amount of energy consumed and represents 1% of emissions associated with total energy use for the category (e.g. electricity, mobile plant, etc.).

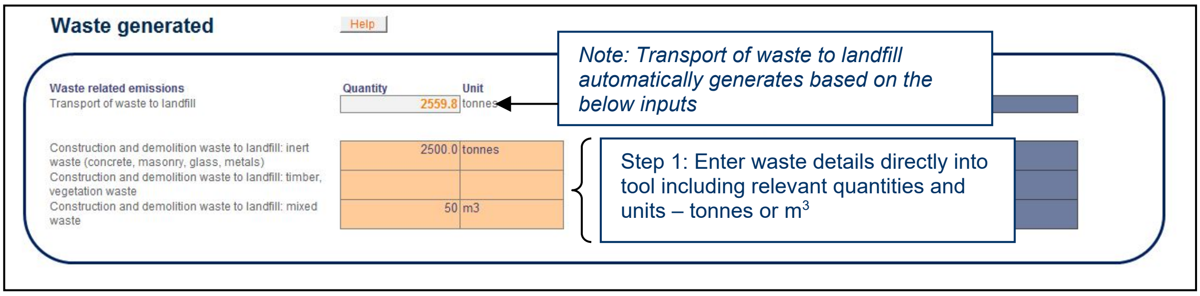
1.8.5. Waste generated

This section of the tool assesses the amount of waste generated by the project and sent to landfill or recycling centres.

In order to account for emissions from degradation in landfill, the tool user is required to distinguish inert waste (such as concrete, metals, glass, sand, spoil, etc.); timber and vegetation waste; and, mixed waste (i.e. a mix of concrete, timber, bricks, etc.).

A transport distance of 50 km to a landfill site and 22 km to a recycling centre is automatically assumed. The tool uses National Greenhouse Account factors for the methane released when organic waste is sent to landfill. The emission factors for the waste options are:

Waste Type	Emission Factor (kg CO_2^e/t)
Transport of waste to landfill	6.45
Transport of waste to recycling centre	2.84
Construction and demolition waste to landfill: inert waste	0
Construction and demolition waste to landfill: timber, vegetation waste	600
Construction and demolition waste to landfill: mixed waste	200

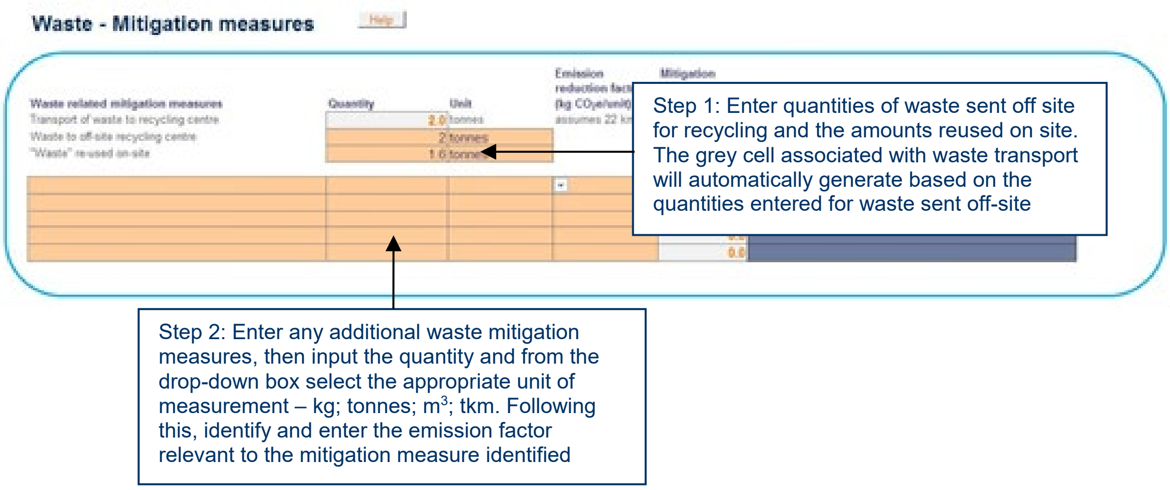


1.8.6. Waste mitigation calculator

Measuring waste mitigation measures aims to capture details on the amount of waste being diverted from landfill.

Note: Waste transport to an off-site recycling centre assumes a transport distance of 22 km to the recycling centre.

Additionally the tool seeks to capture any waste mitigation measures that might have been adopted onsite i.e. materials that have been constructed off site or the selection of prefabricated components etc.

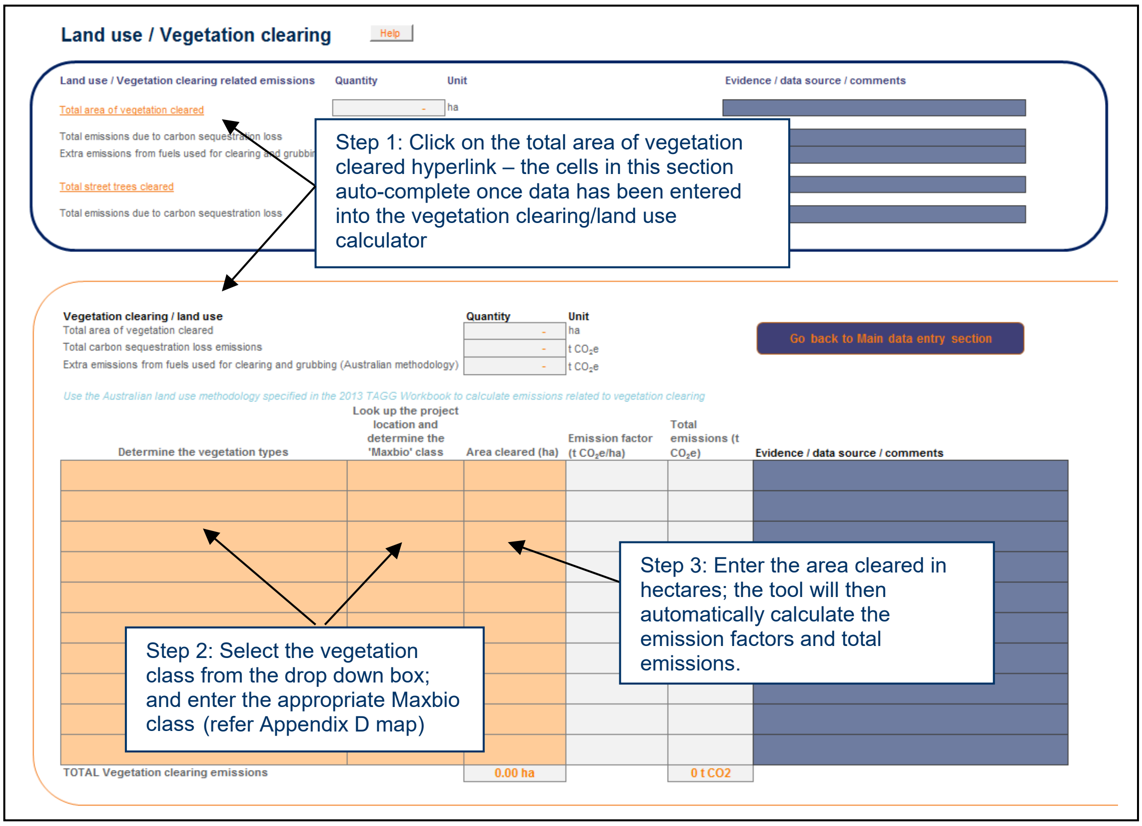


> **Note**: For six-monthly construction reporting (only) it may be useful to base waste data on the information gathered in line with the Government Resource Efficiency Policy (GREP) waste reporting requirements.

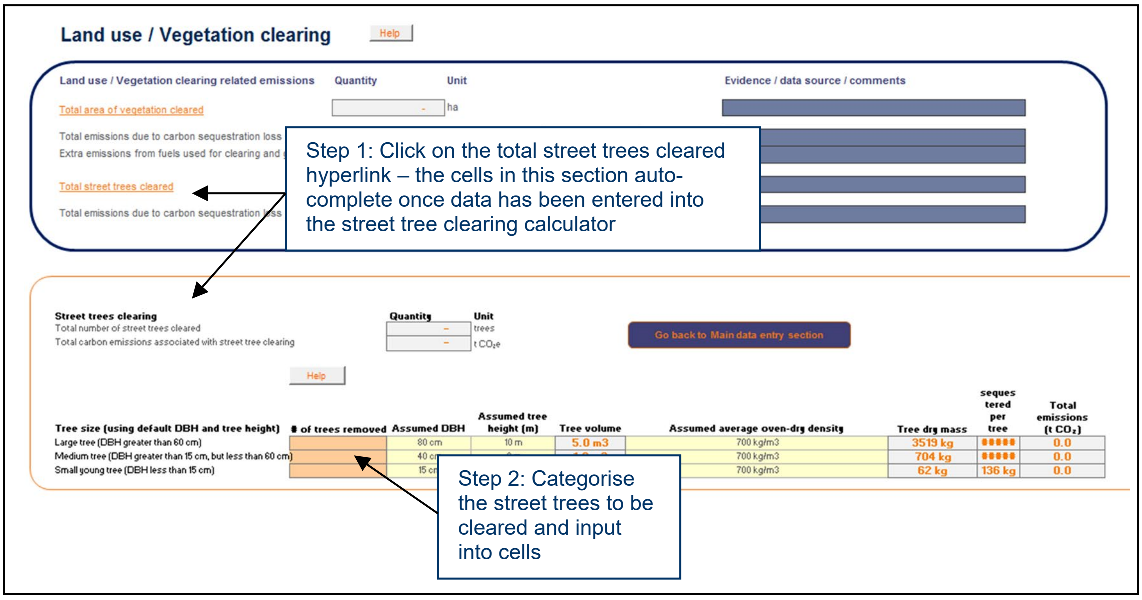
1.8.7. Land use / vegetation clearing

The land use category seeks to identify the emissions associated with vegetation and street tree clearing. A specific calculator has been included to assist with identifying the type of vegetation being cleared, as well as a calculator for street tree clearing.

Based on the maps provided in [Attachment A of the TAGG 2013 Workbook]() the tool user is required to identify the vegetation type and the 'Maxbio' class for the location within the calculator (refer Appendix D: Maxbio Classification Maps – NSW).



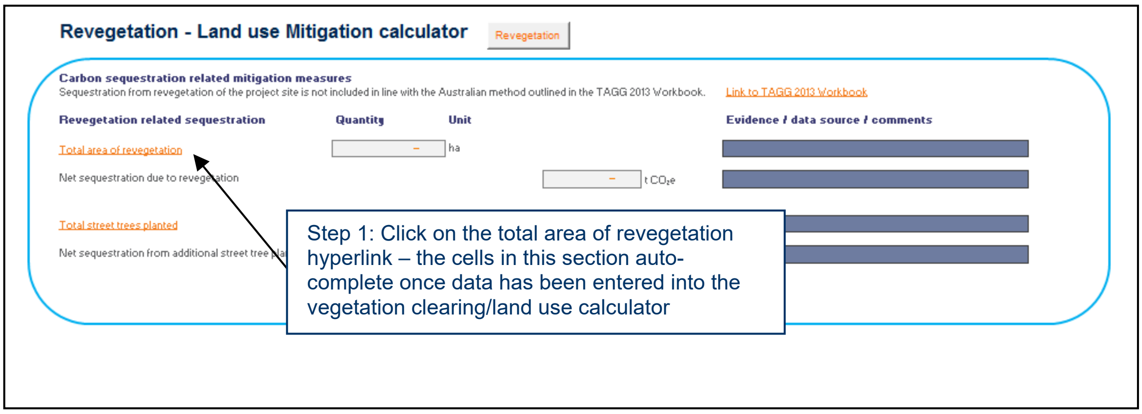
Clearing of street trees is included separately from vegetation clearing across larger areas. The user is required to input the number and size (diameter at breast height) of street trees to be cleared. The tool will automatically calculate the estimated emissions due to carbon sequestration loss. The losses are based on a simplified calculation, assuming all carbon sequestered by the tree is returned to the atmosphere as CO_2. Although this approach carries significant uncertainty, it was deemed appropriate for high level estimates within CERT.

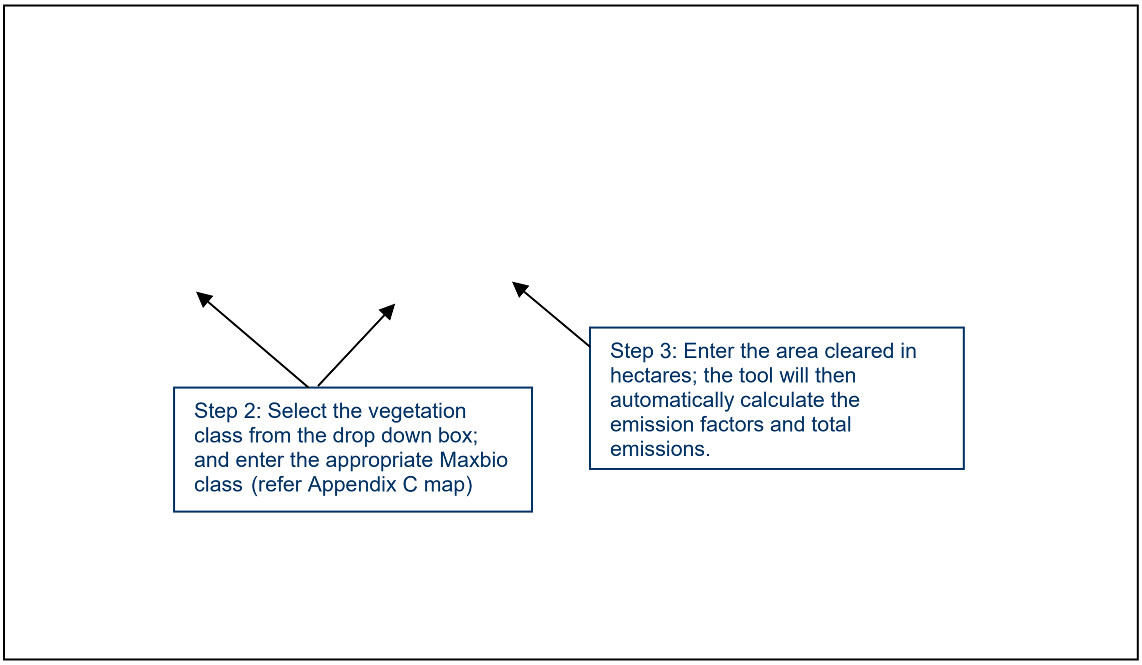


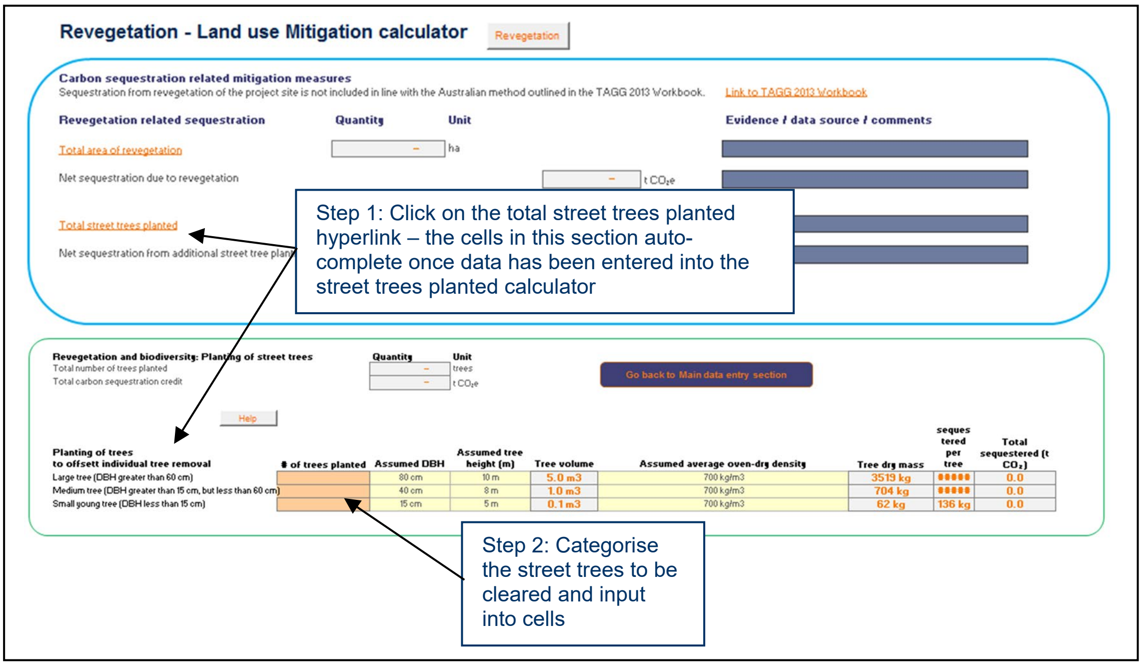
1.8.8. Revegetation – mitigation

Contrary to the first version of the tool, CERT Version 2 now enables measures associated with revegetation (and street tree planting) to be captured and counted towards carbon sequestration. Although the TAGG 2013 Workbook does not consider revegetation, an estimate of revegetation impacts has been included in this tool upon request from stakeholders.

The revegetation calculator operates in the same way (albeit in opposite direction) as the Land Use/Vegetation Clearing calculator. Revegetation is thus counted as a carbon emission mitigation rather than contribution. Data is required to be inputted in the same manner as the Land Use/Vegetation Clearing and street tree removal calculators.







1.8.9. Completion of SDR Stage Data Entry

Once data for land use/vegetation clearing has been entered and appropriate evidence documentation completed across all categories, CERT reporting for this stage of the project is complete.

Prior to submitting the completed SDR CERT to IP for review, ensure the data is checked and verified/assured as per the guidance outlined in Section 2.2.

Reminder: To keep track of the CERT data entries across the respective project stages, it is recommended that each version is saved using a unique name.

The following naming convention is suggested:

'[tool version] – [project name] – [reporting period] – [submission date]'

For example: 'TfNSW CERT v1 – Newcastle Light Rail – CDR – 30 June 2015'. When reporting for each reporting period, it is recommended the latest version of the file is used and is renamed/updated according to the relevant reporting period.

1.9. CDR Stage: Data Entry

For the most part, the steps required to complete the tool during CDR stage are the same as those required with completion during SDR stage.

The following section notes specific differences between SDR and CDR reporting stages and provides clarity on data and tasks required specific to the CDR stage of the CERT.

1.9.1. Data Input

A key functionality at the CDR reporting stage is the ability to carry across source data from SDR. This functionality enables the tool user to input data by either copying it across from the SDR data page, or updating based on new CDR data (e.g. revised Cost Plan or equivalent). In most instances (depending on variables such as the size of the project), a new BOQ would be developed or the tender phase BOQ refined as part of updating the Cost Plan to reflect final design. The project cost planners or procurement teams should have access to this revised Cost Plan/BOQ information.

Tip: Copying data over from SDR to CDR will overwrite any data the user already entered on the CDR tab. Therefore it is recommended to copy data across first before changes are made to the CDR tab.

Note: Users are required to complete the Operational energy and Maintenance Tab information at CDR. Users are not required to report actual performance of the live asset.

The extent to which the design may change from SDR to CDR is dependent on the project. Typically, there would be substantive design changes driven by activities associated with scope variation or design optimisation (such as value engineering) exercises.

The CERT manages this issue by enabling different options for data input from SDR to CDR stage.

The tool user may either:

1. Copy SDR input data to the CDR tab and apply mitigation measures (or leave unchanged).
2. Copy SDR input data to the CDR tab and update data inputs based on final design and associated BOQ.

3. Start afresh using a blank CDR worksheet to input new CDR data based on final design and associated BOQ.

Option 1: Copy SDR input data to the CDR tab and apply mitigation measures (or leave unchanged)

The user may choose to copy SDR input data to the CDR tab and leave entire tab unchanged. Or the user may choose to use the mitigation calculators to demonstrate improvements from early (SDR) design to CDR. It is important to note both (material/energy) reductions and additions must be accounted for. The user has the option to enter positive or negative values in the calculator to get the appropriate result.

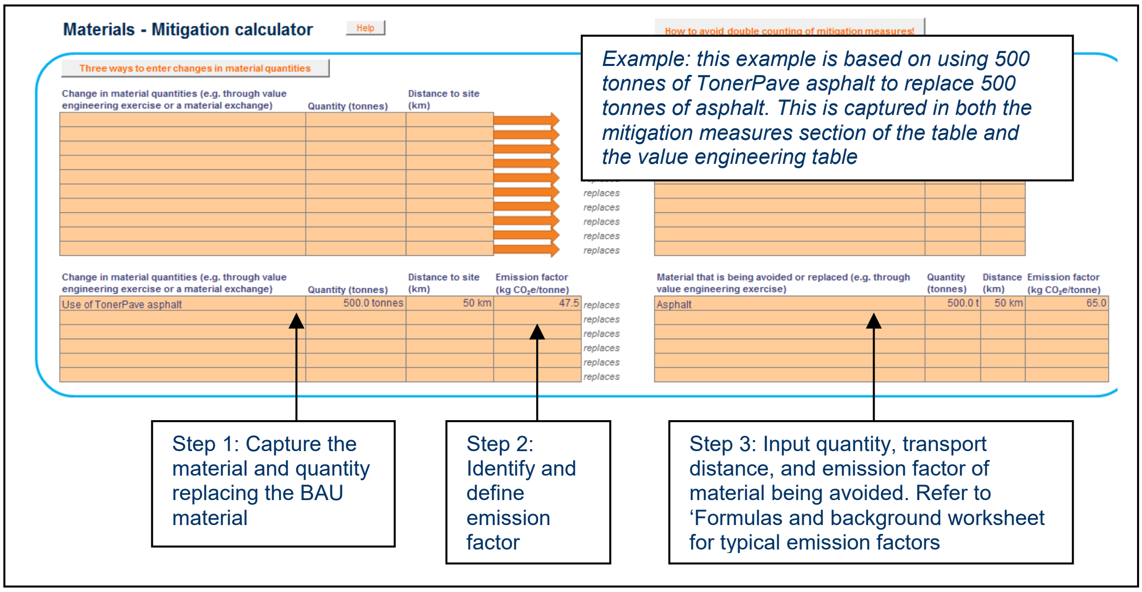
Note: *When entering mitigation data, be sure to check whether the net mitigation is a negative value if you expect a reduction in emissions.*

While some design optimisation may constitute a simple reduction in materials, in many instances a reduction in one material may require an increase in another. Such increases need to be included to ensure a balanced representation of design changes.

1.9.1.1. Materials mitigation calculator

The main area of difference between the SDR and CDR stage reporting relates to materials mitigation.

During CDR stage, the functionality to include design optimisation options is enabled and the tool user can opt to include user defined mitigation measures (such as recycled material) and/or can use the *change in material quantities* calculator as identified in the example below



Note: *The top table features drop-down menus of materials. Use this section if the value engineered or optimised materials exist in this list. The bottom table allows for user-defined alternative materials that are not included in the drop-down menu. Both tables perform the same calculations.*

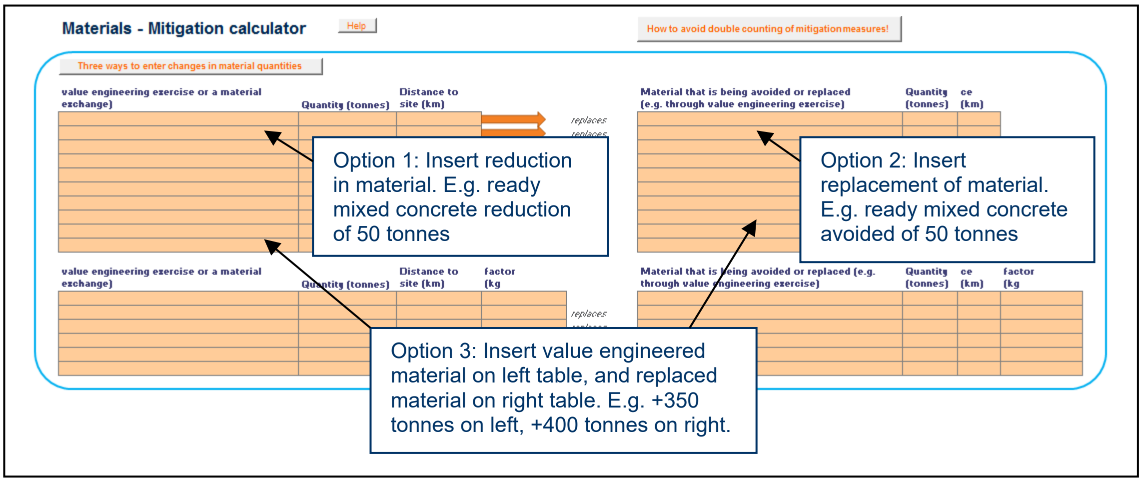
Change in material quantities – design optimisation

Design optimisation can be captured in the value engineering section under *Materials Related Mitigation Calculator.* This is only applicable to CDR as at SDR stage design is not sufficiently progressed to have implemented design optimisation opportunities.

Note: Design optimisation must be accompanied by evidence (e.g. meeting minutes) and must be an active decision to improve design, namely reduce or optimise material consumption. A change (lessening) of design scope (e.g. removal of bridge) is a scope change and cannot be considered a mitigation measure.

EXAMPLE: In the SDR phase 400 tonnes of 40 MPa concrete was used for a car park floor base ('Ready mixed concrete (I)' in *Ready mixed concrete* calculator). Through design optimisation, 350 tonnes of concrete will be used based on CDR design. There are three different ways this change can be entered into the calculator:

- By selecting the appropriate material in the table on the left hand and inserting -50 (negative value) tonnes into the calculator, a reduction from the base case will be enabled.
- By selecting the appropriate material in the table on the right hand and inserting 50 (positive value) tonnes into the calculator, a reduction from the base case will be enabled.
- By selecting the appropriate material in the table on the left hand and inserting 350 (positive value) tonnes into the calculator (= value after mitigation), then selecting the appropriate material in the table on the right hand and inserting 400 (positive value) tonnes into the calculator (= value before mitigation), a reduction from the base case will be enabled.



Note: As there are only 12 rows available in the *Change in material quantities* calculator, only significant design optimisation/change exercises should be captured.

Option 2: Copy SDR input data to the CDR tab and update based on final design and associated BOQ.

By updating the SDR input data based on new BOQ information, any efficiencies gained from SDR to CDR will be lost. This is because there is NO automatic linking of data in SDR to CDR.

Therefore, the only option to demonstrate improvements i.e. material reductions and efficiencies from SDR to CDR is to use the *Change in material quantities* calculator.

A limitation of inputting data using this method is that it will create an artificially smaller GHG footprint as it is subtracting from the CDR design data (which is the final design; not a base case). This does not pose a significant issue because the purpose of this exercise is to encourage mitigation and measure implementation, and at the design stage the calculation always provides an estimated forecast of construction emissions. What is important is the approximate per cent (%) reduction achieved so as to support six-monthly reporting on actual emissions (see Section 2.6).

Option 3: Start blank, inputting new CDR data based on final design and associated BOQ.

The tool user may choose to start the CDR data input sheet blank (e.g. choose not to copy information across from SDR stage). If this option is selected then the same approach as identified for Option 2 above will apply.

1.10. Six Monthly Construction Stages: Data Entry

The data entry processes for entering six-monthly construction stage reporting are the same as those entered at the SDR stage. The key difference between reporting at construction phase as opposed to design phase (SDR and CDR) is that the data entered will be actual data i.e. based on invoices; meter readings etc. In instances where invoices are late, the tool user is advised to retain this information and simply add it to the reporting data for the next six-months. At project completion, all materials used in the project should have been accounted for.

The reporting periods are defined as from 1 January – 30 June, and 1 July – 31 December across the full program of construction. CERT can only handle a construction period of 5 years. Please contact IP if your project will have a construction period in excess of 5 years.

2. Operational Energy Tab

Note: Users are required to complete the Operational Energy Tab information at CDR stage. The Operational Energy Tab information may be provided at SDR at the discretion of the user. It may be difficult to determine the Operational information at the SDR stage. Users are not required to report actual performance of the live asset.

The Operational Energy Tab provides a comparative calculator for the user to enter in the following:

- Base Case – Estimated BAU energy use
- Forecast – Estimated Optimised energy use

The Base Case and Forecast comparison is designed to:

- Assist users to determine areas of material operational energy uses and consider strategies that may reduce future operational GHG emissions during the design and construction stages.
- Capture estimated operational energy towards documentation for ISCA Ene-1 credit evidence

Base Case

The Base Case operational scenario should be used to establish the operational energy use of the project based on BAU (generally minimum compliance) technology and design outcomes. Users are required to enter in all the material operational GHG emission sources. The Base Case quantities and fuel type must be defined by the user. The fuel type emission factors are embedded into the calculator.

The Operations Tab also features a means for optional scope 3 emissions reporting. This includes staff/employee travel for both business-related purposes and daily commuting to and from the workplace and secondary effects of asset delivery or operation. This option has been included to allow for better alignment with the development of the ISCA Ene-1 credit. It is important to note that these optional emissions are not added to the totals reported in the CERT tool.

Forecast

The Forecast scenario should be used to establish the operational energy use of the project based on the intended optimised technology and design outcomes. The optimisation must be relative to the design initiatives and the associated specified/manufacturer performance data where available.

Where applicable, users should consider the ISCA guidance on BAU assumptions to assist in determining industry BAU strategies/performance.

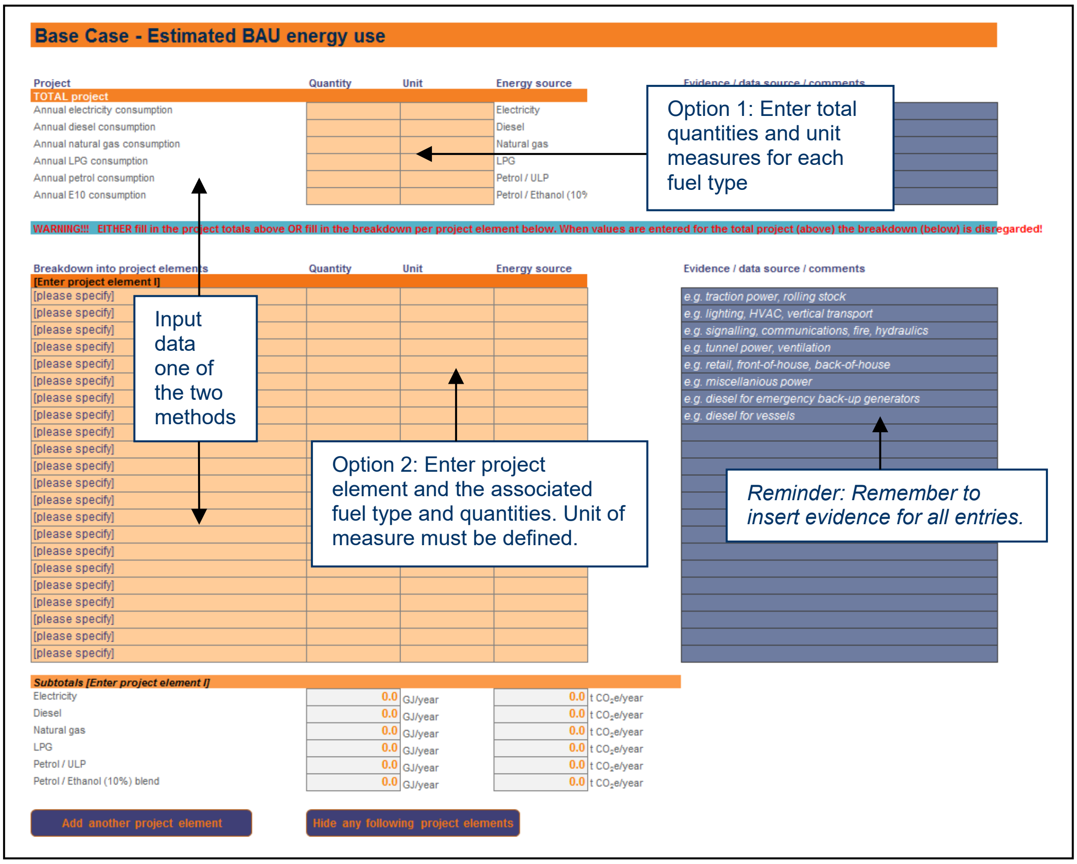
The operational energy mitigation calculator provides the user the opportunity to capture GHG emission mitigation measures through, for example; reduction of energy use and fuel swapping. A separate area in the mitigation section deals with the purchase of green power, renewable energy certificates and carbon offsets. The relevant quantities and unit measures must be defined by the user.

2.1. Estimated BAU Operational Energy Use

The following outlines the necessary steps required to complete the estimated BAU energy use, estimated BAU use of synthetic gases, and optional scope 3 emissions sections.

2.1.1. Estimated BAU Energy Use

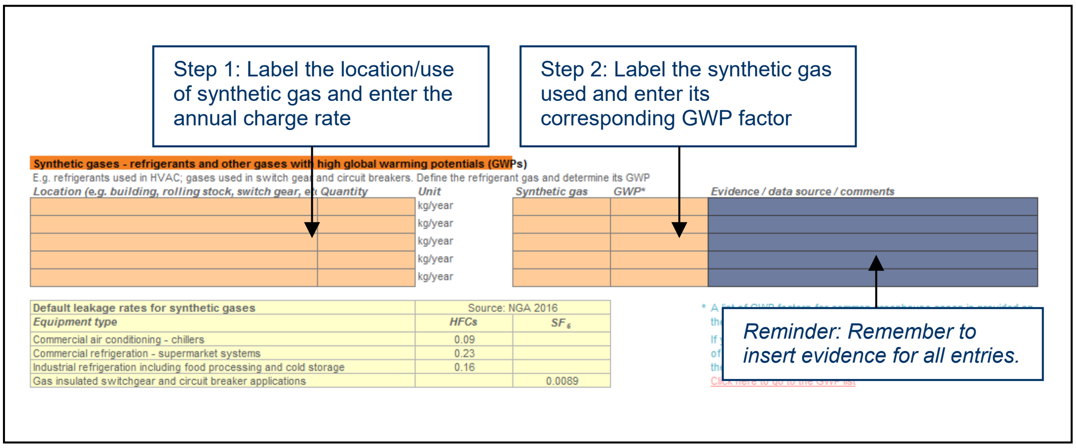
The user has the option of estimating BAU energy use via two methods. Data may be entered as an aggregate across the whole project by energy (electricity/fuel) type and quantity, or broken down by operational activity and the associated energy quantity and type consumed. The user can breakdown the report in up to six sections for various project elements. Note: When the user enters data using both methods, the values entered for the whole project will take precedence over the operational activity breakdown.



2.1.2. Estimated BAU Use of Synthetic Gases

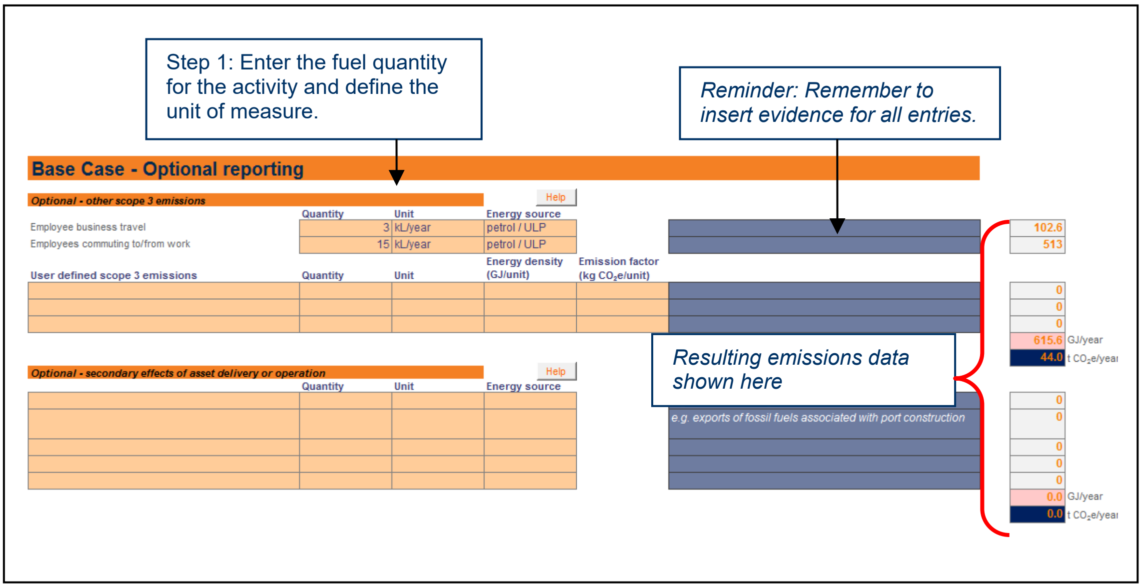
The use of synthetic gases is directly entered into the tool. The quantity of synthetic gases used, denoted as the annual charge rate, and the corresponding Global Warming Potential (GWP) must be entered by the user. If the annual charge rate is not known, it can be estimated by multiplying the initial charge of the system with the system's annual leakage rate. A list of default leakage rates for common uses is provided for reference.

A list of GWP factors for common greenhouse gases is provided on the 'Formulas and background' worksheet. If it is not on the list, it may be a mixture of the greenhouse gases on the list, and can be calculated based on its constituent gases. The supplier can usually also provide the GWP factors.



2.1.3. Optional Reporting of Scope 3 Emissions

The optional reporting of scope 3 emissions is included to provide better alignment of CERT with the ISCA Ene-1 credit. All field entries are user defined, and users must ensure the appropriate fuel quantity, fuel energy density and emission factor are entered correctly. As these emissions are not included in the CERT totals, the resulting energy and emissions data are shown to the right of the data entry section.



2.2. Forecast Optimised Operational Energy Use

The forecast data need to be entered to the right of the base case data. For the most part, the steps required to complete the forecast optimised operational energy use, use of synthetic gas, and optional scope 3 emissions are the same as those required in the base case.

2.2.1. Data Input

In the same manner as the CDR Stage Tab, data entries can be copied from the Base Case through to the Forecast fields.

The tool user may either:

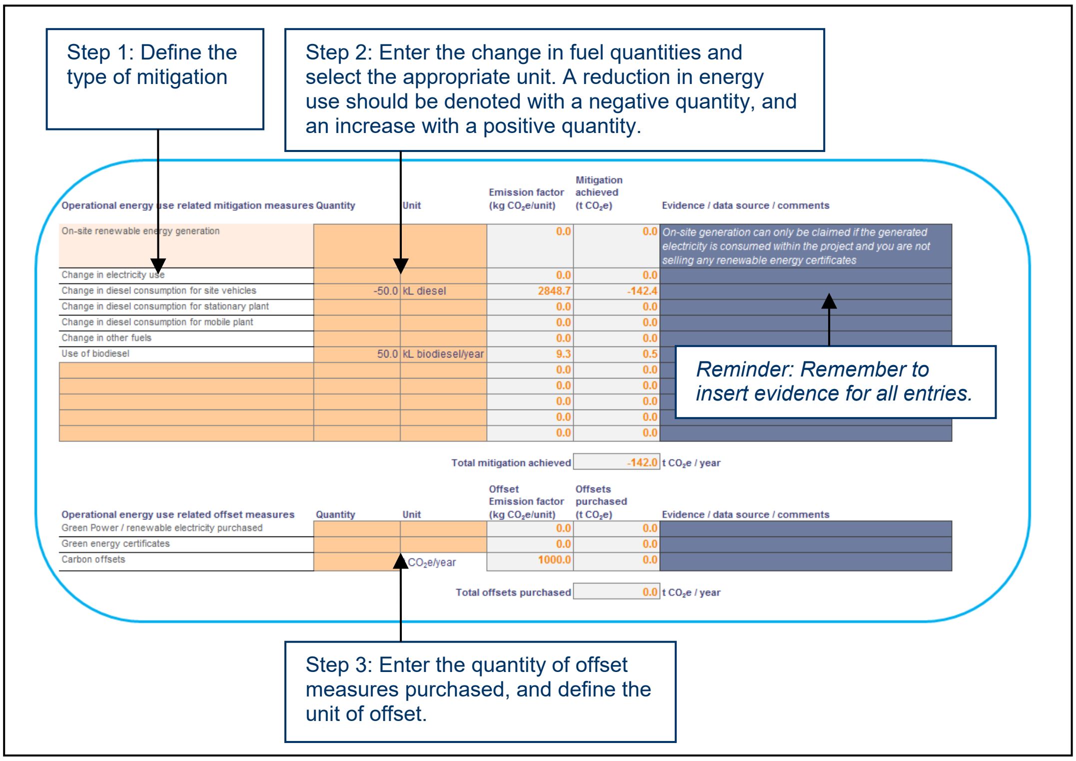
1. Copy Base Case input data to the Forecast Optimised fields and apply mitigation measures (or leave unchanged).

2. Copy Base Case input data to the Forecast Optimised fields and update data inputs based on final design and operational plan.

3. Start afresh using a blank Forecast Optimised fields to input new Forecast Optimised data based on final design and operational plan.

2.2.1.1. Operational Energy Mitigation Calculator

The operational energy mitigation calculator enables the user to capture operational optimisations through, for example; on-site renewable energy generation, energy reduction and fuel swapping. A separate area in the mitigation section deals with the purchase of green power, renewable energy certificates and carbon offsets.



3. Maintenance Tab

Note: Users are required to complete the Maintenance Tab information at CDR stage. The Maintenance Tab information may be provided at SDR at the discretion of the user. It may be difficult to determine the Maintenance information at the SDR stage. Users are not required to report actual maintenance performance of the live asset.

The Maintenance Tab provides a comparative calculator for the user to enter in the following:

- Base Case – Estimated energy use and materials consumption due to:
  - Routine maintenance (RM)
  - Major preventive maintenance (MPM)
- Forecast – Estimated Optimised energy use and materials consumption due to:
  - Routine maintenance (RM)
  - Major preventive maintenance (MPM)

The Base Case and Forecast comparison is designed to:

- Assist users to determine areas of substantial energy use and material consumption during maintenance (including product replacement) and consider strategies during design and construction that may reduce the future GHG emissions.
- Capture estimated maintenance-related energy use towards documentation for ISCA energy credit evidence
- Capture estimated maintenance-related material consumption towards documentation for ISCA Mat-1 credit evidence

Definitions:

Routine maintenance (RM) includes:

- Zonal. visual inspection not requiring dismantling, adjustments, or servicing to identify areas of concern requiring further investigation or remedial action
- Repair or failure (functional or conditional) associated with an asset or component
- Calibrate asset in accordance with the design or manufacturer's specifications so as to return the asset to within standard operating tolerance
- Clean asset to improve presentation or to support operational service requirement

Major Preventive Maintenance (MPM) includes:

- Restore the asset to function (original capacity, not new) by replacing asset components with new or reconditioned components
- Re-profile (i.e. machine or adjust) the asset in accordance with the design or manufacturer's specifications so as to return the asset to within standard operating tolerance

- Replacement of an existing asset that has reached the end of its useful life with a new asset capable of providing the same or agreed alternative level of service as the existing asset.

Base Case

The Base Case maintenance scenario is used to establish the maintenance-related energy use and materials consumption of the project based on BAU (generally minimum compliance) technology and design outcomes. Users are required to enter in all information related to energy and material consumption.

The Base Case fuel and material quantities must be defined by the user and the fuel types and materials selected. The relevant emission factors for the fuel types and materials are embedded into the calculator.

Forecast

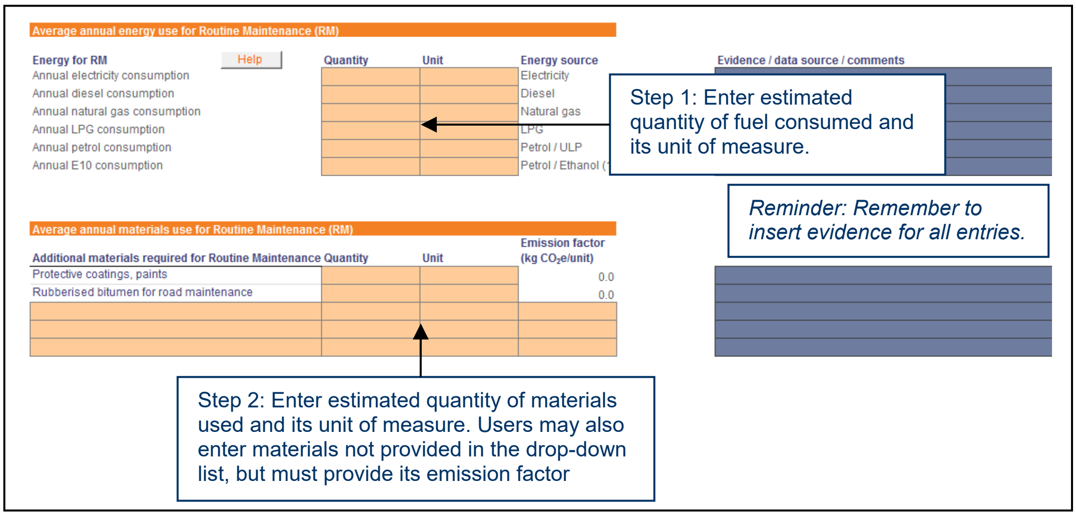
The Forecast scenario is used to establish the maintenance-related energy use and materials consumption of the project based on the intended optimised technology and design outcomes. The optimisation must be relative to the design initiatives and the associated specified/manufacturer performance data where available.

Where applicable, users should consider the ISCA guidance on BAU assumptions to assist determine industry BAU strategies/performance.

3.1. Estimate BAU Maintenance Material and Energy Use

The following outlines the necessary steps required to complete the estimated BAU material and energy use for both routine and major preventive maintenance activities.

3.1.1. Estimated BAU RM Material and Energy Use

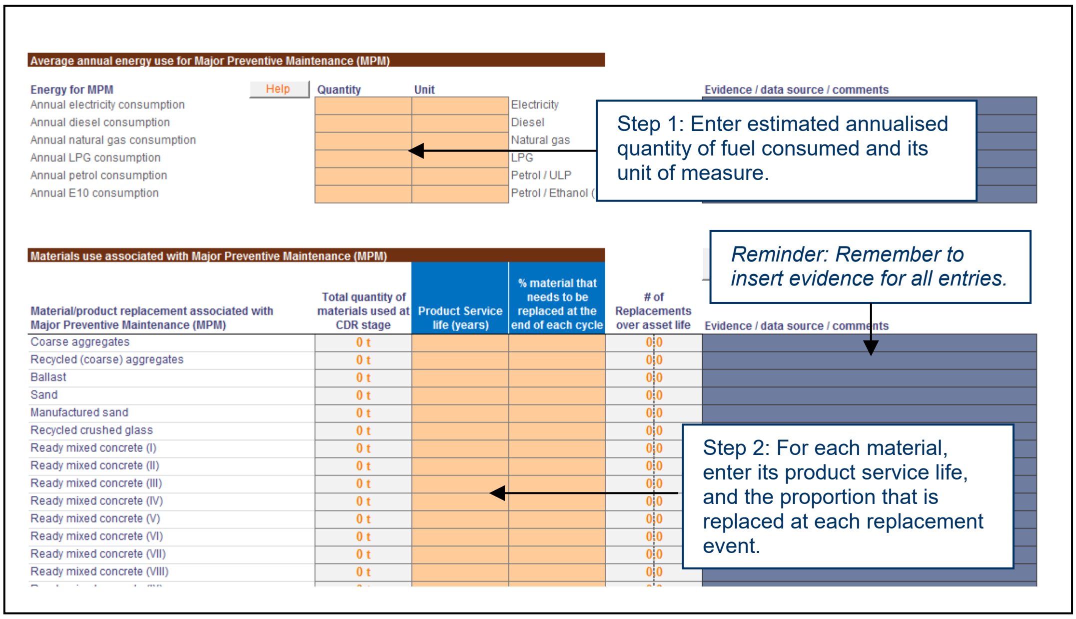


3.1.2. Estimated BAU MPM Material and Energy Use

Users can enter energy use due to MPM directly into the tool. The values are expressed as an annual consumption of energy, therefore must be calculated by dividing the estimated energy use for a particular MPM activity divided by the number of years between each MPM event. For example, if 10kL of diesel is used in the resurfacing of asphalt that is performed once every 5 years, then the user should enter 2kL/year of diesel.

For material use, the quantity of materials used at CDR should already be reflected. Users must define the expected product lifetime of each material used in MPM activities. If only a proportion of the material is replaced at each replacement, then this must also be defined. Enter 100% if the total amount of the material is replaced at each replacement.

Users can use the table below ('Additional or alternative materials required for Major Preventive Maintenance (MPM)') to deal with more complicated replacement scenarios. In this case it might be easier to work out the average quantity of materials required per year.



3.2. Forecast Optimised Maintenance Material and Energy Use

The steps required to complete the Maintenance Forecast Optimised Material and Energy Use data fields are the same as the steps in the Base Case.

3.2.1. Data Input

Data entries can be copied from the Base Case through to the Forecast fields, which sit to the right of the Base Case.

The tool user may either:

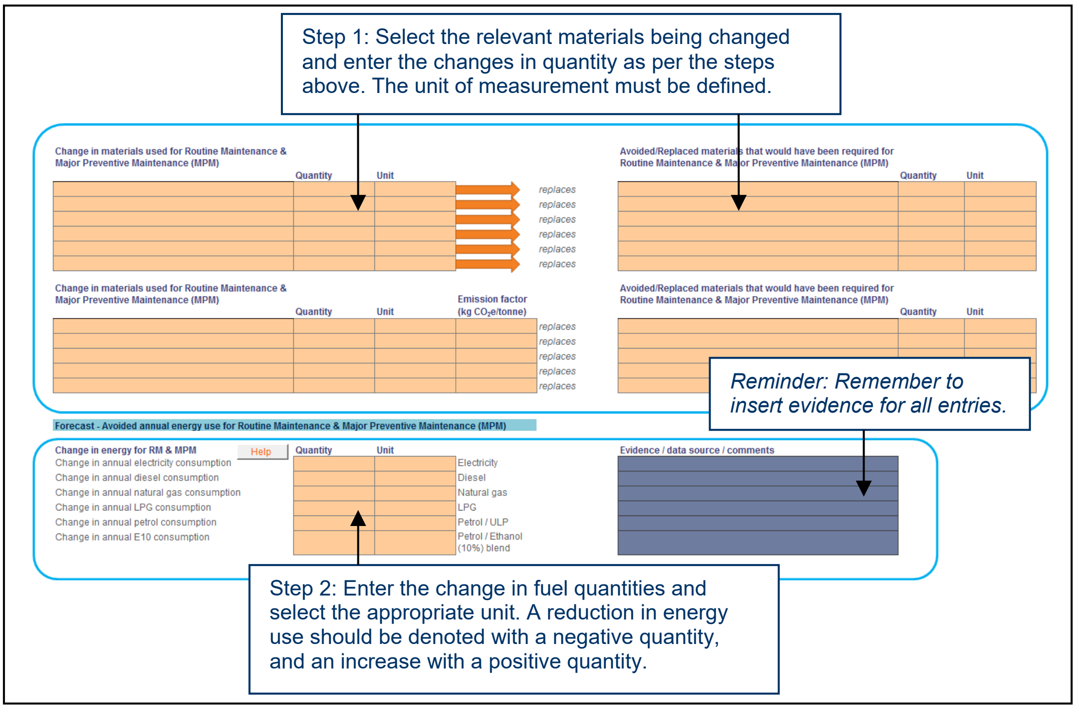
1. Copy Base Case input data to the Forecast Optimised fields and apply mitigation measures (or leave unchanged).
2. Copy Base Case input data to the Forecast Optimised fields and update data inputs based on final design and operational plan.
3. Start afresh using a blank Forecast Optimised fields to input new Forecast Optimised data based on final design and operational plan.

3.2.1.1. Maintenance Mitigation Calculator

The maintenance mitigation calculator enables the user to capture both routine and major preventive maintenance optimisations due to changes in material and energy use. Users may select materials from the pre-defined drop-down list or define their own material, in which case an emissions factor must also be provided.

For the change in material quantities, there are three ways to enter data. Suppose you are reducing the amount of asphalt that needs to be replaced from 100 tonnes to 75 tonnes. The original quantity of 100 tonnes should be entered into the Materials use section. The mitigation can be entered in three different ways:

1. Enter a negative value (change in quantity) in the table on the left (i.e. –25 tonnes of asphalt) and leave the table on the right empty.
2. Enter a positive value (replacement quantity) in the table on the left (i.e. 75 tonnes of asphalt) and the original (replaced) quantity in the table on the right (i.e. 100 tonnes of asphalt)
3. Enter a positive value (avoided quantity) in the table on the right (i.e. 25 tonnes of asphalt) and leave the table on the left empty.

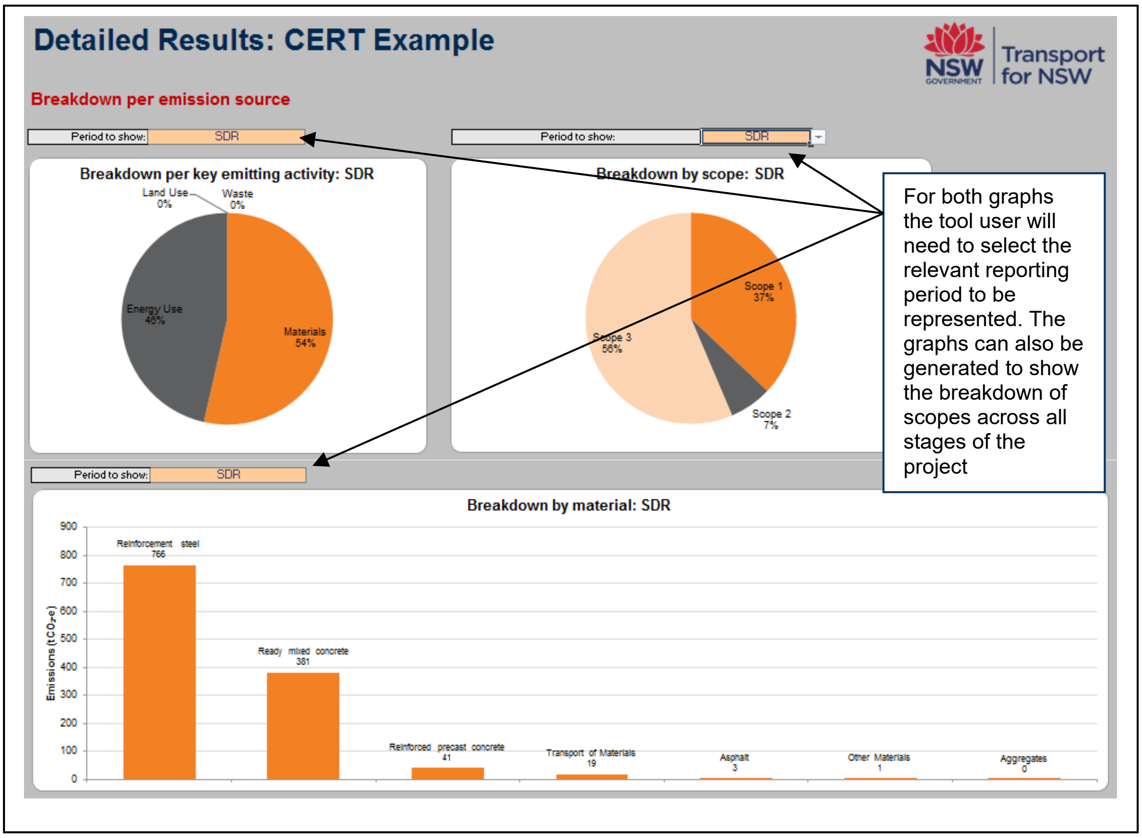


4. Detailed Results tab

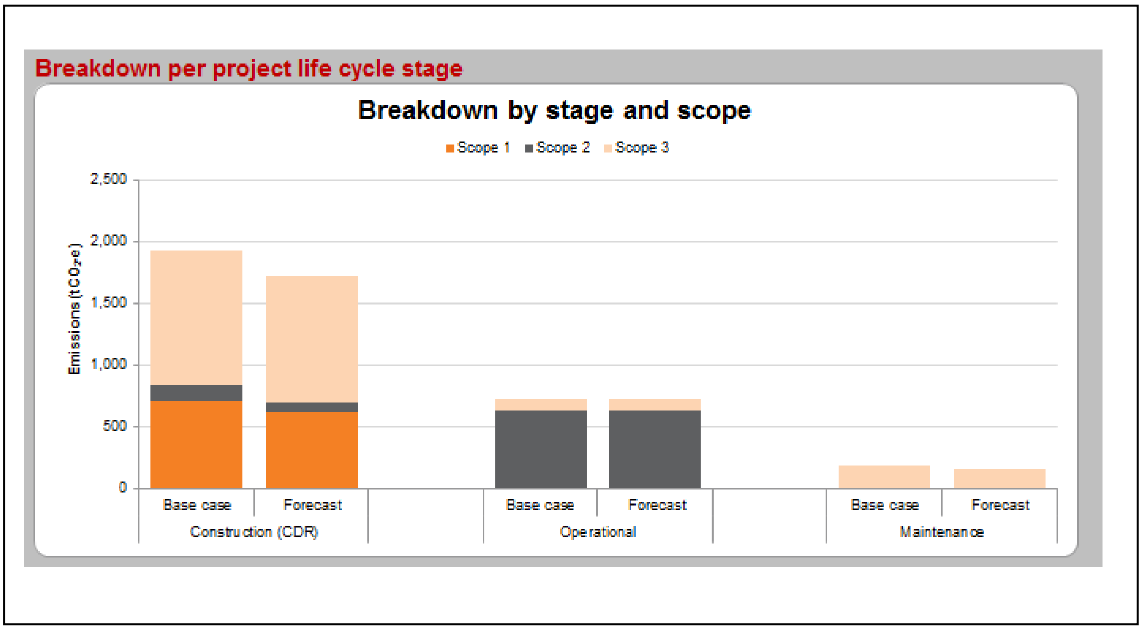
The '*detailed results tab*' provides a range of graphs that are informed by the data entered across the project lifecycle. The detailed results tab provides useful summary information through a number of graphs that help track progress. Notably, this section of the tool also provides a breakdown of scope 1 and scope 2 emissions for use towards the ISCA Ene-1 credit (refer Appendix D). Key graphs within this section include:

- Breakdown of emissions per emitting category for each stage of the project. The graph can also be generated to show emissions for all stages of the project
- Breakdown of emissions by scope for each stage of the project. The graph can also be generated to show the breakdown of scopes across all stages of the project.
- Six-monthly absolute or cumulative project emissions
- Reductions achieved across key emitting categories (materials, energy, land use, waste)

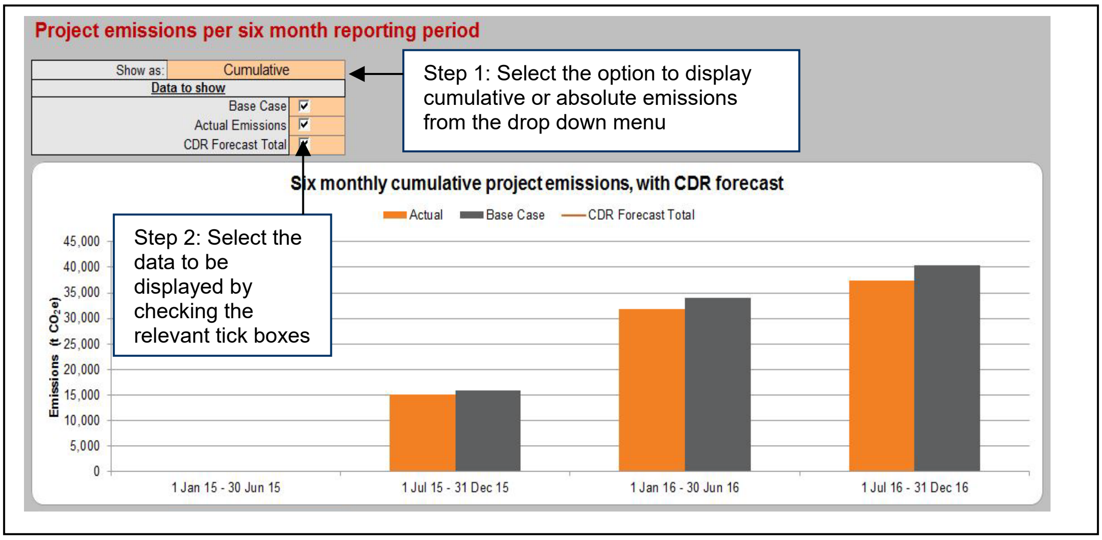
4.1.1. Breakdown per emission source



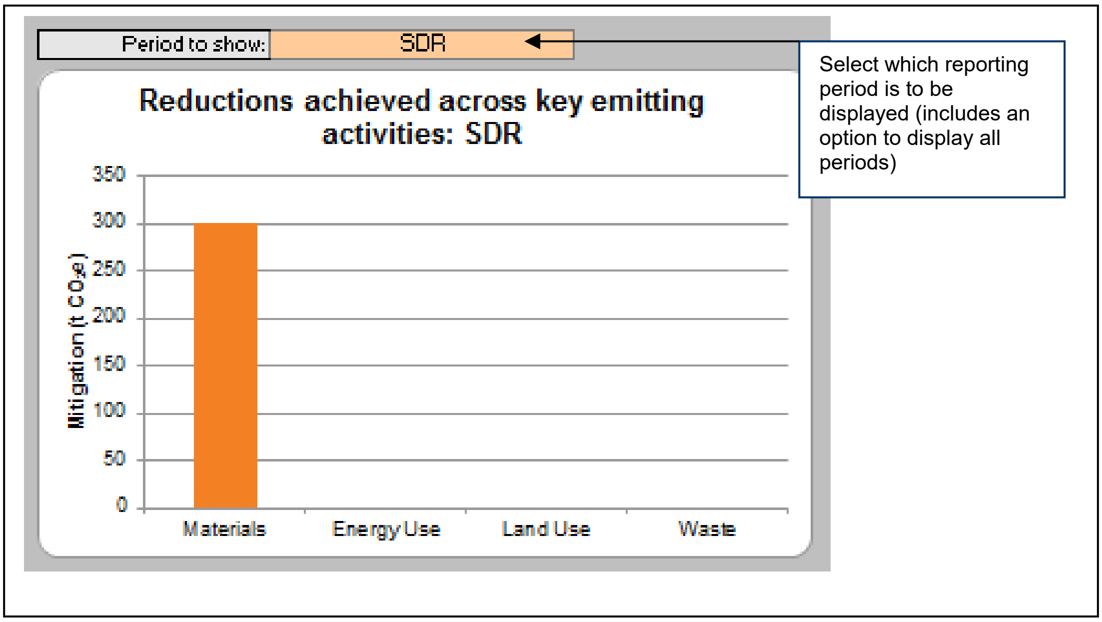
4.1.2. Breakdown per project life cycle stage



4.1.3. Six-monthly cumulative or absolute project emissions

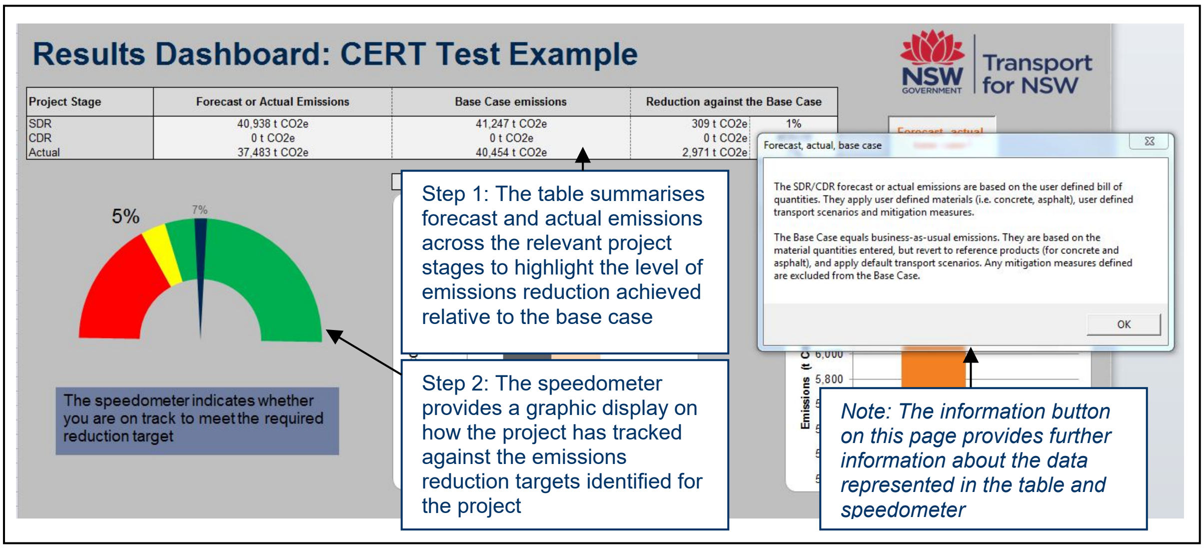


4.1.4. Reductions achieved across key emitting categories (materials, energy, land use, waste)

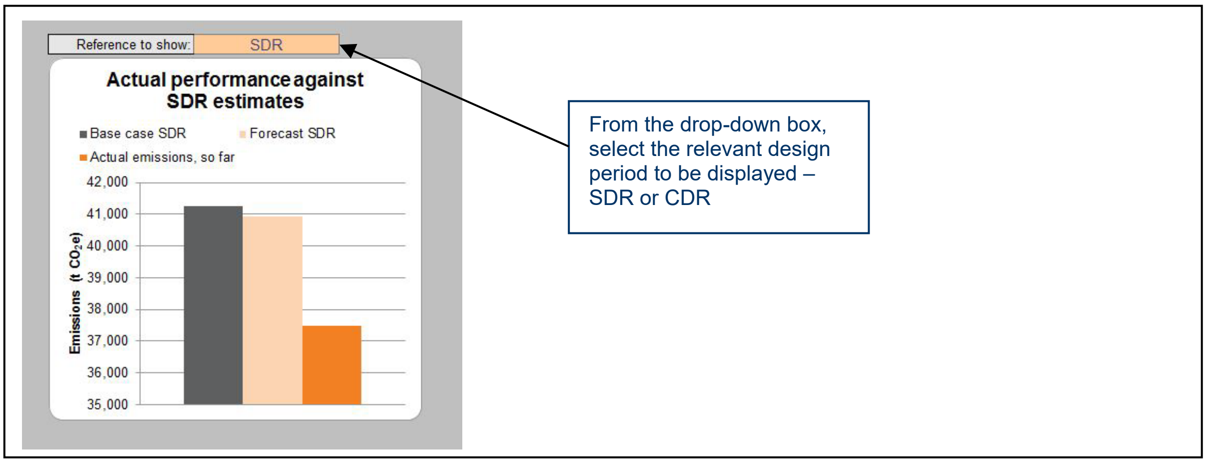


4.2. Dashboard tab

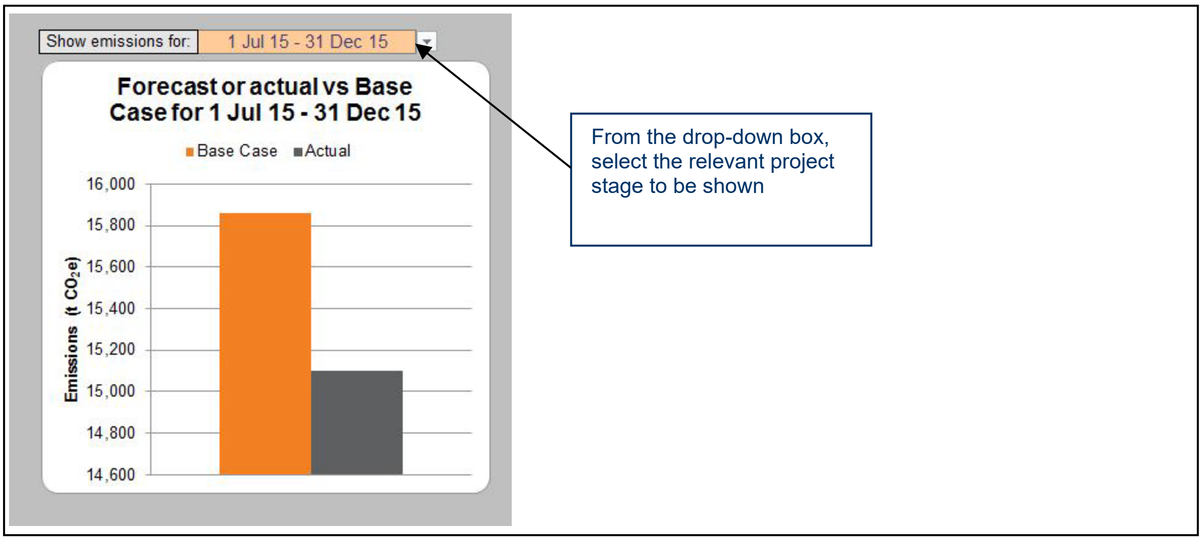
The ‘*dashboard tab*’ provides an outline of the forecast and actual emissions against the base-case in order to present the total percentage reduction in project emissions. This information is presented in a table and ‘speedometer’ graphic – both of which are auto-generated based on the information added at the project details stage and across all of the project’s reporting stages.



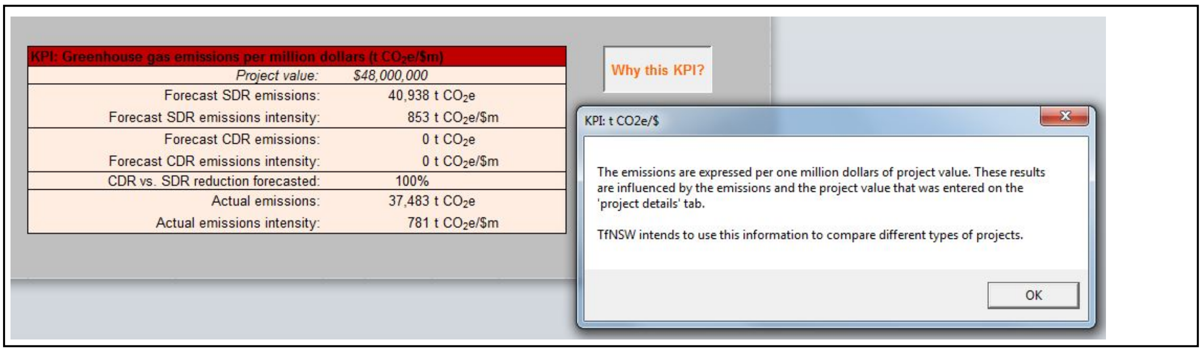
The dashboard also provides the user with the option to generate graphs based on actual performance against the estimates entered at design stages of the project.



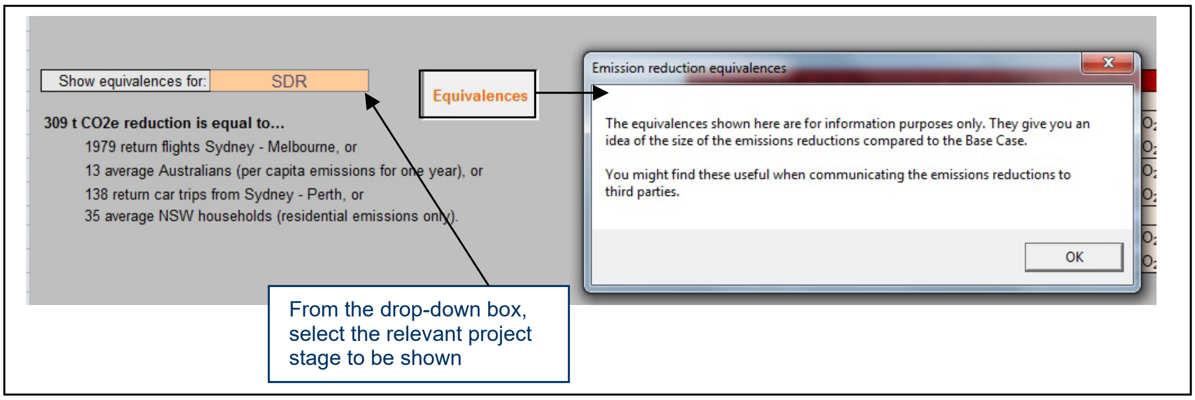
Emissions against the base case for the various project periods can also be displayed.



To assist with the broader benchmarking and comparison across IP projects, an auto-generated KPI response is included in the dashboard that presents the total amount of GHG emissions per million dollars (tCO2e/$m).



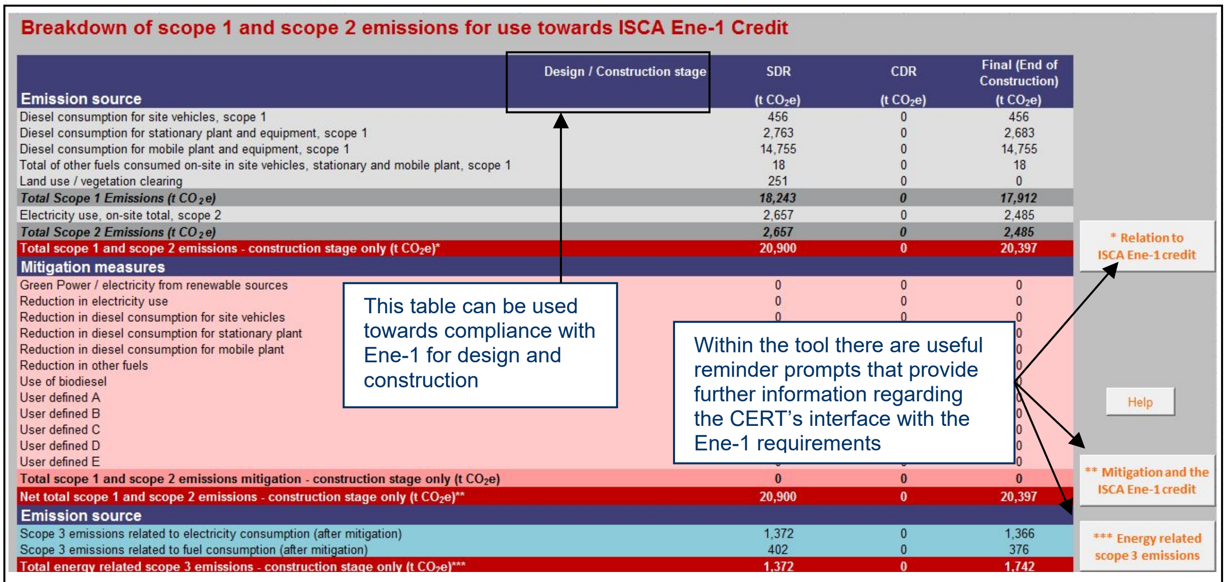
The final feature of the dashboard is to present a summary of emissions reduction equivalent to a number of car trips; number of flights; average Australian per capita and NSW households. This has been developed to assist with communicating emission reductions to third parties. It provides an idea of the size of emissions reduction compared to the base case for each stage of the project.



4.2.1. ISCA and CERT

Reflecting the IP requirement for all projects ≥$50 million to achieve an ISCA rating, many IP projects will be applying both the CERT and the ISCA IS rating tool in parallel. As such efforts have been made to align the requirements of the CERT with those included in the IS rating tool where possible.

An Ene-1 output table has been included in the *Detailed Results tab* of the CERT (refer below). Completion of this table supports the reporting requirements for design, construction and operational emissions as outlined in ISCA's Ene-1 category: Energy and carbon monitoring and reduction.



Breakdown of scope 1 and scope 2 emissions for use towards ISCA Ene-1 Credit

Emission source	Design / Construction stage	SDR ($t\ CO_2e$)	CDR ($t\ CO_2e$)	Final (End of Construction) ($t\ CO_2e$)
Diesel consumption for site vehicles, scope 1		456	0	456
Diesel consumption for stationary plant and equipment, scope 1		2,763	0	2,683
Diesel consumption for mobile plant and equipment, scope 1		14,755	0	14,755
Total of other fuels consumed on-site in site vehicles, stationary and mobile plant, scope 1		18	0	18
Land use / vegetation clearing		251	0	0
Total Scope 1 Emissions ($t\ CO_2e$)		***18,243***	***0***	***17,912***
Electricity use, on-site total, scope 2		2,657	0	2,485
Total Scope 2 Emissions ($t\ CO_2e$)		***2,657***	***0***	***2,485***
Total scope 1 and scope 2 emissions - construction stage only ($t\ CO_2e$)*		20,900	0	20,397
Mitigation measures				
Green Power / electricity from renewable sources		0	0	0
Reduction in electricity use		0	0	0
Reduction in diesel consumption for site vehicles		0	0	0
Reduction in diesel consumption for stationary plant		[illegible]	[illegible]	0
Reduction in diesel consumption for mobile plant		[illegible]	[illegible]	0
Reduction in other fuels		[illegible]	[illegible]	0
Use of biodiesel		[illegible]	[illegible]	0
User defined A		[illegible]	[illegible]	0
User defined B		[illegible]	[illegible]	0
User defined C		[illegible]	[illegible]	0
User defined D		[illegible]	[illegible]	0
User defined E		[illegible]	[illegible]	0
Total scope 1 and scope 2 emissions mitigation - construction stage only ($t\ CO_2e$)		0	0	0
Net total scope 1 and scope 2 emissions - construction stage only ($t\ CO_2e$)**		20,900	0	20,397
Emission source				
Scope 3 emissions related to electricity consumption (after mitigation)		1,372	0	1,366
Scope 3 emissions related to fuel consumption (after mitigation)		402	0	376
Total energy related scope 3 emissions - construction stage only ($t\ CO_2e$)***		1,372	0	1,742

ISCA and IP are working together to seek closer alignment between the materials emission factors included in both tools. In CERT, emission factors for materials are based on the Australian National Life Cycle Inventory Database (AusLCI), including its shadow-database, unless better data are available through published Environmental Product Declarations. The only exceptions are factors for recycled aggregates, which are based on a 2010 study for Sustainable Aggregates South Australia.

IP is committed to reviewing the emission factors included in the CERT on a regular basis (at a minimum this will be done every 12 months) with a view to updating information as appropriate. IP will look to engage with key stakeholders including ALCAS and ISCA to discuss update and revision timeframes.

5. Submission requirements

The following provides general guidance related to report submission requirements. It is noted that these may change for a particular project and any project specific requirements as outlined by the TfNSW Project Sustainability Officer should be followed.

Generally, completed CERT reports should be sent to the TfNSW Project Sustainability Officer in line with the following requirements:

- Submit the final version of the CERT to the nominated TfNSW Sustainability Officer at:
    - SDR design stage (or equivalent)
    - CDR design stage (or equivalent)
    - Six-monthly (from official start of construction)
- Once the tool has been completed for each of the above stages, submit a short memo (template provided in Appendix E) outlining the key results

Important: TfNSW will only accept CERT submissions that are:

- **Complete** – quantities have been completed for all emitting categories and sources (unless the source is not applicable to the project)
- **Supported by documented evidence** – a 90% evidence inclusion rate is required for general data input. A 100% evidence inclusion rate is required for evidence of mitigation measures

Note: at SDR and CDR stage, some mitigation measures may be likely but not 'locked in'. However some evidence of the source of the proposed measure is required e.g. email communication to a supplier of an alternate material.

If these minimum criteria are not met, the TfNSW Sustainability Officer may return the report for revision by the tool user.

Constraints and common questions

While every effort has been made to facilitate the creation of a flexible and user-friendly tool interface we acknowledge the CERT will have some limitations. Feedback is both encouraged and welcomed to help refine and improve future versions on the tool. Comments can be provided at sustainability@transport.nsw.gov.au

The following section provides an overview of some of the known constraints of the tool to help tool users understand current limitations.

A summary of frequently asked questions has also been included – these have been generated through the engagement process that has underpinned the tool's development.

Constraints

- To simplify the tool's data entry process, the option has been included to either input transport scenarios specifically, or use default, business-as-usual transport scenarios.

The transport of materials is and will remain a difficult/contentious issue particularly with regard to referencing a base case. For example, some of the emission factors are not state specific due to information not being available which means they assume a worse case or better case baseline than what could be realistically expected for NSW. Further it is impractical to record all raw materials from the beginning of the project lifecycle (e.g. iron ore and cokes used for steel production).

- Transport is not a major contributor to GHG emissions for most projects (less than 10% on average based on the materiality assessment undertaken by IP). The decisions made regarding transport distances, modes, return loads, etc. will have a limited effect on the overall carbon footprint of a project.
- In order to develop the base case some assumptions have been required due to a lack of existing data and/or reference material. Where assumptions have been made this information is documented, refer 'formulas and background tab'.
- In line with the TAGG 2013 Workbook vegetation offsets are not included as part of land clearing mitigation. It is acknowledged that this could present an issue for greenfield projects as land clearing can produce large emissions profile. It is anticipated this will be reconsidered when the second version of the tool is planned.
- The CERT tool is a simplified, high level GHG reporting tool. It is not designed to substitute detailed Life Cycle Analysis (LCA) models – future versions of the tool make seek to reconcile the inclusion of LCA.

Appendix A: CERT Glossary

Table 1 CERT Glossary

Term	Definition
Actual Emissions	Relates to the project's construction stage emissions. As the name suggests, these relate to the actual emissions being produced during project construction. Data will largely be informed and confirmed by invoices.
Base Case	The tool automatically calculates a project base case for each associated stage of the tool (SDR, CDR or actual). It is designed to provide an understanding of a business-as-usual approach that does not factor in mitigation measures. Emissions reduction across the construction life of the project is measured against the respective base-case NOT against each respective stage. For example, CDR emissions reductions are based on the auto-generated CDR base case – they are not based on emissions reduced through design refinements since SDR. The base case is calculated by applying default emission factors for relevant materials (e.g. concrete, asphalt etc.) to the quantities of materials entered by the tool user. It also takes into account a default transport scenario for the associated materials. Any value engineering options that lead to changes in the materials quantities (typically a reduction in materials or switch from one material to another) should be entered in the 'Materials – mitigation measures' section. (This is possible from CDR stage onwards.) ***Note***: It is possible to end up with a design that has higher emissions than the base case. This would be the case if for example the cement content in the specified concrete is higher than business as usual, or if transport distances are much larger than usual. The base case relates to all data (excluding mitigation measures) associated with materials, energy, waste and land use.
Carbon dioxide equivalent (CO_2e)	A standard measure that takes account of the different global warming potentials (GWPs) of greenhouse gases and expresses the cumulative effect in a common, universal unit of measurement. CERT uses GWPs taken from the IPCC's Second Assessment Report (SAR), applying a 100 year time horizon. This is consistent with NGA and NGERS reporting.

Term	Definition
Critical Design Review (CDR)	CDR represents design completion. CDR tool entries would be based on the project's completed detailed design (i.e. 100%).
Emission Factors	Emission factors for calculating emissions are generally expressed in the form of a quantity of GHG emitted per unit of activity – e.g. energy (kg CO_2e /GJ), fuel (kg CO_2e/L diesel) or material (kg CO_2e/kg steel). Emission factors are used to calculate GHG emissions by multiplying the factor (e.g. kg CO_2e/GJ energy in petrol) with activity data (e.g. kilolitres x energy density of petrol used). The emission factors used in CERT cover scope 1, 2 and 3 emissions.
End of Life	To be defined by Energetics
Forecast Emissions	Forecast emissions relate to those emissions estimated during SDR and CDR reporting stages. They are based on design estimates rather than actual emissions that are generated through the construction phase.
Maintenance	To be defined by Energetics
Mitigation	Represents measures and initiatives to reduce the GHG emissions associated with materials, energy and waste in the project.
System Design Review (SDR)	SDR commonly represents approximately 20% design completion. The CERT supports completion of a preliminary carbon estimate based on early design details.
Operations	To be defined by Energetics
Tool user	Throughout the steps outlined in the guide, reference is made to the 'tool user'. This is the person or people whose responsibility it is to complete the CERT for their respective project. ***Note***: It is at the discretion of the contractor/consultant to nominate the individual/s responsible for completing the CERT and submitting the accompanying reports. However at both SDR and CDR or equivalent stages, signoff must be provided by a cost planner, design manager or equivalent representative with visibility of the cost planning/tender estimate process.

Appendix B: Default Transport Scenarios

Default transport scenarios

	Domestic			
Material	Rigid truck	Articulated truck	Train	Ship
Ready mixed concrete, 20MPa or less	40 km			
Ready mixed concrete, 25MPa	40 km			
Ready mixed concrete, 32MPa	40 km			
Ready mixed concrete, 40MPa	40 km			
Ready mixed concrete, 50MPa	40 km			
Ready mixed concrete, 60MPa	40 km			
Ready mixed concrete, 80MPa	40 km			
Ready mixed concrete, more than 80MPa	40 km			
Portland cement	x	x	x	x
Fine aggregates		100 km		
Coarse aggregates		100 km		
Recycled (coarse) aggregates		50 km		
Ballast		100 km		
Sand		100 km		
Manufactured sand		50 km		
Recycled Crushed Glass		50 km		
Water (potable)	x	x	x	x
Concrete production process	x	x	x	x
Ready mixed concrete (I)	40 km			
Ready mixed concrete (II)	40 km			
Ready mixed concrete (III)	40 km			
Ready mixed concrete (IV)	40 km			
Ready mixed concrete (V)	40 km			
Ready mixed concrete (VI)	40 km			
Ready mixed concrete (VII)	40 km			
Ready mixed concrete (VIII)	40 km			
Ready mixed concrete (IX)	40 km			
Ready mixed concrete (X)	40 km			
Ready mixed concrete (XI)	40 km			
Ready mixed concrete (XII)	40 km			
Ready mixed concrete (XIII)	40 km			
Ready mixed concrete (XIV)	40 km			
Ready mixed concrete (XV)	40 km			

Precast concrete, 32MPa	150 km			
Precast concrete, 40MPa	150 km			
Precast concrete, 50MPa	150 km			
Precast concrete, 65MPa	150 km			
Precast concrete, 80MPa	150 km			
Precast concrete (I)	150 km			
Precast concrete (II)	150 km			
Precast concrete (III)	150 km			
Precast concrete (IV)	150 km			
Precast concrete (V)	150 km			
Precast concrete (VI)	150 km			
Precast concrete (VII)	150 km			
Precast concrete (VIII)	150 km			
Precast concrete (IX)	150 km			
Precast concrete (X)	150 km			
Precast concrete (XI)	150 km			
Precast concrete (XII)	150 km			
Precast concrete (XIII)	150 km			
Precast concrete (XIV)	150 km			
Precast concrete (XV)	150 km			
Reinforcement steel bars - Australian products		150 km		
Reinforcement steel bars - imported products	Not relevant	Not relevant	Not relevant	Not relevant
Reinforcement steel mesh - Australian products		150 km		
Reinforcement steel mesh - imported products	Not relevant	Not relevant	Not relevant	Not relevant
Reo steel: low relaxation strand and wire - Australian products		150 km		
Reo steel: low relaxation strand and wire - imported products	Not relevant	Not relevant	Not relevant	Not relevant
Structural steel, beams and columns - Australian products		150 km		
Structural steel, beams and columns - imported products	Not relevant	Not relevant	Not relevant	Not relevant
Structural steel, hot rolled coil - Australian products		150 km		
Structural steel, hot rolled coil - imported products	Not relevant	Not relevant	Not relevant	Not relevant
Structural steel, merchant bar - Australian products		150 km		
Structural steel, merchant bar - imported products	Not relevant	Not relevant	Not relevant	Not relevant
Structural steel, plate - Australian products		150 km		
Structural steel, plate - imported products	Not relevant	Not relevant	Not relevant	Not relevant

Galvanised steel - Australian products		150 km		
Galvanised steel - imported products	Not relevant	Not relevant	Not relevant	Not relevant
Steel rails - Australian products		50 km	100 km	2200 km
Steel rails - imported products	Not relevant	Not relevant	Not relevant	Not relevant
Hot mix asphalt, 0% RAP (5.5% bitumen)		50 km		
Hot mix asphalt, 0-20% RAP		50 km		
Hot mix asphalt, 20-40% RAP		50 km		
Hot mix asphalt, 40-60% RAP		50 km		
Hot mix asphalt, >60% RAP		50 km		
Warm mix asphalt, 0% RAP (5.5% bitumen)		50 km		
Warm mix asphalt, 0-20% RAP		50 km		
Warm mix asphalt, 20-40% RAP		50 km		
Warm mix asphalt, 40-60% RAP		50 km		
Warm mix asphalt, >60% RAP		50 km		
Asphalt		50 km		
Reinforced concrete pipes		150 km		
Steel pipe and tube - Australian products		150 km		
Steel pipe and tube - imported products	Not relevant	Not relevant	Not relevant	Not relevant
HDPE pipes		150 km		
PVC pipes		150 km		
Aluminium	100 km			
Glass	100 km			
Ceramics	100 km			
Power cables, Copper conductors	1000 km			
Power cables, Aluminium conductors	1000 km			
Power cables, Other conductors	1000 km			
Copper	x	x	x	x
HDPE	x	x	x	x
Timber, Structural (softwood)		150 km		
Timber, Structural (hardwood)		150 km		
Timber, MDF / Particleboard		150 km		
Timber, Plywood		150 km		
Timber, Cross-Laminated Timber (CLT)	Not relevant	Not relevant	Not relevant	Not relevant

Default transport scenarios	
	Imported

Material	Rigid truck	Articulated truck	Train	Ship
Ready mixed concrete, 20MPa or less	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete, 25MPa	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete, 32MPa	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete, 40MPa	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete, 50MPa	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete, 60MPa	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete, 80MPa	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete, more than 80MPa	Not relevant	Not relevant	Not relevant	Not relevant
Portland cement	x	x	x	x
Fine aggregates	x	x	x	x
Coarse aggregates	Not relevant	Not relevant	Not relevant	Not relevant
Recycled (coarse) aggregates	Not relevant	Not relevant	Not relevant	Not relevant
Ballast	Not relevant	Not relevant	Not relevant	Not relevant
Sand	Not relevant	Not relevant	Not relevant	Not relevant
Manufactured sand	Not relevant	Not relevant	Not relevant	Not relevant
Recycled Crushed Glass	Not relevant	Not relevant	Not relevant	Not relevant
Water (potable)	x	x	x	x
Concrete production process	x	x	x	x
Ready mixed concrete (I)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (II)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (III)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (IV)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (V)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (VI)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (VII)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (VIII)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (IX)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (X)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (XI)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (XII)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (XIII)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (XIV)	Not relevant	Not relevant	Not relevant	Not relevant
Ready mixed concrete (XV)	Not relevant	Not relevant	Not relevant	Not relevant
Precast concrete, 32MPa	150 km			8250 km
Precast concrete, 40MPa	150 km			8250 km
Precast concrete, 50MPa	150 km			8250 km
Precast concrete, 65MPa	150 km			8250 km

Precast concrete, 80MPa	150 km			8250 km
Precast concrete (I)	150 km			8250 km
Precast concrete (II)	150 km			8250 km
Precast concrete (III)	150 km			8250 km
Precast concrete (IV)	150 km			8250 km
Precast concrete (V)	150 km			8250 km
Precast concrete (VI)	150 km			8250 km
Precast concrete (VII)	150 km			8250 km
Precast concrete (VIII)	150 km			8250 km
Precast concrete (IX)	150 km			8250 km
Precast concrete (X)	150 km			8250 km
Precast concrete (XI)	150 km			8250 km
Precast concrete (XII)	150 km			8250 km
Precast concrete (XIII)	150 km			8250 km
Precast concrete (XIV)	150 km			8250 km
Precast concrete (XV)	150 km			8250 km
Reinforcement steel bars - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Reinforcement steel bars - imported products		150 km		8250 km
Reinforcement steel mesh - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Reinforcement steel mesh - imported products		150 km		8250 km
Reo steel: low relaxation strand and wire - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Reo steel: low relaxation strand and wire - imported products		150 km		8250 km
Structural steel, beams and columns - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Structural steel, beams and columns - imported products		150 km		8250 km
Structural steel, hot rolled coil - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Structural steel, hot rolled coil - imported products		150 km		8250 km
Structural steel, merchant bar - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Structural steel, merchant bar - imported products		150 km		8250 km
Structural steel, plate - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Structural steel, plate - imported products		150 km		8250 km
Galvanised steel - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Galvanised steel - imported products		150 km		8250 km
Steel rails - Australian products	Not relevant	Not relevant	Not relevant	Not relevant

Steel rails - imported products		150 km		8250 km
Hot mix asphalt, 0% RAP (5.5% bitumen)	Not relevant	Not relevant	Not relevant	Not relevant
Hot mix asphalt, 0-20% RAP	Not relevant	Not relevant	Not relevant	Not relevant
Hot mix asphalt, 20-40% RAP	Not relevant	Not relevant	Not relevant	Not relevant
Hot mix asphalt, 40-60% RAP	Not relevant	Not relevant	Not relevant	Not relevant
Hot mix asphalt, >60% RAP	Not relevant	Not relevant	Not relevant	Not relevant
Warm mix asphalt, 0% RAP (5.5% bitumen)	Not relevant	Not relevant	Not relevant	Not relevant
Warm mix asphalt, 0-20% RAP	Not relevant	Not relevant	Not relevant	Not relevant
Warm mix asphalt, 20-40% RAP	Not relevant	Not relevant	Not relevant	Not relevant
Warm mix asphalt, 40-60% RAP	Not relevant	Not relevant	Not relevant	Not relevant
Warm mix asphalt, >60% RAP	Not relevant	Not relevant	Not relevant	Not relevant
Asphalt	Not relevant	Not relevant	Not relevant	Not relevant
Reinforced concrete pipes		150 km		8250 km
Steel pipe and tube - Australian products	Not relevant	Not relevant	Not relevant	Not relevant
Steel pipe and tube - imported products		150 km		8250 km
HDPE pipes		150 km		8250 km
PVC pipes		150 km		8250 km
Aluminium		150 km		8250 km
Glass		150 km		8250 km
Ceramics		150 km		8250 km
Power cables, Copper conductors	500 km			2500 km
Power cables, Aluminium conductors	500 km			2500 km
Power cables, Other conductors	500 km			2500 km
Copper	x	x	x	x
HDPE	x	x	x	x
Timber, Structural (softwood)		500 km		8250 km
Timber, Structural (hardwood)		500 km		8250 km
Timber, MDF / Particleboard		500 km		8250 km
Timber, Plywood		500 km		8250 km
Timber, Cross-Laminated Timber (CLT)		500 km		21500 km

Material	Base case default scenario
Ready mixed concrete, 20MPa or less	domestic
Ready mixed concrete, 25MPa	domestic
Ready mixed concrete, 32MPa	domestic

Ready mixed concrete, 40MPa	domestic
Ready mixed concrete, 50MPa	domestic
Ready mixed concrete, 60MPa	domestic
Ready mixed concrete, 80MPa	domestic
Ready mixed concrete, more than 80MPa	domestic
Portland cement	
Fine aggregates	
Coarse aggregates	domestic
Recycled (coarse) aggregates	domestic
Ballast	domestic
Sand	domestic
Manufactured sand	domestic
Recycled Crushed Glass	domestic
Water (potable)	
Concrete production process	
Ready mixed concrete (I)	domestic
Ready mixed concrete (II)	domestic
Ready mixed concrete (III)	domestic
Ready mixed concrete (IV)	domestic
Ready mixed concrete (V)	domestic
Ready mixed concrete (VI)	domestic
Ready mixed concrete (VII)	domestic
Ready mixed concrete (VIII)	domestic
Ready mixed concrete (IX)	domestic
Ready mixed concrete (X)	domestic
Ready mixed concrete (XI)	domestic
Ready mixed concrete (XII)	domestic
Ready mixed concrete (XIII)	domestic
Ready mixed concrete (XIV)	domestic
Ready mixed concrete (XV)	domestic
Precast concrete, 32MPa	domestic
Precast concrete, 40MPa	domestic
Precast concrete, 50MPa	domestic
Precast concrete, 65MPa	domestic
Precast concrete, 80MPa	domestic
Precast concrete (I)	domestic
Precast concrete (II)	domestic
Precast concrete (III)	domestic
Precast concrete (IV)	domestic
Precast concrete (V)	domestic

Precast concrete (VI)	domestic
Precast concrete (VII)	domestic
Precast concrete (VIII)	domestic
Precast concrete (IX)	domestic
Precast concrete (X)	domestic
Precast concrete (XI)	domestic
Precast concrete (XII)	domestic
Precast concrete (XIII)	domestic
Precast concrete (XIV)	domestic
Precast concrete (XV)	domestic
Reinforcement steel bars - Australian products	domestic
Reinforcement steel bars - imported products	imported
Reinforcement steel mesh - Australian products	domestic
Reinforcement steel mesh - imported products	imported
Reo steel: low relaxation strand and wire - Australian products	domestic
Reo steel: low relaxation strand and wire - imported products	imported
Structural steel, beams and columns - Australian products	domestic
Structural steel, beams and columns - imported products	imported
Structural steel, hot rolled coil - Australian products	domestic
Structural steel, hot rolled coil - imported products	imported
Structural steel, merchant bar - Australian products	domestic
Structural steel, merchant bar - imported products	imported
Structural steel, plate - Australian products	domestic
Structural steel, plate - imported products	imported
Galvanised steel - Australian products	domestic
Galvanised steel - imported products	imported
Steel rails - Australian products	domestic
Steel rails - imported products	imported
Hot mix asphalt, 0% RAP (5.5% bitumen)	domestic
Hot mix asphalt, 0-20% RAP	domestic
Hot mix asphalt, 20-40% RAP	domestic
Hot mix asphalt, 40-60% RAP	domestic
Hot mix asphalt, >60% RAP	domestic
Warm mix asphalt, 0% RAP (5.5% bitumen)	domestic
Warm mix asphalt, 0-20% RAP	domestic
Warm mix asphalt, 20-40% RAP	domestic
Warm mix asphalt, 40-60% RAP	domestic
Warm mix asphalt, >60% RAP	domestic
Asphalt	domestic
Reinforced concrete pipes	domestic

Steel pipe and tube - Australian products	domestic
Steel pipe and tube - imported products	imported
HDPE pipes	domestic
PVC pipes	domestic
Aluminium	imported
Glass	imported
Ceramics	domestic
Power cables, Copper conductors	imported
Power cables, Aluminium conductors	imported
Power cables, Other conductors	imported
Copper	
HDPE	
Timber, Structural (softwood)	domestic
Timber, Structural (hardwood)	domestic
Timber, MDF / Particleboard	domestic
Timber, Plywood	domestic
Timber, Cross-Laminated Timber (CLT)	imported

Appendix C: Default Material Mix Compositions

Ready Mixed Concrete: Default mix compositions (simplified)

Ingredients in kg/m^3					
Characteristic strength (MPa)	**Cement**	**SCM's (fly-ash, GGBFS)**	**Fine and coarse aggregates**	**Potable Water**	**total mass (kg/m3)**
20MPa or less	250	0	2062	88	2400
25MPa	280	0	2022	98	2400
32MPa	330	0	1954	116	2400
40MPa	400	0	1860	140	2400
50MPa	450	0	1792	158	2400
60MPa	450	0	1792	158	2400
80MPa	550	0	1657	193	2400
more than 80MPa	650	0	1522	228	2400

Precast Concrete: Default mix compositions (simplified)

Ingredients in kg/m^3					
Characteristic strength (MPa)	**Cement**	**SCM's (fly-ash, GGBFS)**	**Fine and coarse aggregates**	**Potable Water**	**total mass (kg/m3)**
32MPa	400	0	1860	140	2400
40MPa	400	0	1860	140	2400
50MPa	450	0	1792	158	2400
65MPa	550	0	1657	193	2400
80MPa	612	68	1506	214	2400

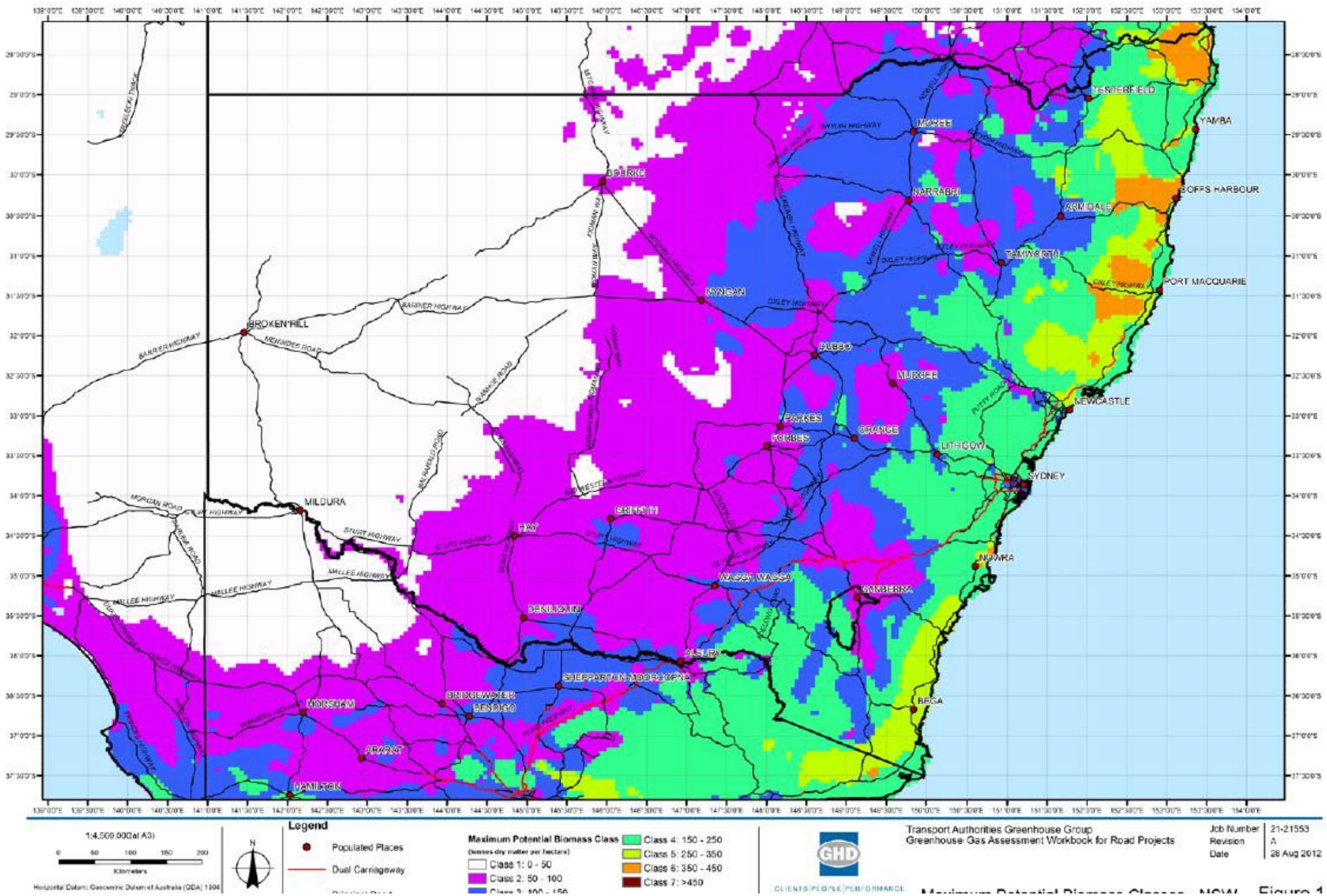
Asphalt: Default mix compositions

Ingredients in kg/tonne					
Asphalt product (both HMA & WMA)	**Bitumen**	**Fine aggregates**	**Coarse aggregates**	**Filler**	**RAP**
asphalt, 0% RAP (5.5% bitumen)	55	200	495	250	0
asphalt, 0-20% RAP	50	170	430	250	100
asphalt, 20-40% RAP	40	150	310	200	300
asphalt, 40-60% RAP	30	120	190	160	500
asphalt, >60% RAP	20	100	80	100	700

Appendix D: Maxbio Classification Maps – NSW

Extracted from TAGG 2013 Workbook, Attachment A
Maximum Potential Biomass Classes

Refer: http://www.rms.nsw.gov.au/documents/about/environment/greenhouse-gas-assessment-workbook-road-projects.pdf


TENTERFIELD
YAMBA
MOREE
BOURKE
NARRABRI
COFFS HARBOUR
ARMIDALE
TAMWORTH
PORT MACQUARIE
NYNGAN
BROKEN HILL
DUBBO
MUDGEE
NEWCASTLE
PARKES
FORBES
ORANGE
LITHGOW
SYDNEY
MILDURA
GRIFFITH
HAY
NOWRA
WAGGA WAGGA
CANBERRA
DENILIQUIN
ALBURY
SHEPPARTON-MOOROOPNA
BRIDGEWATER
BENDIGO
HORSHAM
BEGA
ARARAT
HAMILTON
1:4,500,000(at A3)
Kilometers
Legend
Populated Places
Dual Carriageway
Maximum Potential Biomass Class
Class 1: 0 - 50
Class 2: 50 - 100
Class 4: 150 - 250
Class 5: 250 - 350
Class 6: 350 - 450
Class 7: >450
GHD
CLIENTS|PEOPLE|PERFORMANCE
Transport Authorities Greenhouse Group
Greenhouse Gas Assessment Workbook for Road Projects
Job Number 21-21553
Revision A
Date 28 Aug 2012

Appendix E: Supporting information

A selection of supporting information is provided to address a number of CERT requirements that might need further clarification.

Mitigation evidence requirements

While it is important to include evidence requirements as identified in Section 1.1.2, it is important to note that mitigation evidence in particular, will be reviewed in greater detail i.e. with more numerous spot checks as per above method. It is critical that all references to mitigation evidence, as a minimum follow the following referencing protocol:

- document title;
- document version;
- issue date; and,
- page/section reference.

Table 2 below provides examples of acceptable mitigation evidence for the different emission categories and sources.

Table 2 Example of acceptable mitigation evidence

Source	Example evidence
Materials	
User defined Portland cement content for ready mix concrete	• Concrete mix design sheet
Recycled/alternative material	• Page of BOQ, or • Supplier invoice, and • Emission factor source
Change in material quantities (value engineering)	• Meeting minutes from value engineering workshop
Energy Use	
Green Power	• Copy of contract with electricity supplier
Reduction in diesel consumption for mobile plant (e.g. via idling procedure)	• Copy of idling procedure, and • Audit results from onsite idling checks
Waste	
Waste reused on site (e.g. reuse ballast for road base)	• Photos of material in end use, and • Email from Construction Manager estimating volumes of material reused

Frequently Asked Questions

The following outlines a number of frequently asked questions (FAQ) that have been posed during the tool's development and pilot stages. They are designed to provide further context and guidance to support completion of the tool.

Table 3 CERT frequently asked questions

Question	Response
Interface with design	
My project has more than one design package, with design review/submission dates differing in terms of program. How does the CERT facilitate this?	Please use more than one copy of the CERT for each major design package. TfNSW will accept multiple submission of the CERT for large projects with complex design packages. However the memo (refer Appendix E) should collate the results to represent one project.
Can't I just "over design" at SDR to look better at CDR and construction stage reporting?	No. The aim of the tool is not to compare the various stages against each other, but to compare them against the auto-generated base case. Conservative/over designing at SDR stage to try and achieve efficiencies later in the project will serve no benefit as all emissions reductions are charted against the respective base case.
What if the quantification is way off, quantification can be way out from reality? Is there a margin for error? Contingency?	There is always a risk that quantities are off. Until now, this was difficult to spot because of the variation in reporting formats, scope, etc. With CERT, TfNSW can compare materials use and greenhouse gas emissions to other (similar) projects.
I can only change the Portland cement quantity to achieve reductions for ready mix and precast concrete. What about recycled aggregates etc?	Recycled aggregates only have minor impacts on the carbon footprint of concrete. Therefore it was determined that there is no need to distinguish these for the purposes of the CERT
So if I copy across SDR data to CDR and update the changes to CDR manually efficiencies from SDR to CDR will be lost?	Yes, while improvements in managing design change and optimisation in subsequent CERT versions may be considered, currently if you choose this data input option you will need to use the *change in material quantities calculator* to demonstrate efficiencies and reductions.
Base case generation	
How is the base case generated?	The base case is generated via: i) Business as usual assumptions related to transport scenarios and concrete Portland cement content, and ii) The mitigation measures identified by the tool user The base case is the estimated forecast or actual emissions for the project without any user defined: i) transport/concrete estimates and ii) mitigation measures. (Refer Appendix B)

My mitigation measure is not provided for in the CERT. How can I include it?	Each category (except land use change) allows for user defined mitigation measures. The tool user must source the emission factor.
Compliance with other standards and requirements	
How does the CERT relate to the National Greenhouse and Energy Reporting Scheme (NGERS)?	The CERT scope of emissions sources differs from that of NGERS e.g. it allows estimation of scope 3 emissions. However, the energy use category has been developed to allow data gathered for NGERS reporting purposes to be easily transferred for CERT reporting
Does the CERT align with commonly accepted standards for GHG assessment??	There are a number of Standards (e.g. WRI GHG Protocol, ISO14040, ISO14067, PAS2050) that could be applied, and all are slightly different. Although the calculator uses key carbon accounting principles, it is also a simplified reporting tool with limited scope. There has been no formal assessment of consistency with different Standards as yet.
Why aren't Scope 3 emissions captured more fully?	The tool was informed by a materiality assessment that sought to identify significant emissions sources for projects. Therefore only those emissions that are of material impact have been included.
Will completing the CERT automatically meet the associated requirements under the ISCA tool?	No. IP has worked in close collaboration with ISCA to align the CERT with the Infrastructure Sustainability rating tool where possible, but the use of the CERT does not automatically comply with the IS requirements for energy and materials. Notably, completing the CERT will meet ISCA's reporting requirements for Ene-1 emissions associated with design, construction and operation.
Is the ISCA base-case and CERT base case the same?	The CERT base-case may provide a basis for an ISCA base case once combined with suitable operation emissions and subject to verification through ISCA.
Emissions factors change fairly regularly – how frequently will the tool be updated?	IP acknowledges that emission factors for both electricity and materials are updated frequently. It is anticipated that emission factors will be reviewed on an annual basis and IP will work closely with key stakeholders to ensure this is an efficient process.

Appendix F: CERT Overview and Context

TfNSW is committed to working in partnership to deliver innovative and sustainable transport networks that make NSW a great place to live and work. As an organisation, TfNSW has a demonstrated commitment to sustainability and aims to be a world class authority delivering safe, reliable and integrated transport across the State.

As part of its broader sustainability commitment, greenhouse gas (GHG) or carbon emissions, are viewed as a key sustainability issue for TfNSW and have been identified as an appropriate metric for measuring sustainability performance. The measurement of GHG emissions are central themes in the:

- **TfNSW Environment and Sustainability Framework**: the Department's corporate sustainability framework includes key themes around energy and resource management that seek to reduce consumption and emissions.
- **TfNSW Transport Projects' Sustainability Framework**: Infrastructure and Place Division (IP) confirms a GHG emissions reduction target of 15% (from a 2010 baseline) by 2020. It also identifies a need to reduce the absolute quantity of Portland cement by at least 30% as an average across all concrete mixes subject to meeting strength and durability requirements).
- **TfNSW Sustainable Design Guidelines**: The Sustainable Design Guidelines (SDGs) support the preparation of a carbon footprint assessment for all projects, and, reducing the use of Portland cement quantity.

It is important to note, the introduction of the CERT does not place an additional reporting requirement on IP's stakeholders. Rather, it seeks to streamline and simplify the current process associated with the assessment of project GHG emissions from design through to construction. The introduction of the CERT will supersede the requirements within the current TfNSW *Greenhouse Gas Inventory for Construction Projects,* and in future TfNSW's Standard Requirements – Environment (TSR-E) will be updated to require completion of the CERT for all projects ≥ $15million.

A comprehensive engagement process has further informed development of the CERT. Key stakeholders that were engaged throughout the process include (but are not restricted to):

- Sydney Trains
- Roads and Maritime Services (RMS)
- Transport Projects Delivery Office (TPD)
- Various tier 1 and 2 contractors
- Wickham Transport Interchange (WTI) project team
- Infrastructure Sustainability Council of Australia (ISCA)

A key component of developing the tool was testing and piloting the draft tool on the Wickham Transport Interchange project to gain practical insight into its useability and functionality. IP has also worked closely with ISCA to seek alignment (where possible) with relevant categories within the Infrastructure Sustainability (IS) rating tool e.g. Energy-1 (Ene-1) and Materials-1 (Mat-1).

Appendix F: Reporting Template

The following provides a reporting template of key project information generated using the CERT. This information should be completed for each stage of the project and submitted to IP along with the completed CERT. It is designed to provide IP with a quick reference of high-level project results. It may also be used internally to communicate progress.

Reporting Area	Response
Project Name	
Reporting stage covered by submission *(delete as appropriate)*	• SDR • CDR • Six-monthly construction reporting
Project GHG Reduction Target/s	
Key materials mitigation opportunities explored	
Key energy mitigation opportunities explored	
Key waste mitigation opportunities explores	
Total forecast/actual emissions for relevant reporting stage (tCO_2e)	
Total base case emissions for relevant **reporting** stage (tCO_2e)	
Total emissions reduction identified (tCO_2e)	