Rail Carbon Tool

User Guides

12 May 2015

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Abbreviations and Acronyms

Abbreviation	Definition
$kgCO_2e$	kilograms of carbon dioxide equivalents
Nr	Number of
RCT	Rail Carbon Tool
RSSB	Rail Safety and Standards Board
Tool	Rail Carbon Tool

Glossary

Term	Definition
Calculation	A predefined formula/equation in the RCT that provides the means (along with the relevant Carbon Factor) for a user to convert their project data into carbon footprint values. A user selects the calculation that they require, once they have selected the relevant Carbon Factor and according to the project data that they have. A user's data needs to match the Parameters used in the calculation so that the calculation can be fully completed. For example, the calculation for a pipe has the following parameters: • Length (length of the pipe); • External diameter (external diameter of the pipe); • Internal diameter (internal diameter of the pipe); • Material density.
Carbon Factor	An entity for which there is one or more Carbon Factor value. In most cases this will be a raw material (e.g. the embodied carbon in 1 kg of concrete), a fuel (e.g. the embodied and direct carbon emitted from using 1 litre of diesel), or other greenhouse gas conversion factor (e.g. the carbon equivalent of 1 kg methane). However, these are just examples and the tool does not limit what the user can store as a Carbon Factor.
Carbon Factor Library	The dataset of Carbon Factor records in the RCT. All publicly available Carbon Factors included in the tool are available to all users. Access to other factors can be restricited to specific groups of users, as required.
Carbon Factor Value	A factor that converts material or activity data into carbon footprint value, e.g., kg CO_2e emitted per liter of fuel consumed, kg CO_2e emitted per kilometer traveled, or kg CO_2e emitted per kilogram of materials used.
Carbon Footprint	The sum of one or more individual carbon calculations that define the carbon value (in $kgCO_2e$) of a scenario or item, or any collection thereof.
Carbon Hot-spot	A scenario or item, or part thereof, in a carbon model that has a higher carbon footprint value than other scenarios or items with the same carbon model.

Term	Definition
Carbon Model	A specific collection of Folders, CO_2 Packages, and Carbon Factors in a Project Tree that define a specific scenario and / or item, or collection thereof. A carbon model can be an entire Project Tree, or a specific sub-section thereof.
Carbon Model Analysis	The investigation of a carbon model in the RCT using the analysis fucntionality to identify the carbon profiles and hot-spots. The functionality concerned is: the expand / contract function, viewing project data and Custom Fields data and information, and graphing.
CO_2 Package	A line item in a Project Tree that is used to define a real-world scenario or item for which the carbon value is to be calculated using Carbon Factor(s) and the associated calculations. Each CO_2 Package is defined by a name, quantity, and unit of measure. A CO_2 Package can be used inside another CO_2 Package, as a sub Package, to define sub-components, and CO_2 Packages can be defined at different levels of granularity and complexity, depending upon the need. E.g. a length of permeant way, to a single sleeper.
Custom Field Data	User specific, non-core data added to a Project Tree using Custom Fields, and which is viewed via the Customise Columns function.
Custom Fields	A functionality that allows a user to add their own non-core information to any line item in a Project Tree to enhance the content and context of the associated carbon model.
Dataset	A group of records all with consistent structure and content, e.g. a Project, source records, calculation records, etc.
Domain Data	A range of datasets that contain background information for Carbon Factors.
Field	A single item of data in a record.
Folder	A named placeholder used to create structure in a Project Tree, into which CO_2 Packages and their Carbon Factor calculations are placed.
Headline Folder	The highest level folder in a Project Tree. All other Folders or CO_2 Packages can only be defined as child items to such a Folder.
Line Item	A Folder, CO_2 Package, or Carbon Factor in a Project Tree.
Options Evaluation and Selection	The activity of using a carbon model in the RCT and the RCT's functionality to assist users and associated teams with understanding the carbon performance of the scenario(s) and item(s) quantified in their carbon model, and to identify low carbon solutions.
Parameter	A numeric field in a Carbon Factor calculation formula, which must be completed to enable the calculation to be completed.
Parameter Name	The name given to a numeric field in a Carbon Factor calculation formula, e.g. length, diameter, and density.
Project	A collection of Folders, CO_2 Packages, and Carbon Factors in a Project Tree, which define one or more carbon models for a rail industry scenario, or item, or collection thereof. For example, a project, activity, organisation or product.
Project Tree	The hierarchical structure within which a Project is defined. The Project Tree uses an intuitive interface that is not unlike Microsoft Windows Explorer.

Term	Definition
Radio Button	An on / off option button that activates / de-activates a function.
RCT Content	Any data or information included in the RCT, consisting of individual fields, records, and datasets.
Record	A predefined group of one or more fields.
Sandbox	A user specific Project Tree that is private to each individual user, and for their own personal use to test out carbon footprinting calculations and analysis. Any content created in a Sandbox can be transferred to a Project, and vice versa.
Source Record	A record that defines the specific document reference for a carbon factor value.
Template CO_2 Package	A mini Project Tree for a specific scenario or item, which a user can add directly to their Project Tree.
Templates Library	The dataset of Template CO_2 Package records in the RCT.
User Data	Any data or information entered into the RCT by a user.

1 Introduction

The Rail Carbon Tool is a web-based carbon reduction tool that is provided by the Rail Safety and Standards Board (RSSB) for UK rail industry organisations and companies to enable them to:

- calculate and analyse the carbon footprints of UK rail projects and activities;
- identify and assess alternative low carbon options; and
- select low carbon solutions.

The RSSB has provided the tool to assist with reducing the industry's carbon footprint, and is part of the response to the carbon and energy requirements in the High Level Output Specification (HLOS) 2012: Railways Act 2005 statement.

The tool is free to use for UK rail industry organisations, and its combined functionalities and capabilities (as outlined above) are specifically designed to enable lower carbon solutions to be identified with maximum effectiveness and with the least administration requirements.

In addition to the tool's centralised, web-based format, it also has extensive security controls, which combined give the tool full multi-user capability. This means that multiple users can simultaneous and securely:

- carry out carbon footprint calculations;
- analyse their resulting carbon models; and
- identify, assess, and select low carbon options and solutions; which is herein collectively referred to as 'options evaluation and selection'.

The calculation and analysis functions are the core capabilities of the tool, and follow standard techniques for such activities. The security controls and the options evaluation and selection capability are also very important because, respectively, they enable the tool to function as required, and provide the ultimate means to reduce the industry's carbon footprint. Given the tool specific nature of security controls and the options evaluation and selection they are outlined in more detail below.

1.1 Security Controls

The security controls are important because they provide the mechanism for controlling access to the tool's content and functionality at an individual user level, thus ensuring the tool can be appropriately used throughout the UK rail industry. Specifically, the controls that are provided:

- enable complete data security (confidentiality) for every individual user;
- allow local data sharing between users for collaborative working on carbon footprint calculations and models; and
- allow global data sharing between large groups, or all users, for efficient and consistent carbon footprinting and knowledge transfer on low carbon solutions.

In summary, the security controls ensure all of the tools content is kept secure and that overall user content can be effectively managed, to the benefit of the tool's users.

1.2 Options Evaluation and Selection

Options evaluation and selection is ultimately the most important capability of the tool because it is the specific means by which low carbon solutions will be identified, the one that directly drives carbon reduction.

In essence, it involves using the tool's efficient and effective calculation and analysis functionality, and it's clear and flexible structure to:

- gain an understanding of the carbon performance of the scenario(s) and / or item(s) being investigated, e.g. a project design, construction activities, product(s), operational and maintenance activities and works;
- identify potential changes to improve the carbon performance using the ingenuity of relevant specialists; and
- assist with decision making that will deliver enhanced carbon performance through selection of low carbon solutions.

Options evaluation and selection exercises can be done on a single user basis, or in combination with relevant specialists (designers, engineers, project managers, constructors, operators, or maintainers), depending on the nature of the scenarios / items concerned and the decision making that is required.

1.3 User Guide Purpose, Structure and Content

This User Guide has been specifically prepared to provide technical instructions for users on how to use the Rail Carbon Tool (herein referred to as 'the tool' or 'the RCT'). The structure and content are as follows:

Section 2 - User Accounts, Login, and Security	• Explains how to obtain a user account, how to log-in, and how security controls work.
Section 3 - Quick Start Instructions for Carbon Calculation and Analysis	• Provides outline instruction to enable users to quickly start using the tool.
Section 4 - RCT Overview	• Explains the concepts of the tool and outlines the process and functionality for carrying out carbon calculations, carbon model analysis, and options evaluation and selection.
Section 5 - How to Use Generic Functions	• To avoid repetition throughout this guide, this section explains how to use the generic functions in the tool, such as on-screen help, standardised search functions, editing, and changing / resetting user passwords.
Section 6 - How to Navigate Libraries	• Explains how to find and use the carbon data and project libraries that are in the tool.
Section 7 - How to Carry Out Carbon Calculations	• Explains how to operate the carbon calculation functionality of the tool.
Section 8 - Exporting Data and Reports	• Explains how to output data from the RCT to spreadsheet and PDF formats.
Section 9 - How to Analyse Carbon Models	• Explains how to analyse a carbon model once it has been generated by the carbon calculations.
Section 10 - How to do Options Evaluation and Selection	• Explains how to use the tool to inform low carbon decision making and compare different options and support design, engineering, and operational decision making.
Section 11 - How to Operate Security Groups and Security Controls	• Explains how to set up security controls for data and records.

Note: Instructions for administration users (who have access to additional functionalities) are provided separately in the Rail Carbon Tool First Line Support Manual.

1.3.1 Format and Updates

The instructions provided in this guide use a mixture of written instructions and screenshots to explain the tool's functions. Where screenshots are used:

- some are cropped to include only the relevant area of the tool interface; and
- green boxes are used to signpost specific features.

As a user progresses through this guide they will develop a clear understanding of the overall functionality and as such the instructions in the latter sections of the guide have comparatively less detailed instructions.

This guide has been produced to only cover the functionality available in the tool at the time of writing. Should the tool's functionality be expanded at any time, this guide will be updated accordingly.

1.3.2 User Support

If users require technical support with using the tool they should contact the RSSB RCT Support Team, which can be contacted at railcarbontoolsupport@rssb.co.uk.

2 User Accounts, Login, and Security

All users require an account to login to the RCT. The instructions for how to obtain a user account and login are provided below. This section also provide full details of the tool's security controls.

2.1 Request a User Account for the RCT

To obtain a user account for the RCT:

1) go to: **www.railindustrycarbon.com;**
2) use the **Register user** link;
3) complete the required user details in the **Register** page; and
4) click the **Register** button to complete the account request.

The Register button will send the user's details to the RSSB RCT Support Team for approval and activation. Once received, the Team will check the details to make sure a valid user account request is being made. They will then activate the account by allocating the user as:

- a Project User;
- with Sandbox access; and
- with security settings to enable access to all public content.

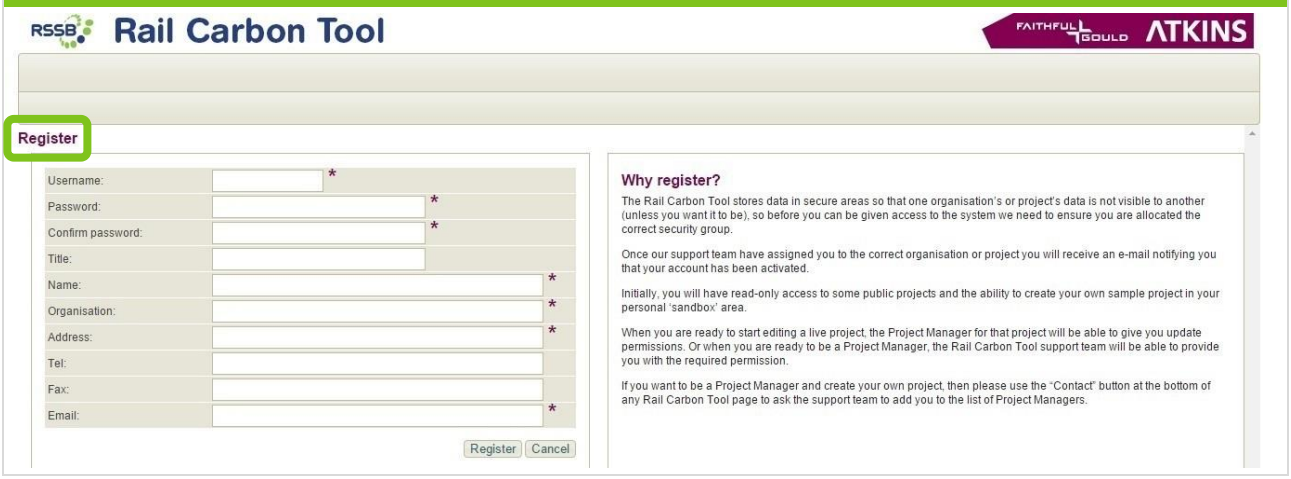
These settings will allow the user to carry out carbon calculations and analysis in their private Sandbox, and view the tool's public content, which is:

- **Carbon Factor** library content from publicly available sources; and
- **Templates library content**, **Custom Fields**, and **Projects** that are approved for general use, or for use by specific users / user groups as specified by an individual user.

Once the account is activated the user will be provided with account details to the email address that was provided in the account registration. The user can then log-in to the RCT, as detailed in section 2.2 below.

Log-in page with Register user link:

Register page:

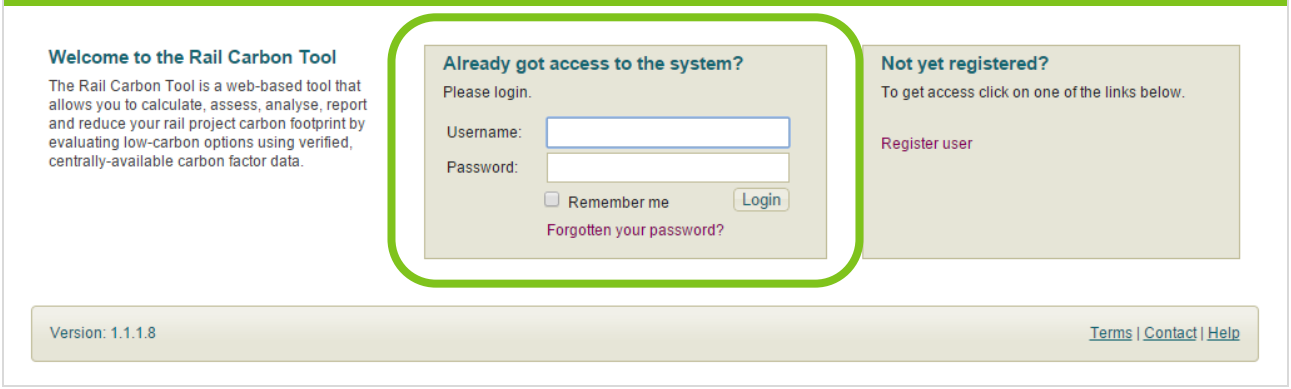


2.2 Login

Login to the RCT as follows:

1) go to: www.railindustrycarbon.com;
2) enter **Username**, which is case sensitive;
3) enter **Password**, which is case sensitive; and
4) click the **Login** button.

Login panel:



Once in the tool, access to content and functions will be limited by the standard security controls applied to new user accounts. If access is required to content and functions that are not available with the standard controls, they can be changed by either the RCT Support Team, or by the user(s) that control the particular content that another user requires access to, e.g. a Project.

Key content that new users are restricted from accessing are Projects that are limited to user or private group access only.

Key functions that new users are restricted from using are creating new Projects and Security Groups.

2.3 RCT Security Controls

The RCT's security controls are applied through **user accounts**, **user roles**, **security settings,** and **Security Groups**, as follows:

- **user accounts** provide the platform for specifying each user's role and some group level access, in particular for public library content;
- **user roles** set the overall level of access a user is given to the tool's content and functionality;
- **security settings** exist on all content subject to security control and define:
  - exactly which items of content a user can access (such as Carbon Factor records in the carbon Factor library, Projects, etc.); and
  - what level of access and functionality each user will have.
- **Security Groups** enable security settings to be applied for predefined groups of users.

These functions are explained in the following sub-sections and full instructions for how to use them are provided in Section 11.

2.3.1 User Accounts and User Roles

User accounts and user roles operate by automatically providing a user with access to the tool's content and functionality according to, their username, the user role specified on their user account, and Security Groups they are included in.

The three roles for general users and the levels of access and functionality that they provide are as follows:

- **Project Browser**: this role allows a user to:
  - use the tool's full functionality in a Sandbox (where provided); and / or
  - access and edit user content, where they are given rights to do so by the user that controls the content concerned, e.g. a Project.

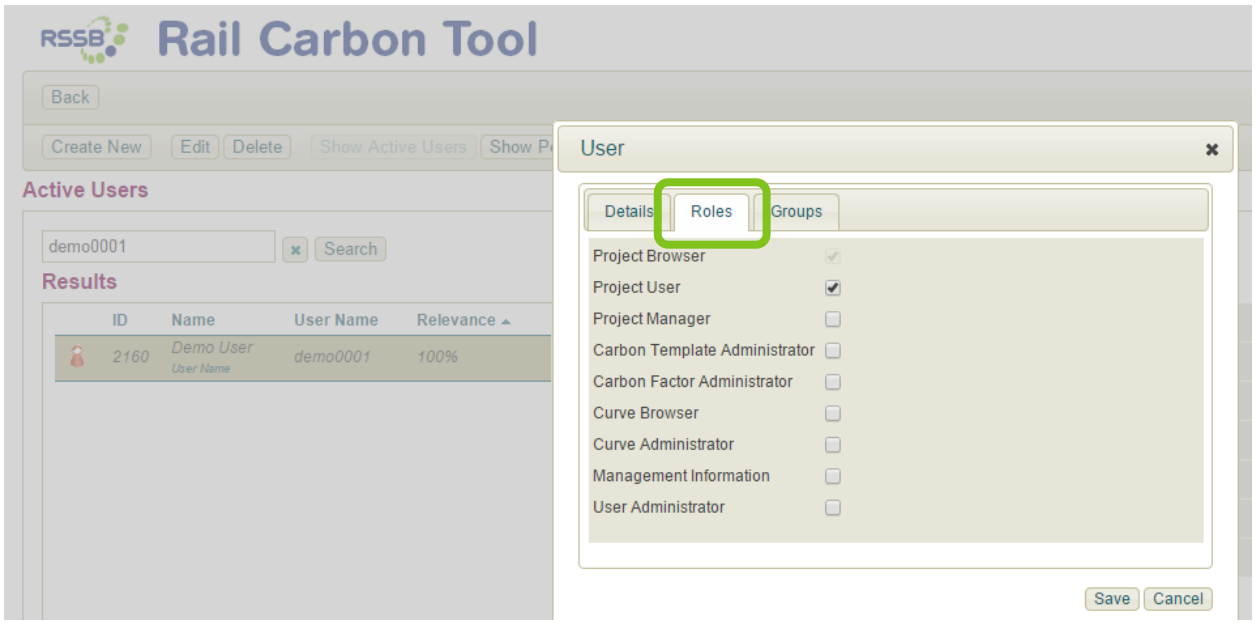
  However, as a first rule a Project Browser cannot: control security settings; upload files; manage source information for user specific Carbon Factors; or manage Custom Fields. The only case where a Project Browser can have some access to these functions is on specific user content, where they are given relevant rights by another user.
- **Project User**: this role provides the same features as Project Browser. However, a Project User can:
  - control security settings on content they own or are given admin rights to;
  - upload files;
  - manage data source information; and
  - manage Custom Fields.
- **Project Manager**: this role provides the same features as Project User but in addition a Project Manager can:
  - create and manage Projects; and
  - create and use Security Groups.

As explained in section 2.1, the default role for new users is **Project User**. The **Project Manager** role will only be provided to designated users within each organisation. This approach has been taken to ensure that control can be maintained on the quantity of Projects that are created in the tool. The **Project Browser** role will only be used in a few cases where a predominantly read-only access role is necessary.

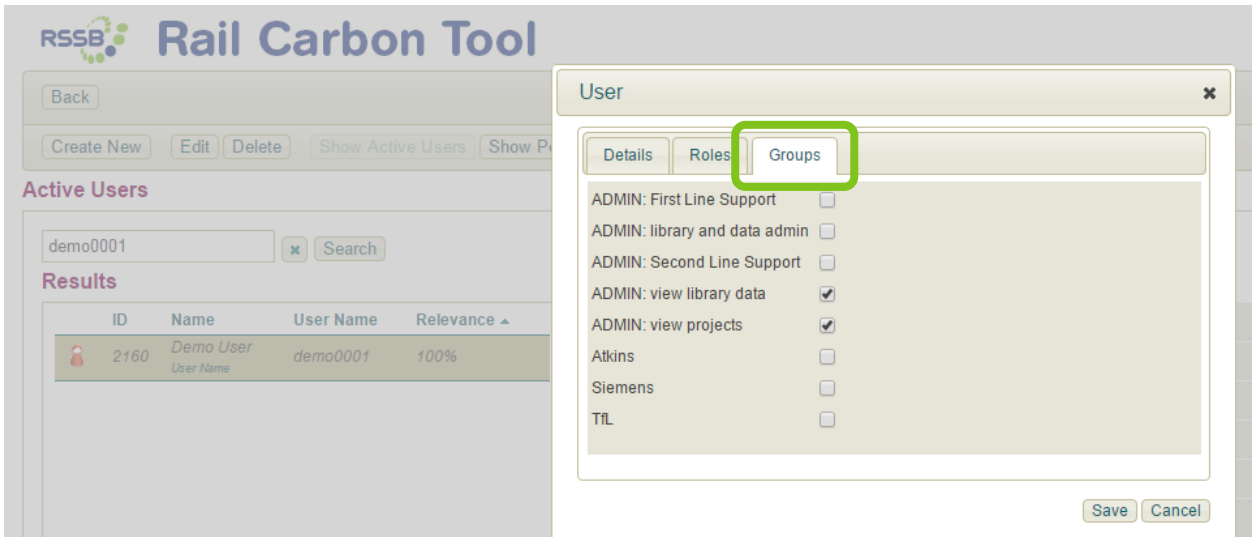
All user accounts are managed by the RCT Support Team, who have exclusive administration control for them. Therefore, if a user requires changes to their user role or access to public library content (if not already provided) they must email a request to: railcarbontoolsupport@rssb.co.uk.

Note: The **Project User** roles do not provide a user with access to data. All data is controlled by the group security settings on a user's account and / or the individual or group security settings each item of content in the tool.

User account record showing Demo User specified with the Project User role:



Demo User user account showing the Group controls for access to public content:



2.3.2 Security Settings

As outlined above, security settings control which items of content each user can access and the edit rights each user is provided with for each item of content.

Access is provided by including the relevant user in the items security settings using the user's username, or by including them in a Security Group, and including the Security Group in the items security settings. The level of access a user or Security Group can have is provided by selecting one of the three specified levels, which are:

- **Read** – this provides read only access;
- **Update** – this automatically provides read rights, plus edit rights (and therefore access to the edit functions); and

- **Admin** – this automatically provides read and edit rights, and rights to administrate the items security controls, i.e. a user with this access level can set the access rights, as outlined in this section.

Controls are also provided to specifically **Allow** or **Deny** these Read, Update, or Admin settings.

The content that general users can control the security on are:

- Projects;
- Custom Fields;
- User specific Source records;
- Organisation records (for associated Source records); and
- Security Groups.

All library content is controlled by the library administrators. General users are provided with read-only access to the public library content as part of the Group settings on their user account.

Examples of how user security setting can be applied are as follows:

- a user could share a new Project that they control with other individual users in a project team, including giving each user different Read, Update or Admin rights; or
- a Project Manager user could create an organisation specific Security Group, add the users in the organisation to it, and add the Security Group to relevant content to share on an organisation specific basis; or
- a user could share an existing Project on a Read or Update basis with the users in their organisation level via a predefined Organisation specific Security Group; or
- a user could share a Project with all RCT user by adding the ADMIN: view projects Security Group to the Project's security settings.

Note:

- where a user is provided with higher levels of access than their default role they will be provided with access to the tool's functionality relevant to that access level, e.g. a Project Browser can be provided with Project User rights on an individual project by granting edit control for the Project; and
- The range of security controls mean that any level of access control can be provided, ranging from open access to all users, through to organisation specific control, to even single user access. The user or organisation specific access controls are particularly useful for organisations, projects or users that require complete confidentiality.

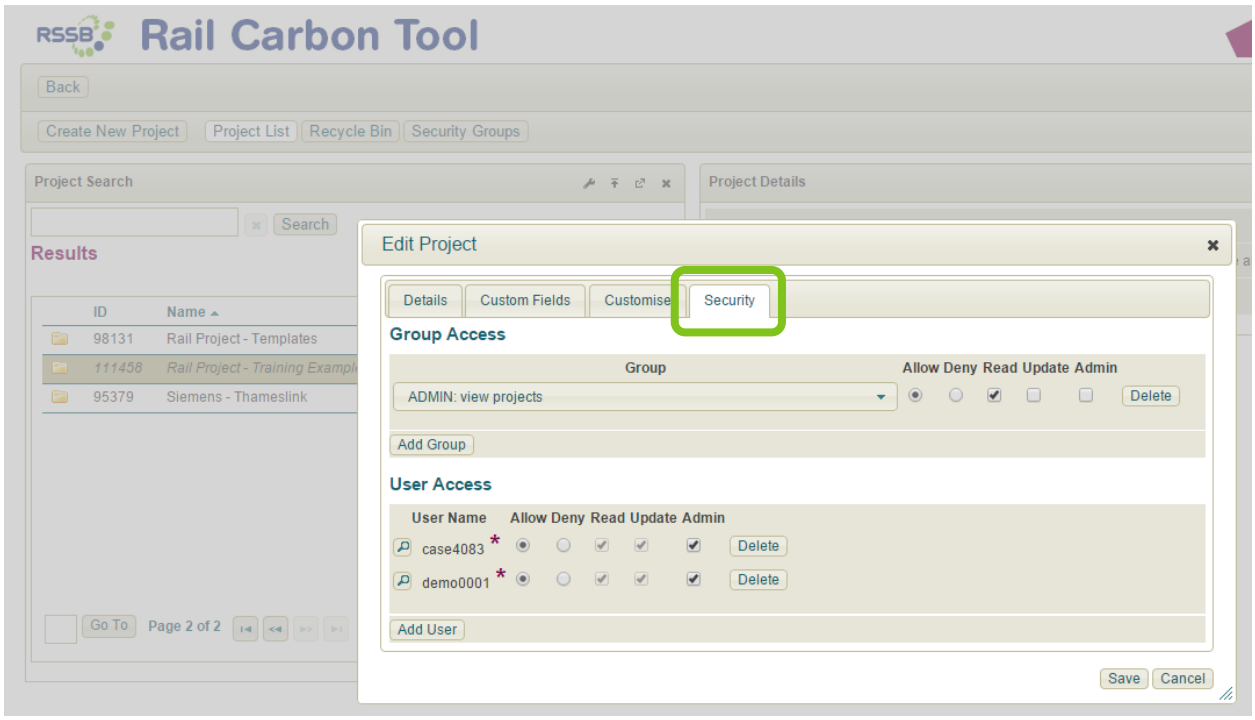
2.3.3 Security Groups

The purpose of Security Groups is to allow consistent and efficient application of the security settings for groups of records and / or multiple users. Essentially a Security Group provides an automatic access for groups of users to groups of content, and is operated by including the Group, with the required security setting on a relevant item, or items of content. Users are then added to the Group and automatically get access to the content that the Group is included on.

Security Groups can only be created by Project Managers, but then used by any user that is given the required level of control.

The settings in the following screen shot, demonstrate how the Project shown can to be viewed by all users in the ADMIN: view projects Security Group (which includes all users), and it can be edited and administered by two individual users.

Security tab on a Project, showing Group and User Access security settings:



Note: User specific settings will override group settings.

2.3.4 Data and Functionality Exclusions

Data and functionality exclusions are automatically applied by the RCT settings according to the user roles that are set on a user account, and the security settings on relevant content. The exclusions operate by either removing or disabling the relevant data access or functionality.

All of the general user roles specified above exclude rights to:

- edit library and system content covering the Carbon Factor library, the Templates library, and associated Domain Data; and
- administer user accounts.

3 Quick Start Instructions for Carbon Calculation and Analysis

This section sets out the basic rules and steps for carbon calculation and analysis in the RCT. Beyond these, calculation and analysis can be carried out in any way that a user requires or finds most suitable.

Quick start instructions for options evaluation and selection are excluded from this section as these uses of the tool require a more advanced level of user skill, which is beyond the 'the quick start' purposes of these instructions. Full details of the purpose and instructions for options evaluation and selection are provided in sections 1.2 and 10 respectively.

3.1 Rules

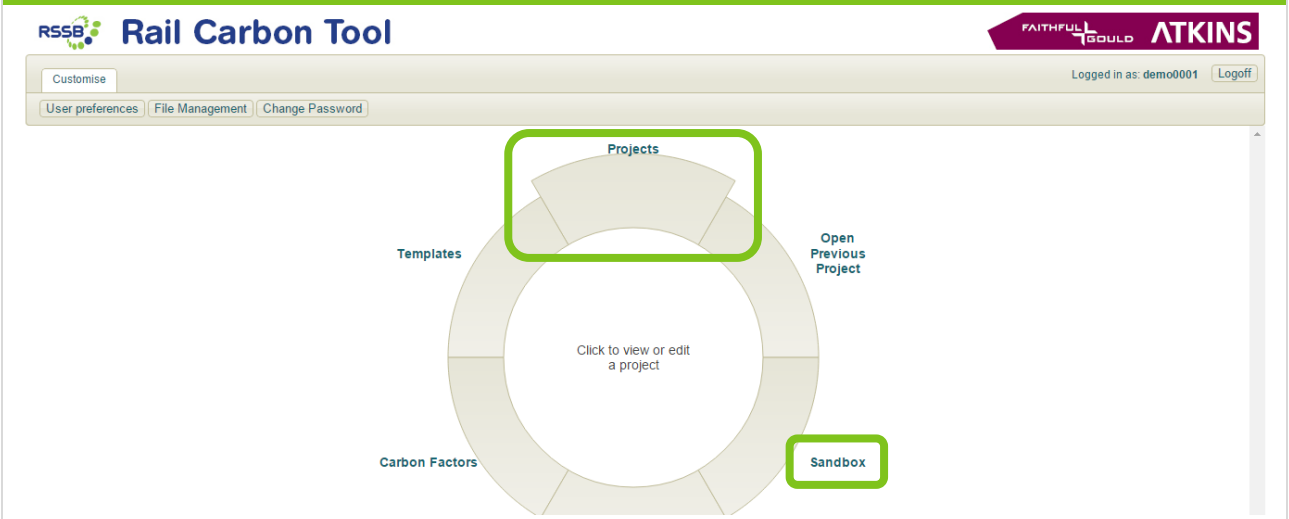
One of the key characteristics of the tool is that it has flexibility and thus can accommodate a range of different approaches to carbon calculation, analysis, and options evaluation and selection. However, there are five core carbon calculation rules that must be followed because they have been designed into the structure and functionality of the tool's software. They are:

- a Folder must be created as the first tier in a Project Tree, below the headline Folder;
- a first tier Folder, or lower, must be used to show carbon calculation totals, because the headline Folder cannot show calculation totals;
- Folders can only be placed into other Folders;
- CO_2 Packages can only be put into Folders or other CO_2 Packages; and
- Carbon Factors can only be placed into CO_2 Packages.

3.2 Basic Steps for Carbon Calculations

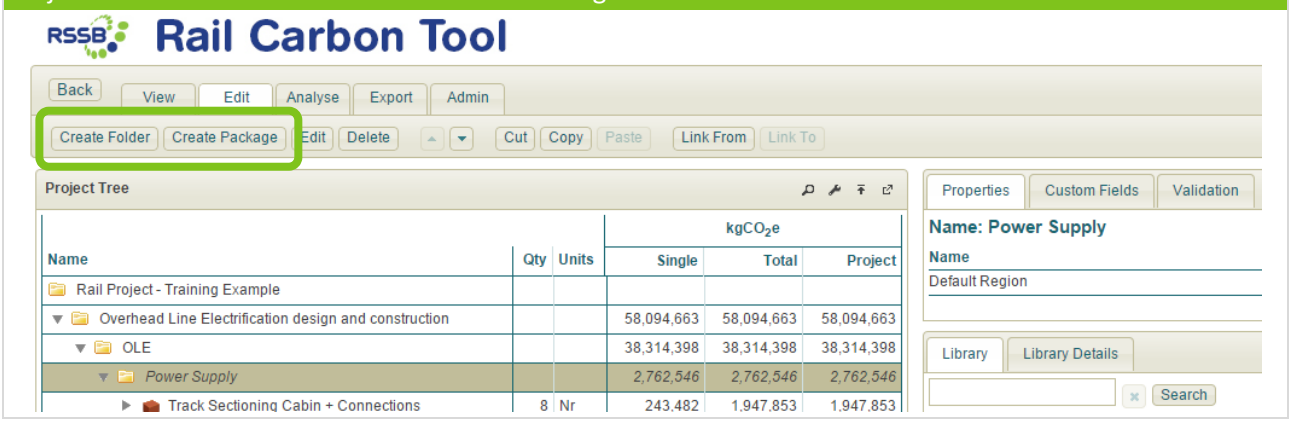
1) From the home page go to the relevant **Project Tree**; i.e. either **Create** or **Open** a **Project** in the **Project** library, or open the **Sandbox**.

Home page navigation wheel with Projects segment selected – clicking the segment goes to the Project library. Access the Sandbox in the same way via the Sandbox segment:



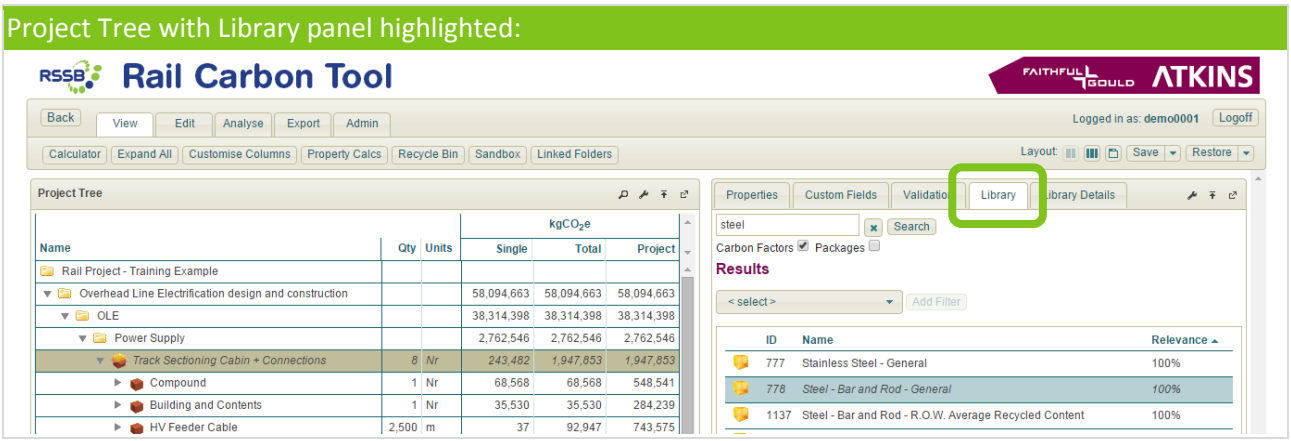
2) Once in a **Project Tree** add **Folders** and **CO_2 Packages** to define the structure for the carbon footprint that is to be calculated.

Project Tree with Create Folder and Create Package buttons:



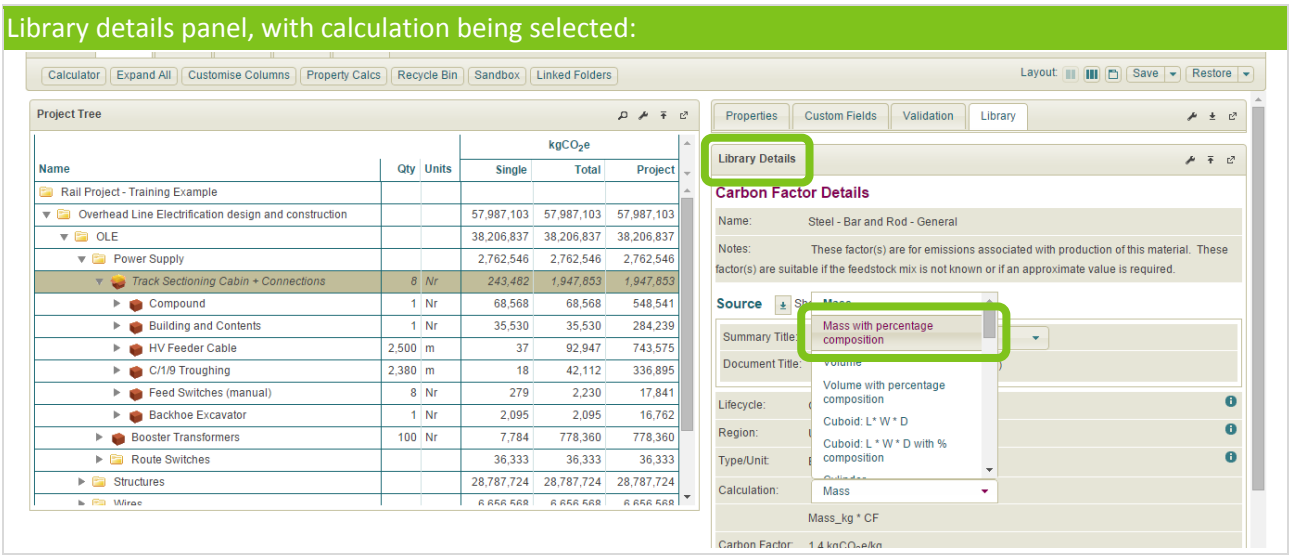
3) Go to the **Library** panel / tab adjacent to the **Project Tree** and search for and select the **Carbon Factor** or **Template CO_2 Package** to be used for the carbon calculation.

Project Tree with Library panel highlighted:



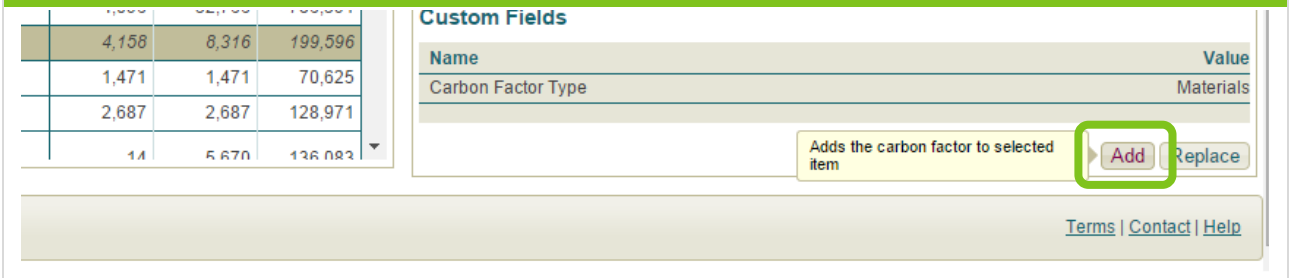
4) For Carbon Factors, go to the **Library Details** panel / tab and set the required details to be used, which can include: **Source**, **Region, Type / Unit,** and **Calculation** formula.

Library details panel, with calculation being selected:



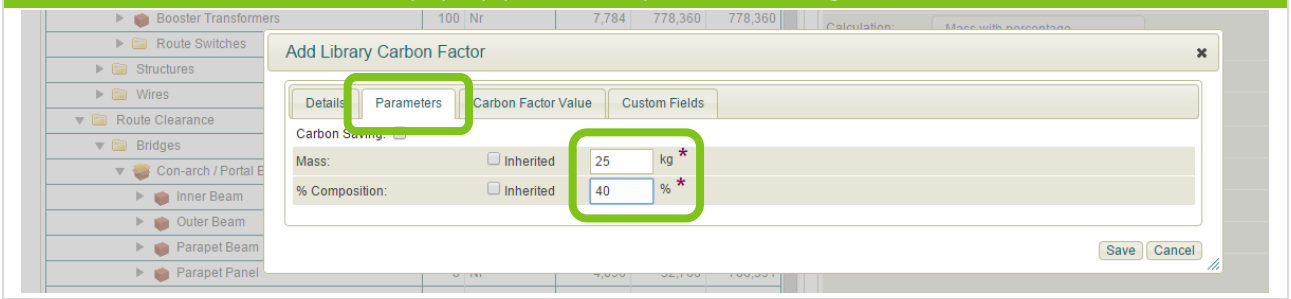
a) Select the **CO_2 Package** that the **Carbon Factor** is to be added to, and click the **Add** button at the bottom of the **Library Details** panel.

The Add button for Carbon Factors:



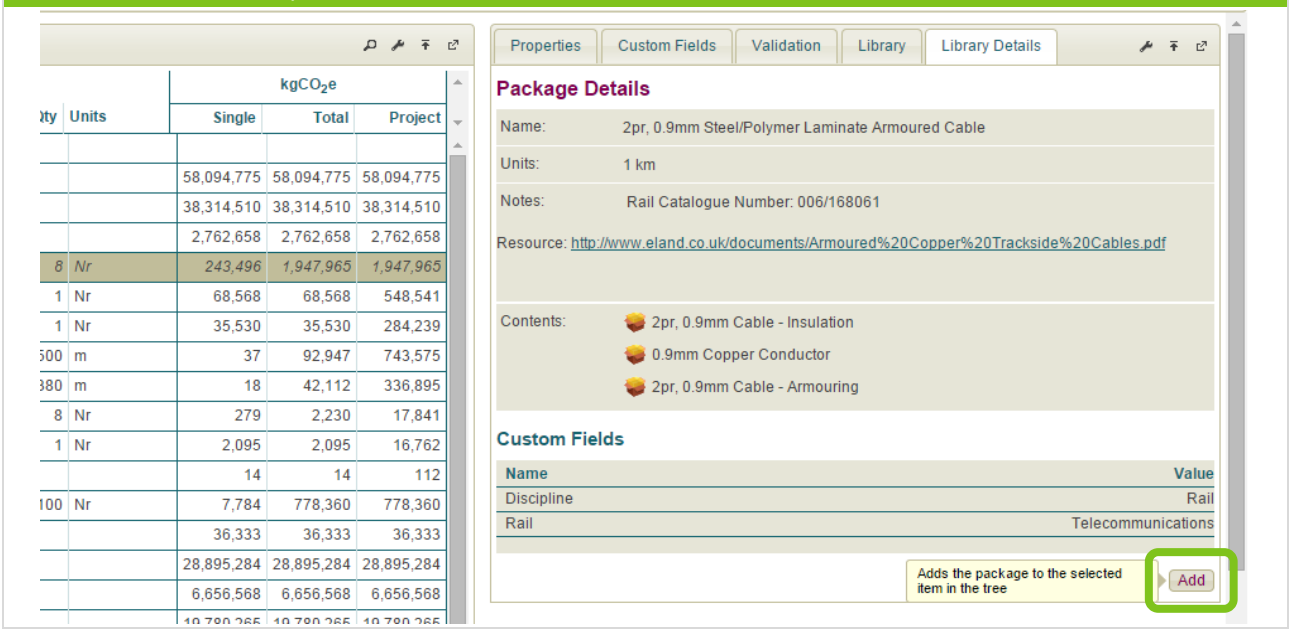
b) On the **Add Library Carbon Factor** pop-up window that opens, go to the **Parameters** tab and enter the parameter details according to the units that are shown.

Parameters tab on Carbon Factor pop-up panel, with parameter being entered:



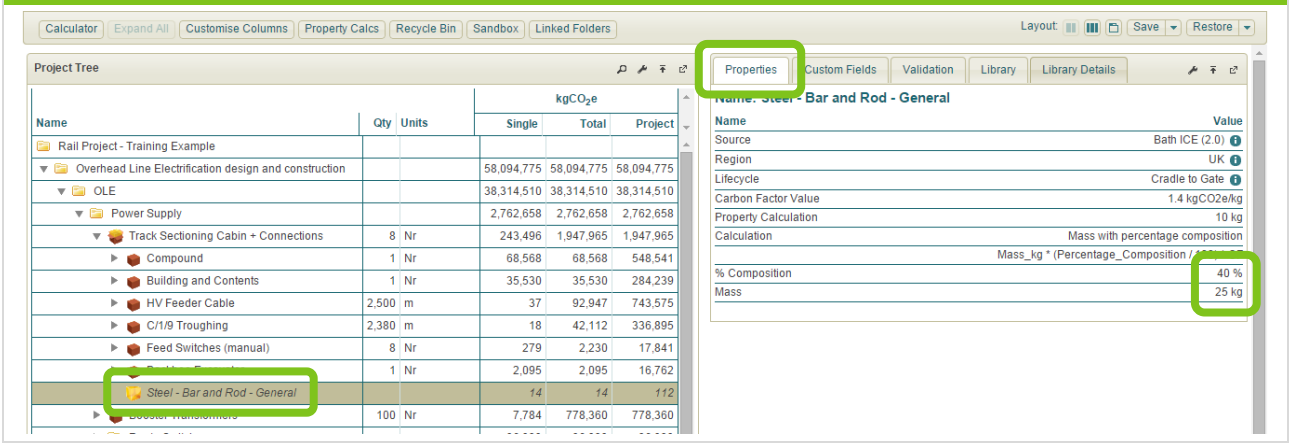
5) For templates: select the relevant **Folder** or **CO_2 Package** that the **Template CO_2 Package** is to be added to, and click the **Add** button at the bottom of the **Library Details** panel.

The Add button for templates:



6) Click the **Save** button to add the new carbon calculation / template to the **Project Tree**.

New Carbon Factor calculation and parameter details showing on the Properties tab:



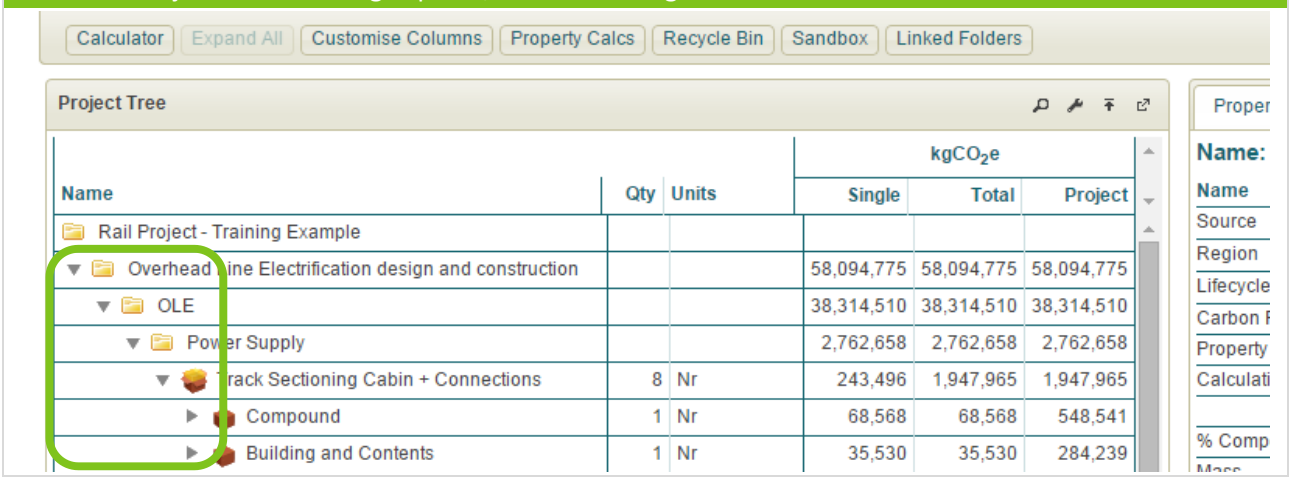
7) Repeat steps 2 – 6 as many times as required to produce a complete carbon model.

3.3 Analysis

Analyse the carbon model generated by carbon calculations, as follows:

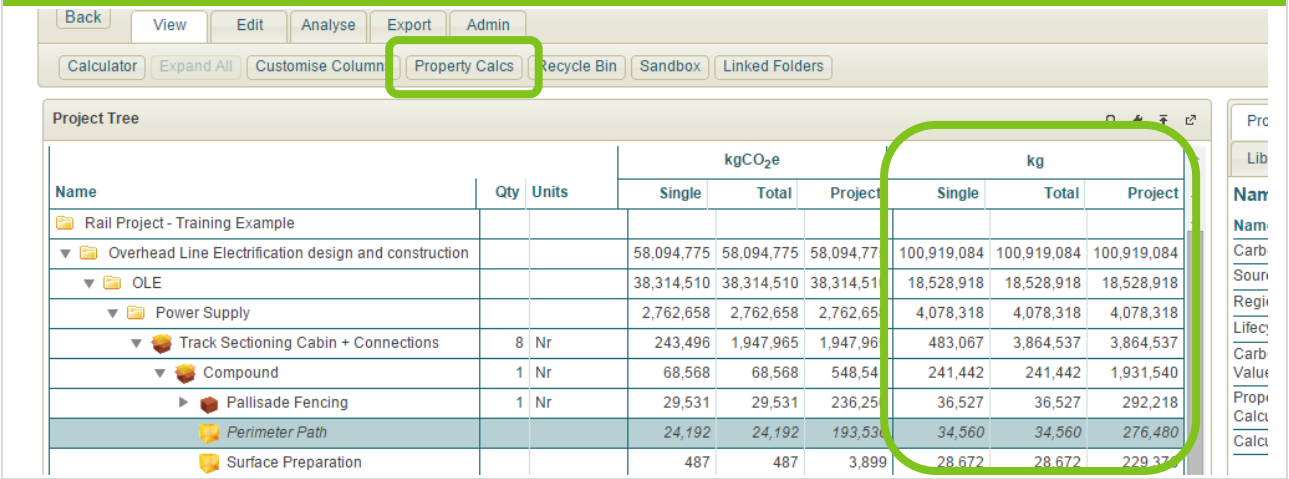
- Examine the **Project Tree** by expanding and contracting the levels using the triangle arrows on the left hand edge.

Section of Project Tree showing expand / contract triangles:



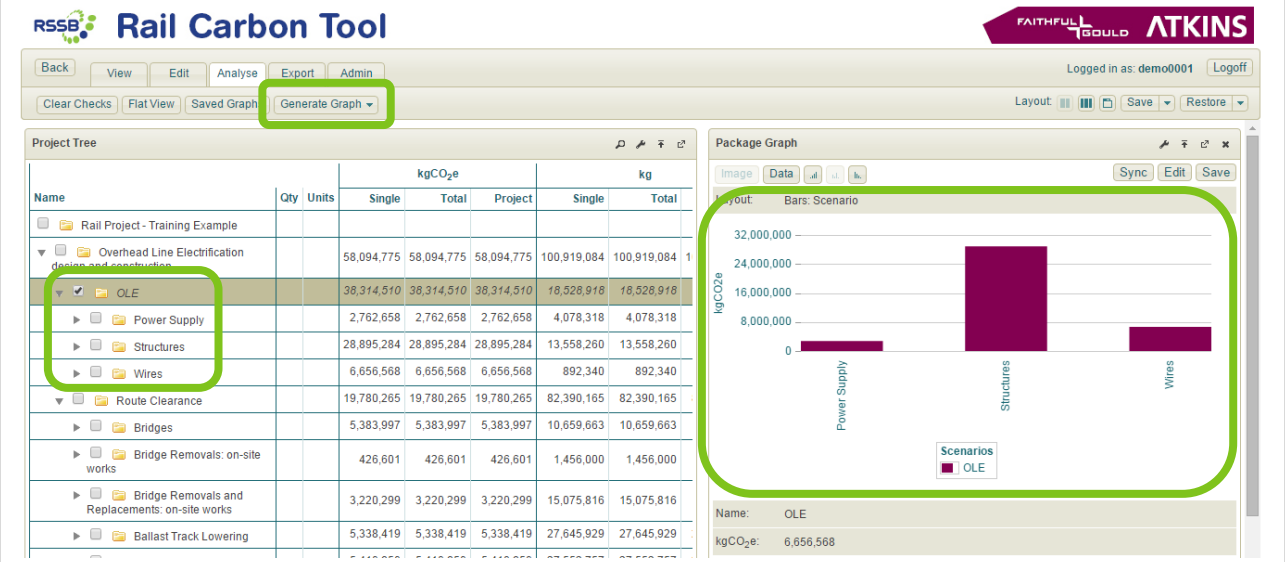
- View project data calculations (e.g. material masses) via the **Property Calcs** button.

Property Calcs button and kg Property Calcs showing in the Project Tree:



- View **Custom Fields** added to any line item in the Project Tree via the **Customise Columns** button on the **View** tab. Instruction for adding **Custom Fields** are provided in section 5.12.
- View any data in the **Project Tree**, line by line as one single table, and sort the data by the columns headings using the **Flat View** button on the **Analyse** tab. The user selects the data to view by ticking the appropriate boxes in the **Project Tree**. Note: If no boxes are ticked all of the **Project Tree** will be included.
- Create a graph for any part of the **Project Tree**, by selecting the **Analyse** tab, ticking the relevant box(s) on the left hand side of the **Project Tree**, and following the process from the **Generate Graph** button.

Project Tree with ticked line item and graph generated from its content:



4 RCT Overview

This section introduces the main user interfaces and concepts of the RCT.

4.1 Introduction to the User Interface

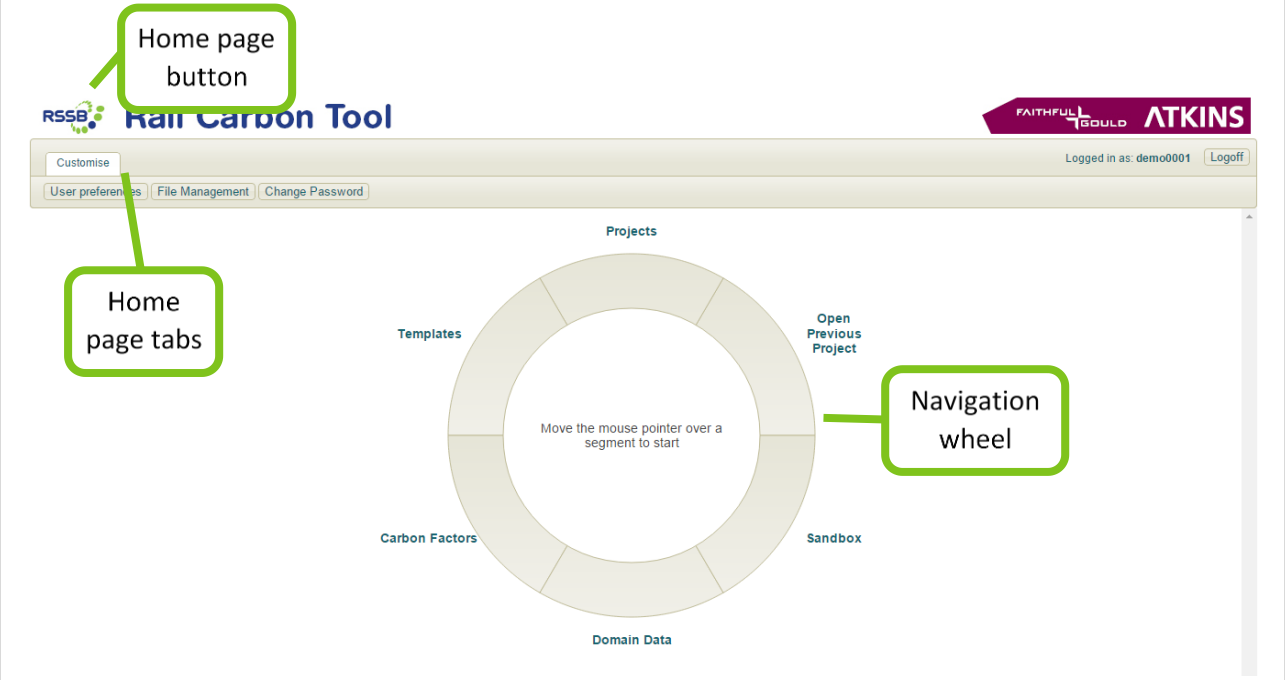
The user interface for the tool has two key parts, which are the home page and Project Trees.

4.1.1 Home Page

The home page provides access to all of the functionalities and contents that the tool contains. The key components of the home page are:

- **Home button**: this is the **RSSB** logo, and returns a user directly to the home page from wherever they are in the RCT;
- **Home page tabs** (**User Preferences**, **File Management** and **Change Password**): provides access to standard functionalities; and
- **Navigation wheel**: provides access to the various content and functionalities in the RCT.

Home page and main user interface components:

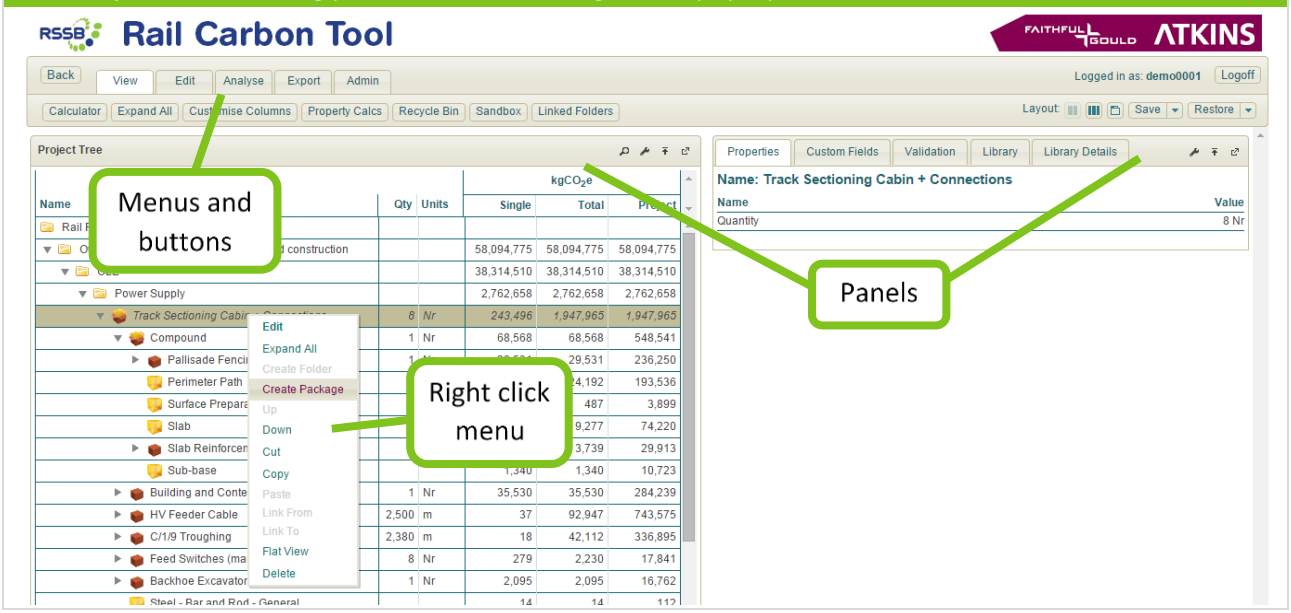


4.1.2 Project Trees

Project Trees are the interface where carbon calculations and analysis are carried out, and they have the following key features:

- the interface uses a panel and pop-up panel format;
- each item of functionality is operated using standard software menus, buttons, and double and right click functionality; and
- all of the panels can be rearranged to suit user preferences and requirements, instruction for which are provided in section 5.2.

Main Project Tree showing panels, buttons and right click pop-up menu:



4.2 Core Components and Functionality

The core components of the tool are predefined libraries of Carbon Factors and carbon calculation formulas and Project Trees, all of which provide the basis for the carbon footprint calculation and analysis, and options evaluation and selection, each of which are explained in greater detail in the following sections.

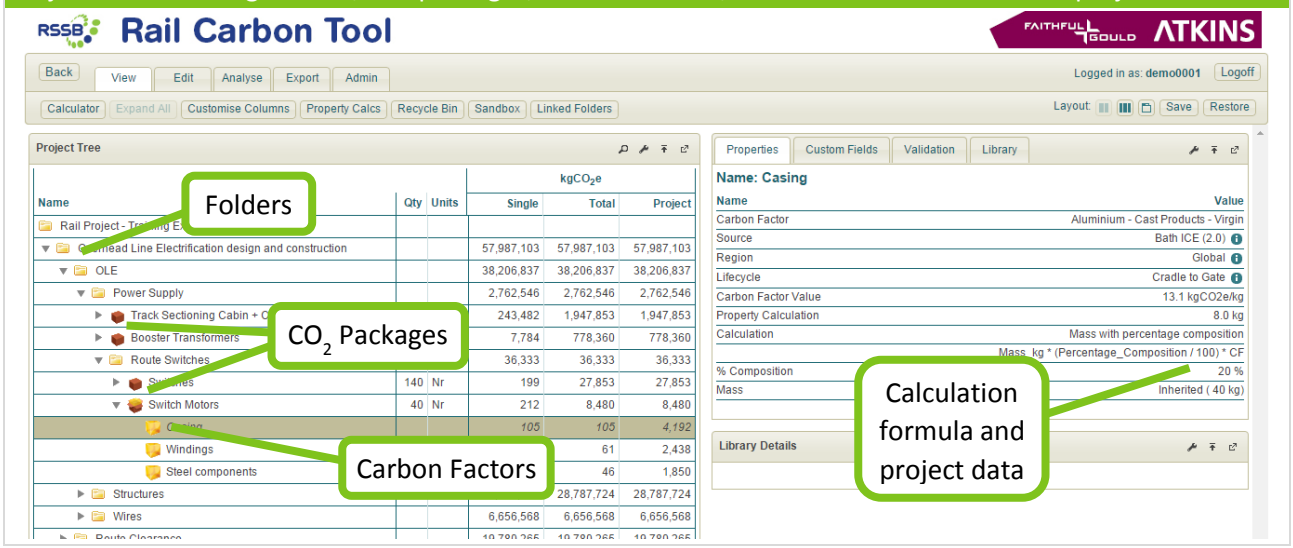
4.2.1 Carbon Footprinting

For carbon footprinting, a Project Tree provides the means for a user to structure a carbon footprint calculation using **Folders** and **CO_2 Packages**, whereby:

- Folders are used to organise the structure for the carbon calculations, in the same way that Windows Folder Explorer is used to organise files;
- CO_2 Packages are used to define scenario(s) / item(s) for which separate carbon calculations are to be carried out; and
- calculations are carried out by adding Carbon Factors and / or Template CO_2 Packages from the libraries to the user's Project Tree structure, along with the user's project data. Note: Carbon Factors can only be added to CO_2 Packages, but Template CO_2 Packages can be added to Folders and other CO_2 Packages.

The Folder and CO_2 Package structure that a user generates and the Carbon Factors that they contain creates the overall carbon model.

Project Tree showing Folders, CO_2 packages, Carbon Factors, and calculation formula and project data:



Edit functionality in the tool provides efficient and flexible options that allows users to manipulate their carbon calculations to ensure the carbon model they produce is accurate. The flexible editing options also enable the calculations to be directly updated, as required.

4.2.2 Analysis

For analysis, functionalities are provided in the Project Tree which allow users to examine their carbon model to identify its carbon hot-spots, including **Data Analysis** and **Graphing**.

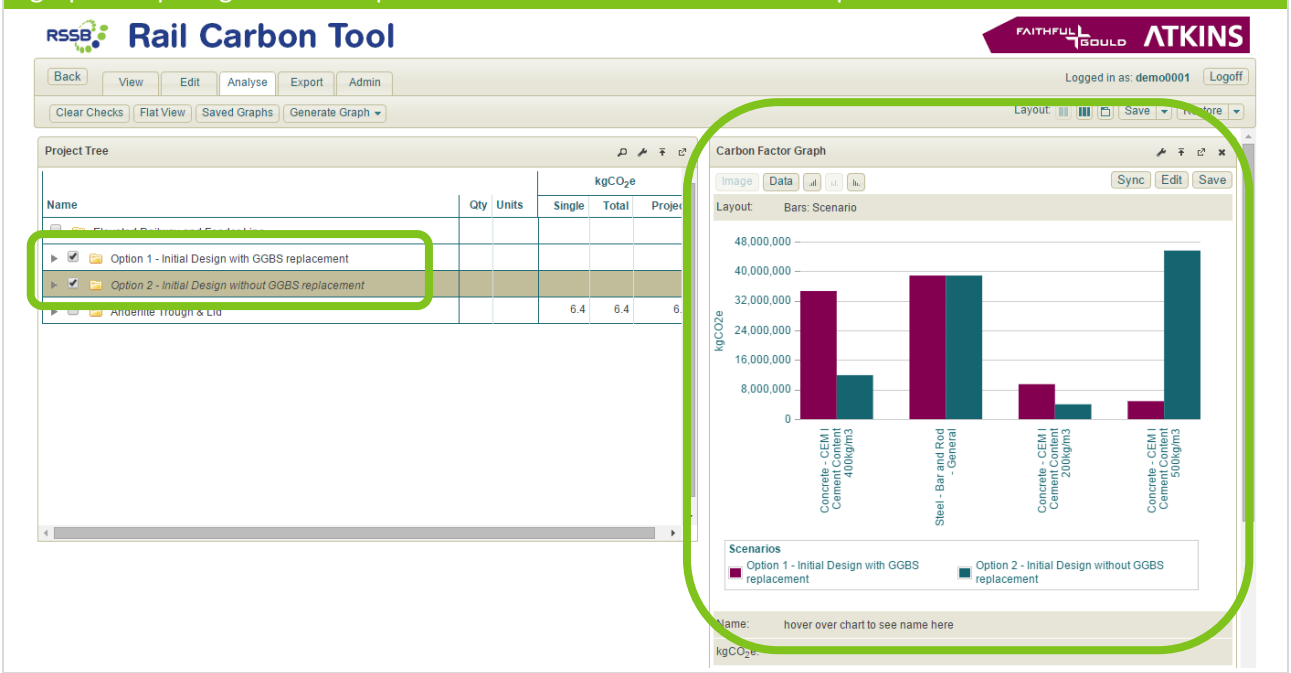
The **Data Analysis** functionalities allow users to view their carbon model in different ways including:

- expanding or collapsing the Project Tree to see different levels of data, and follow carbon calculation values through the tiers in a Project Tree to identify the carbon hot-spots;
- viewing **Project** and **Custom Field** data to aid project analysis beyond carbon performance, such as resource efficiency; and
- viewing the Project Tree in **Flat View** format, which allows all of the tiered line items in a Project Tree to be viewed as un-tiered line items.

The **Graphing** function allows users to produce graphs to analyse individual parts of a Project Tree, or compare different parts of a Project Tree. A wide range of graph formats are available for this.

Data analysis and graphing are key components of the tool, as they allow users to go beyond pure carbon calculation and really investigate carbon performance and identify lower carbon solutions.

A graph comparing the carbon performance of materials within two options:



4.2.3 Additional Supporting Functionalities

In addition to the RCT's calculation and analysis functionalities a range of other supporting functions are available which enable users to generate and manage their carbon calculations with the best content and securely. Such functions include:

- **file uploading**: this allows users to upload files which can then be attached to any line item in a Project Tree, to support the calculations, thereby enhancing the overall technical clarity of the carbon model;
- **data sharing**: this allows users to publish best practice CO_2 Packages from their Project Trees as templates for use by others, and to copy data from one Project Tree to another.
- **data exporting and reporting**: this allows users to export data from the tool for use elsewhere, such as for bespoke analysis with other datasets outside of the RCT and / or content to support written reports.
- **security controls on key records and data sets**: this ensures that users can access the functionality and content that they require, and they can share or protect their own data.

4.2.4 Options Evaluation and Selection

There is no specific functionality for options evaluation and selection. Instead, as outlined in section 1.2, it is an approach and / or a series of techniques from which real-world carbon reduction solutions are devised using a combination of the tool's clear and flexible structure, it calculation and analysis functionalities, plus user and project team inventiveness to fully explore carbon issues and carbon reduction options.

Details of the core process for options evaluation and selection is provided in Section 10.

5 How to use Generic Functions

The RCT has been designed around a series of generic functions that are used throughout the tool, as listed below. This section provides instructions on how to operate these functions, which are as follows:

- Home page navigation;
- Panel functions;
- User preferences;
- On-screen help;
- Right click and double click controls;
- Search function;
- Create new, edit, and save functions;
- Magnifying glass function;
- Cancelling a pop-up panel record;
- Mandatory fields;
- File upload and use;
- Custom fields;
- Publish Package;
- Sandbox (data transfer); and
- Passwords.

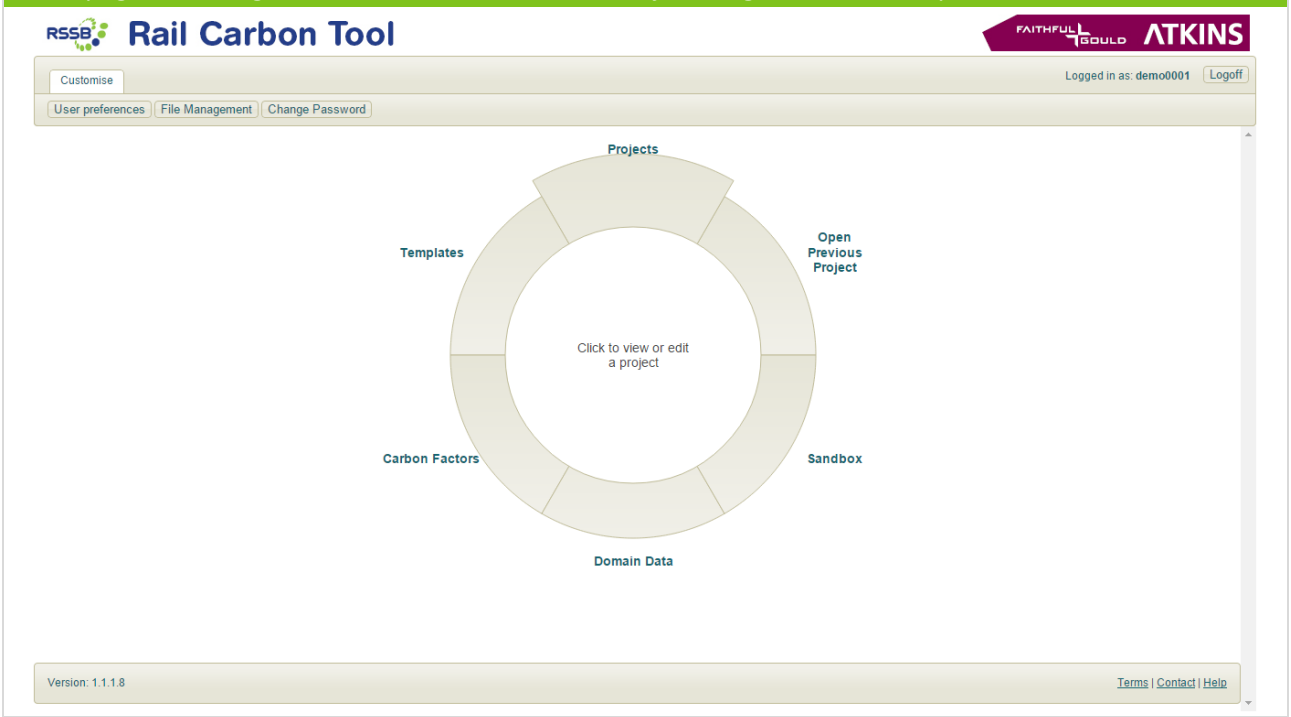
5.1 Home Page Navigation

The home page is the portal used to directly access the six core parts of the RCT. This is done by moving the cursor and single clicking on to the relevant grey segment of the navigation wheel.

The six core parts of the RCT accessed from the home page are as follows:

- **Projects**: this takes the user to the Project library. From here the user can access their library of carbon footprint calculations or start a new carbon footprint calculation, depending on their access level;
- **Open Previous Project**: this takes the user directly to the last Project they opened.
- **Sandbox**: this takes the user directly to their personal carbon calculation area. From here the user can test and experiment with carbon calculations. Any calculations a user creates in their Sandbox can be directly transferred to a Project. This is done by accessing their Sandbox via the Sandbox option when in a Project;
- **Domain Data**: this takes the user to libraries of source information for Carbon Factors and Custom Fields, both of which can be used to specify project specific information for their carbon calculations;
- **Carbon Factors**: this takes the user to the Carbon Factor library. From here the user can view the full data for all of the available Carbon Factors; and
- **Templates**: takes the user to the Template library, where they can view templates of carbon footprints for various items, as Template CO_2 Packages.

Home page and navigation wheel with cursor over Projects segment, which expands it:



The buttons on the top left of the home page allow the user to do the following:

- **User Preferences**: set options for the region used in carbon calculations, the default is 'global' as this provides the most flexibility to use the tool, and this is appropriate for current uses of the RCT;
- **File Management**: upload files and pictures to support their carbon calculations; and
- **Change Password**: change their login password. Users can not change their username.

5.2 Panel Functions

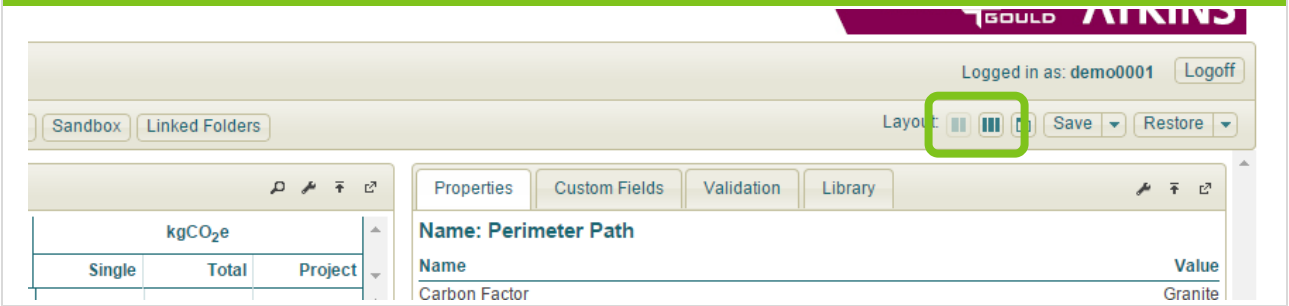
Beyond the home page, the RCT is mainly made up of moveable panels and or pop-up panels. These allow users to structure their screen layout to suit their specific requirements. The key functions of panels are:

- panels can be set in two or three columns;
- panels can be resized (e.g. up to full-screen);
- separate panels can be relocated, including being placed on top of each other as tabs in a single panel; and
- layouts can be saved.

5.2.1 Columns for Panels

Panels are set into either a two or three columns format using the **Layout** buttons. Simply click either the two or three column layout buttons to set the required layout.

Column layout buttons, currently set as two columns, with the option for three columns showing:

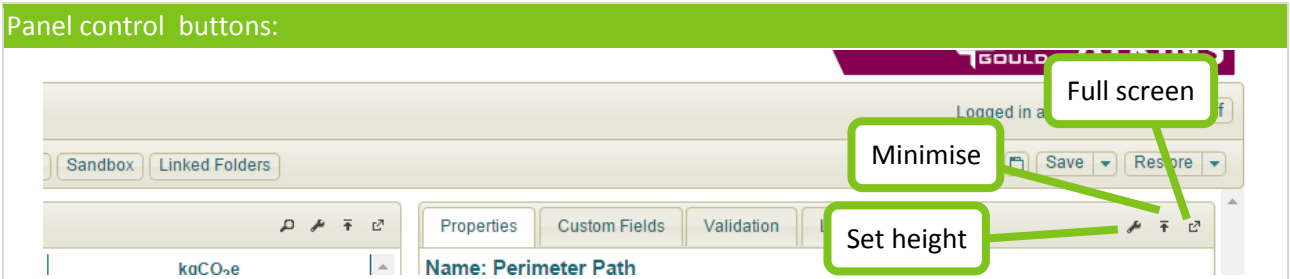


5.2.2 Change Panel Size

The size of any panel can be changed using the various control buttons in the top right of each panel, as follows:

- set height using the **Spanner** button (left), and click one of the radio buttons provided (re-clicking removes the radio buttons);
- minimise the panel to show only the heading bar using the **Vertical Arrow** button (middle); and
- go to full screen using the **Angled Arrow** button (right).

Panel control buttons:

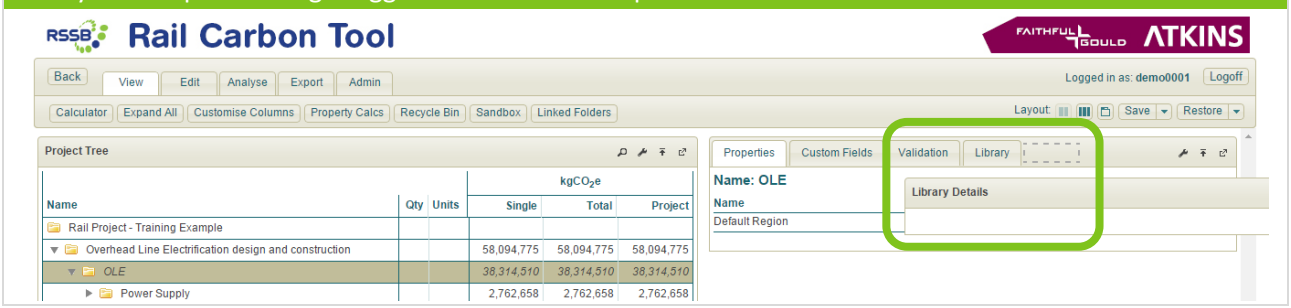


In addition to the control buttons each panel can be resized by dragging and dropping the sides or the bottom of the panel, when the cursor is on the side or bottom of a panel and shows as a double ended arrow.

5.2.3 Relocate Panels

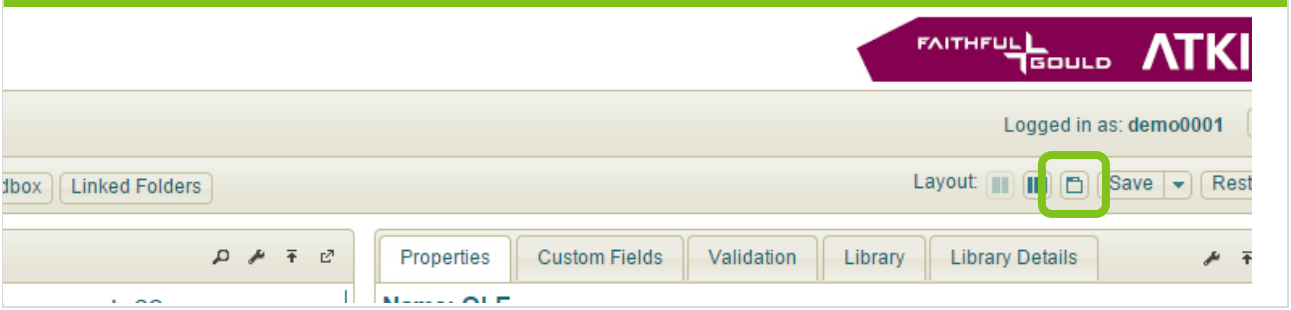
Panels can be relocated, by dragging and dropping the panel's header bar. This includes being combined into tabbed panels.

Library Details panel being dragged into a combined panel:



Where a combined tab is not available it can be created using the **Tab Panel** button.

Tab panel button:



5.3 User Preferences

User preferences allow a user to set a default 'Region' and the option for a default or project specific panel layout for each Project Tree, as explained below.

5.3.1 Default Region

The default region sets the region used on a new Project and defines the Carbon Factor values used, if applicable. However, the region used can be edited for each Project Tree, or each individual carbon calculation as required, regardless of the default setting.

To define a default region:

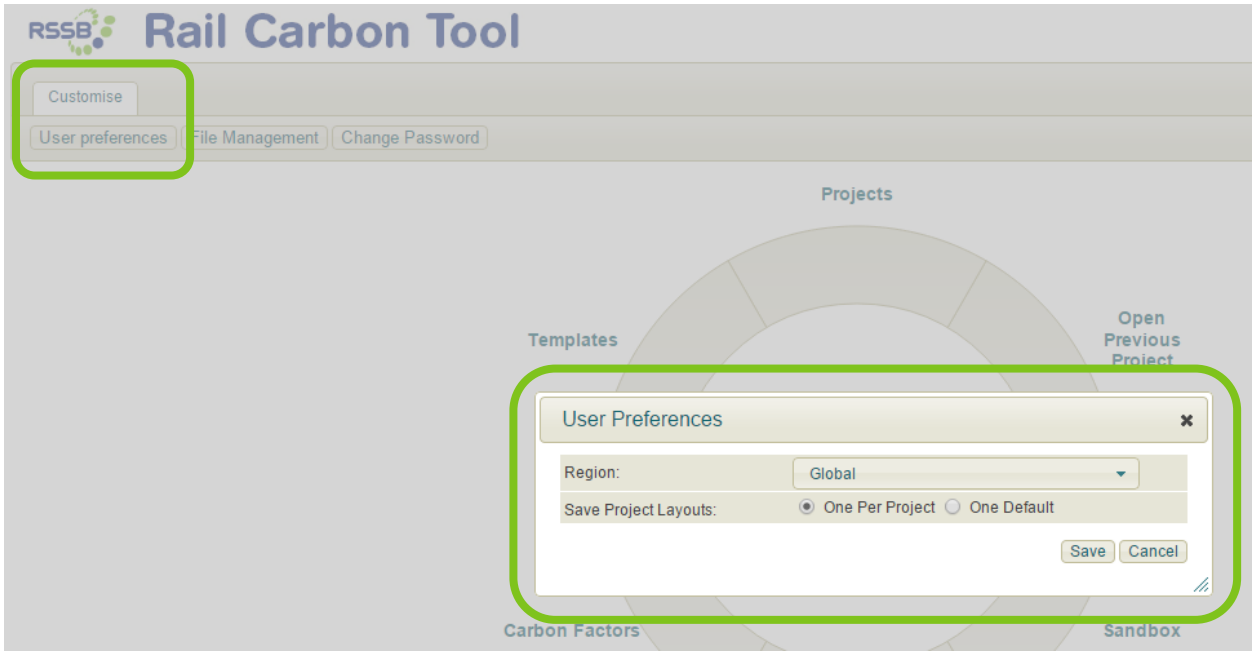
1) go to the **Customise** tab on the home page;

2) click the **User Preferences** button;

3) in the pop-up window select the required region from the dropdown menu; and

4) click **Save** to finalise the settings.

Customise tab, User preference button, User Preferences pop-up panel:



Note: Global is the default setting which is appropriate for all UK rail projects.

5.3.2 Default or Project Specific Panel Layouts

The default or project specific panel layout options set whether a user has the same panel layout for all Project Trees, or individual layouts for each separate Project Tree.

The option for default or project specific panel layouts is set in **User Preferences**. To set this option:

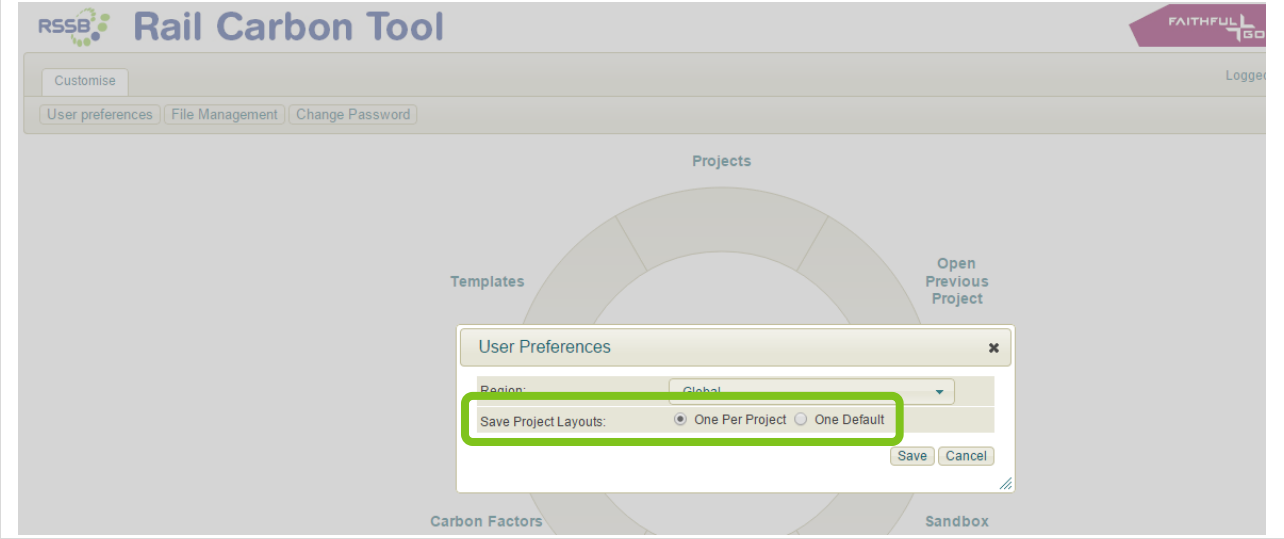
1) go to the **Customise** tab on the home page tab;

2) click the **User Preferences** button;

3) tick the **Save Projects Layouts** radio button as required; and

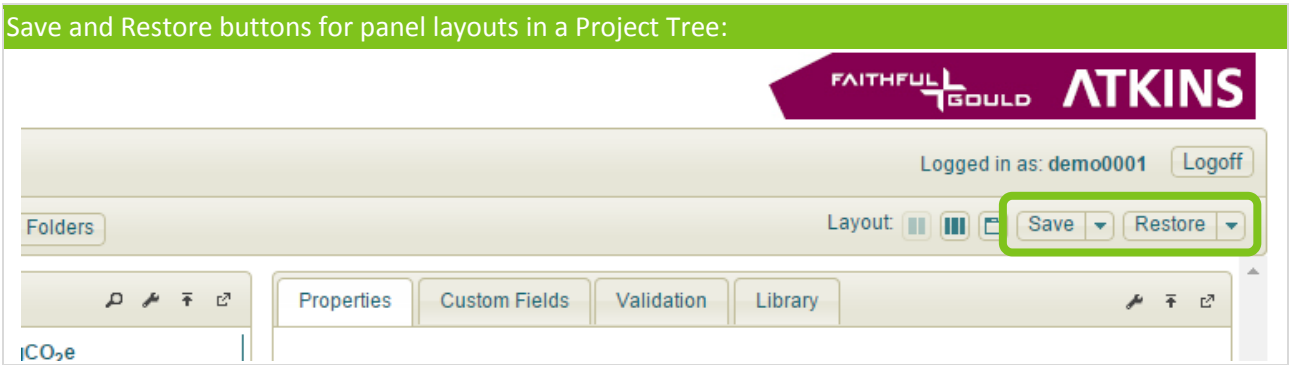
4) click **Save** to set the panel layout preference.

Save Project Layouts radio buttons:



In a Project Tree, any panel layout that is created can be saved using the **Save** button, and a user's default panel layout can be restored using the **Restore** button, if any layout changes are made. Where a user has specified to have a specific layout for each Project Trees, they can save a new layout either for the specific Project Tree, or as the default layout to be used for all Project Trees.

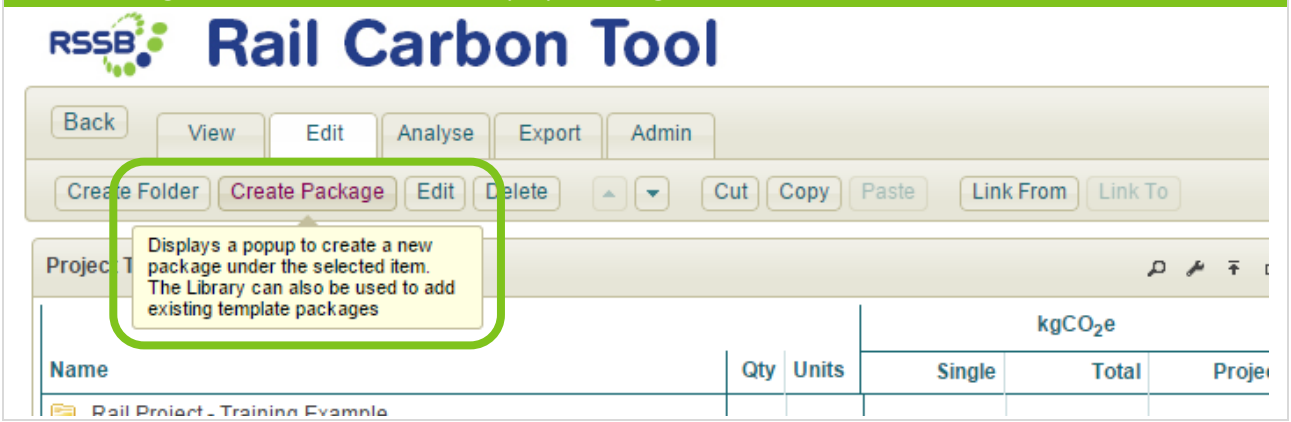
Save and Restore buttons for panel layouts in a Project Tree:



5.4 On-Screen Help

On-screen help tips are provided on all major buttons to assist users with understanding the function each button provides. To view the tips place the cursor over the relevant button.

Create Package button with on-screen help tip showing:



5.5 Right Click and Double Click Controls

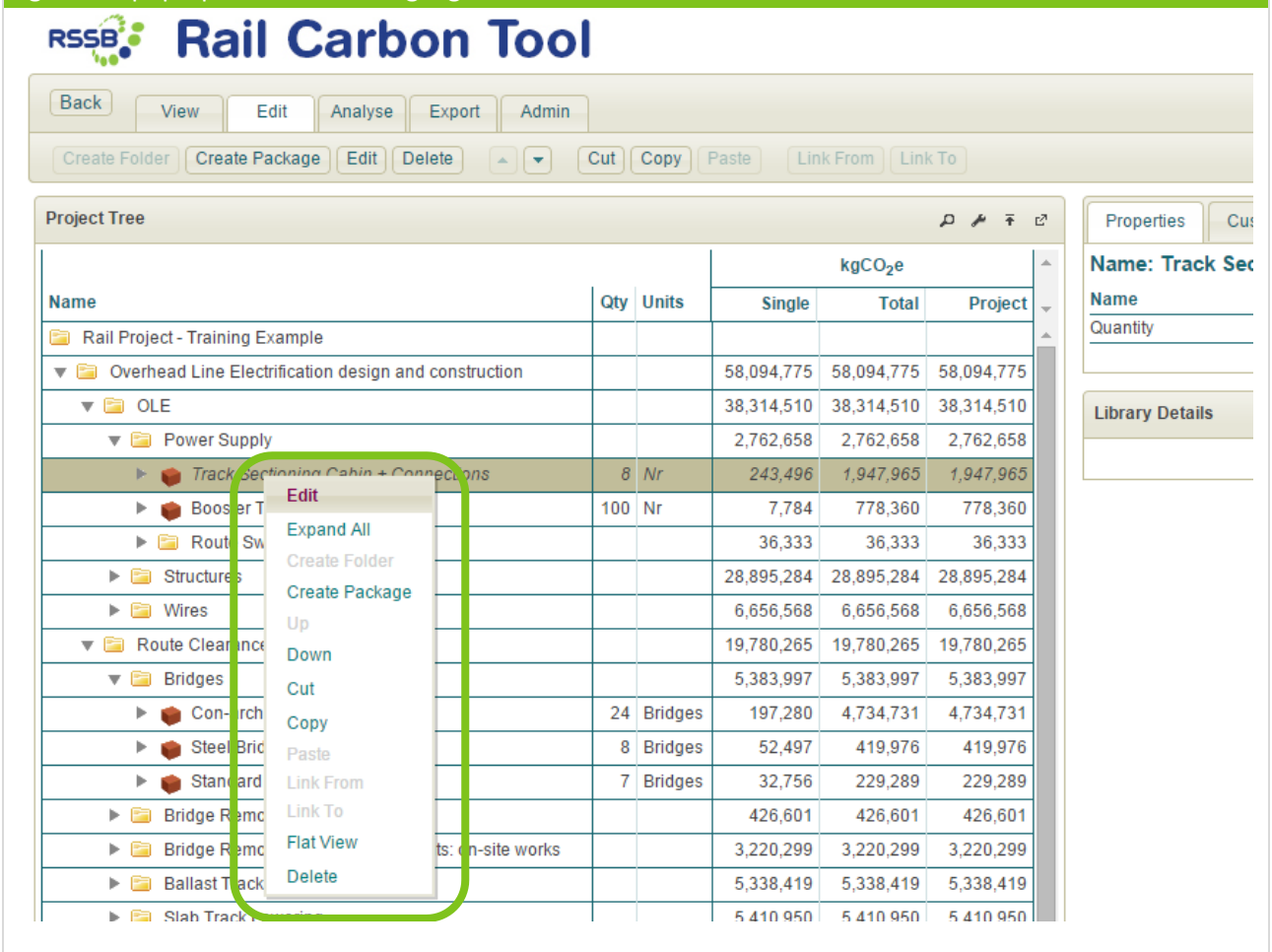
Some of the functions available on Project Tree tabs and buttons are also available on a right click menu for the Project Tree line items, as follows:.

1) to open the right-click menu, **right click** on the **line item** in the Project Tree that the users wants to apply the 'right-click menu' function to; and

2) select the required option.

In addition, any line item in a Project Tree can be opened by double clicking. To open a Project Tree line item with double click, **point the cursor** at the **relevant item** and **double click**.

Right click pop-up menu for the highlighted line item:



5.6 Search Function

A standard search function is operated throughout the tool using the **Search** buttons.

In most cases, where the search function occurs it initially shows as a blank panel layout, which is the default system setting. Where this is the case click the **Search** button to show all available records in a **Results** list. Note: There are currently no options in the tool to change the system settings for how search functions are presented.

For all searches, at any point a search term can be entered into the text box next to the **Search** button, and the **Search** button clicked to search the specific term only. Filters can also be applied, where they occur. If this function is available it will be presented below the search button.

Selecting any record that is presented from a search will result in its details being shown in an adjacent panel.

Where there are multiple pages of records shown, the page arrows can be used to navigate through them. To navigate quickly to a specific page, the **Go To** function can be used at the bottom left of the search page. To use this, enter the required page number and click the **Go To** button.

In summary the search processes are:

- click the **Search** button to view all records; or
- enter a search term in the blank text box to the left of the **Search** button and then click the **Search** button.

In summary the filter process is as follows:

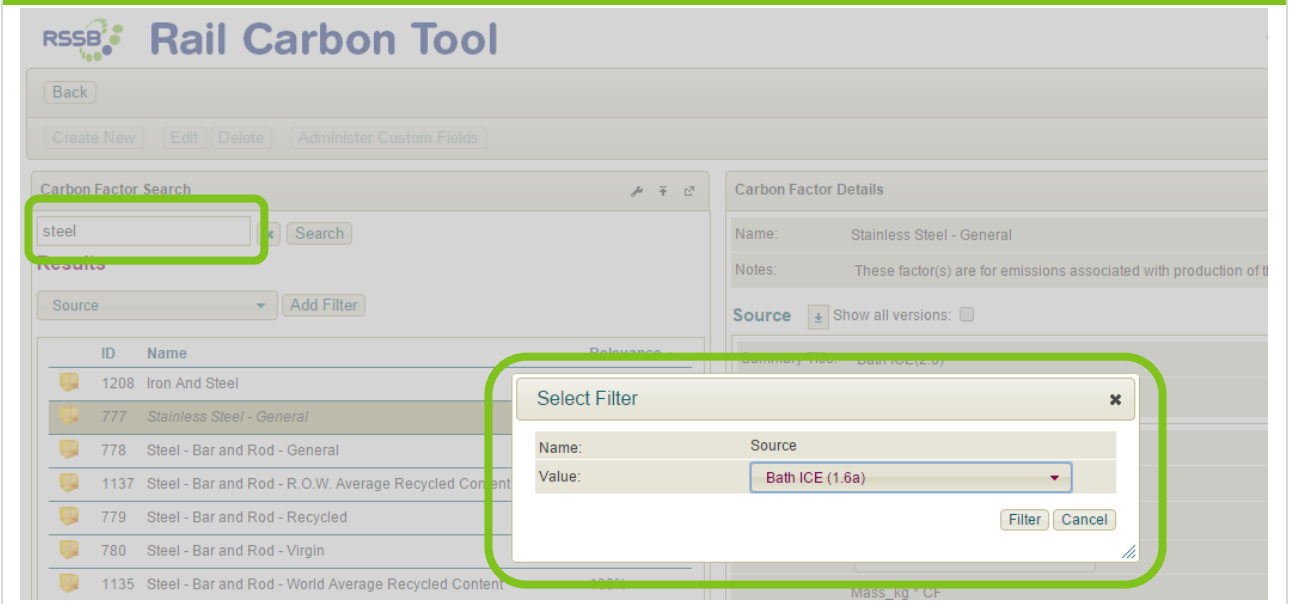
1) click the **< select >** filter menu, and select one of the drop-down options that are provided;

2) click the **Add Filter** button and follow the drop-down menu and prompts in the pop-up window; and

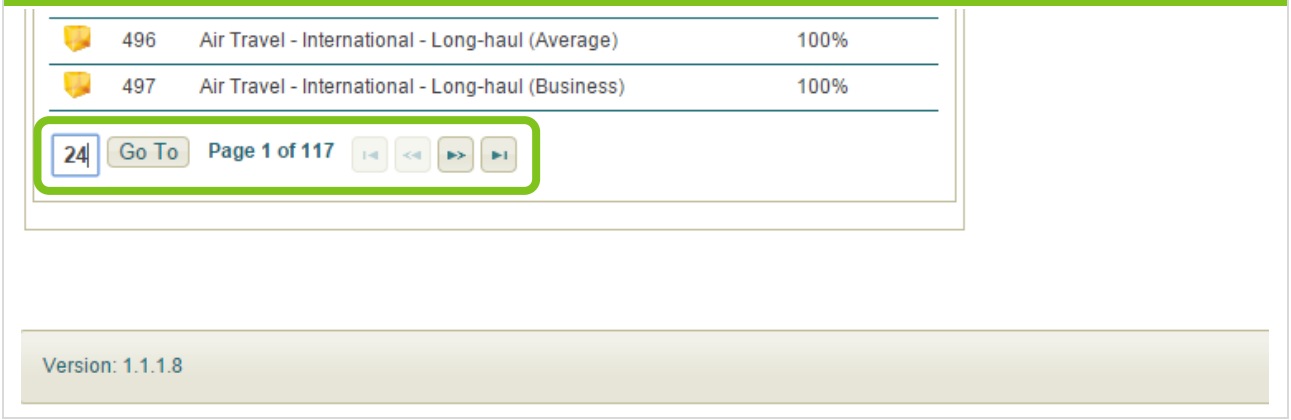
3) click the **Filter** button to apply the selected filter.

Any search or filter can be cancelled using the **X** buttons next to the relevant **Search** or **<Filter>** buttons.

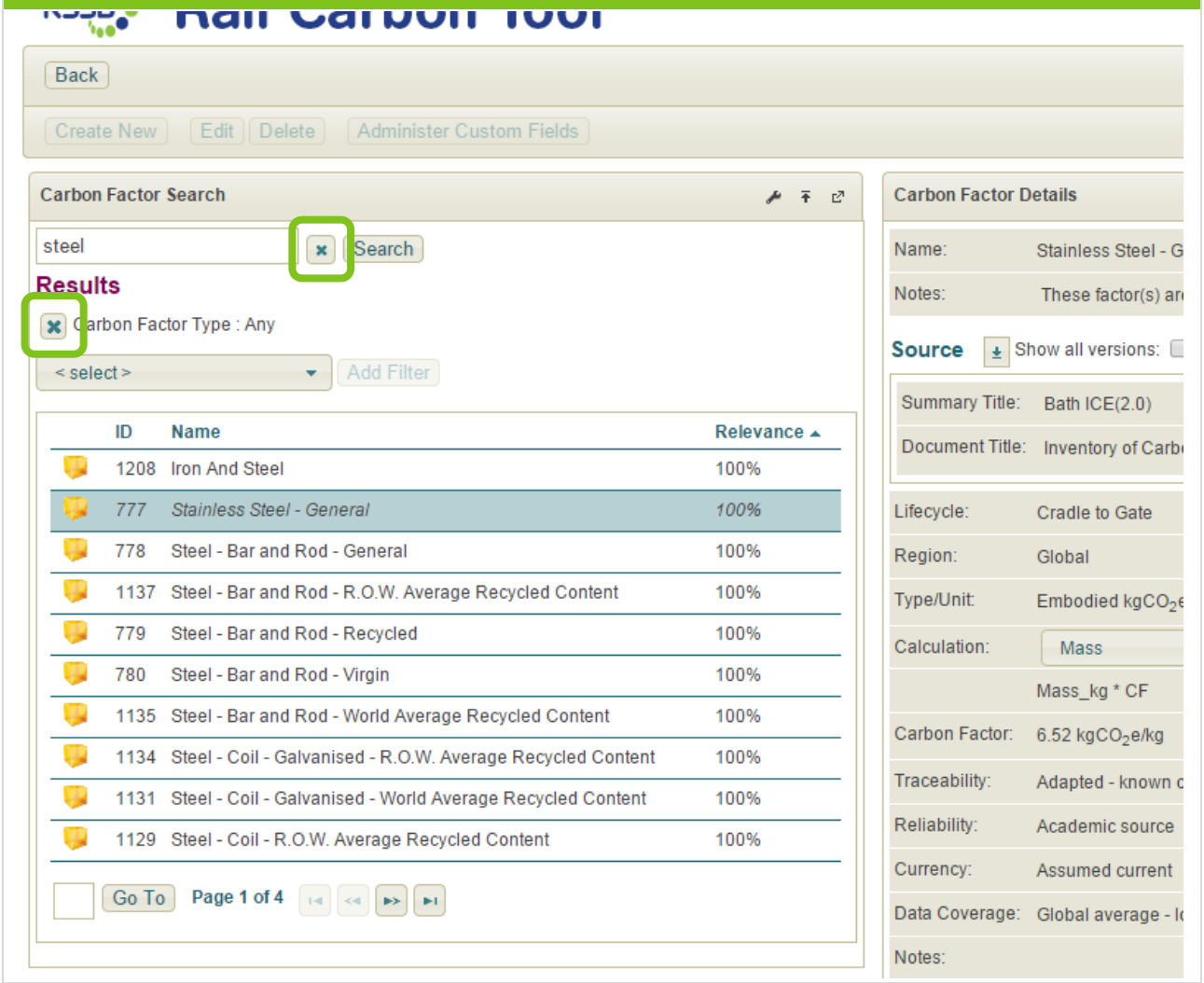
Results generated by a search for steel, with the Source filter being applied:



Go To button, and arrows to navigate through pages:



Cancel buttons for Search and Add Filter:

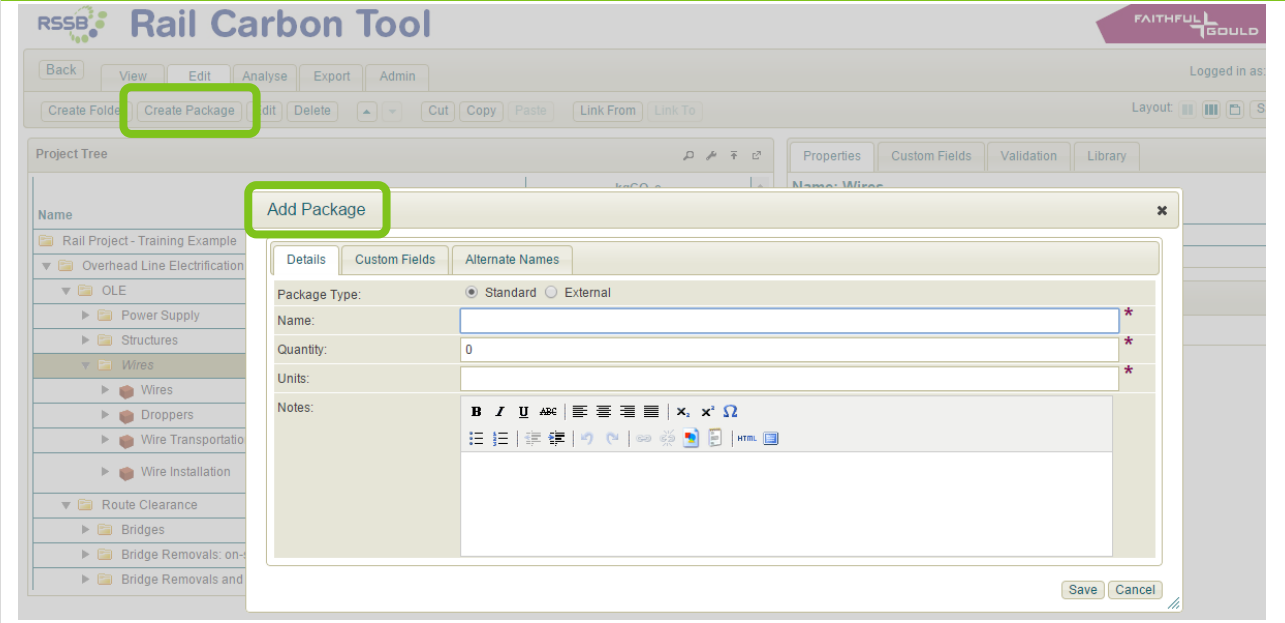


5.7 Create, New, Edit, and Save Functions

Create, **New**, **Edit**, and **Save** are key functions in the RCT as they provide the fundamental means for carrying out carbon calculations. All four functions are operated using standard buttons and standard pop-up panels, as follows:

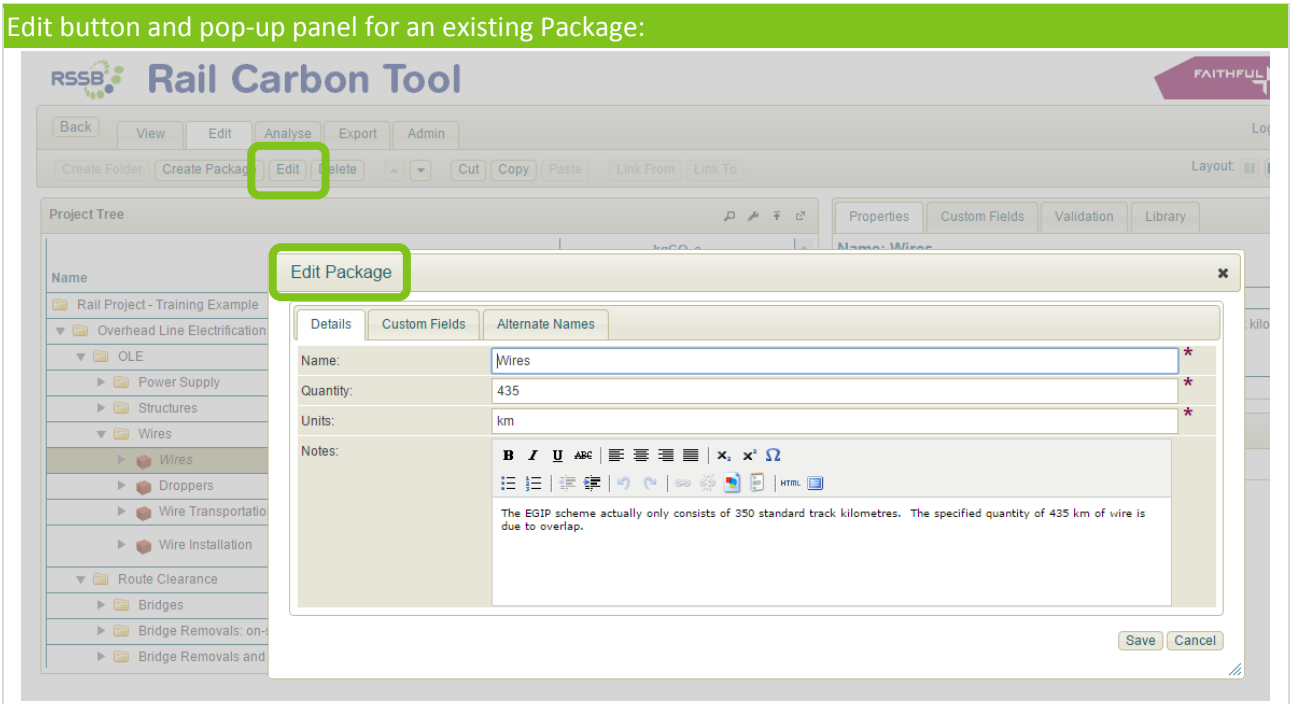
1) click the **Create** or **New** button to open a blank record.

Create button and blank record for a new CO_2 Package:



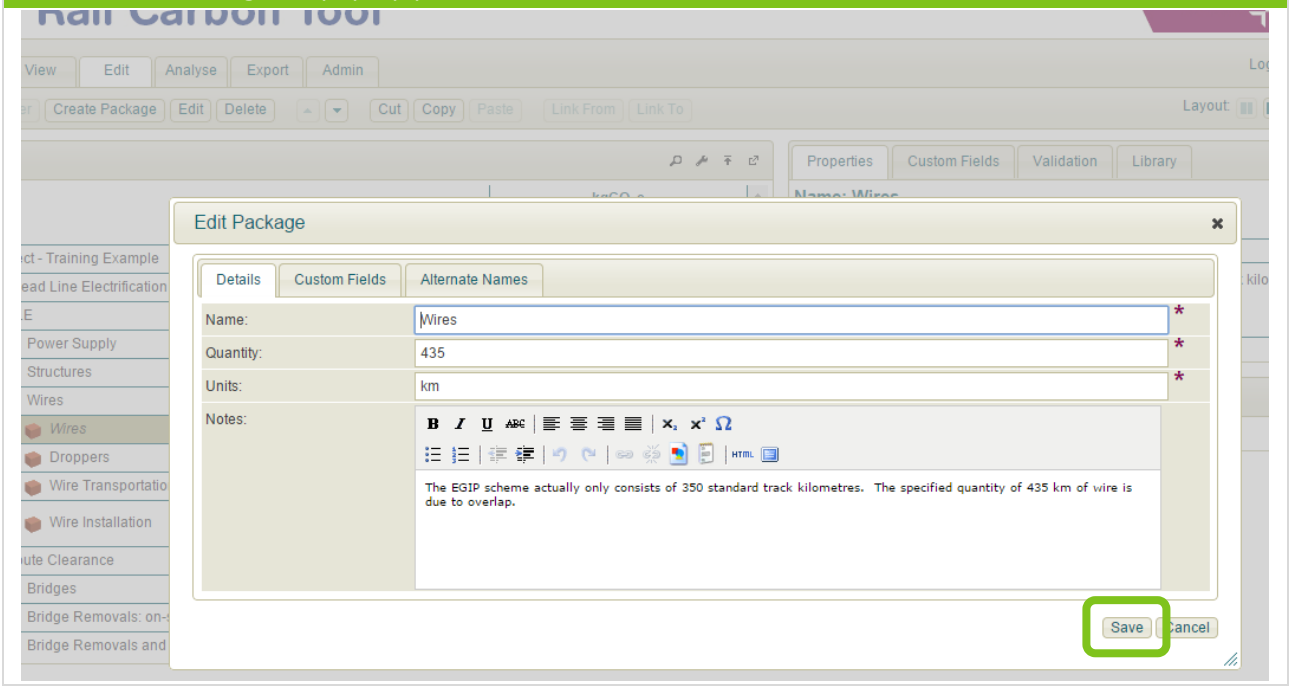
2) click the **Edit** button to open an existing version of a record.

Edit button and pop-up panel for an existing Package:



3) click the **Save** button to either save new content, or to save any edits made to existing content.

Save button showing on a pop-up panel:



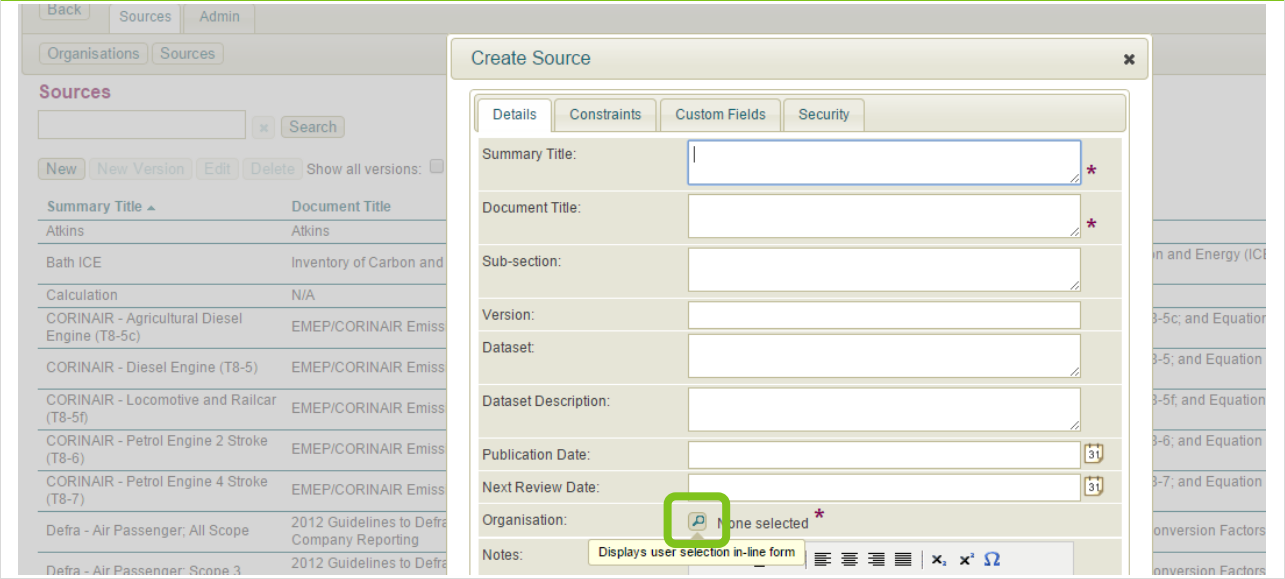
5.8 Magnifying Glass Function

Some records require linking to other records, such as organisation links on user accounts, and user links on Security tabs. Where these occur a standard linking function is provided for selecting the relevant linked record, which is shown as a **Magnifying Glass** button against the applicable field heading.

To use the magnifying glass function:

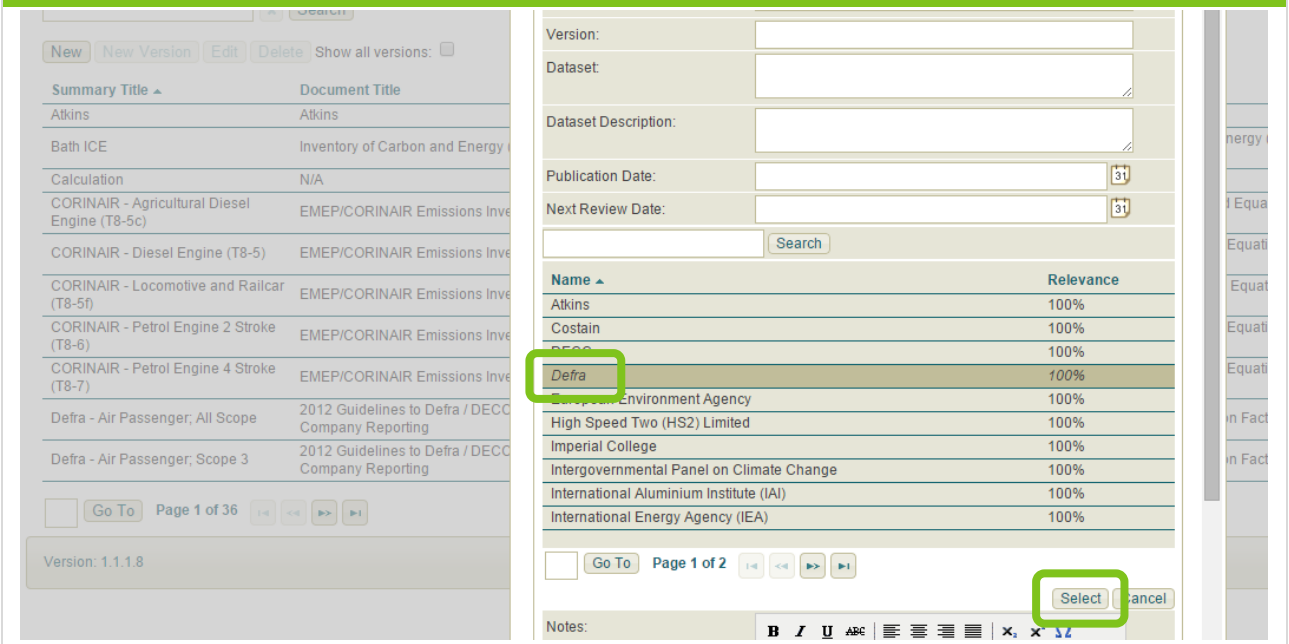
1) click the **Magnifying Glass** and use the standard search function to find the required record; and

Magnifying glass function on Create Source pop-up panel:



2) once the required record is found, to assign it click to select it and then click the **Select** button, or double click it.

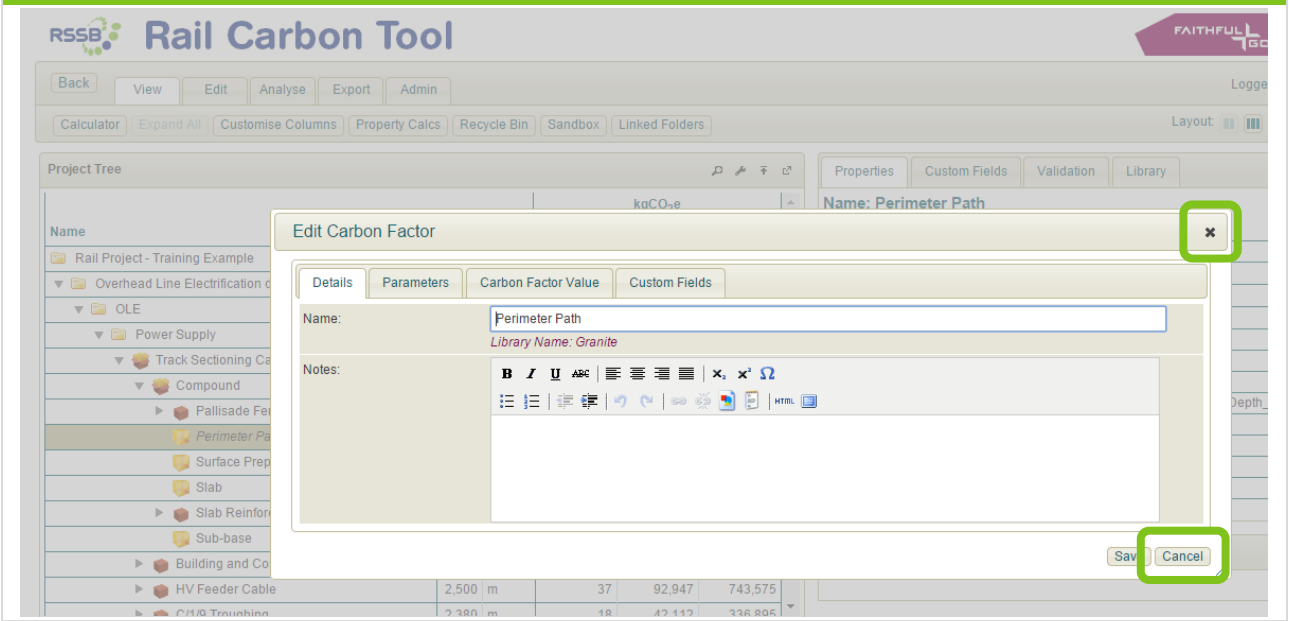
Selected record and Select button:



5.9 Cancelling a Pop-up Panel Record

Any pop-up record can be cancelled at any time by clicking the **Cancel** buttons, which are the **Cancel** button or the **X** in the top right of the relevant pop-up.

X and Cancel buttons on a Carbon Factor pop-up panel:

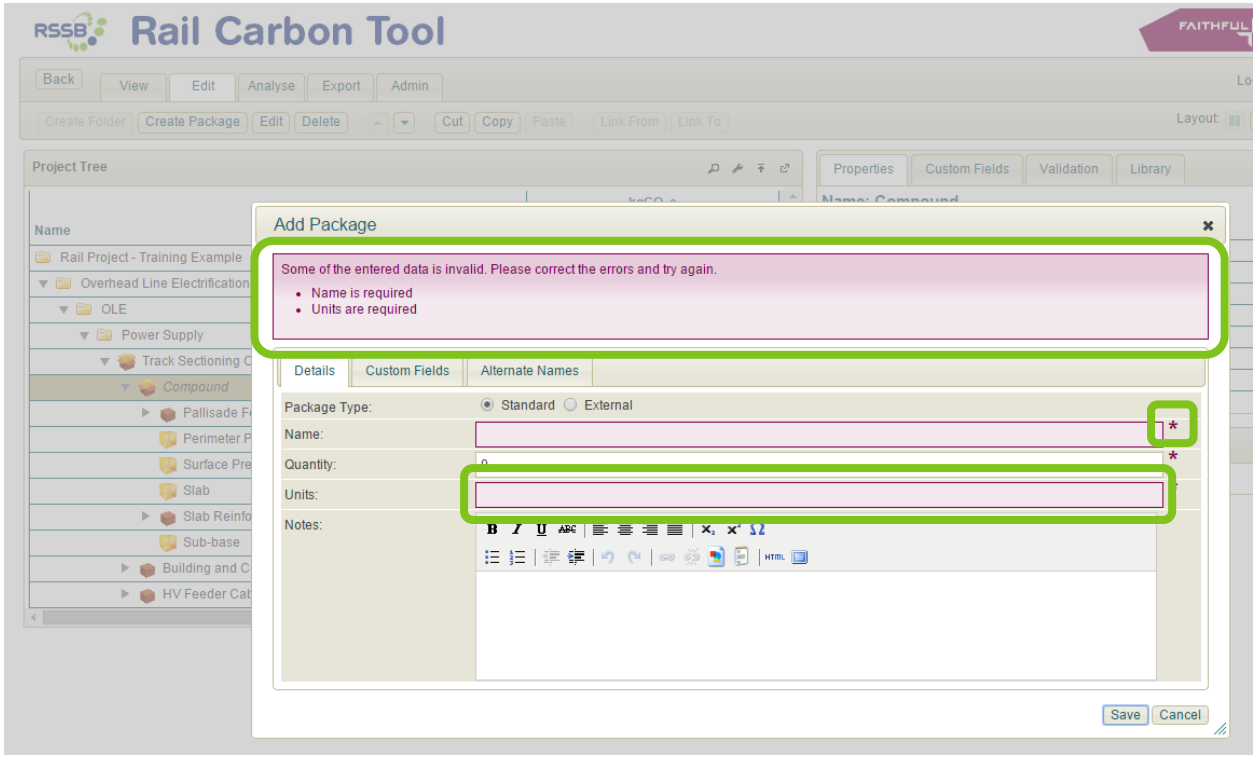


5.10 Mandatory Fields

Mandatory fields occur on various content in the tool and must be completed before the content can be saved. The relevant fields are always highlighted with a red star.

If a mandatory field is not completed and the Save button is clicked, the record will not save and an error message will appear at the top of the record. The mandatory fields that require input will also become highlighted in pink.

Mandatory fields and error messages highlighted:



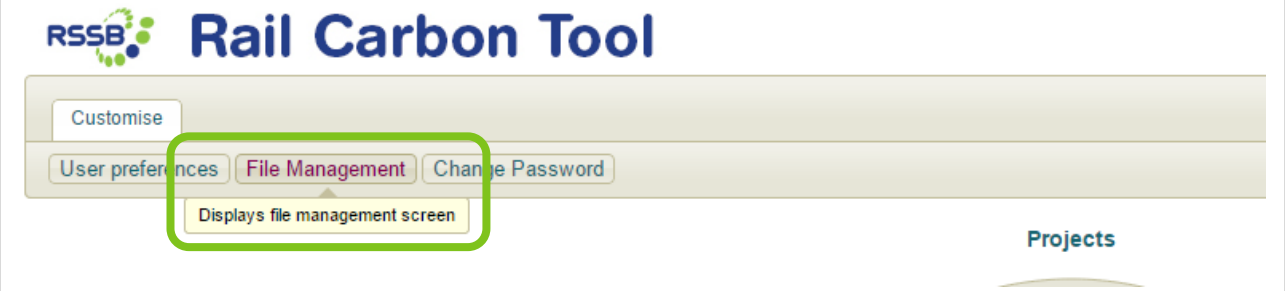
5.11 File Upload and Use

All major file types can be uploaded to the RCT and added into Project Trees to provide additional technical content.

Files are uploaded as follows:

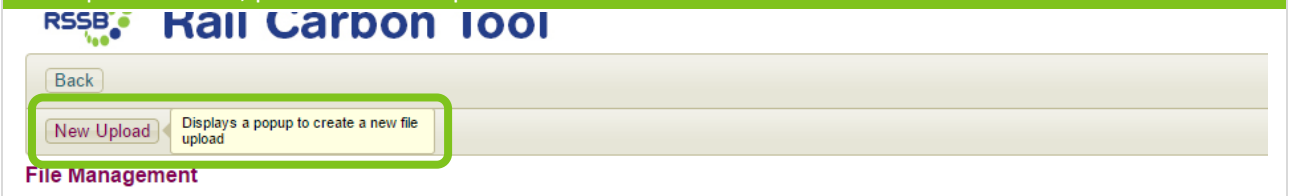
1) navigate to the home page and click the **File Management** button on the home page tab;

File Management button highlighted, plus on-screen tip:



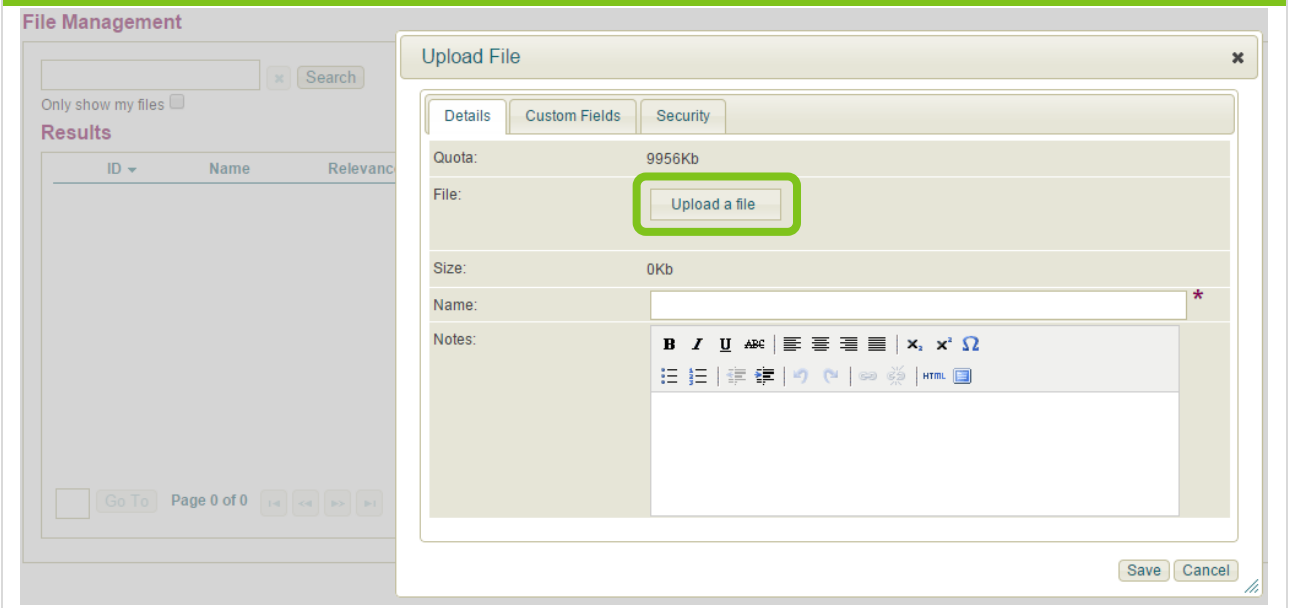
2) on the **File Management** page click the **New Upload** button;

New Upload button, plus on-screen tip:



3) on the **Upload File** pop-up window click the **Upload a file** button;

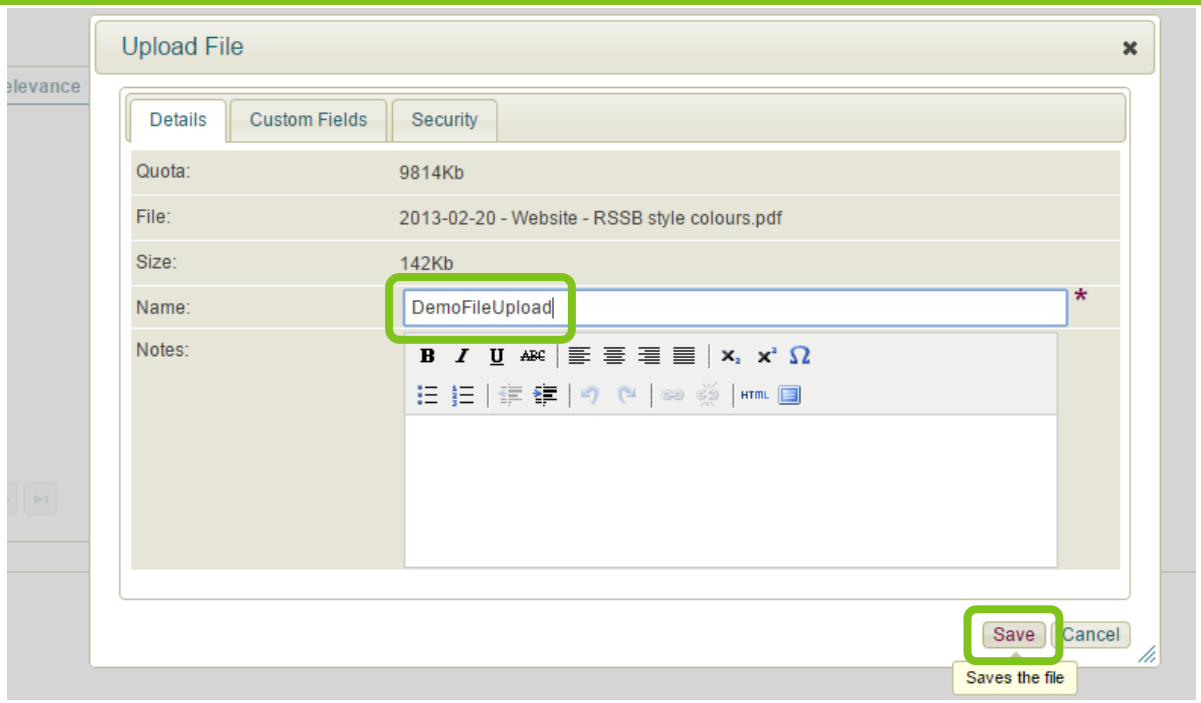
Upload a file button:



4) select the file as usual from the file upload window that opens and click the **Open** button once the file is selected;

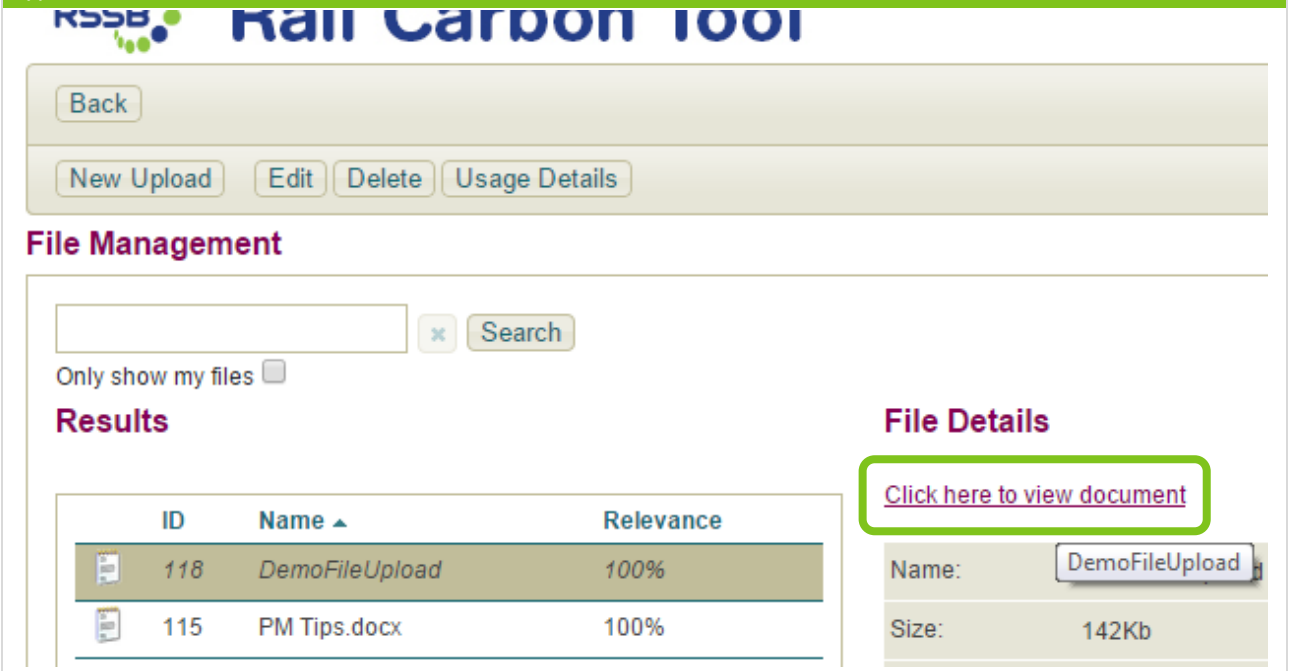
5) the file is added and given a default name, which can be changed. To complete the upload click the **Save** button; and

New file name, and Save button on Upload File pop-up window:



6) a newly uploaded file can be located in the **File Management** library using the standard search functionality on the **File Management** page, and the file can then be view by clicking the **Click here to view document** link.

Hyperlink to view the selected document:



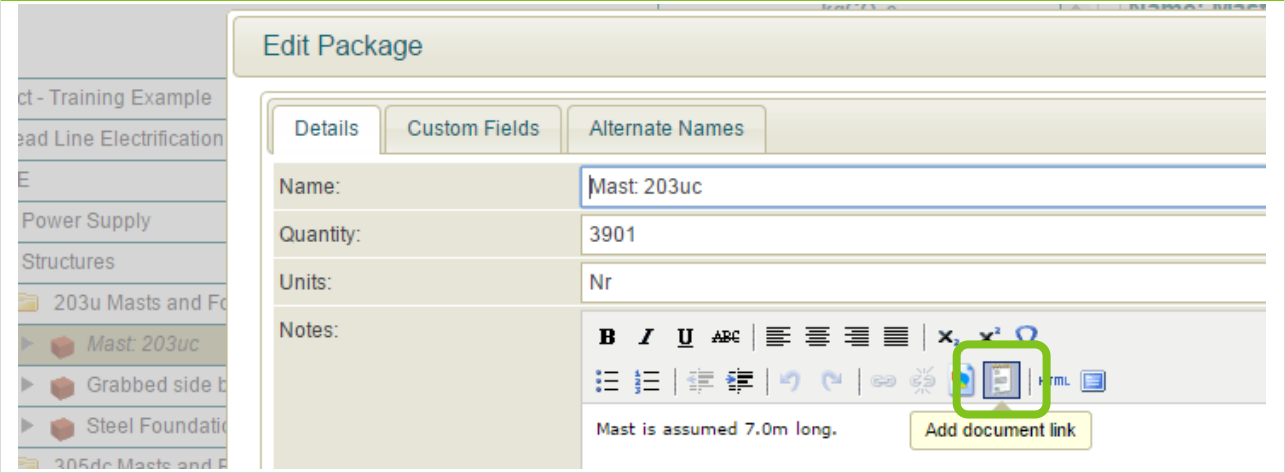
Once a file is uploaded it can be attached to any line item in a Project Tree, as follows:

1) go to the relevant line item in the Project Tree and open it in **Edit** mode;

2) go to the **Details** tab;

3) start the process to attach a document using the **Add document link** button;

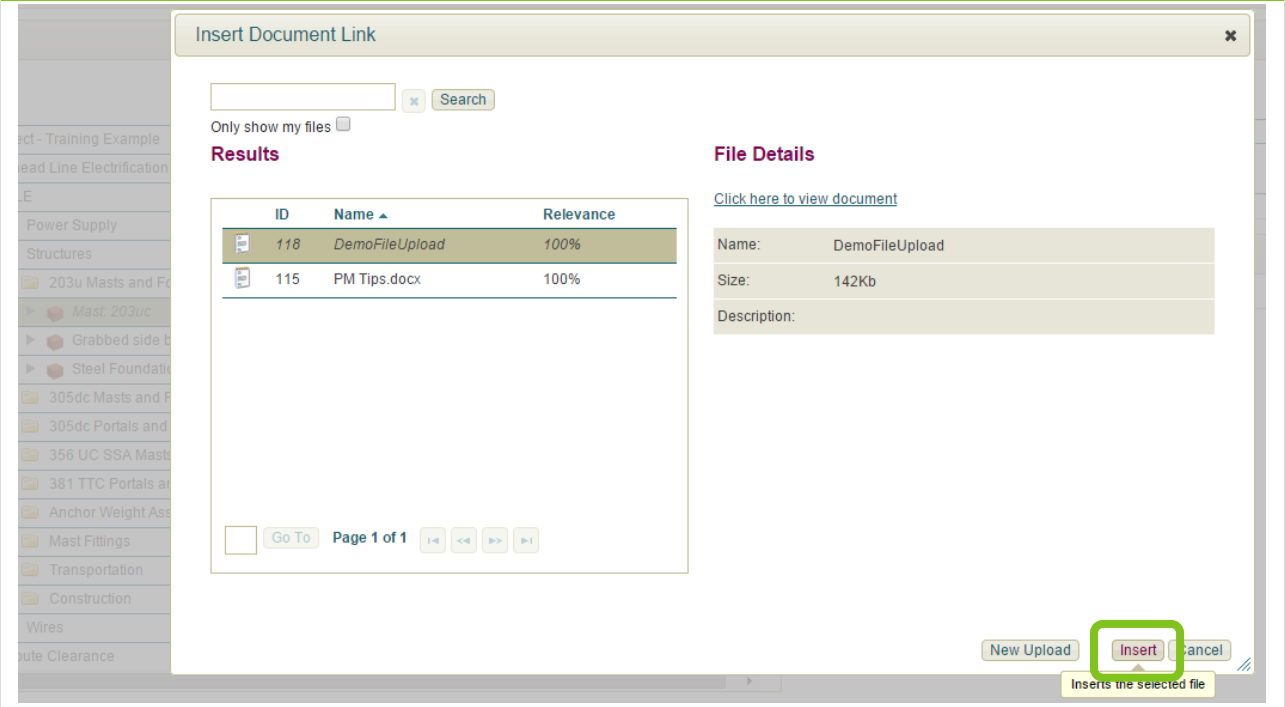
Add document link button, with on-screen tip showing:



4) in the **Insert Document** pop-up window, locate the file using the standard search function and select it;

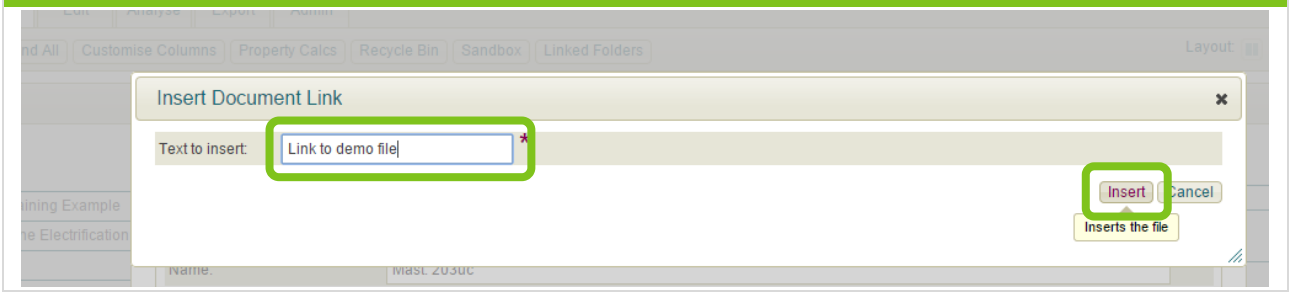
5) insert a link to the document using the **Insert** button;

Insert button:



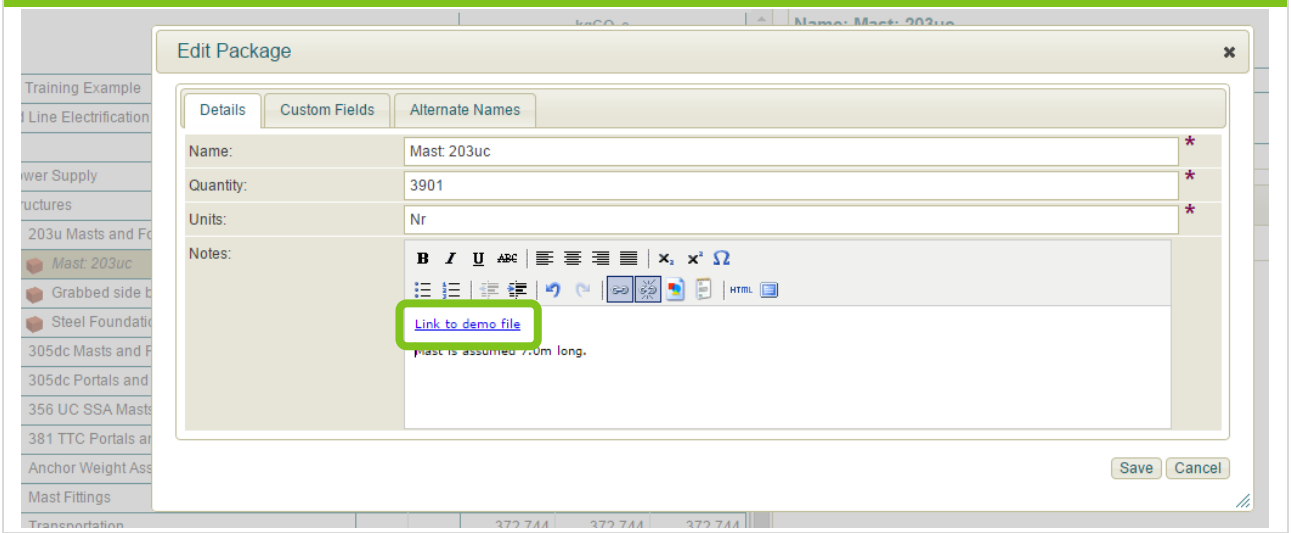
6) in the **Insert Document Link** pop-up panel add the text that will show as the hyperlink to the file and click the **Insert** button to complete the link; and

Document link name and Insert button:



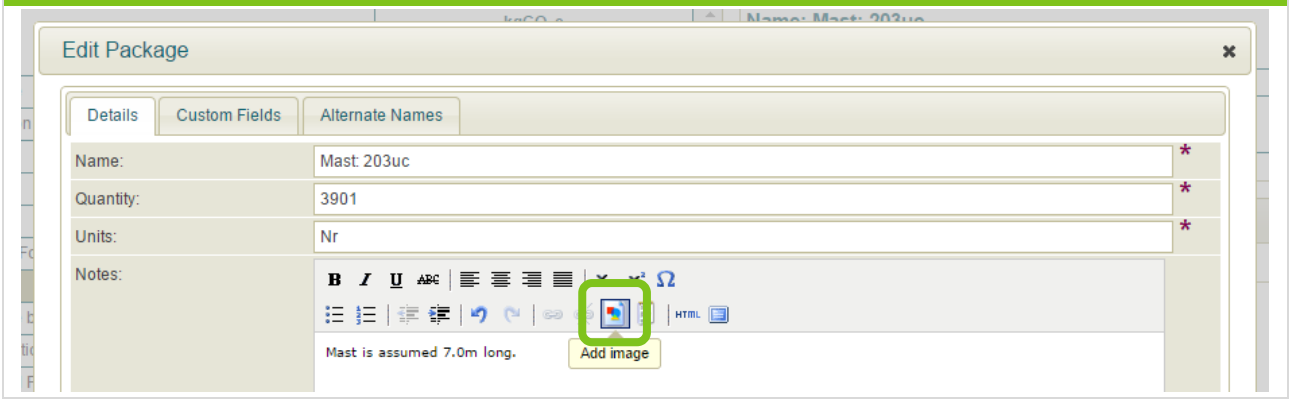
7) in the main **Edit Package** pop-up window the link text will appear in the Notes. Click **Save** to complete adding the link to the Project Tree line item.

File text hyperlink:



Images can also be added to Notes using the same process as for documents, but rather than creating a link the actual image will be inserted directly into the Notes field. Images are added using the Add Image button, as shown below:

Add Image button, plus on-screen help tip:



5.12 Custom Fields

A Custom Field function is provided to allow users to include additional information and data on any Folder, CO_2 Package or Carbon Factor within a Project Tree. Such information and data can be added manually when a new Folder, CO_2 Package or Carbon Factor is created or edited. Alternatively, settings can be used on the headline Folder of a Project Tree to automatically provide Custom Fields on all new Folders, CO_2 Packages, or Carbon Factors. Where this setting is used the specified Custom Fields will always show on the details tab of content concerned, but it is not mandatory to complete them. This function is particularly useful for ensuring additional information and data is consistently included.

A range of Custom Fields are already specified in the RCT and new ones can be created by any user with the required edit rights.

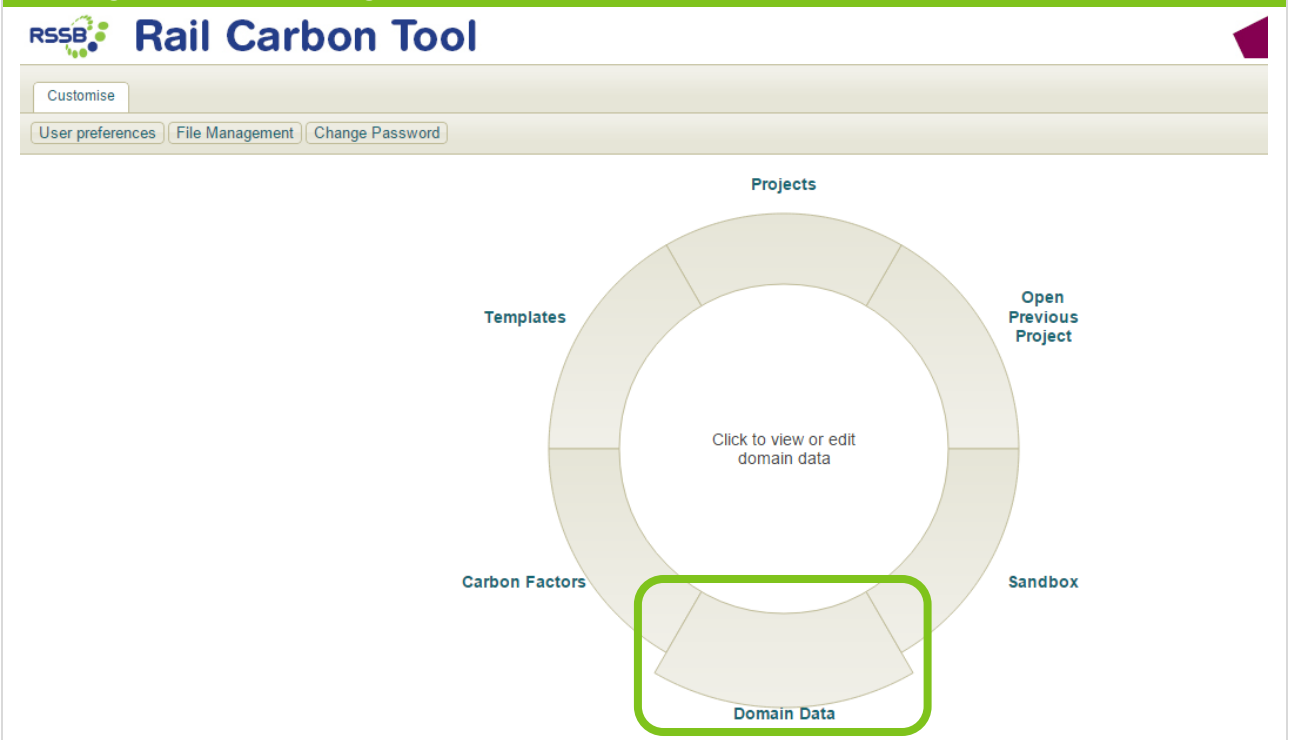
The following sections set out how to create new Custom Fields and use them either via the automatic settings or by adding them manually.

5.12.1 New Custom Fields

New custom fields are created as follows:

1) go to the **Domain Data** section in the home page;

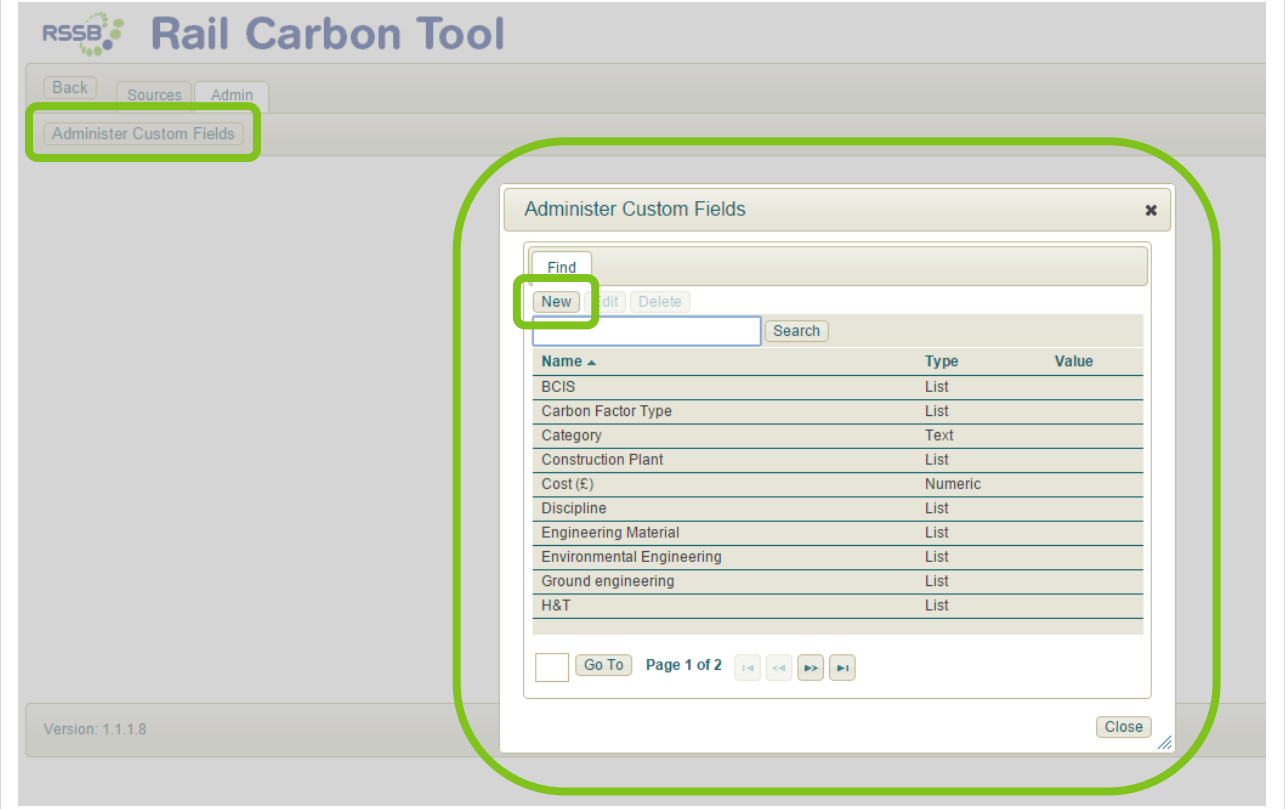
Accessing the Domain Data segment:



2) go to the **Admin tab** and click the **Administer Custom Fields** button to open the pop-up window;

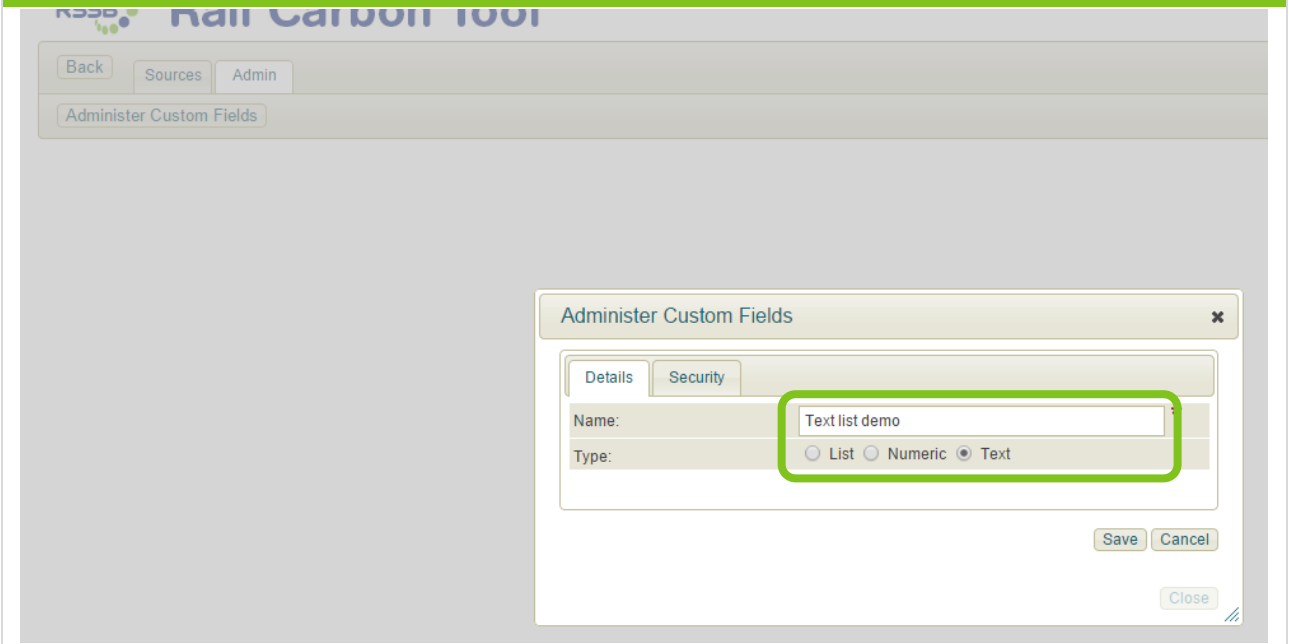
3) click the **New** button to start creating a new set of fields;

Administer Custom Fields button, new pop-up window, and New button:



4) follow the prompts in the pop-up window to create a new set of fields; and

Creating a new Text list:



5) click the **Save** button to complete creating the new custom fields.

5.12.2 Setting and Completing Automatic Custom Fields

Automatic Custom Fields are set and completed as follows:

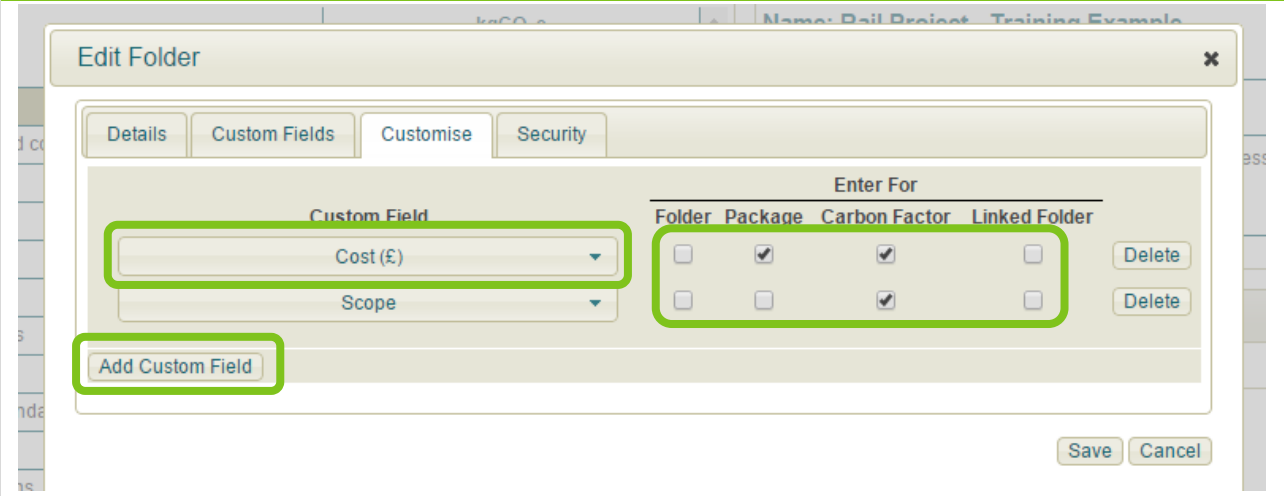
1) go to the **Projects library**, search for and select the required project, and click the **Edit** button;

2) go to the **Customise** tab and click the **Add Custom Field** button (do this as many times as necessary for the different Custom Fields that are to be applied);

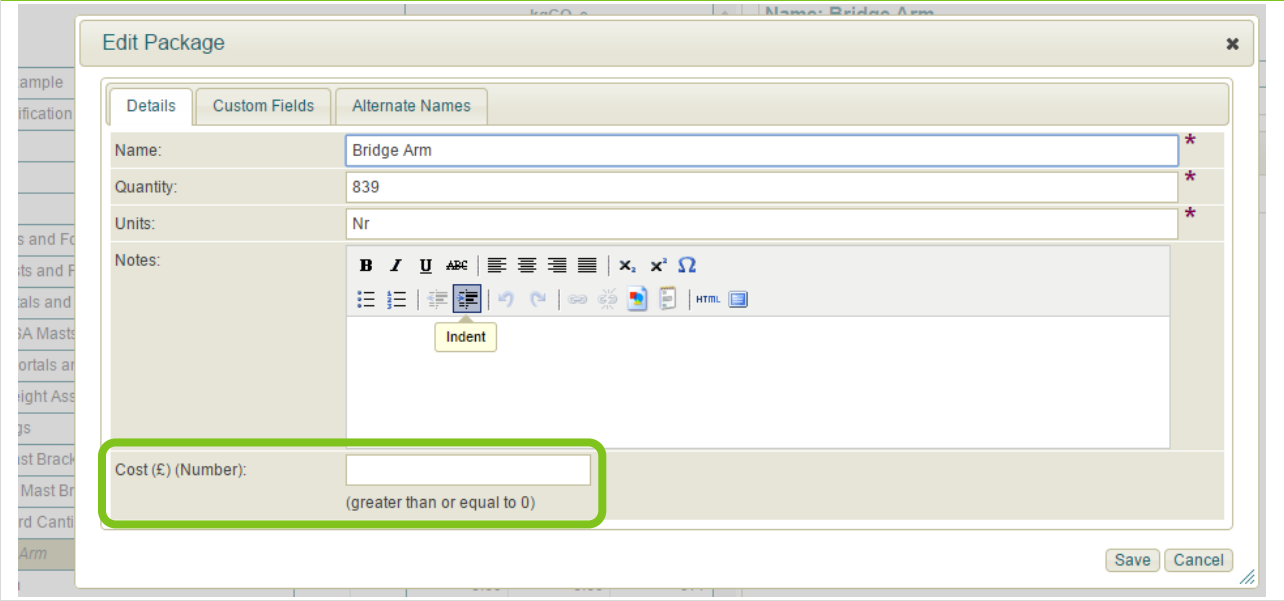
3) tick the **radio** buttons for where the custom fields are to be applied; and

4) click the **Save** button to complete the action.

Customise tab, Add Custom Field button, and radio buttons:



Package pop-up window showing automatic custom fields on the Details tab:



5.12.3 Manual Use of Custom Fields

Custom Fields can be manually applied to any part of a Project Tree as follows:

1) open the item to have **Custom Fields** assigned to it in **Edit** mode;

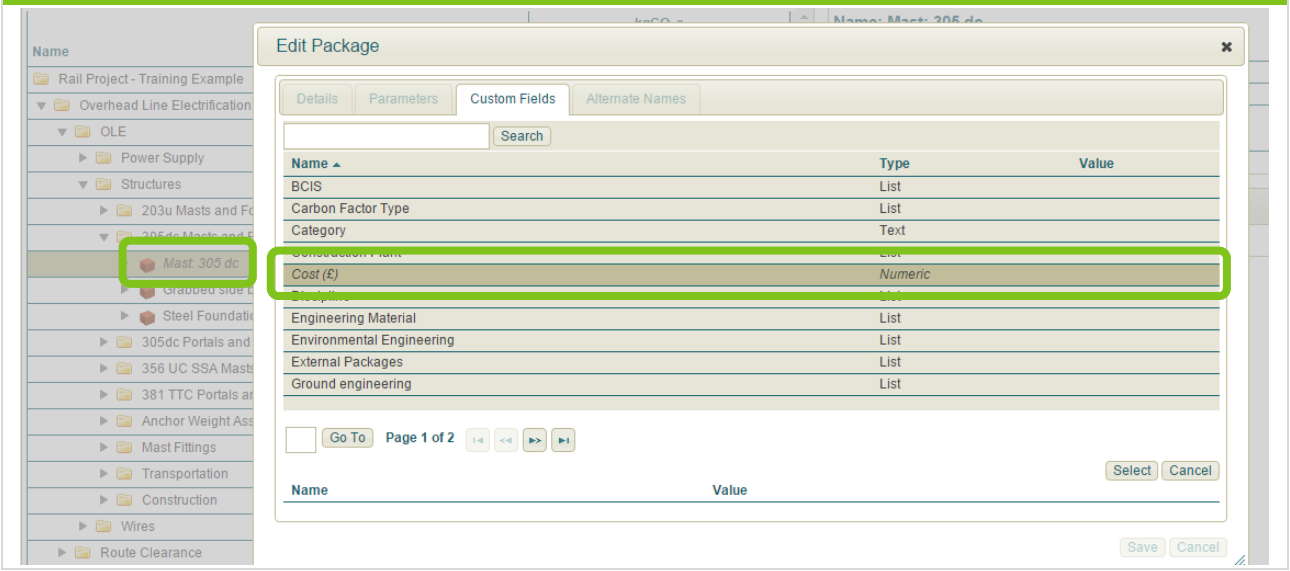
2) going to the **Custom Fields** tab and select the required category;

3) select the required list item, or enter the required data; and

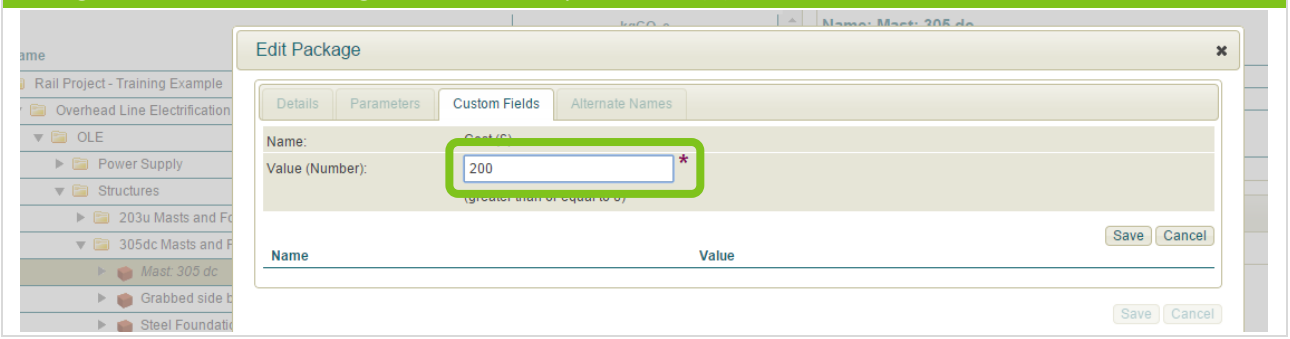
4) **Save** the changes.

Note: Custom Field information added to a Project Tree line item will not show in the Properties Details for the line items. They are viewed using the Customise Columns function, as detailed in section 9.2. In addition, Custom Fields applied to a Project Tree can be used in the graphing functionality as analysis categories**.**

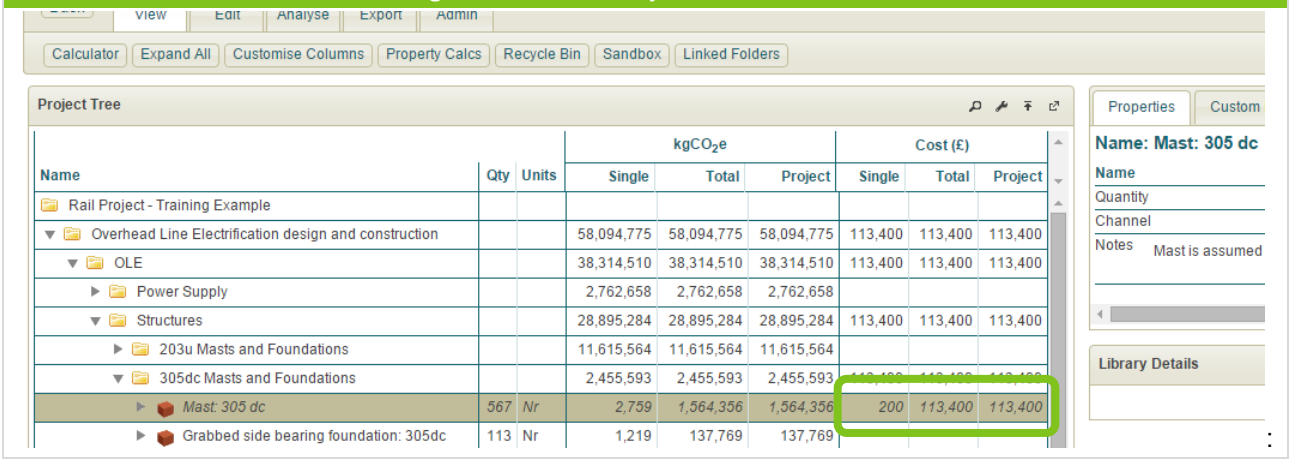
Adding a cost value to a Mast: 305dc CO_2 Package:



Adding the actual value having selected the required Cost (£) Custom Field:



The new Custom Field content being shown in the Project Tree:



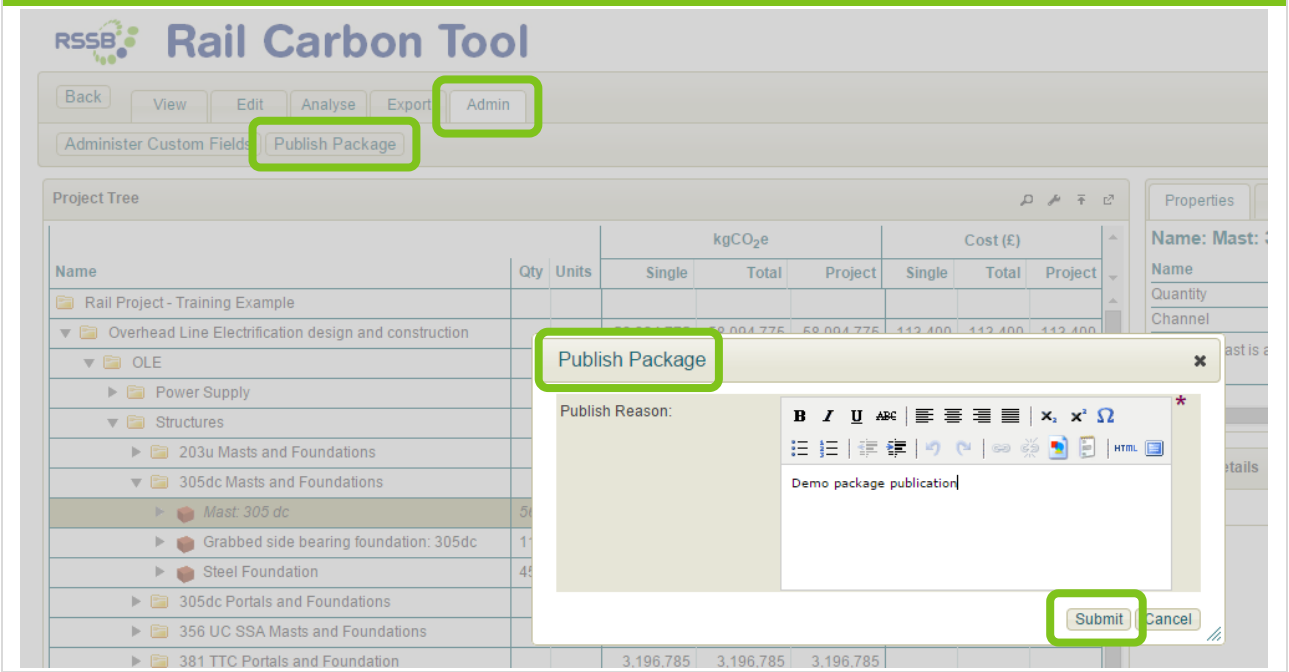
Name	Qty	Units	kgCO2e Single	kgCO2e Total	kgCO2e Project	Cost (£) Single	Cost (£) Total	Cost (£) Project
Rail Project - Training Example								
Overhead Line Electrification design and construction			58,094,775	58,094,775	58,094,775	113,400	113,400	113,400
OLE			38,314,510	38,314,510	38,314,510	113,400	113,400	113,400
Power Supply			2,762,658	2,762,658	2,762,658			
Structures			28,895,284	28,895,284	28,895,284	113,400	113,400	113,400
203u Masts and Foundations			11,615,564	11,615,564	11,615,564			
305dc Masts and Foundations			2,455,593	2,455,593	2,455,593			
Mast: 305 dc	*567*	*Nr*	*2,759*	*1,564,356*	*1,564,356*	*200*	*113,400*	*113,400*
Grabbed side bearing foundation: 305dc	113	Nr	1,219	137,769	137,769			

5.13 Publish Package

Publish Package is a key function for knowledge transfer in the RCT as it allows for the transfer of content from a project into the Templates library for use by other users. Where a user identifies that a CO_2 Package would be a useful template for other users, they can initiate it's publication as follows:

1) go to the relevant **CO_2 Package** in the Project Tree;
2) go to the **Admin** tab and click the **Publish Package** button;
3) add notes in the **Publish Package** pop-up window to explain the reason for publishing the CO_2 Package; and
4) click the **Submit** button to complete the request.

Admin tab, Publish Package button, pop-up window, and Submit button:



5.14 Sandbox Data Transfer

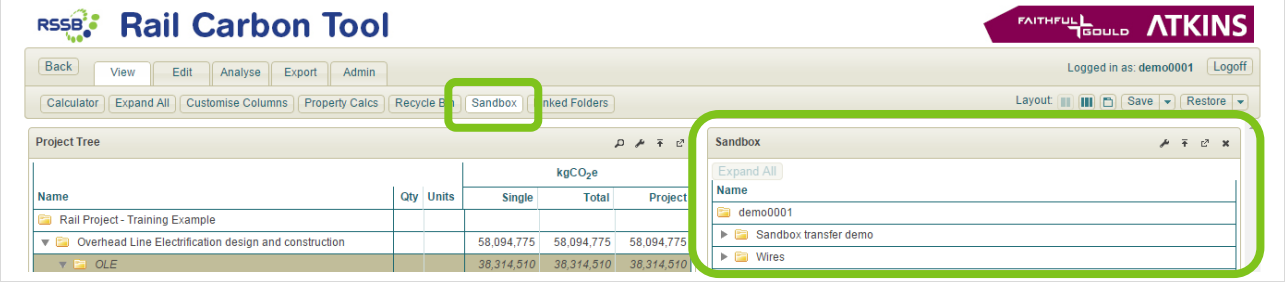
The Sandbox data transfer function is included in the RCT to enable content created by an individual user in their Sandbox to be directly used in a Project, and for Project content to be moved to a user's Sandbox for separate investigation.

To transfer content from a Sandbox to a Project a user should follow these steps:

1) go to the relevant **Project**;

2) go to the **View** tab and click the **Sandbox** button;

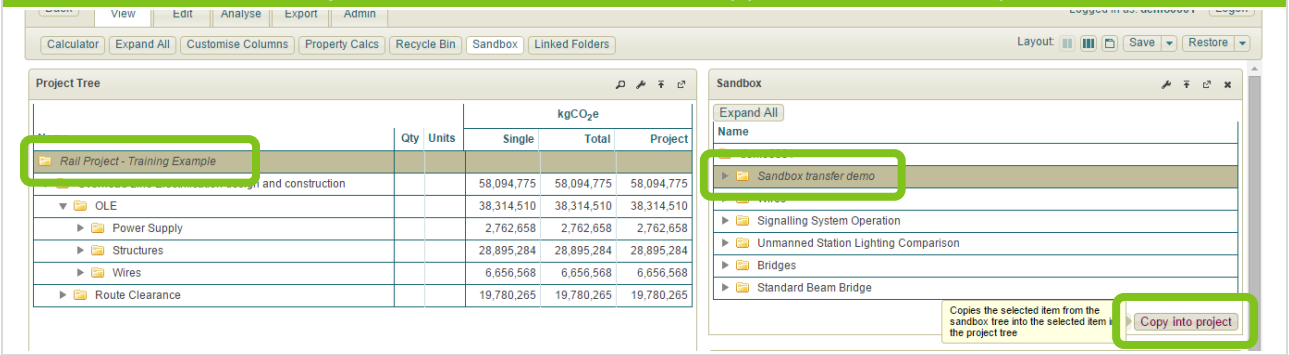
Sandbox button activated and Sandbox panel showing:



3) go to the **Sandbox** panel that appears and expand the Project Tree in the Sandbox panel (as required) to obtain the required item; and

4) select the location in the Project where the item is to be added, and click the **Copy into project** button.

Sandbox item selected, Project Tree location selected and copy button about to be pressed:

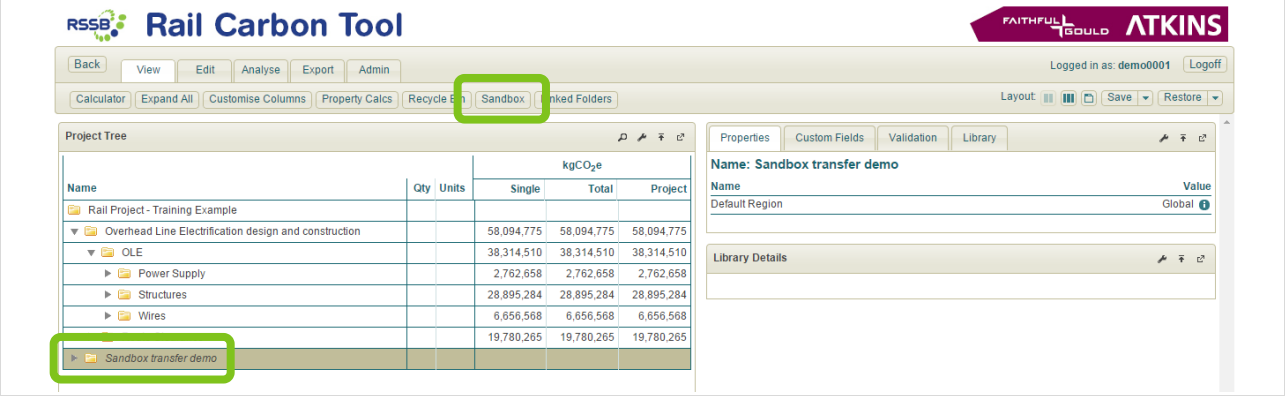


To transfer Project content to a Sandbox:

1) select the location in the **Sandbox** panel where the content is to be copied to; and

2) select the line item in the Project that is to be copied, and click the **Copy from project** button.

Folder copied and Sandbox closed:



5.15 Passwords

A user can change or reset their password at any time, for any purpose. The instructions for these two functions are set out below.

5.15.1 Change Password

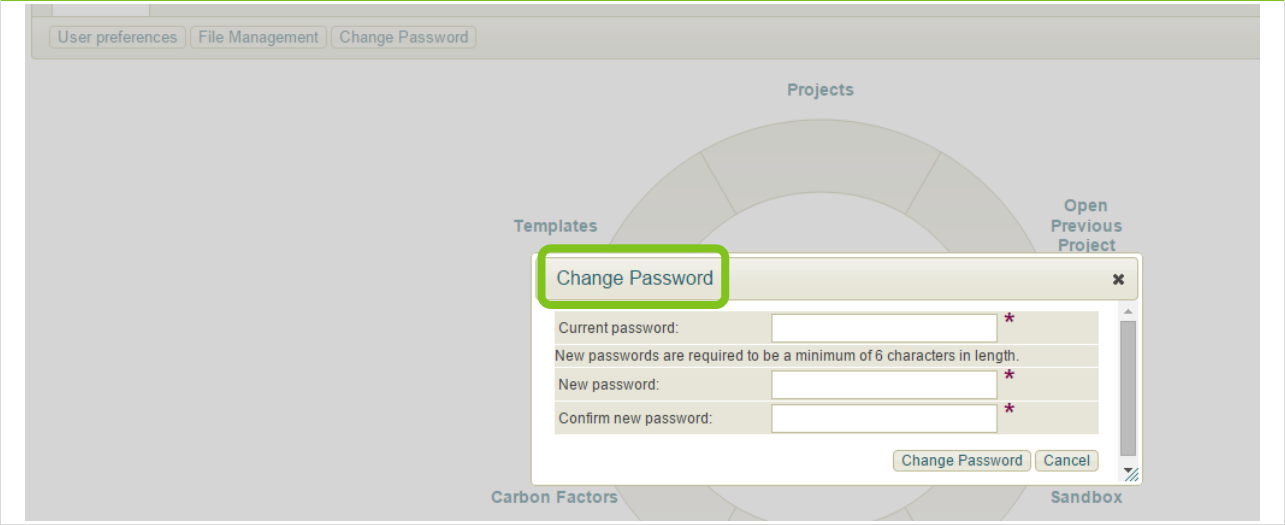
Change password as follows:

1) go to the **Customise** tab on the home page, and click the **Change Password** button; and

Customise tab and Change Password button:

2) enter the existing password, and the proposed new password twice in the fields indicated and click the **Change Password** button.

Change Password pop-up panel:



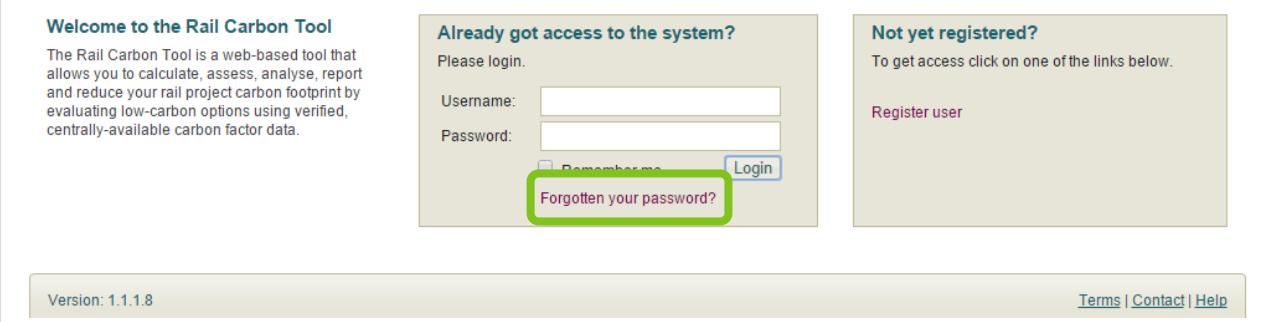
When a user's password has been changed they will receive an on screen message stating this is the case, and an email confirmation will be sent to the email address in their user account.

5.15.2 Reset Forgotten Password

If a user has forgotten their password, they can automatically reset it using the **Forgotten your password?** link. To do this:

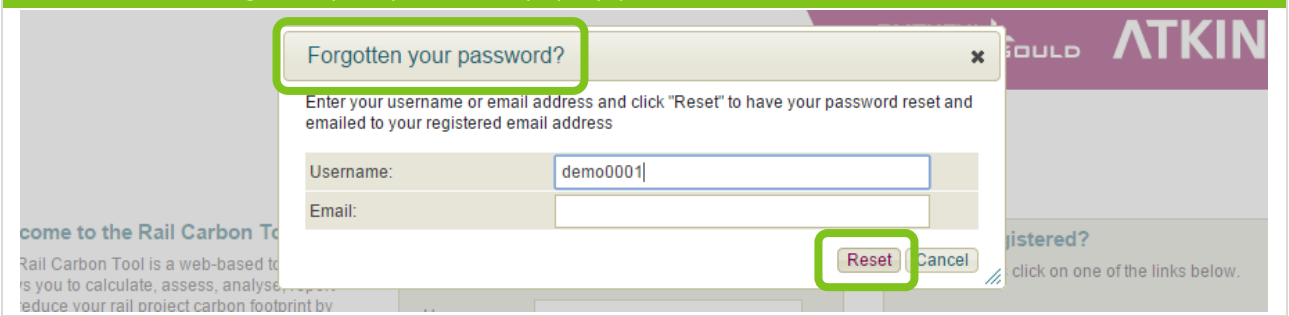
1) go to the **Login** page and click the **Forgotten Password Link**;

Login page with Forgotten your password? link:



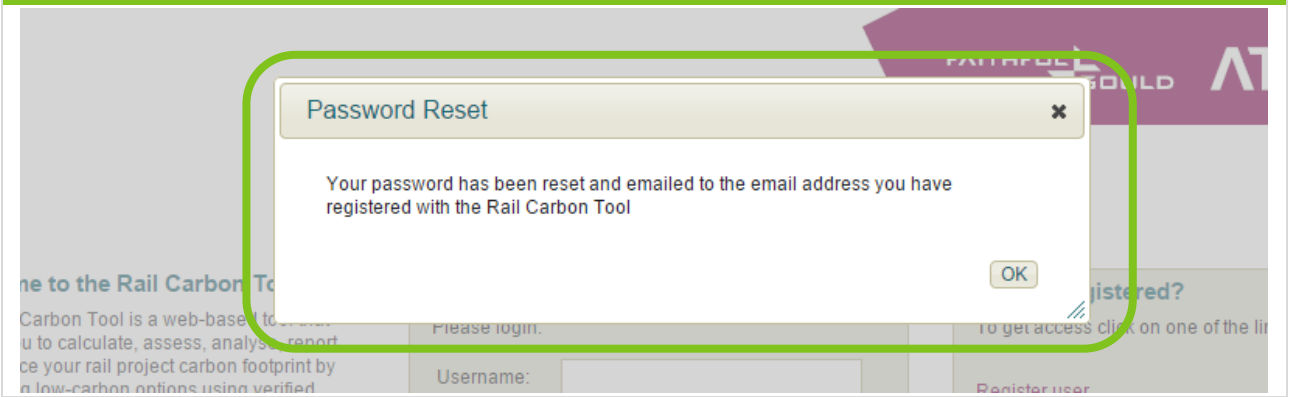
2) follow the instructions on the **Forgotten your password?** pop-up window, and click the **Reset** button;

Reset button on Forgotten your password? pop-up panel and Reset button:



3) the on-screen message shown below will be displayed to show the password reset has been completed; and

On-screen password reset message:



4) once a new password has been retrieved the user can login in the usual way.

Note: It is strongly encouraged that once logged-in with a reset password, it is changed to one that is easily memorable. The RCT has no memory for previously used passwords, as a result previously used passwords can be reused.

6 How to Navigate Libraries

This section provides detailed instructions on how to navigate the libraries in the RCT. The titles of the libraries and their features are outlined below.

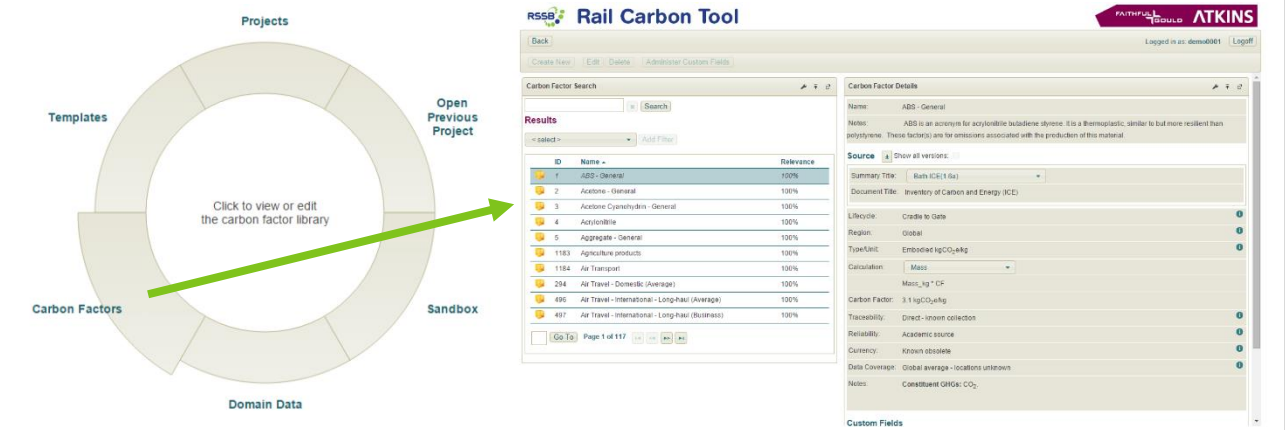
Carbon Factors library	This library contains all of the Carbon Factors that users can utilise to carry out their carbon calculations, and it can be viewed either directly from the navigation wheel, or in a Project Tree.
Templates library	This library contains templates of predefined items that users can input directly into their carbon calculations. • The key point of these items are that they enable users to quickly create a carbon footprint without having to do all the background data gathering or calculations. • This Library can be viewed either directly from the navigation wheel, or in a Project Tree.
Project Library	This library contains a list of all Project carbon calculations a user has access to and is used to: • create a new project; • open existing projects; • edit top level details of existing projects; • create a copy of an existing project for use as a template for a new, separate a project (this allows users to quickly transfer data and knowledge from one project to another and can save significant calculation time); and • delete a project.

6.1 Where to find Libraries

All of the libraries are accessed directly from the navigation wheel. In addition, the Carbon Factor and Templates libraries can also be accessed within Project Trees.

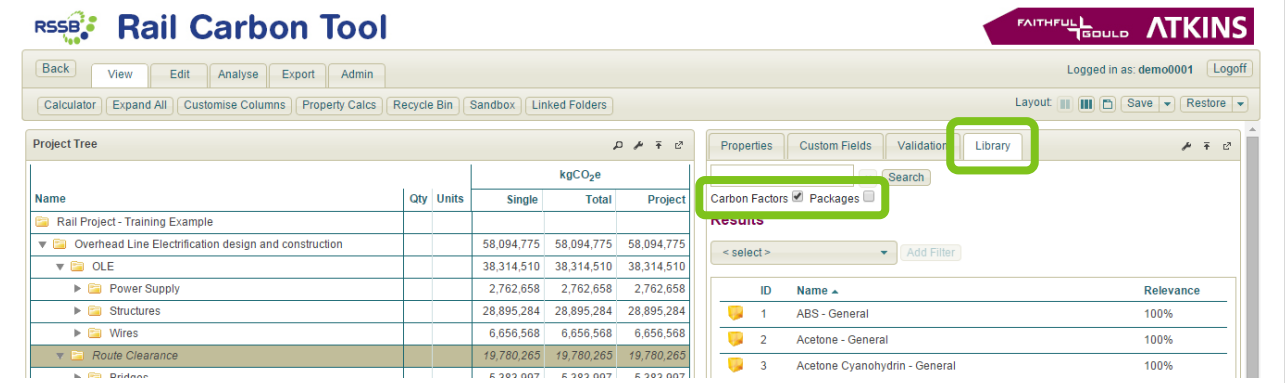
To access the libraries from the navigation wheel simply click on the **Carbon Factors**, **Templates**, or **Projects** segment of the navigation wheel, which takes the user directly to the relevant library.

Carbon Factor navigation wheel segment and Carbon Factor library:

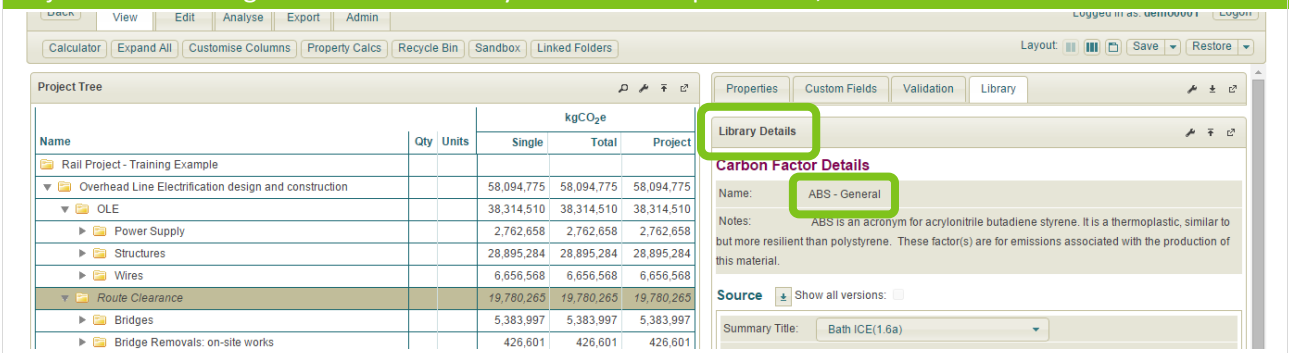


To access the **Carbon Factor** or **Template** libraries in a Project Tree, go to the relevant Project Tree (see section 7.1 below for details on how to do this). Both libraries are then provided directly on the **Library** and **Library Details** panels or tabs next to the Project Tree panel itself. Each library, can be accessed separately or together by ticking / un-ticking the **Carbon Factors** or **Packages** radio buttons.

Project Tree showing Library and radio buttons for Carbon Factors and / or Templates:



Project Tree showing Carbon Factor library details on a separate tab, for the selected item ABS General:

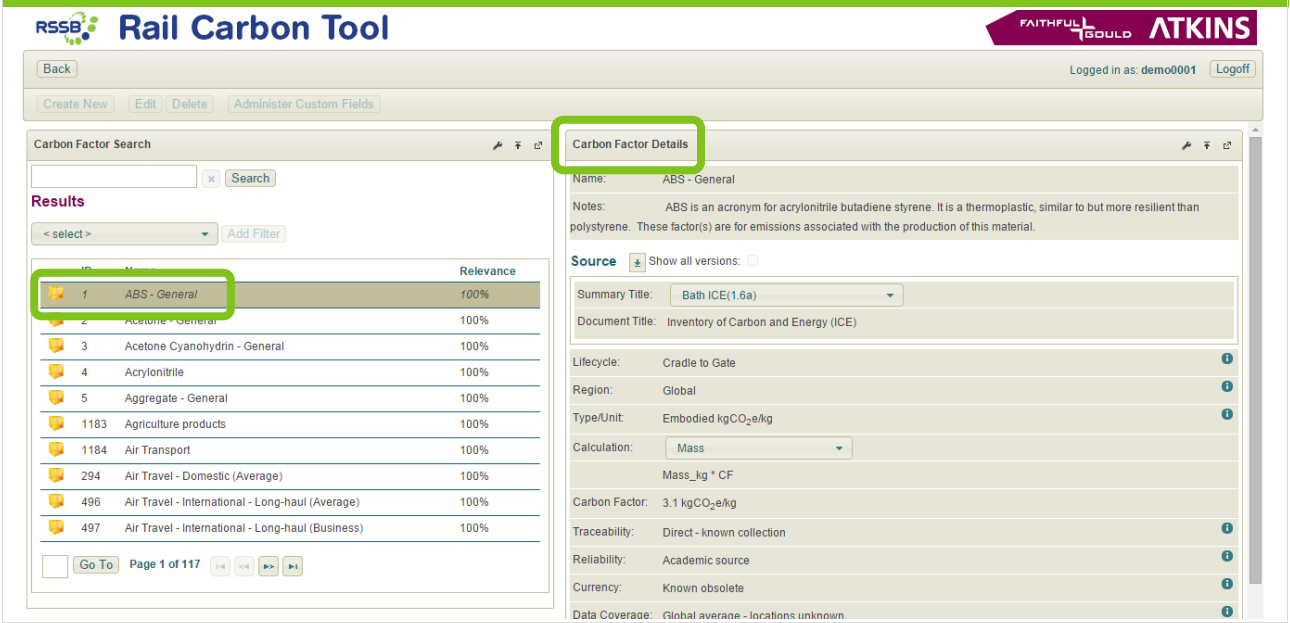


6.2 How to View Library Content

The content of all the libraries is viewed using the standard search functionality, as explained in Section 5.6.

Once the required record has been found, the details can be viewed by clicking on the relevant record. The details are then shown in the adjacent **Carbon Factor Details** panel. The details provided for each library type are set out in the following sections.

Library showing a selected record and its details:



6.3 Carbon Factor Library Content

The Carbon Factor library consists of a list of Carbon Factor names, with one or more Carbon Factor value records attached to each name. One Carbon Factor can have multiple values for the following reasons:

- different versions of the same source, e.g. the Defra carbon conversion factors which are updated annually;
- different values from different sources;
- different values for different regions; and
- different values for different types / units of measure.

Note: It is important a user fully understands what the correct Carbon Factor values are for their specific carbon calculations.

The details for each Carbon Factor value record (as shown in the **Carbon Factor Details** panel) are:

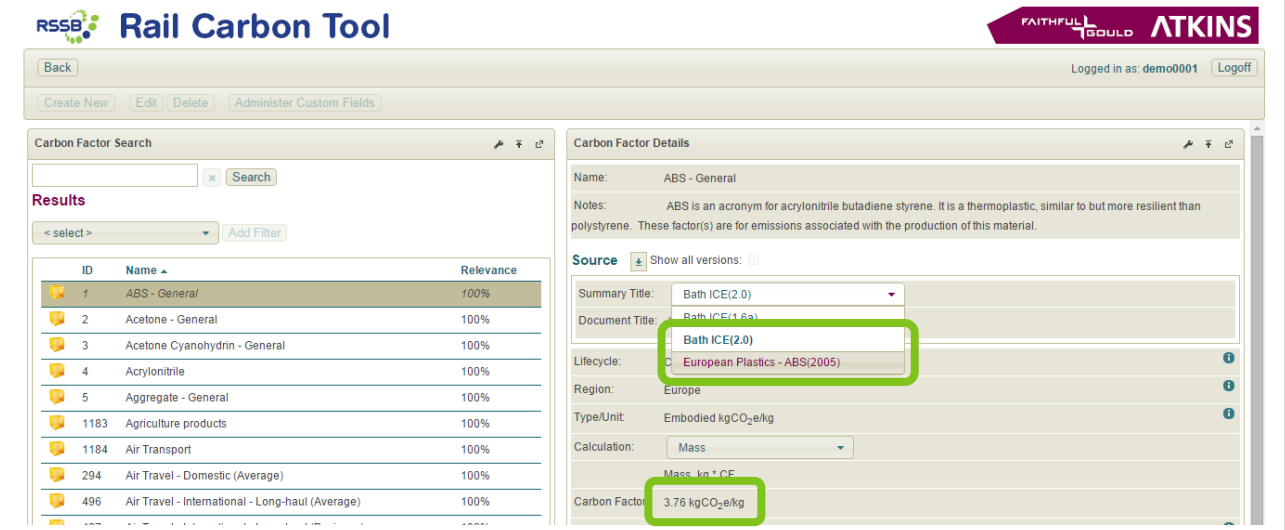
- **Name**: the name of the Carbon Factor;
- **Carbon Factor Notes**: these are written notes about the Carbon Factor, and can include images and links to additional documents;
- **Source**: this section has full details of the specific source for the Carbon Factor value. One Carbon Factor may have several sources or versions, which can be viewed by selecting the required source from the drop down menu;
- **Lifecycle**: shows the part of the lifecycle that the Carbon Factor value represents;
- **Region**: the geographical region that the Carbon Factor is specified for;
- **Type / Unit**: the type of Carbon Factor value provided and the unit of measure;
- **Calculation**: the calculations available to the user for the specified type of Carbon Factor value;
- **Carbon Factor**: the Carbon Factor value;
- **Traceability**: specification of the quality of the source;
- **Reliability**: specification of the quality of the source;
- **Currency**: specification of the status of the Carbon Factor value (this is manually updated and not always up to date);
- **Data Coverage**: the geographical region(s) covered by the Carbon Factor value; and
- **Carbon Factor Value Notes**: additional notes for the specific Carbon Factor value.

6.3.1 How to View Different Source Details, Carbon Factor Values and Calculation Options

The different Carbon Factor values and calculation options are viewed by selecting the choices from the drop-down menu lists in the **Carbon Factor Details**. The choices are as follows:

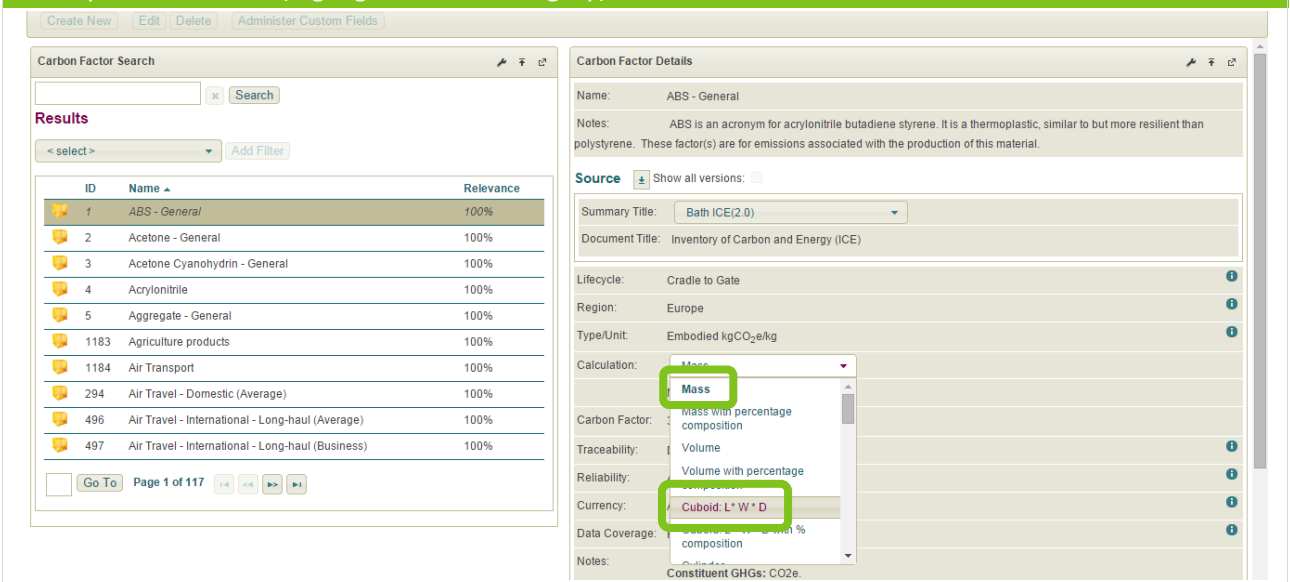
- different **Carbon Factor values** are viewed by changing either: the **Summary Title** (for different sources), the **Region**, or the **Type / Unit**, where a drop-down menu is available. If the user changes any one of these the Carbon Factor value will change. Drop-down menus are only available if the particular record has different values; or

Carbon Factor for Bath ICE (2.0) showing, and European Plastics selected from the drop-down list, which will show the value for that source once fully selected:



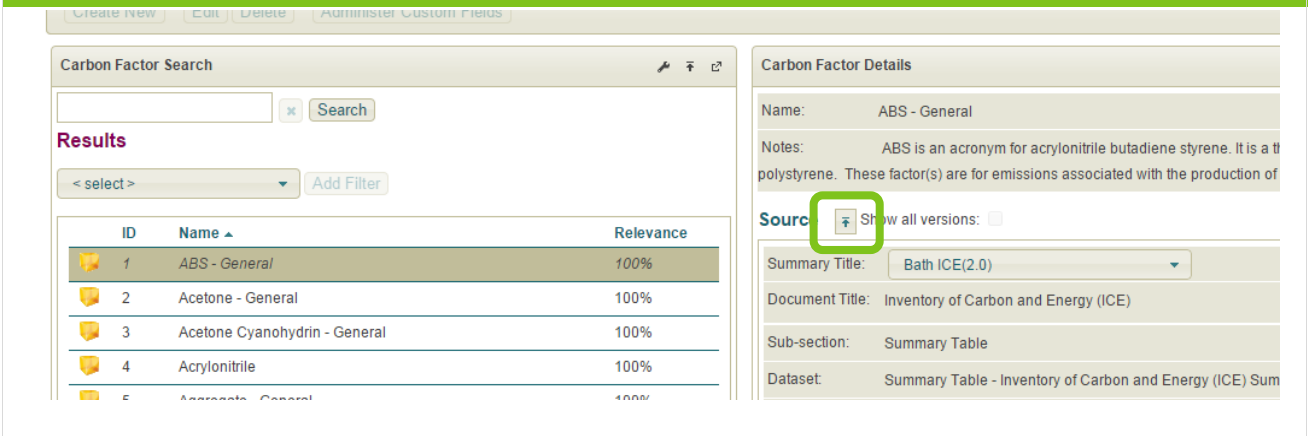
- different **Calculation** options are viewed by changing the calculation in the drop-down menu. Changing the calculation option changes the project data (Parameters) that the user will have to enter for the specific carbon calculation. When using the Carbon Factor in a Project the user must select the calculation options relevant to the data available; or

Carbon Factor record with Mass options currently being shown (as highlighted in blue), and Cuboid: L * W * D ready to be selected (highlighted as red on grey):



- **Source** details for each Carbon Factor can be viewed by clicking the **Show / Hide** button.

Source details hide button:



6.4 Templates Library Content

The Templates library shows the **Templates CO_2 Packages** available in the tool. Within the library the headline structure for each Template CO_2 Package is shown in a **Template Details** panel, and a **Template Tree** shows the full details. The details included in Template Trees are:

- sub-CO_2 Packages (where relevant);
- Carbon Factors; and
- project data.

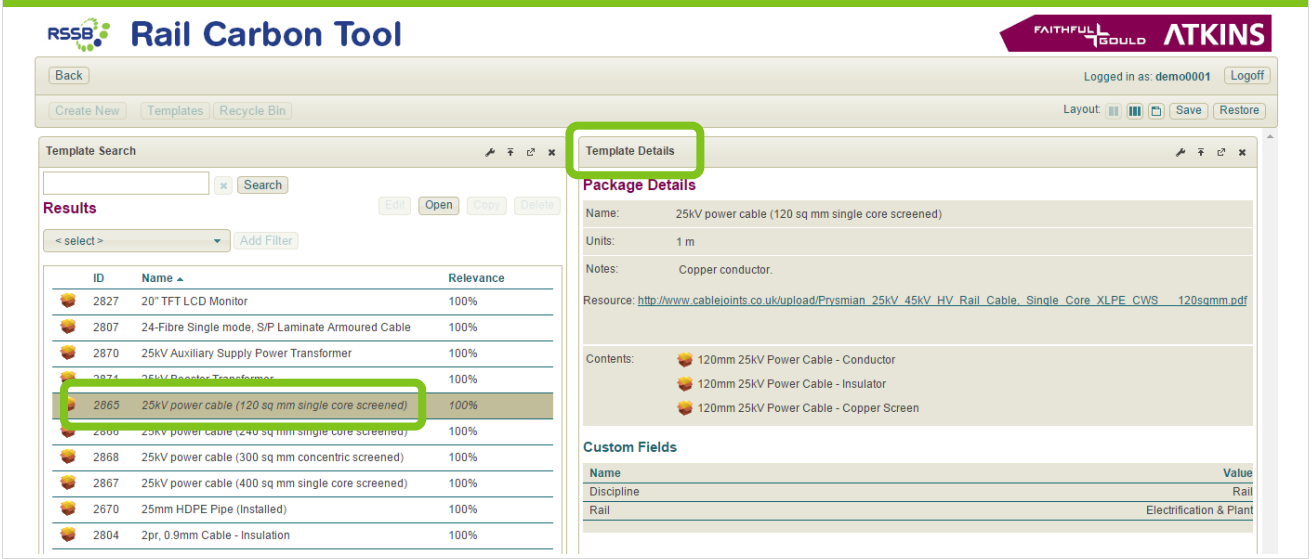
To view each Template CO_2 Package in the library use the following steps:

1) go to the **Templates** library;

2) search for the required **Template CO_2 Packages**;

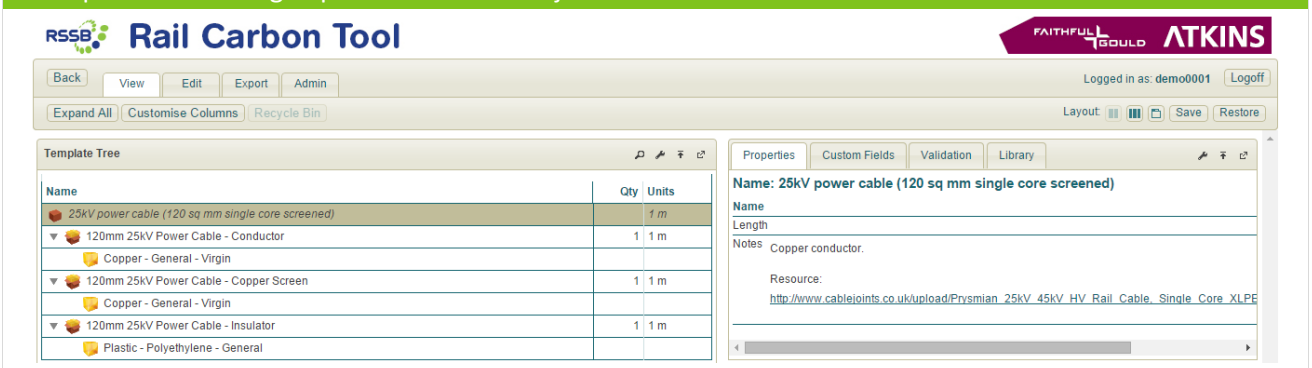
3) in the **Template Search** panel select the record in the **Results** list to make the details show in the **Template Details** panel; or

Template with details shown in the Template Details panel:



4) open the Template as a mini **Template Tree** by either double clicking it in the **Result** list, or by selecting it and using the **Open** button.

A Template CO_2 Package opened as a mini Project Tree:



6.5 Project Library Content and Managing Projects

The Project library shows the Project that a user controls or has been given to access to, and the Project Details panel shows the headline structure for the associated Project Tree. In addition, the library provides the following functions for managing Projects:

- create;
- edit;
- open;
- copy; or
- delete.

The details of each of these functions are explained below.

6.5.1 Create a New Project

To create a new Project:

1) click the **Create New Project** button;

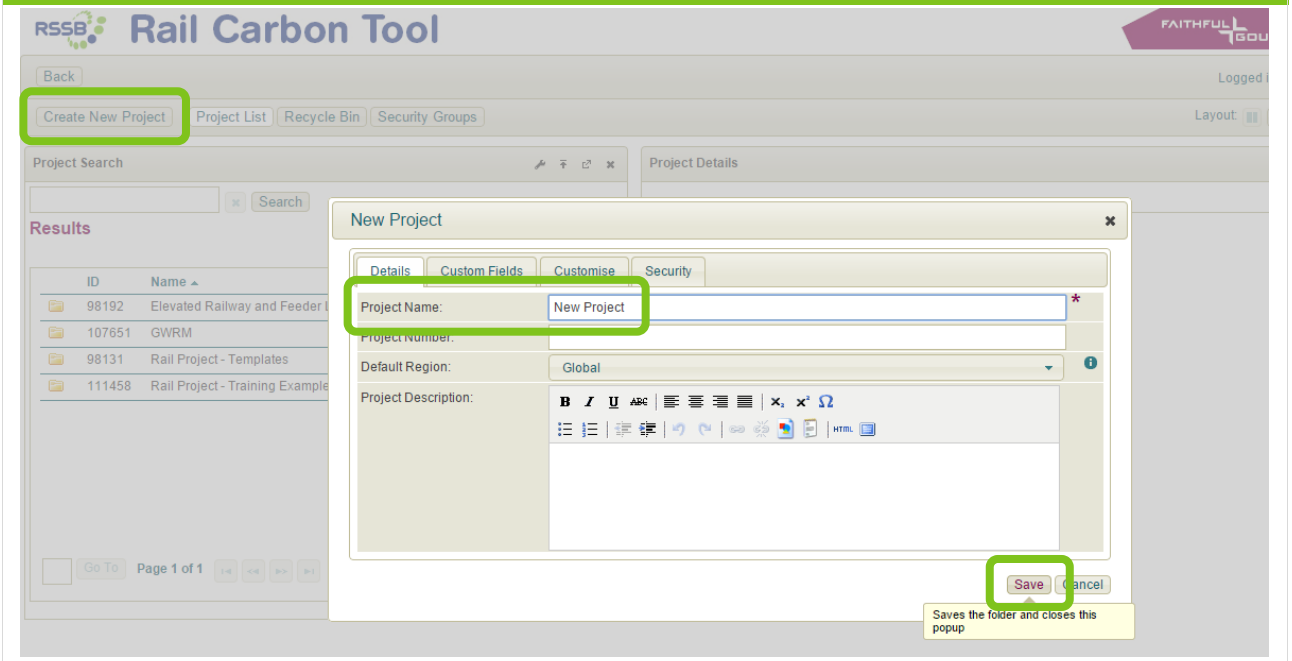
2) complete the details on each tab in the pop-up window; and

3) click the **Save** button.

Instructions for the Custom Fields and Customise tabs are provided in section 5.12, and instruction for the Security tab is provided in Section 11.

Note: Newly created Projects will open immediately in the Project Tree screen (where the carbon calculations are undertaken). Once a new project is closed it can be found and opened by using the **Search** function in the Project library. Only Project Managers can use this function.

Create New Project button, and New Project pop-up window, with key points highlighted:



6.5.2 Edit, Open, or Copy a Project

All available Projects can be copied in, opened or edited from the Project library. Where a user does not have rights to operate any one of these functions, the relevant buttons will be greyed-out.

For open, edit, and copy actions use the following steps:

1) find the required Project in the Project library using the standard **Search** functions;

2) click the required Project to select it; and

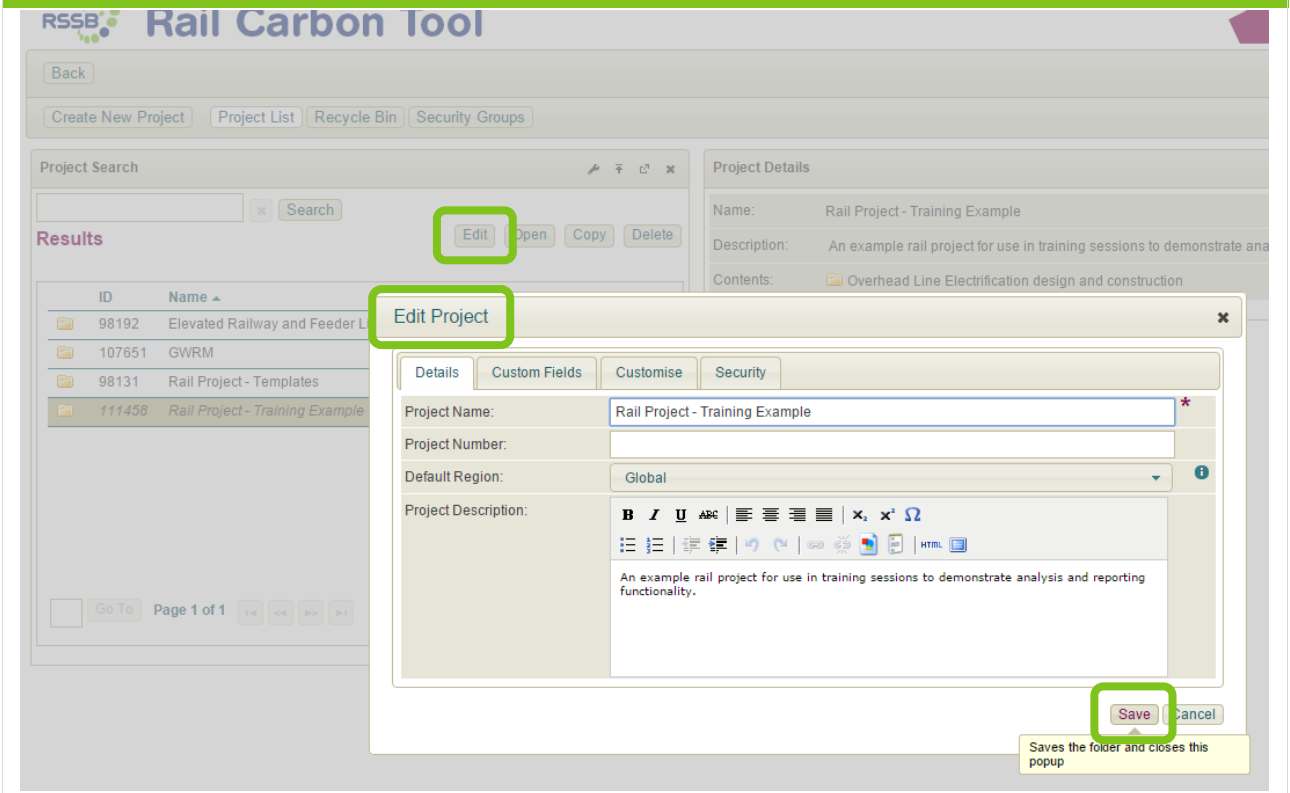
3) click the **Edit**, **Open**, or **Copy** buttons to start the required process.

The Edit, Open, and Copy actions are explained in more detail below.

6.5.2.1 Edit Details

The **Edit** button opens the **Edit Project** pop-up window, which allows the high level project details to be changed and saved. The **Edit Project** pop-up window does not allow editing of carbon calculations, this is only possible in the Project Tree screen.

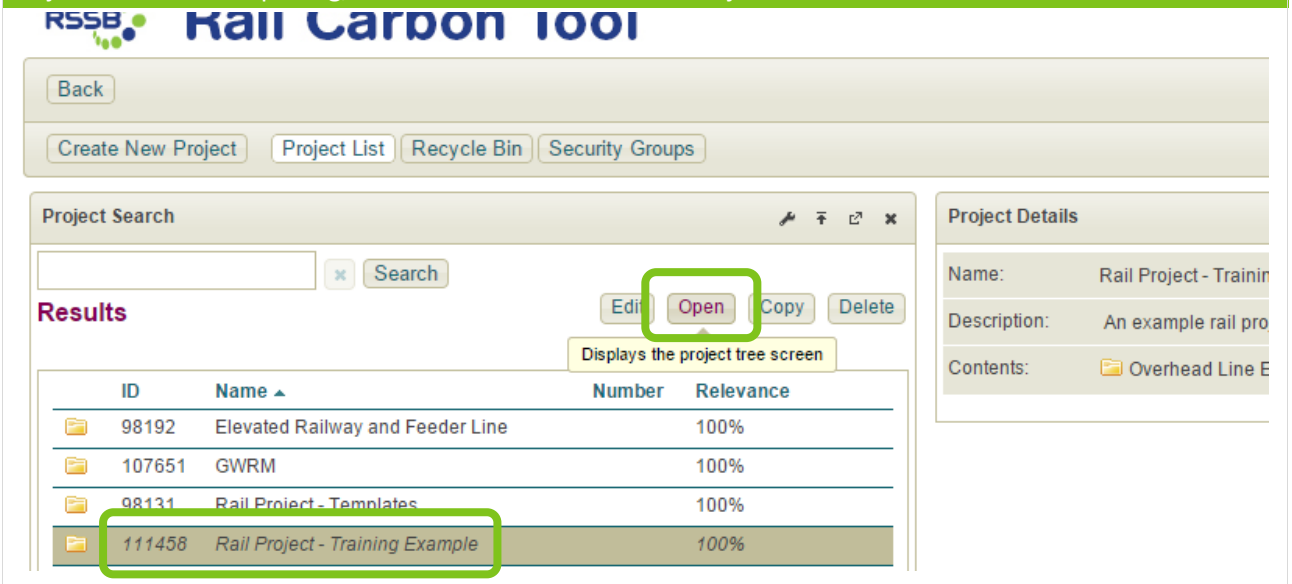
Project opened in edit mode using the Edit button, where any of the shown information can be changed and saved:



6.5.2.2 Open Details

The **Open** button opens the Project in the Project Tree screen, where the carbon calculation and analysis functions are carried out.

Project selected for opening, which takes the user to the Project Tree screen:

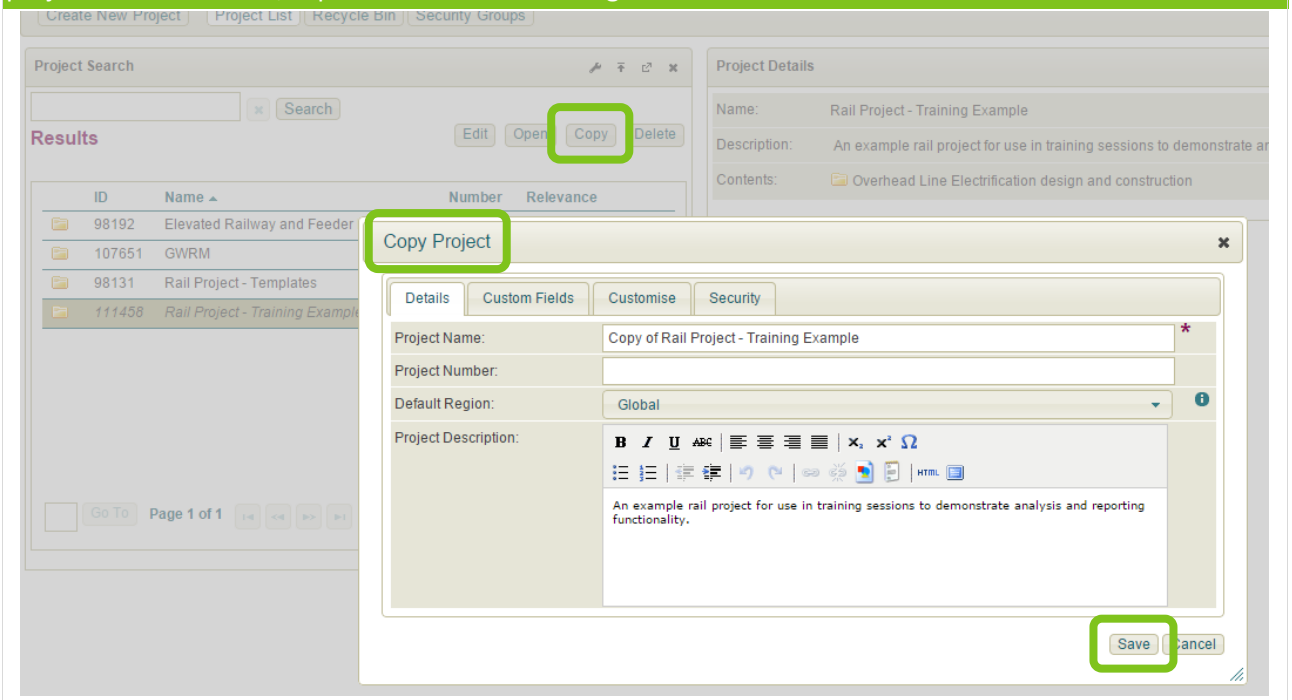


6.5.2.3 Copy

Any project in the library can be copied to create an independent copy of the original. The **Copy** function is a key function of the tool for providing carbon calculation efficiency and knowledge transfer. This is because it allows complete carbon models to be copied and used as a template for new Projects, thus negating data collection and data entry requirements, and directly facilitating knowledge transfer.

The **Copy** button opens a pop-up window and allows users to change the top level details and create a new, separate version of the original project.

Project in copy mode using the Copy button, where any of the shown information can be changed and the project saved as a new, separate version of the original:



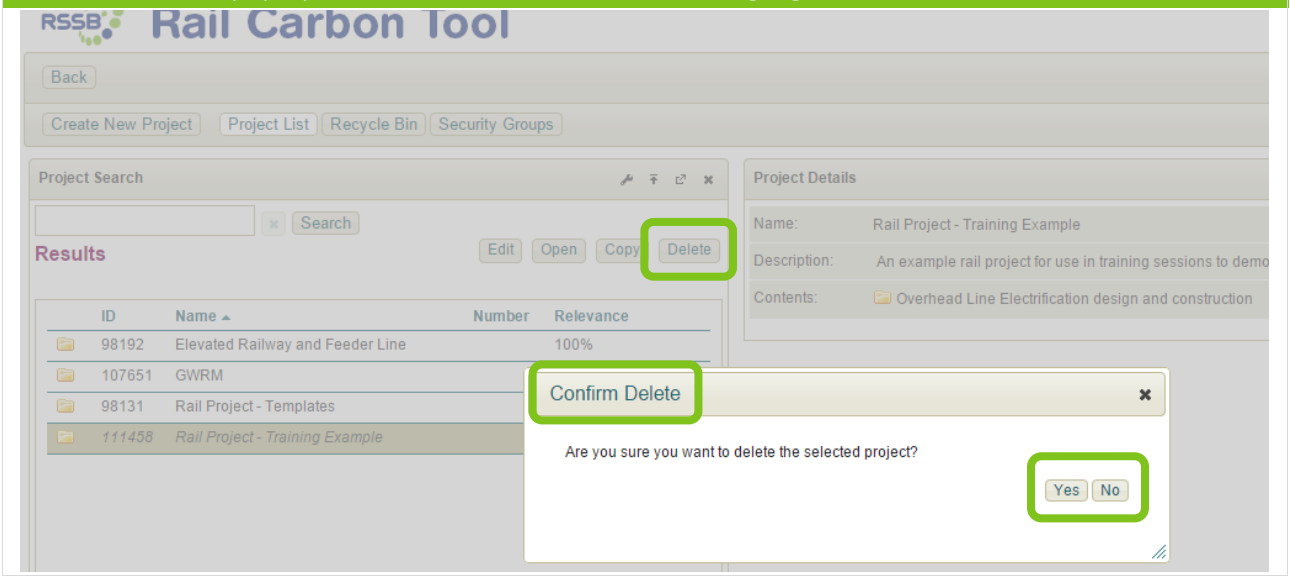
Note: When the copied version of a Project is saved it is placed in the Project library from where it can be opened.

6.5.3 Delete a Project

The **Delete** function moves a Project to the **Recycle Bin**, where it remains for seven days. After seven days it is automatically deleted from the RCT. A deleted Project can be un-deleted from the Recycle Bin at any time during the seven day period, but after this it will be permanently deleted and cannot be recovered. To delete a project:

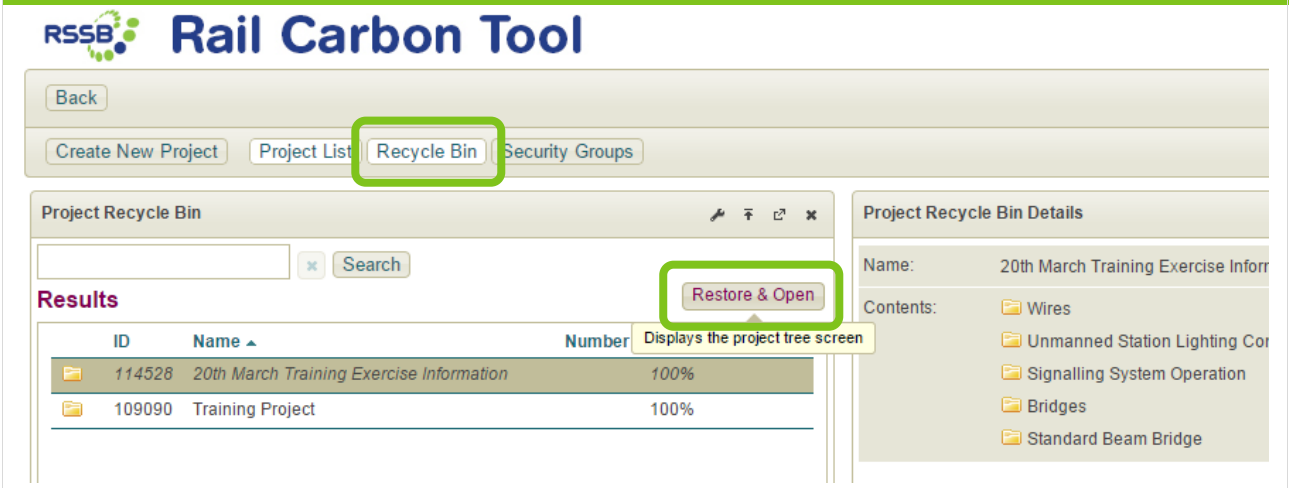
1) find the required Project in the Project library;
2) click the required Project to select it;
3) click the **Delete** button; and
4) On the **Confirm Delete** pop-up window, if the deletion is required, click the **Yes** button. The **No** button cancels the deletion.

Delete button and pop-up window with Yes and No buttons highlighted:



To restore a deleted project within seven days of deletion, click the **Recycle Bin** button, use the standard search functionality to find the Project in the **Project Recycle Bin** panel, and click the **Restore & Open** button to return the project to the Project library from where it can be opened.

Recycle Bin opened, the project selected, and the Restore & Open button ready to be clicked to carry out the retrieval from the Recycle Bin back to the Projects library:



7 How to Carry Out Carbon Calculations

Carbon calculations are carried out in the RCT using a Project Tree, for which there are two versions:

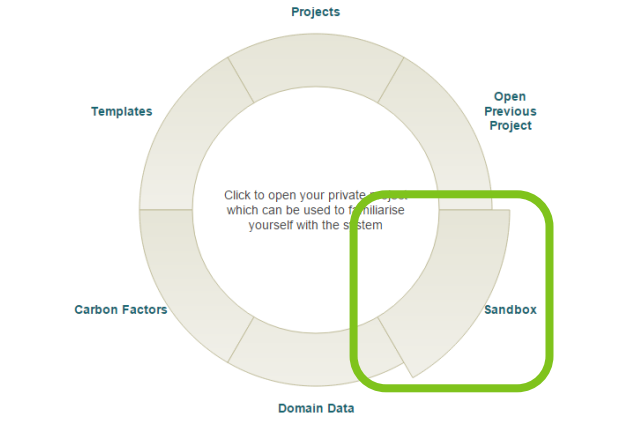
- **Sandbox**: this is a user specific, private Project Tree, which is where a user must carry out all non-project carbon calculation work; and
- **Projects**: this is a project specific version of the Project Tree, which is where project specific carbon calculations are carried out. Multiple users can access one Project, with varying levels of editing rights, as described in section 2.30.

Note: Unless a user is working on a specific Project, they must always use their Sandbox for any carbon calculations. However, any content that is created in a Sandbox can be directly transferred to a project and vice versa, as explained in section 5.14.

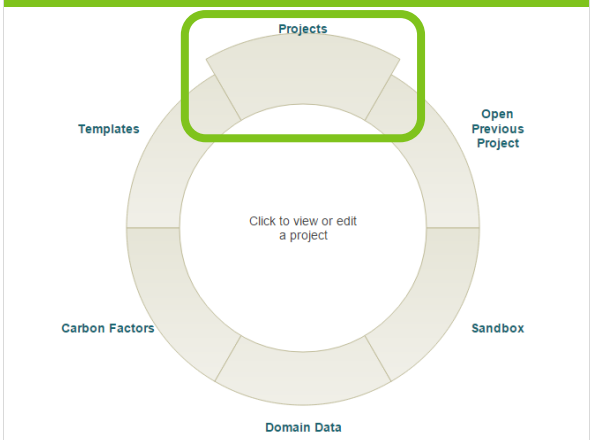
7.1 How to Find Project Trees

The **Sandbox** Project Tree is accessed directly from the navigation wheel, and Projects are accessed via the **Projects** link on the navigation wheel, and subsequently via the Project library, as detailed in section 6.5.2.

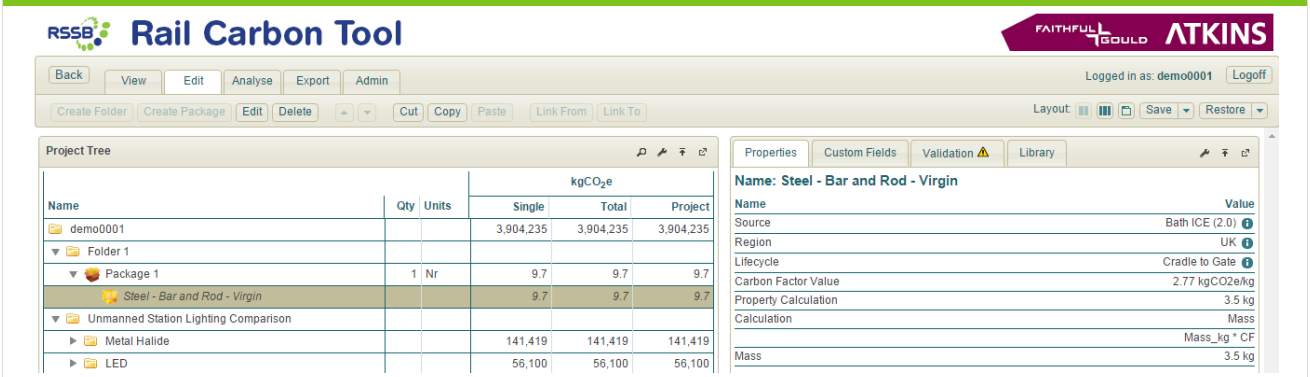
Sandbox link on the navigation wheel:



Projects link on the navigation wheel:



Sandbox Project Tree for user demo100, showing user specific carbon footprinting exercises:



In the Sandbox Project Tree all of the carbon calculation and analysis functionalities are available to the user, as this is their private area.

In Projects the functionalities available to each user will depend on the level of control they have been provided with, as explained in Section 2.30.

7.2 Creating Folders and CO_2 Packages

Folders and CO_2 Packages are the fundamental building blocks used to create a carbon model. This section explains the rules for using Folders and CO_2 Packages, and provides detailed instructions for creating them.

7.2.1 Mandatory and Best Practice Rules for Folders and Packages

There are five general rules for Folders and CO_2 Packages:

Rule 1 (mandatory): a Folder must be created below the top tier Folder in the Project Tree, before any other Folder, or CO_2 Package can be created. The Folder can be a single Folder or a series of Folders;

A series of Folders below the top tier Folder:

Project Tree

Name	Qty	Units	kgCO2e Single	kgCO2e Total	kgCO2e Project
Rail Project - Templates					
Bridges and Track Lowering					
OLE Structures and Fittings					
OLE Wires					
OLE Construction					
General Civils					
Permanent Way					
Signalling					

Rule 2 (best practice): any amount of tiers of sub-Folders and sub-packages can be created, but a pragmatic approach must always be taken to the use of both;

Tiers of Folders and packages:

Project Tree

Name	Qty	Units	kgCO2e Single	kgCO2e Total	kgCO2e Project
demo0001			3,904,225	3,904,225	3,904,225
Folder 1					
Folder 1.1					
Folder 1.1.1					
Package 1	1	Nr	0	0	0
Package 1.1	1	Nr	0	0	0
Package 1.1.1	*1*	*Nr*			

Rule 3 (best practice): any amount of Folders and CO_2 Packages can be created in series. The number required will be dictated by the number of items / components to be included in the carbon calculation;

Rule 4 (best practice): planning of the Folders and CO_2 Packages that are required in a Project Tree is crucial to generating a well-structured Project Tree. Good planning only comes with experience, but it can be easily gained because of the user-friendly format of the Project Tree, i.e. the ease of use means Project

Tree structure improvements can be easily carried out by novice users. However, novice users should be aware of this, plan where possible, and expect to need to restructure Project Trees. To avoid excessive reworking extensive carbon calculations should be avoided until an emerging Project Tree structure has been reviewed.

There is no specific definition for what constitutes a well-structured Project Tree because it is dependent on the particular carbon footprint being generated. However, in general:

- all line items should clearly relate to real-world items and activities, or groups thereof;
- names on Folders, CO_2 Packages and Carbon Factors should be as informative as possible e.g. '*Bridge Deck Bearings*'.
- units on CO_2 Packages should be as detailed as possible e.g. '*Nr. per bridge deck*', rather than just '*Nr.*';
- Custom Fields should be used to add useful meta-data, including automatic Custom Fields, to make this as easy as possible; and
- the Notes section on each line should be used to provide additional details, where available and relevant. Such details include: scope detail, images, documents, and reference numbers.

Rule 5 (best practice): If a CO_2 Package is only a unit of one and it only has one Carbon Factor, the values for **Single**, **Total**, and **Project** in the Project Tree will be the same. The CO_2 Package will therefore be superfluous and should be removed. This is only possible where there is a parent CO_2 Package available to place the Carbon Factor into. The purpose of this rule is to ensure that a Project Tree does not have unnecessary line items, which aids its usability. However, it is recognised that there will be circumstances where this rule cannot be applied e.g. where the structure of the Project Tree Folders and CO_2 Packages require this e.g. where an item has only one material, such as a metre of rail, but there are more than one of such items, e.g. 1000m of rail.

7.2.2 Create Folders and CO_2 Packages

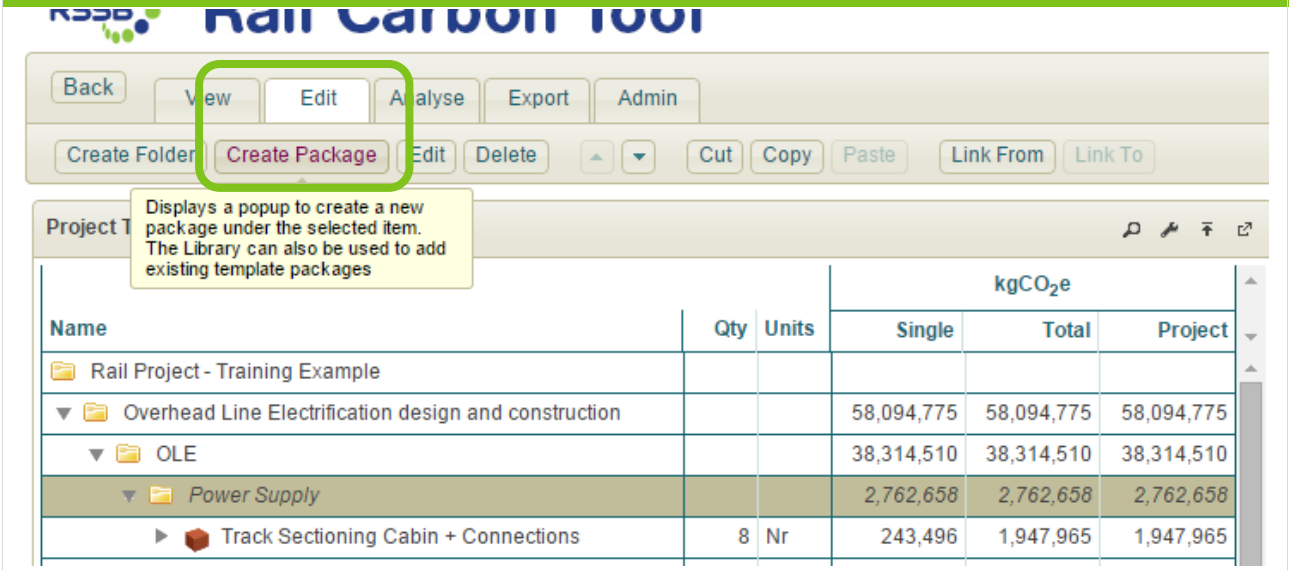
The process for creating Folders and CO_2 Packages is carried out by selecting the parent tier to which a Folder or CO_2 Package is to be added to, then:

1) select the **Edit** tab and click the **Create Folder** or **Create Package** button, or right click on the relevant tier and select **Create Folder** or **Create Package** from the pop-up menu; and
2) for Folders, in the pop-up panel add the required information to the fields, as follows:
   - **Name**: the Folder name that will show in the Project Tree;
   - **Default Regions**: a region can be set that dictates what regional Carbon Factors are used, where they exist. The default setting is Global, which is appropriate for UK rail projects;
   - **Notes**: any written description can be added to provide further details about the Folder that has been specified;
   - **Show Totals**: the Yes or No radio buttons allow the sum total of any carbon calculations within a Folder to be shown. This is a simple on / off option, and can be readily changed to either; and
   - **Custom Fields**: this allows users to add additional information or data to a Folder (see section 5.12 for explanation of this).
3) for CO_2 Packages, in the pop-up panel add the required information as follows:
   - **Package Type**: use the radio buttons to set the type of package (for Standard Packages see the details in the following bullets, for External Packages see section 7.3);

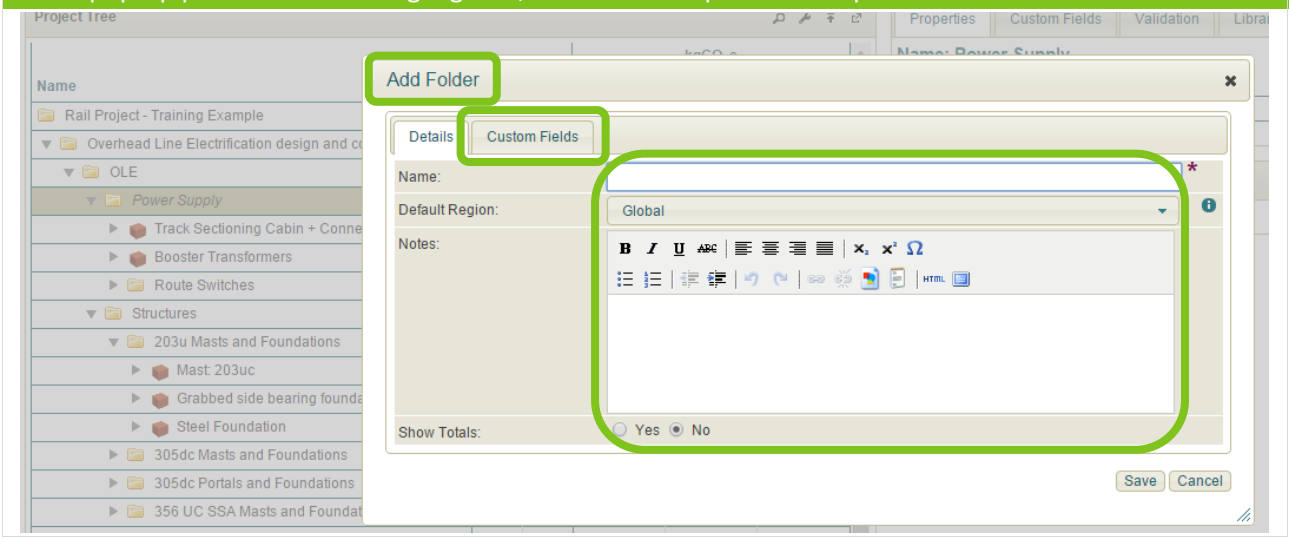
- **Name**: add the name of the item, activity etc. that is to be displayed in the Project Tree and for which a carbon footprint is to be calculated;
- **Quantity**: the number of items, etc. which are to be accounted for;
- **Units**: the units for the item – see examples in the Project Tree screenshots below;
- **Notes**: any written description can be added to provide further details about the CO_2 Package that has been specified;
- **Custom Fields**: this allows users to add additional information or data to a CO_2 Package (see section 5.12 for an explanation of this); and
- **Alternate Names**: function not in use due to current lack of technical application.

4) click the pop-up panel **Save** button, to add the Folder or CO_2 Package into the Project Tree.

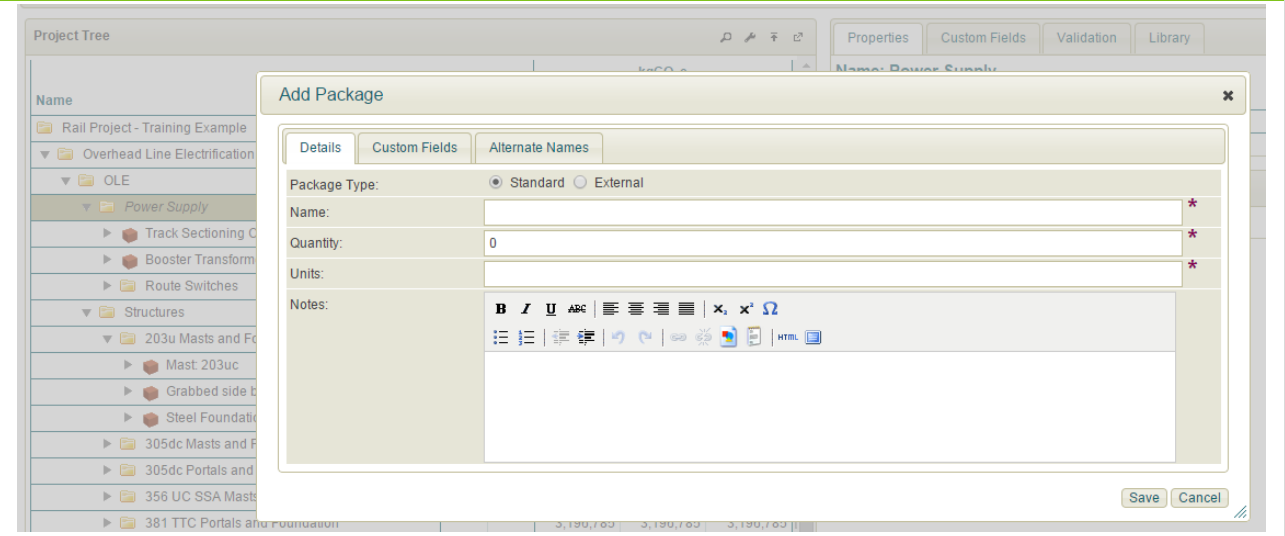
Edit tab and Create Package button:



Folder pop-up panel with fields highlighted, and to be completed as required:



Package pop-up panel:



7.3 Add External Packages

An option is provided on CO_2 Packages to allow a user to set their own ('external') Carbon Factor values, independently of the Carbon Factor library. The purpose of this function is to provide maximum flexibility for users to any Carbon Factors they require. The main uses of this function are for when a user has a more accurate value than those available in the RCT, or when the Carbon Factor value the user requires is not available in the RCT.

External CO_2 Packages are set as follows:

1) Add a **CO_2 Package** as defined in section 7.2.2 above and tick the **External** radio button for Package Type;

2) An **External Package** tab is then created where the relevant data is required to be entered including:

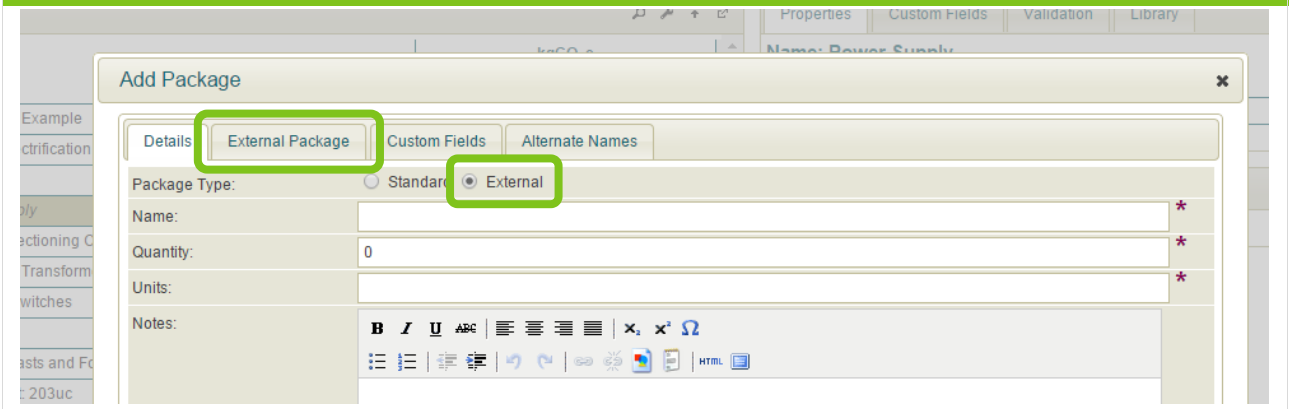
   – **Carbon Factor**: this field is for the numerical Carbon Factor value that is to be used;

   – **Source**: this is the source details for the new value, for which a Source record has to be created separately, as detailed below. It is the responsibility of users to ensure that carbon data used in external packages is appropriately referenced; and

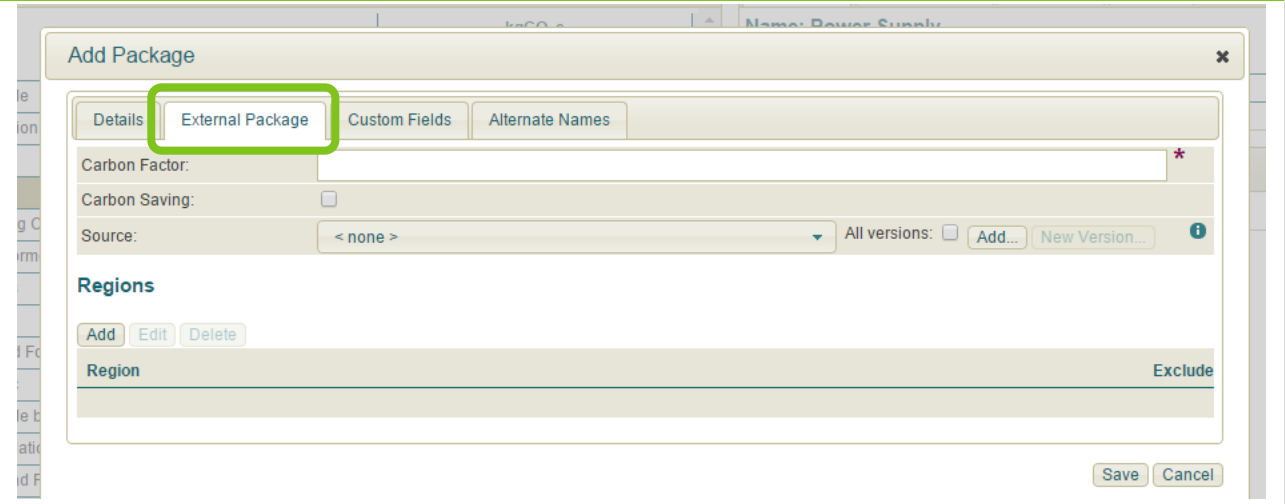
   – **Region**: the region that the external factor applies to.

Note: Neither the Source or Region fields are mandatory.

External Package pop-up panel showing External radio button ticked on the Details tab, and External Package tab:



External Package tab showing field details:



7.3.1 Source Records

Source records allow an External Package Carbon Factor value to be fully referenced, which is required to ensure a robust carbon footprint model is developed. Source records can be created either as a separate exercise in the source records list, and then used on the External Package, or directly in the Package pop-up window.

For creating a source record from the Source record list, use the following steps:

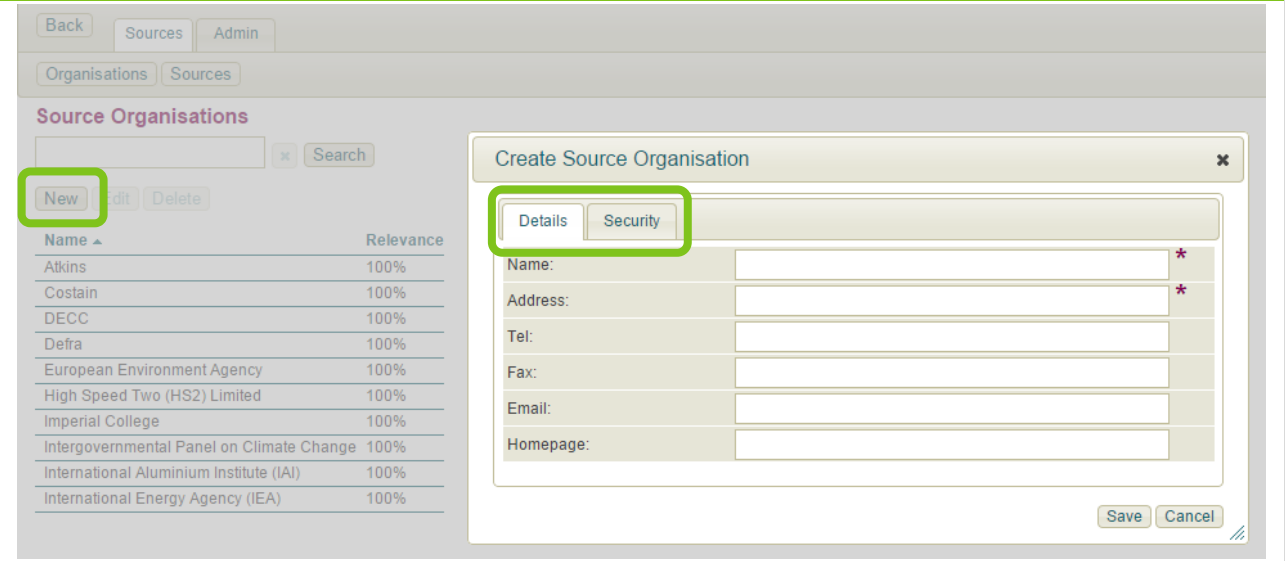
1) ensure that the required Organisation record exists;

2) navigate to the Source Organisation records list via: Navigation wheel ➔ Domain Data ➔ Source tab ➔ Organisations button;

3) use the search function to check for the required organisation record;

4) where the required organisation does not exist create a new record using the **New** button, complete the details on each tab, and **Save** the new record;

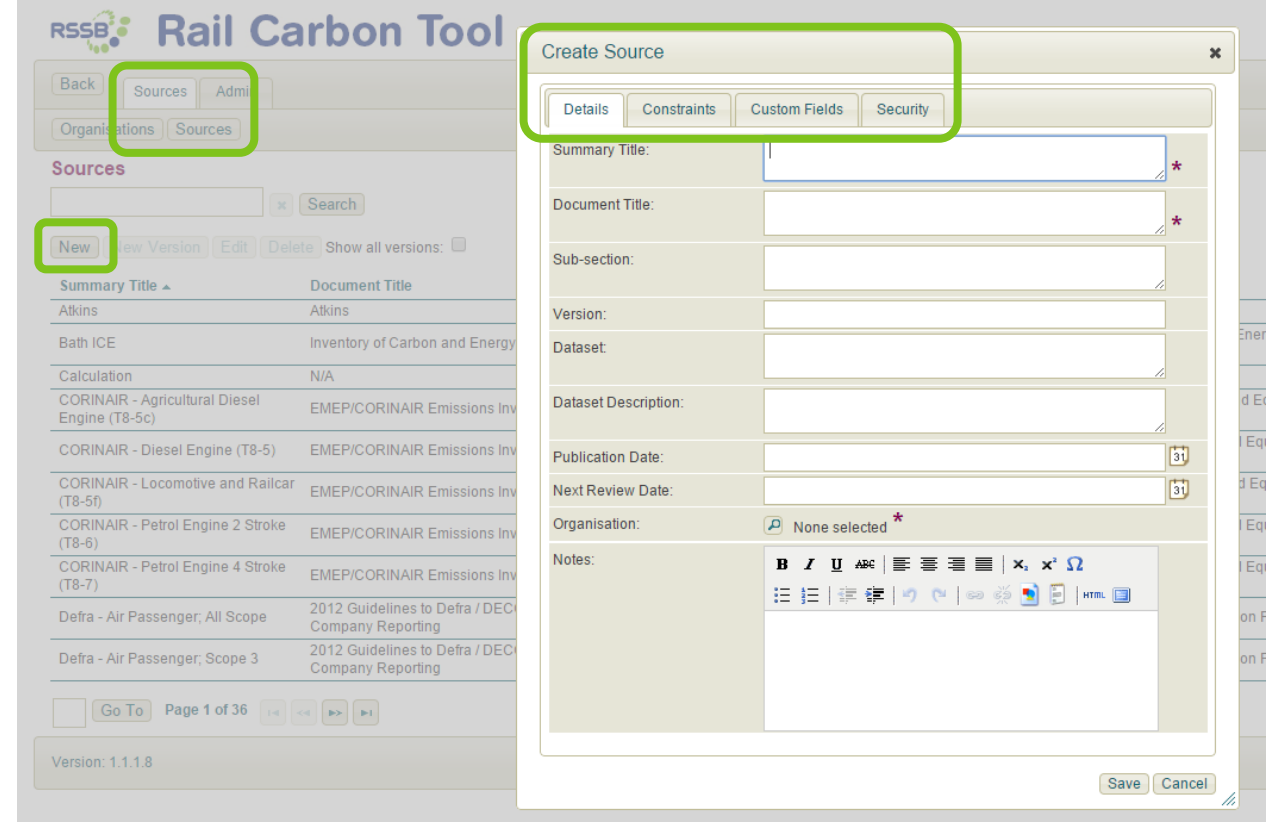
New Source Organisation record, with New button, and record pop-up with Details and Security tab:



5) create the Source record by clicking the **Source** button on the **Source** tab, then click the **New** button; and

6) in the **Create Source** pop-up window complete the fields on each of the four tabs as required (**Details**, **Constraints**, **Custom Fields** and **Security**), and click the **Save** button.

Source tab, Source button, New button, and Create Source pop-up window and tabs:

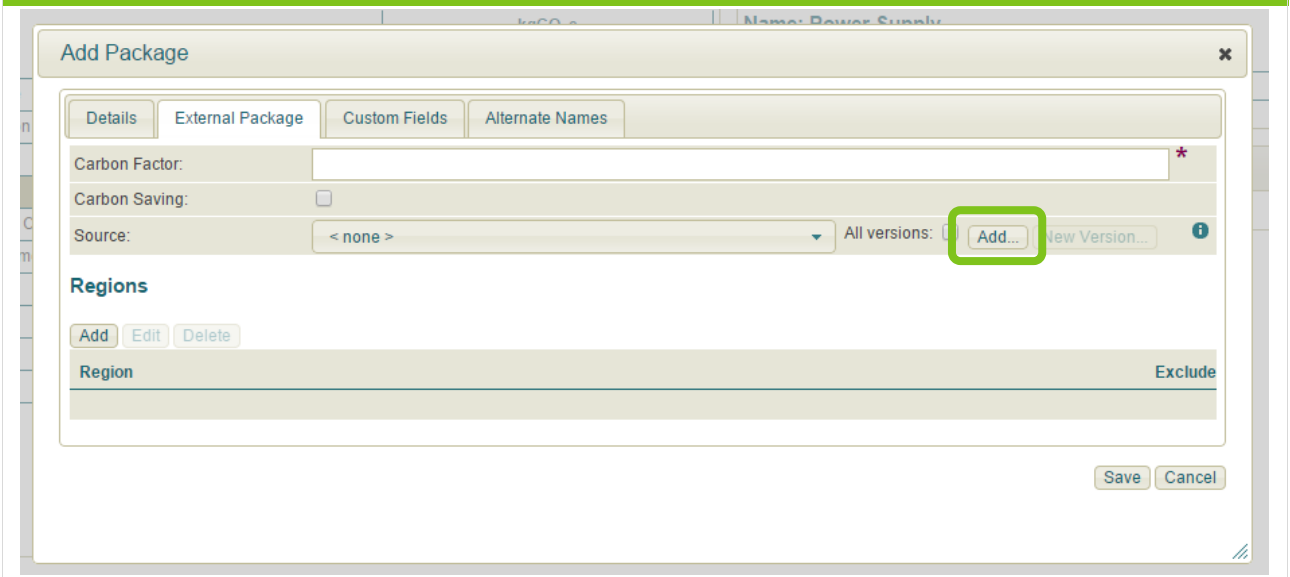


For creating a Source record in an External Package pop-up window, use the following steps:

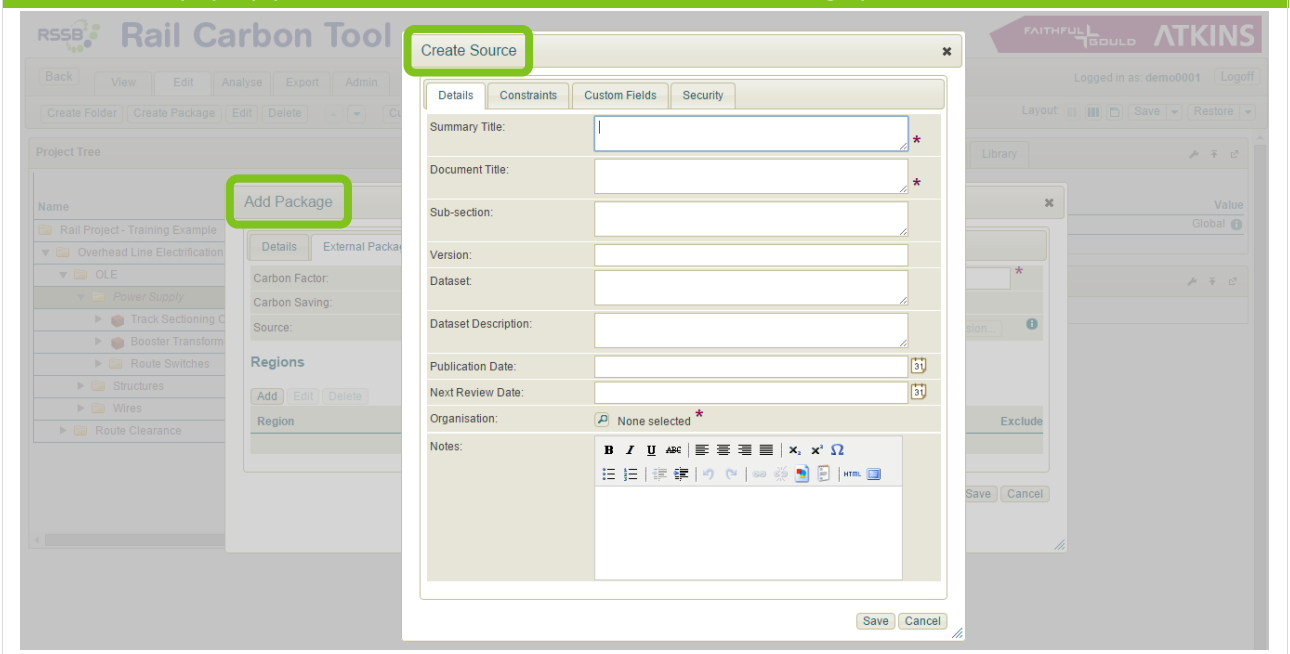
1) click the **Add** button on the **External Package** tab; and

2) complete the **Source** record fields on each tab in the **Create Source** pop-up window, and **Save** the new record.

Add button on the External Package tab:



Source record pop-up panel in front of the associated External Package panel:



7.4 Add Carbon Factors to the Project Tree

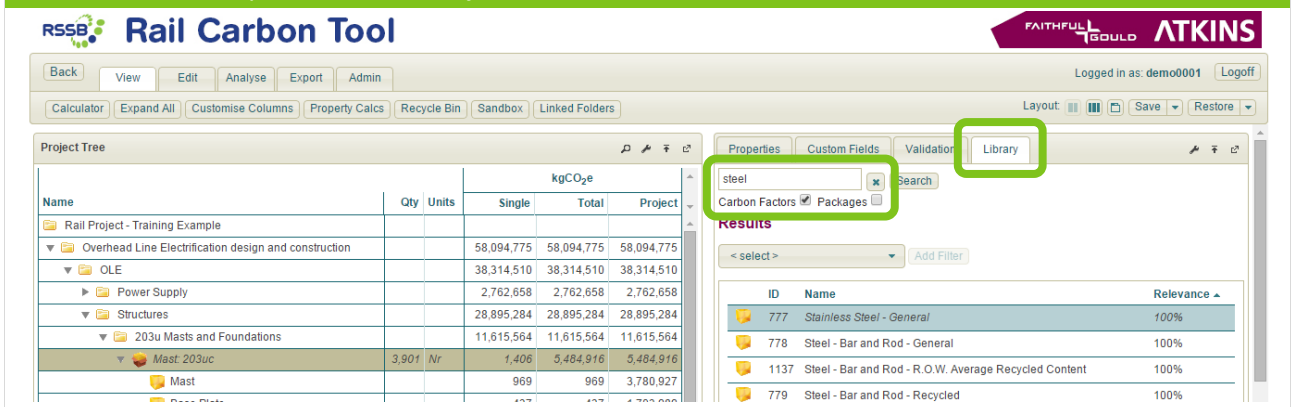
The next key step to using the tool after creating Folders and CO_2 Packages is to add in Carbon Factors and project data. The key rule for this is that Carbon Factors can only be added to a CO_2 Package in a series, and they are always the lowest level of detail possible within a Folder and CO_2 Package structure, i.e. no additional tiers can be added below a Carbon Factor.

The steps to add a Carbon Factor to the Project Tree are:

1) go to the library in the **Project Tree**, and ensure only the **Carbon Factors** radio button is ticked;

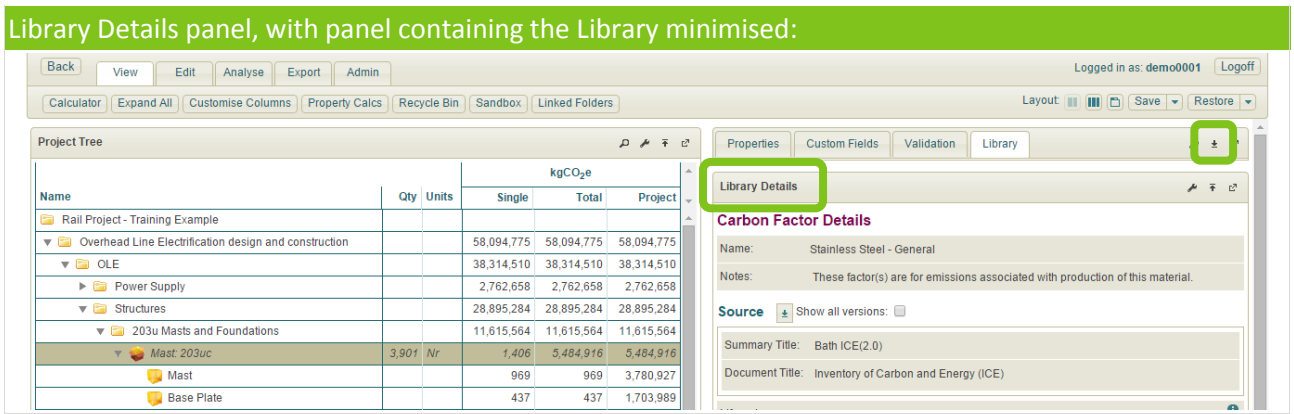
2) use the standard search function to search for the required Carbon Factor;

Carbon Factor library search in the Project Tree:



3) once identified, select the required Carbon Factor in the library list, and go to the **Library Details** section;

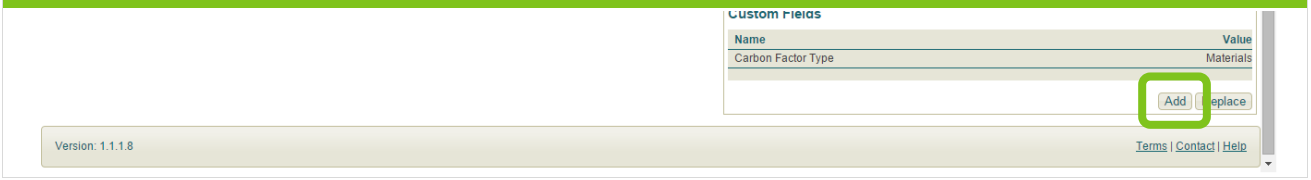
Library Details panel, with panel containing the Library minimised:



4) in the Library Details section set the relevant options as required: **Summary Title**, **Region**, **Type / Unit** and **Calculation**;

5) once set, select the relevant CO_2 Package in the **Project Tree** that the Carbon Factor is to be added to, and click the **Add** button at the bottom of the **Library Details** section (it may be necessary to scroll-down to access the **Add** button);

Add button:

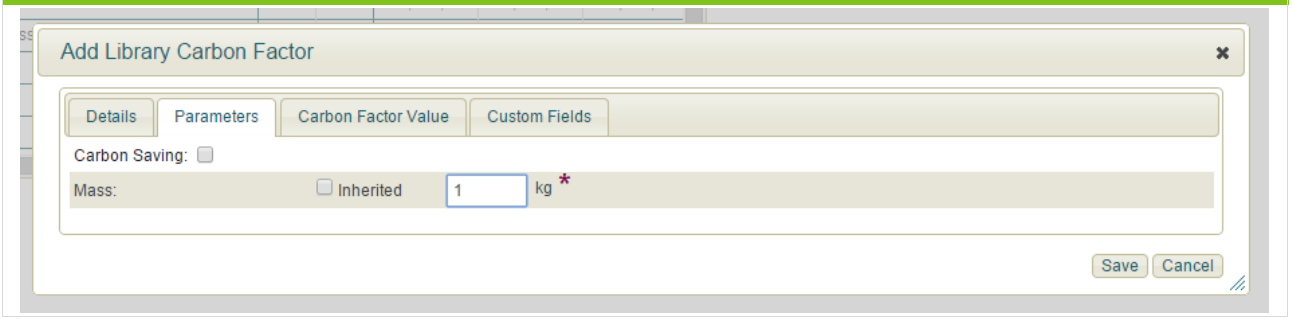


6) a **Carbon Factor** pop-up window will open where the relevant details must be added, as follows:

- **Name:** the name for the Carbon Factor in the Project Tree. The library name for the Carbon Factor will be provided as the default name in the Project Tree. However, a user can specify any name they require. The purpose of this is to enable the library name to be changed to reflect the item, etc. that the Carbon Factor represents. Where a user specifies a name different to the library name the default library name will show in the Properties for the Carbon Factor in the Project Tree. A different name can be provided for every use of a Carbon Factor in the Project Tree, even where the Carbon Factor and / or the new name is used more than once.
- **Carbon Saving:** the option exists to add a Carbon Factor as a carbon saving rather than a carbon cost. This is done by ticking the Carbon Saving radio button on the Carbon Factor edit pop-up. Where this function is used the value shows in brackets and the value shown is detracted from the overall carbon footprint.

  When using this function it is important to bear in mind that it calculates a true saving and not an emissions avoidance, e.g. if a carbon footprint has a total value of 1000 $kgCO_2e$, and a saving of 70 $kgCO_2e$ is then added, the total will be shown as 930 $kgCO_2e$. This function ensures that the tool can accommodate circumstances where actual carbon savings need to be quantified;
- **Parameters**: the numerical project data to be used to define the item;
- **Inherited Parameters**: see section 7.7; and
- **Custom Fields**: see section 5.12.

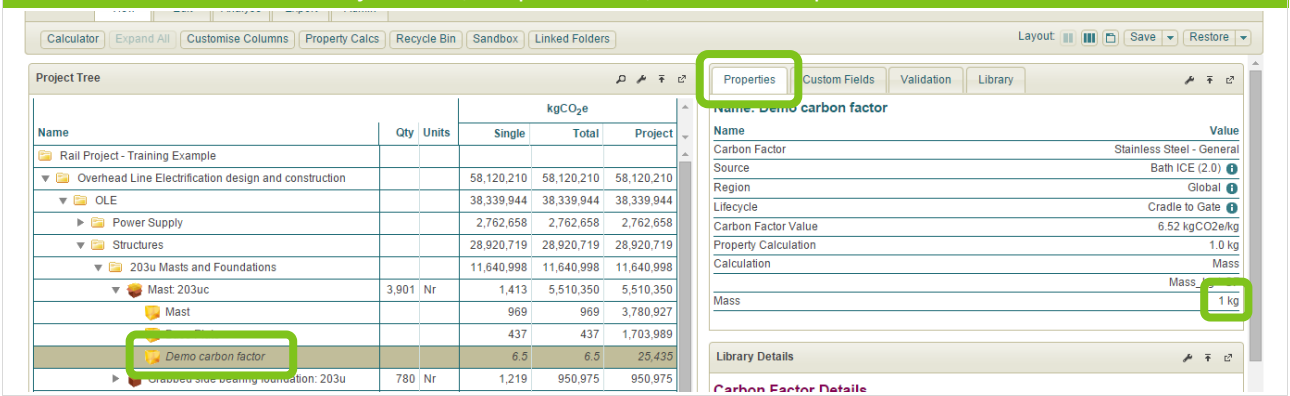
Parameter tab on a Carbon Factor pop-up window:



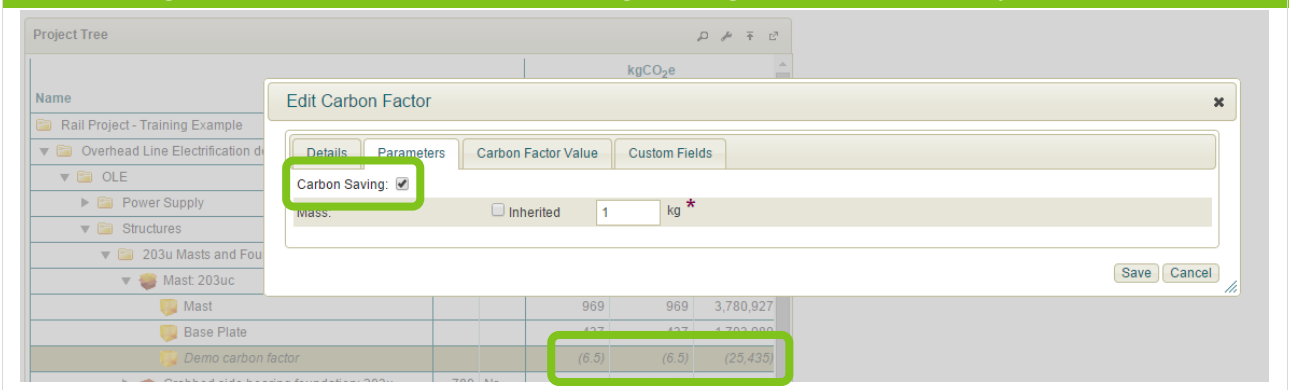
7) click the **Save** button to add the Carbon Factor to the **Project Tree**.

The steps above complete the essentials of carbon footprint calculations in the RCT. The details entered can be seen in the **Properties** tab.

New Carbon Factor in the Project Tree, Properties tab, and entered parameter:



Carbon Saving radio button ticked and carbon saving showing in brackets in the Project Tree:



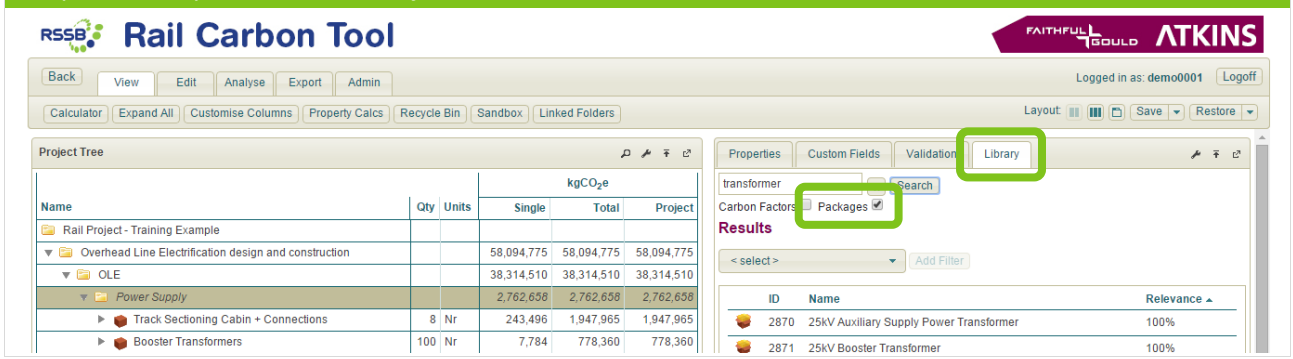
7.5 Add a Template CO_2 Package to the Project Tree

As an alternative to directly adding in Carbon Factors and project data, predefined Carbon Factors and project data can be added by using the Templates CO_2 Packages.

The steps to add a template to the **Project Tree** are:

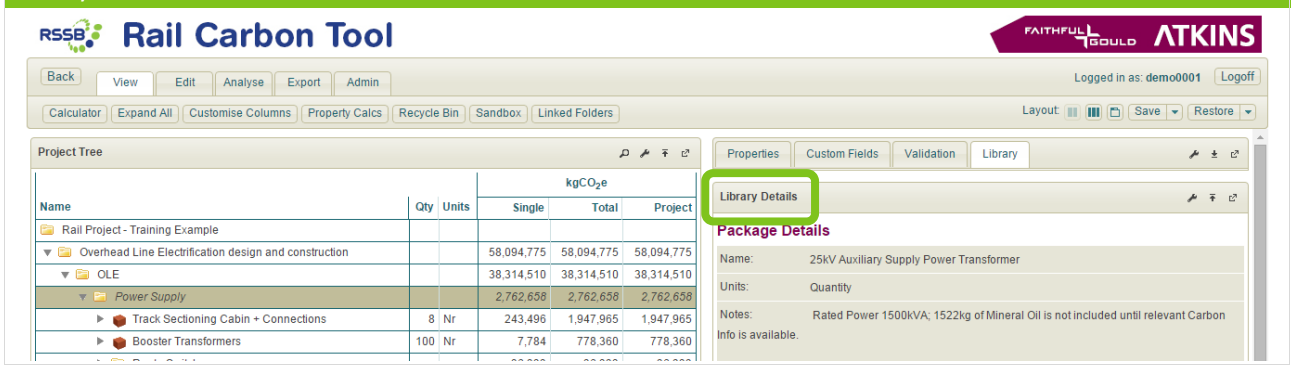
1) go to the **Library** in the **Project Tree**, ensure only the **Packages** radio button is ticked (this selects the Template library only), and search for the required Template CO_2 Packages, using the standard search function;

Template library search in the Project Tree:



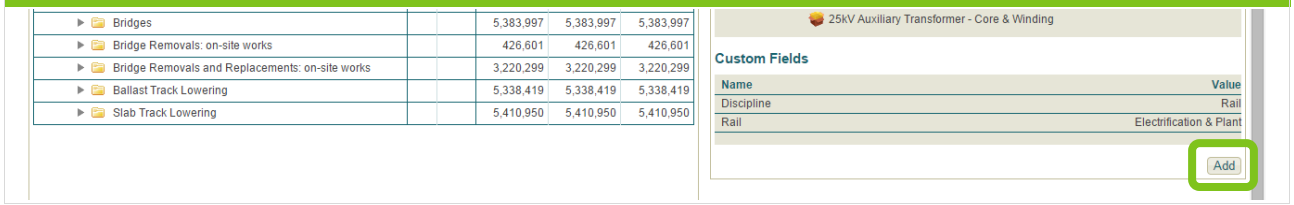
2) once identified, select the required template in the **Library** list, and go to the **Library Details** section;

Library details:



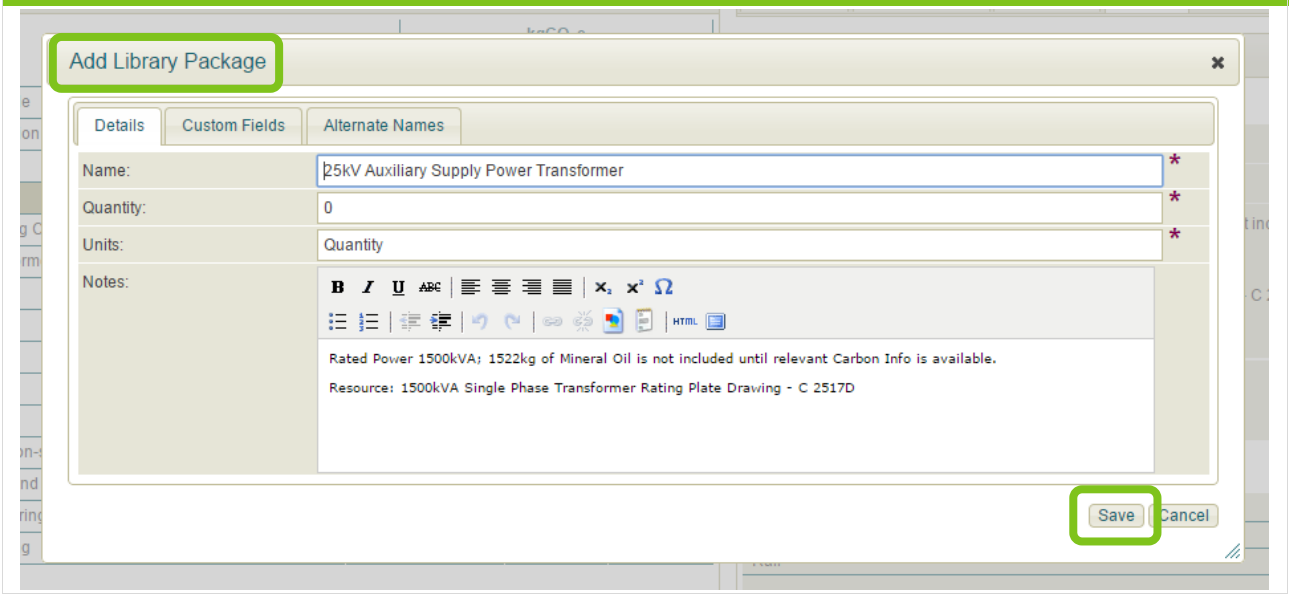
3) select the relevant Folder or CO_2 Package in the **Project Tree** that is to receive the Template CO_2 Package and click the **Add** button at the bottom of the **Library Details** section (depending on panel layout it may be necessary to scroll down to access the button);

Add button:



4) an **Add Library Package** pop-up window will open where the **Name**, **Quantity**, **Units** and **Notes** must be added; and

Template package pop-up window and Save button:



5) click the **Save** button to add the template to the **Project Tree**.

7.6 Editing Content in the Project Tree

Once a carbon model has been partially or fully created any Folder, CO_2 Package, or Carbon Factor in the Project Tree can be edited, including:

- amending any content that a user has entered; and / or
- moving, copying, cutting, or deleting any part of the Project Tree structure.

7.6.1 Amending Content

All user entered content can be amended as follows:

1) open the relevant line item in the **Project Tree** in edit mode by selecting it and clicking the **Edit** button, or double click it, or right click and click **Edit** on the pop-up menu;

2) in the **Edit** pop-up panel delete any existing content that is not required and enter the new content as if being originally entered; and

3) click the **Save** button to save the amendments.

Note: Any content that is deleted as part of an amendment will be permanently lost once the amendments are saved. This is the case because any changes take effect immediately, once saved, and there is no undo functionality.

7.6.2 Moving and Cutting

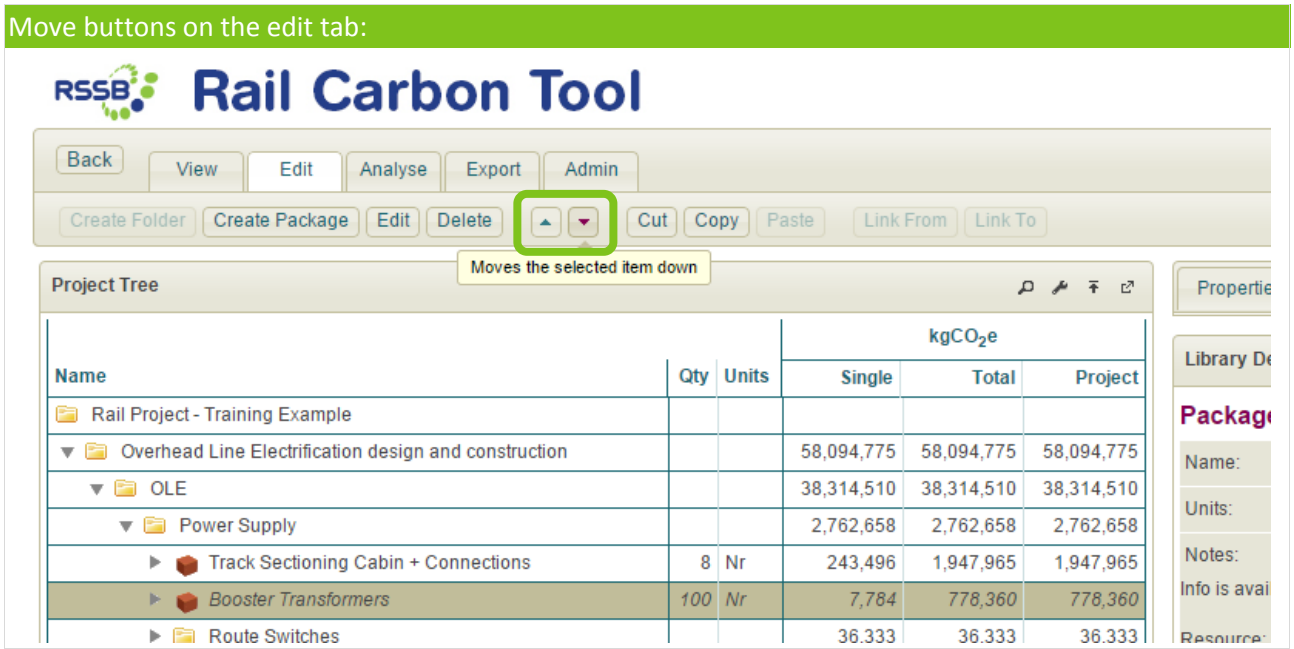
Any part of the **Project Tree** can be moved by either pushing it up or down the immediate **Project Tree** structure, or by cutting and pasting it.

To move an item up and down its immediate structure:

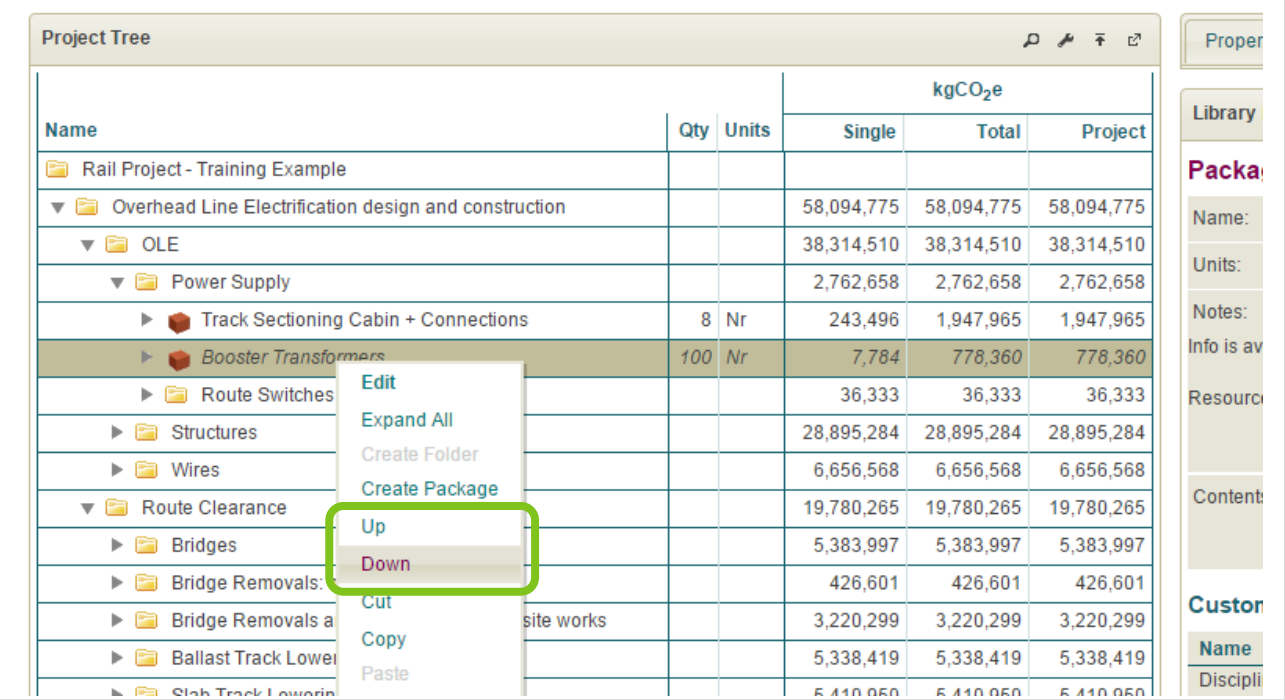
1) select the relevant item; and

2) use the **Up** and **Down** buttons on the **Edit** tab, or the **Up** and **Down** options on the right click pop-up menu to make the required moves.

Move buttons on the edit tab:



Up / Down options on the pop-up menu:



To move an item to entirely different part of a Project Tree use the cut and paste functions on the **Edit** tab, or on the right click pop-up menu, as follows:

1) select the relevant item;

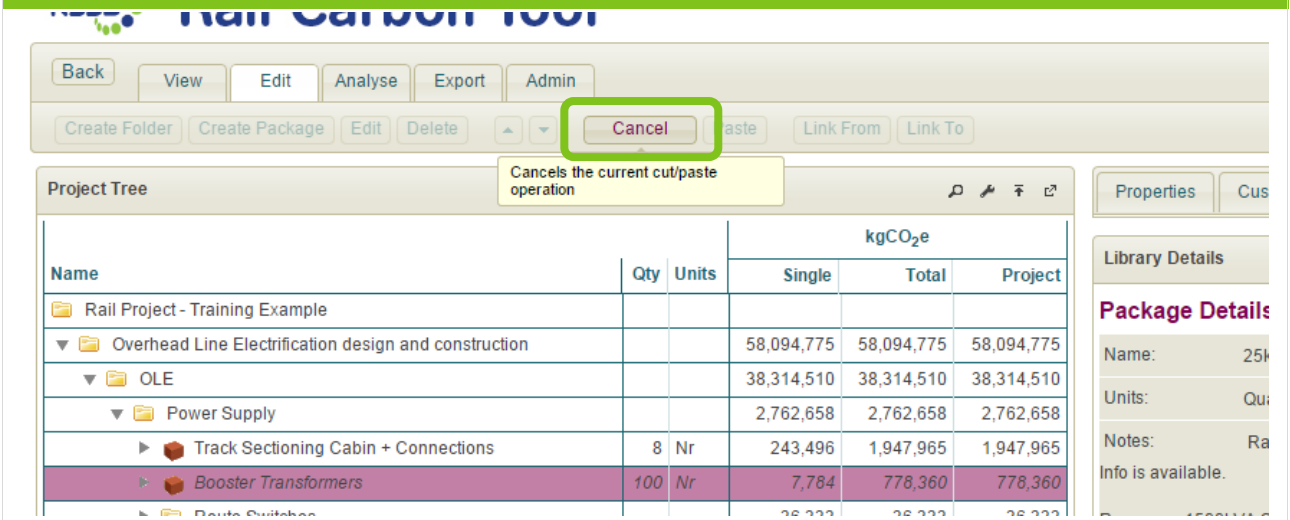
2) click the **Cut** button;

3) navigate to and select the new location in the Project Tree, and click the **Paste** button; and

4) any item that is selected to be cut but the function is then not required, can be cancelled using the **Cancel** button on the **Edit** tab.

Note: The sub contents of any items that are cut and pasted will also be moved.

Line item selected and Cut function applied (as shown by pink line item), and Cancel button for copy and cut functions:



7.6.3 Copying

Any part of the Project Tree can be copied. This is particularly useful where duplicate contents or structures are required. By copying structure and data it eliminates additional data entry requirements.

Copying is carried out as follows:

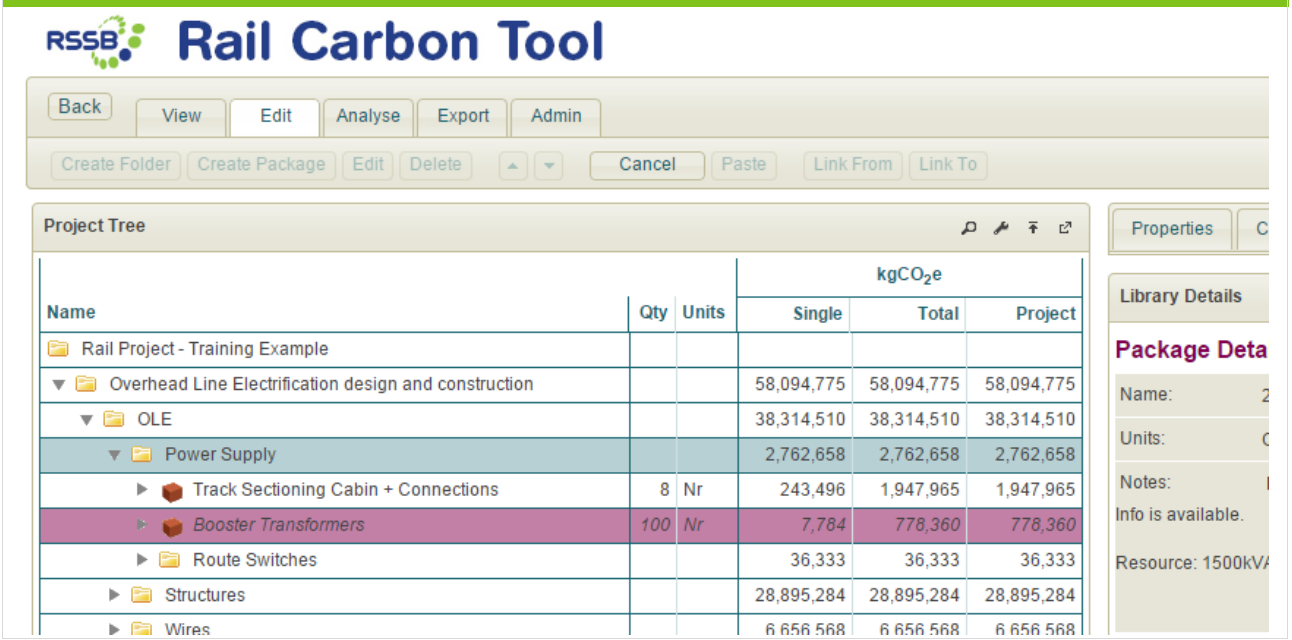
1) select the relevant line item to be copied;

2) copy the item using the **Copy** button on either the **Edit** tab or the right click pop-up menu; and

3) select the location the item is to be copied to and paste it in, using the **Paste** button on either the **Edit** tab or the right click pop-up menu.

Note: If any item(s) have sub contents these will also be copied.

Packages selected and copied (pink row), and new location selected ready for pasting (blue row):



7.6.4 Deleting

Any part of the Project Tree can be deleted.

Deleting is carried out as follows:

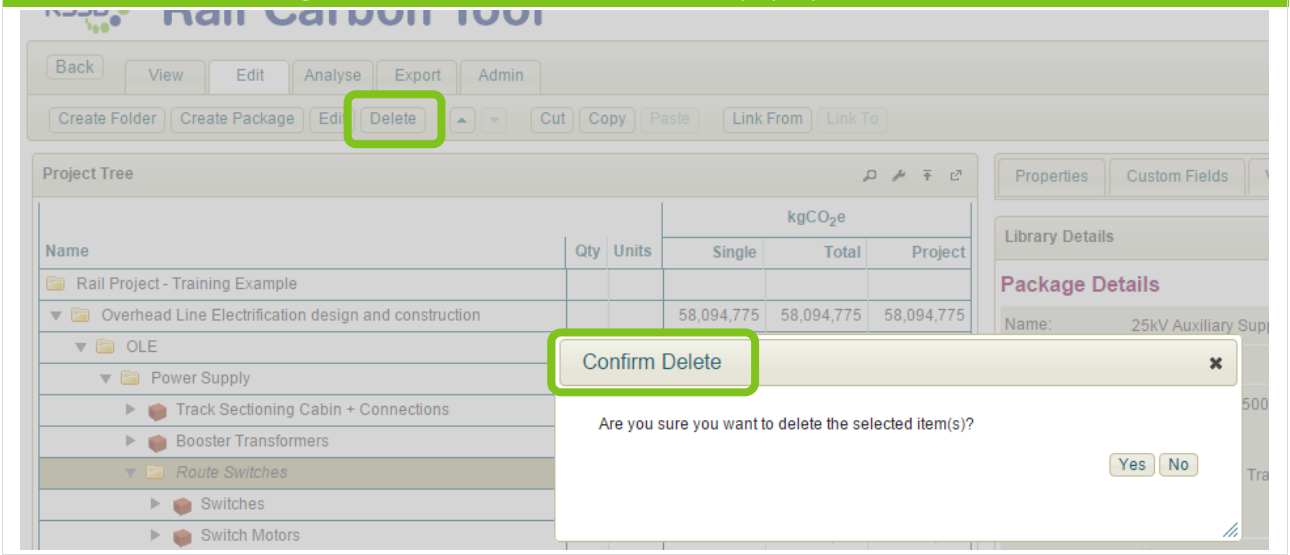
1) select the relevant line item to be deleted;

2) click the **Delete** button on either the **Edit** tab or the pop-up menu; and

3) select the **Yes** button on the pop-up window that appears.

Note: Any item that is deleted is sent to the **Recycle Bin**, where it remains for seven days. After seven days it is automatically fully deleted from the RCT. A deleted item can be un-deleted from the Recycle Bin at any time during the seven day period, but any time after this it will be permanently deleted and cannot be recovered. Instructions on how to recover deleted items are provided in section 7.6.5below.

Item selected for deleting, Delete button and Confirm Delete pop-up window:



7.6.5 Recovering Deleted Items

Any deleted items can be recovered from the **Recycle Bin** in a Project Tree, as follows:

1) go to the **View** tab and click the **Recycle Bin** button to open the **Recycle Bin** library panel;

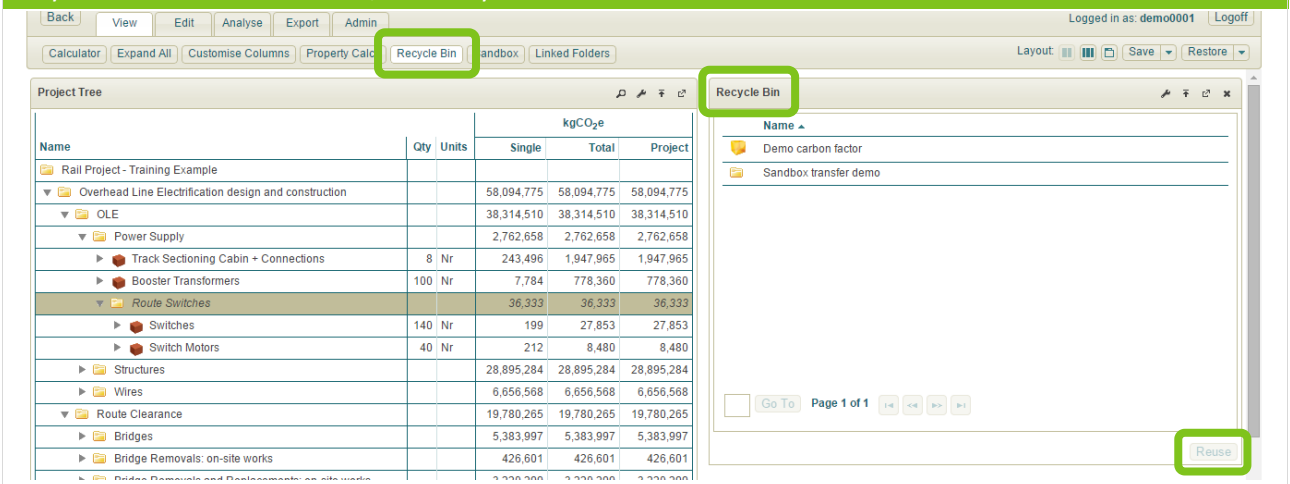
2) select the relevant item in the **Recycle Bin**;

3) select the location in the **Project Tree** where the item is to be recovered to;

4) click the **Reuse** button in the **Recycle Bin** panel to return the item to the **Project Tree**; and

5) close the Recycle Bin by pressing the **X** button in the top right of the panel or by re-clicking the **Recycle Bin** button.

Recycle Bin and Reuse buttons, and Recycle Bin:



7.7 Promoting and Editing Parameters

The RCT includes functions to enable parameters to be promoted up the Project Tree to the parent CO_2 Package(s). The purpose of this is to allow a parameter value to be used more than once or to allow 'one-stop' updates, i.e. the function removes the need for line by line amendments should they be required.

Parameters are initially promoted as follows:

1) open the relevant Carbon Factor in **Edit** mode;

2) go to the **Parameters** tab;

3) tick the **Inherited** radio button;

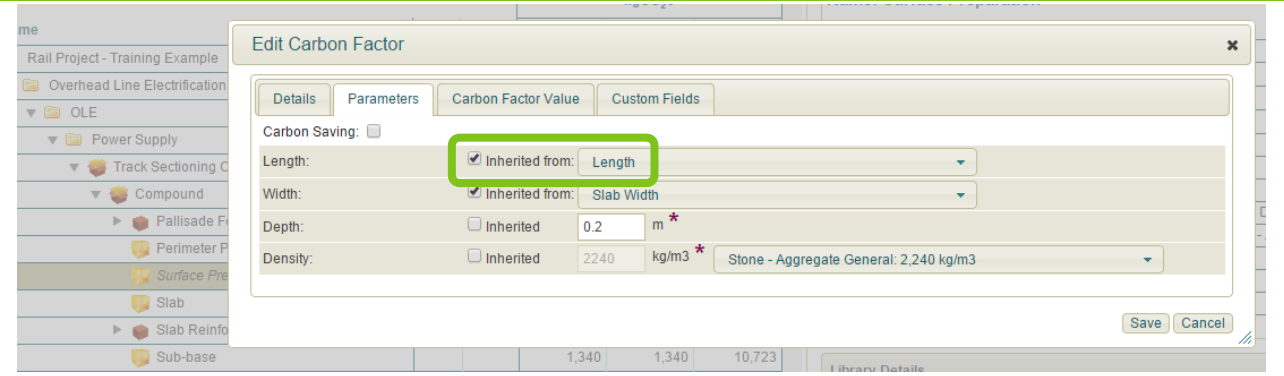
4) add a **<custom>** name where required (otherwise the standard Parameter name will be used); and

5) click the **Save** button to apply the change.

This action automatically moves the parameter field up to the CO_2 Package level, where it will be displayed in the Properties tab for the CO_2 Package and in the Parameters tab for the CO_2 Package, when it is in Edit mode.

Any parameter that is promoted must be updated on the CO_2 Package as the associated value field will initially show as empty. This includes where the original Parameter value was entered on the Carbon Factor because values are not copied up when the Parameter field is inherited.

Parameter ticked to be inherited and standard field name used:



An inherited parameter can be further promoted to other higher (parent) CO_2 Packages, as required, by repeating the above process for the Parameter from its location in a CO_2 Package. However, Parameters cannot be promoted to Folders.

To update Parameters that have been promoted to CO_2 Packages use the following process;

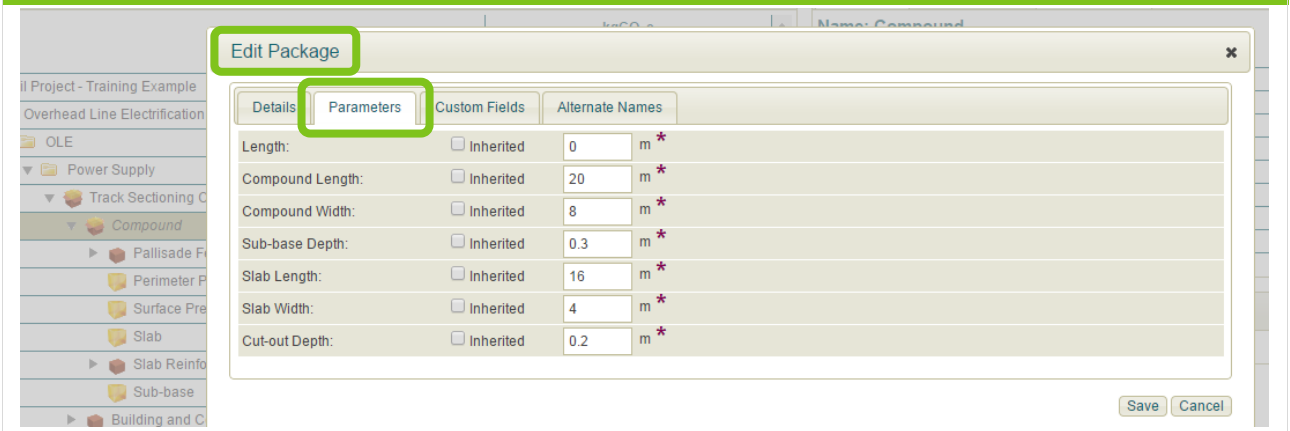
1) open the relevant CO_2 Package in **Edit** mode;

2) go to the **Parameters** tab and enter the required values, e.g. mass, length, litres, and kWh; and

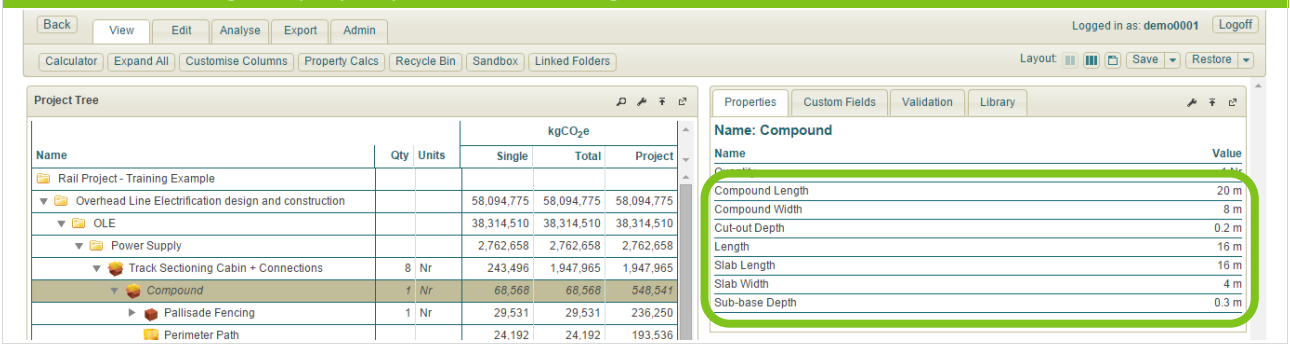
3) Click the **Save** button to apply the change.

All parameters can be un-inherited by removing the tick from the **Inherited** radio button and re-entering the parameter value at the required level.

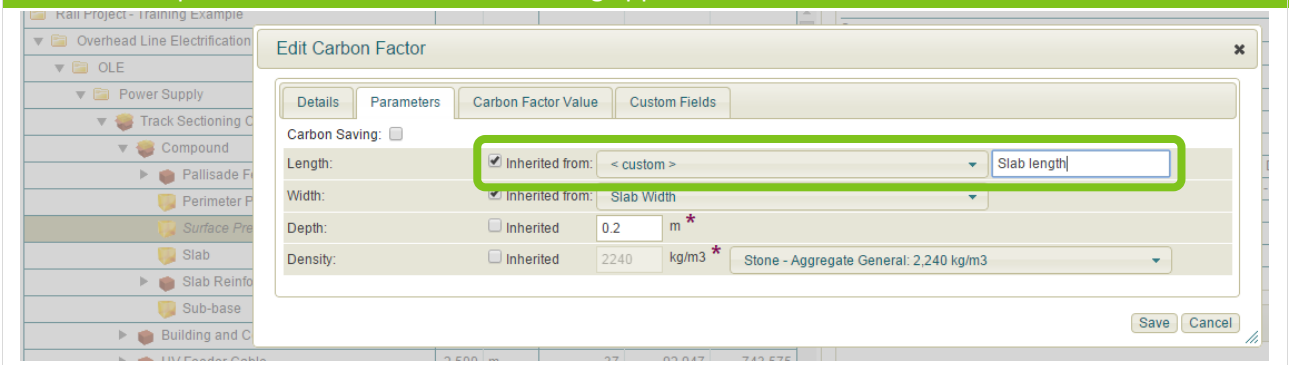
CO_2 Package pop showing Parameter tab:



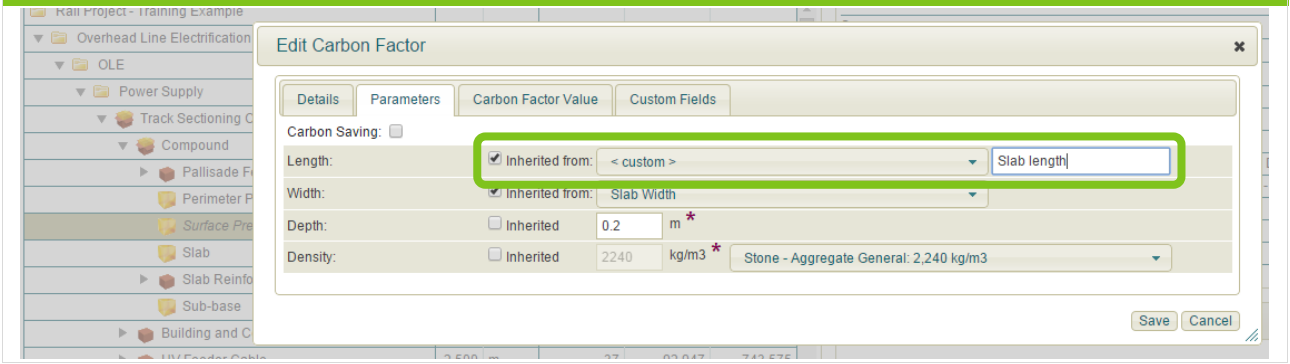
Parameter showing as a property of the CO_2 Package:



Carbon factor parameter with custom name being applied:



Carbon Factor with inherited parameter being used from parent package:



7.8 Replacing Carbon Factors

If incorrect Carbon Factor(s) have been used in a Project Tree they can be readily replaced without the user having to entirely delete them. This function is useful as it allows quick changes to Carbon Factors without the loss the data that has been entered with the existing incorrect Carbon Factor(s).

The replace function is carried out as follows:

1) select the location in the **Project Tree** where the changes are to be applied;

2) go to the **Library** and select the new Carbon Factor;

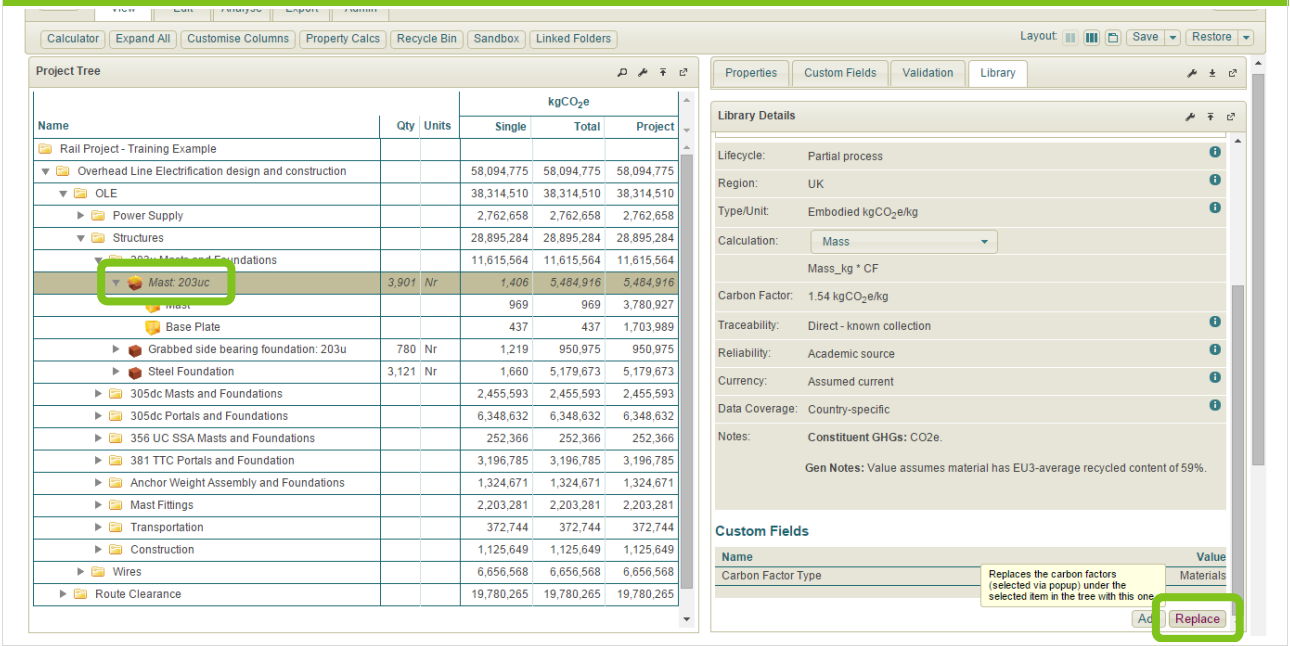
3) go to the **Library** details, select the correct source, and click the **Replace** button;

4) in the **Replace Carbon Factors** pop-up window, select the Carbon Factor that is to be replaced; and

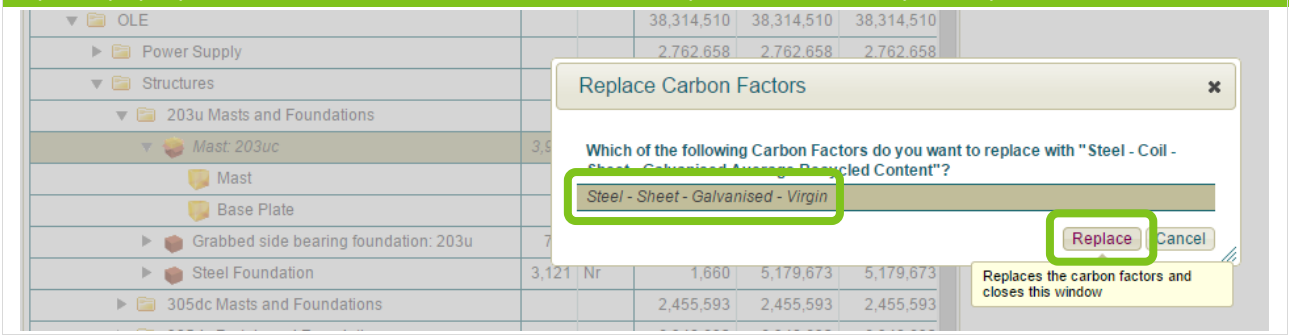
5) click the **Replace** button in the pop-up window to complete the change.

Note: This function can only be applied on Folders and CO_2 Packages and it will change all uses of any one Carbon Factor, with the new version, for all tiers below the selected item. This function needs to be used with caution when making individual or small groups of edits as changed can be introduced in other parts of the Project Tree by accident. However, it can be applied on the headline Folder of a Project Tree to make Project Tree wide changes. This can be very useful, e.g. for changing a whole carbon model from virgin materials to recycled.

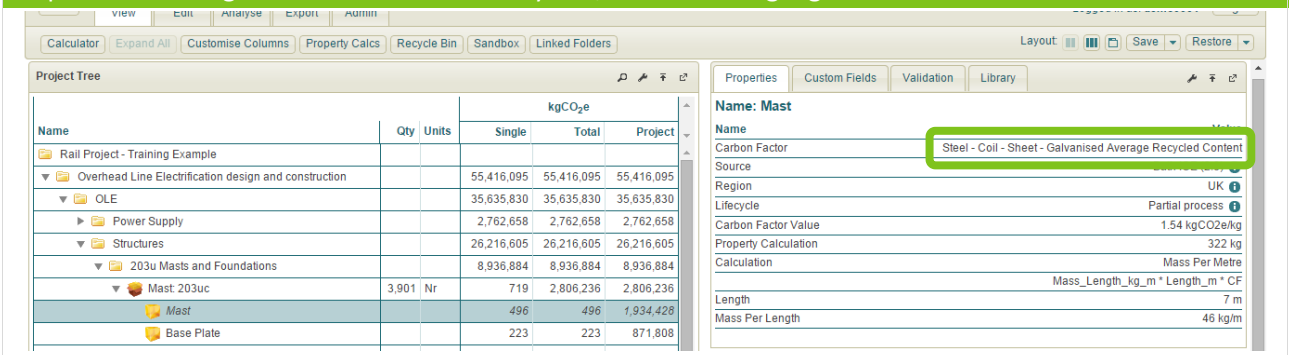
Selected Project Tree location and Replace button:



Replace pop-up and selected new Carbon Factor, with Replace button ready to be pressed:



Properties showing the Carbon Factor as recycled, instead of virgin galvanised steel:



7.9 Changing Carbon Factor Value Sources or Versions

Some Carbon Factors have multiple values from different sources, and / or multiple versions of values from the same source. Given this, situations will occur where a user needs to correct or update the source or version of a single Carbon Factor in a Project Tree. For such one-off changes a function is provided to allow such corrections or updates to be easily carried out in the Carbon Factor pop-up window, as follows:

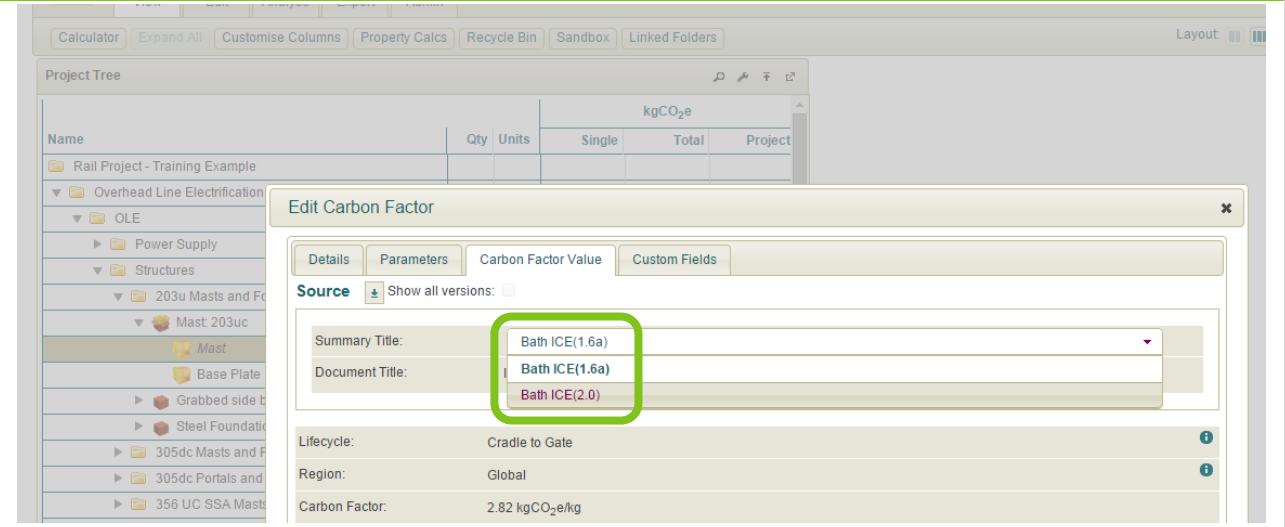
1) open the **Edit Carbon Factor** pop-up window for the relevant Carbon Factor and go to the **Carbon Factor Value** tab;

2) in the **Summary Title** field select the correct version from the drop down menu; and

3) click the **Save** button to apply the change.

Note: This function is only available where there is an alternative version to use. If there is not an alternative version available there will not be a drop down menu. Secondly, where multiple Carbon Factors need changing this is best done using the Replace function (see Section 7.8).

Current version 2.0 shown in bold and version 1.6a with the cursor over it to be selected:

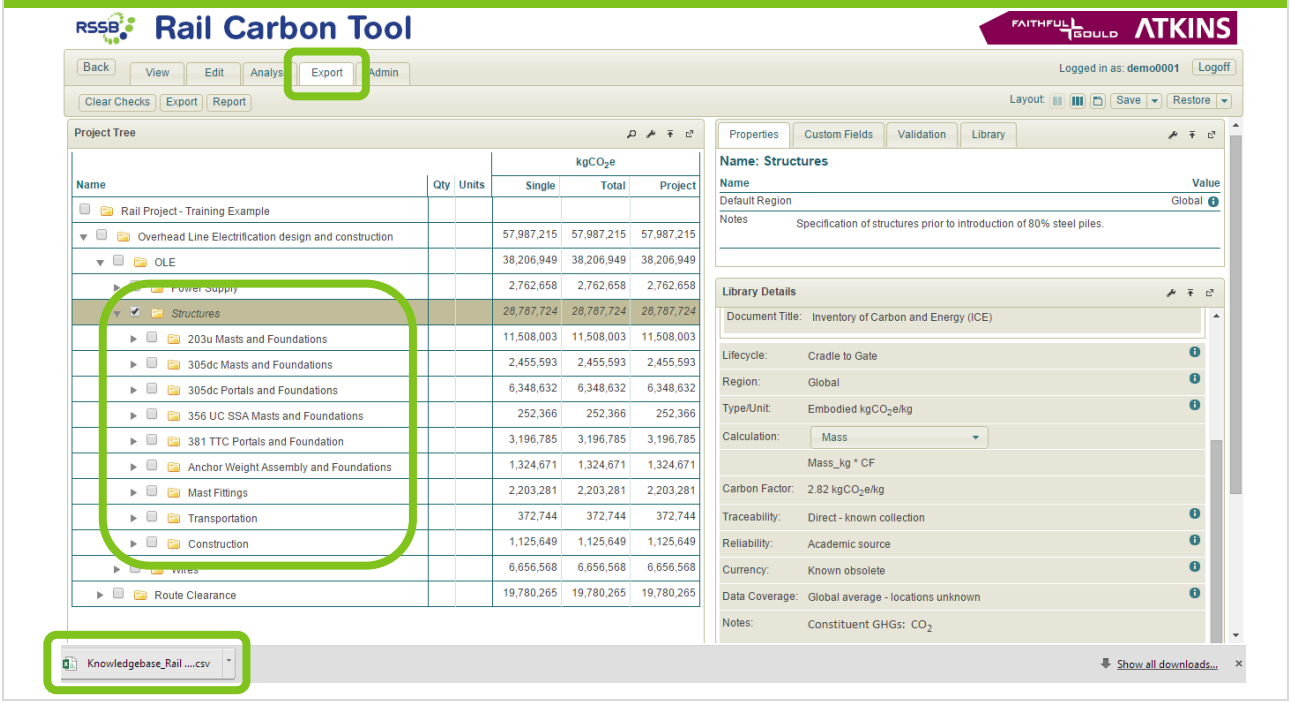


8 Exporting Data and Reports

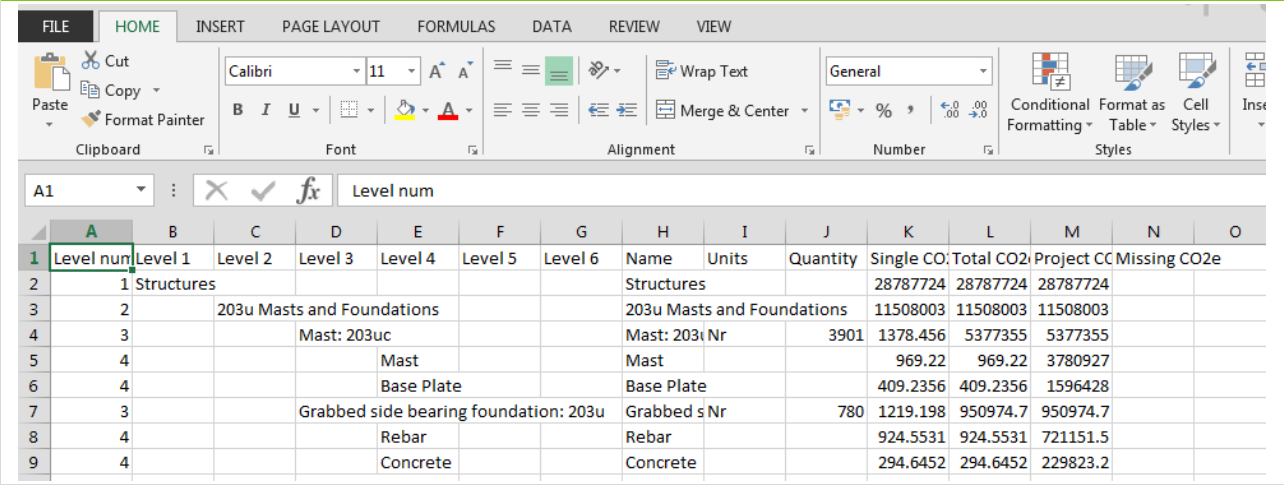
Any data entered into or calculated in the RCT can be exported in either a spreadsheet or PDF format, as follows:

1) go to the **Export** tab (which this introduces tick boxes at the start of each line item in the Project Tree);
2) tick the top tier section of the **Project Tree** that are to be included in the data export;
3) either click the **Export** button to initiate generation of a spreadsheet or the **Report** button to initiate generation of a PDF;
4) the **Export** option downloads a CSV file which can be opened and/or saved;
5) the **Report** option opens a pop-up window where the report format is defined, as follows:
   – set the **Tree Contents** radio buttons to set whether the report is produced as shown in the Project Tree on the screen or whether all sub-tier items are displayed in the PDF report; and
   – set the **Details** radio buttons to set whether the report is produced with just the Project Tree line item names or all details, as shown in the Properties tab for each line item in the Project Tree.
6) to produce the report, click the **Export** button, which generates and downloads the PDF which can be opened and / or saved.

Export tab selected, Structures selected in the Project Tree and CSV report downloaded and shown in bottom left:

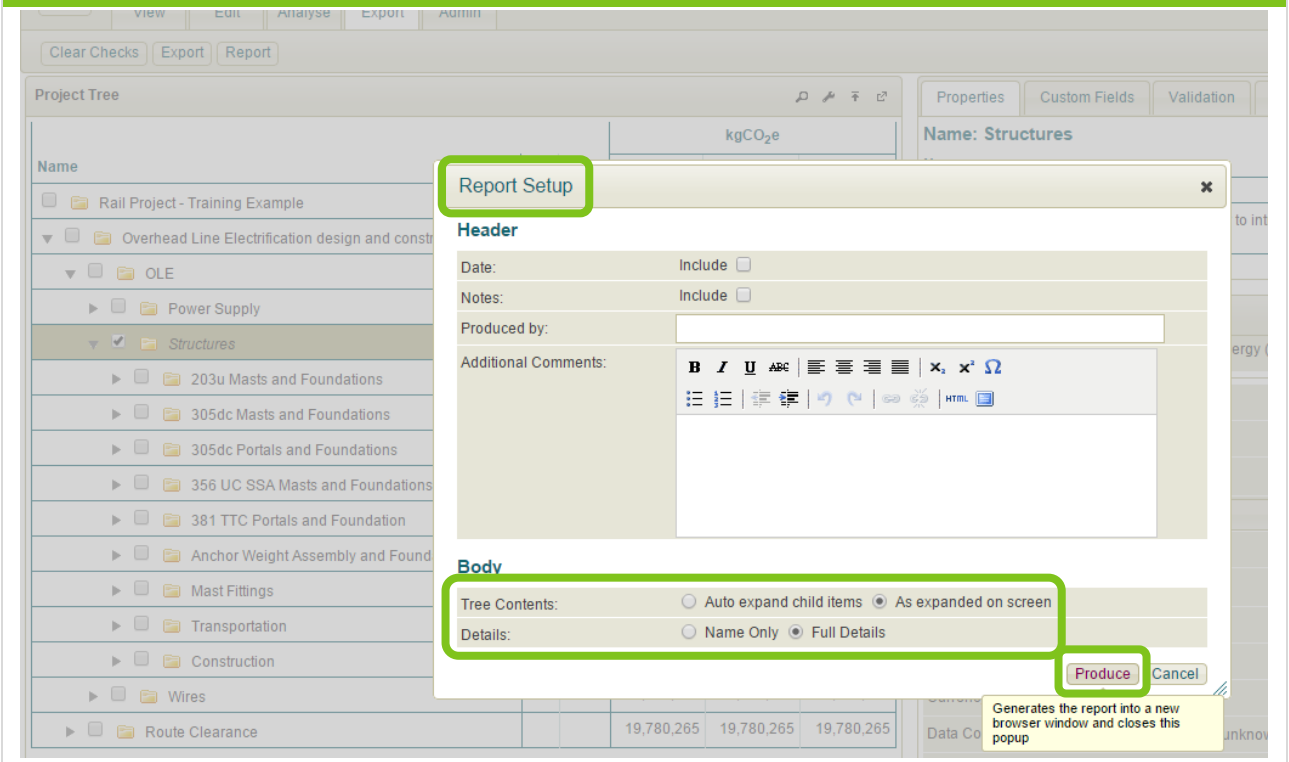


CSV report of Structures:



Level num	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Name	Units	Quantity	Single CO	Total CO2	Project CC	Missing CO2e
1	Structures						Structures			28787724	28787724	28787724	
2		203u Masts and Foundations					203u Masts and Foundations			11508003	11508003	11508003	
3			Mast: 203uc				Mast: 203	Nr	3901	1378.456	5377355	5377355	
4				Mast			Mast			969.22	969.22	3780927	
4				Base Plate			Base Plate			409.2356	409.2356	1596428	
3			Grabbed side bearing foundation: 203u				Grabbed s	Nr	780	1219.198	950974.7	950974.7	
4				Rebar			Rebar			924.5531	924.5531	721151.5	
4				Concrete			Concrete			294.6452	294.6452	229823.2	

Report pop-up window for Structures PDF report, Tree Contents set as As expanded on screen, Details set as Full Details, and Produce button:



Structure PDF report showing the items as expanded on screen:

RSSB **Rail Carbon Tool** ATKINS

Project Name: Rail Project - Training Example

Section: Structures

Name	Quantity	kgCO$_2$e Single	Total	Project
Structures		28,787,724	28,787,724	28,787,724
203u Masts and Foundations		11,508,003	11,508,003	11,508,003
305dc Masts and Foundations		2,455,593	2,455,593	2,455,593
305dc Portals and Foundations		6,348,632	6,348,632	6,348,632
356 UC SSA Masts and Foundations		252,366	252,366	252,366
381 TTC Portals and Foundation		3,196,785	3,196,785	3,196,785
Anchor Weight Assembly and Foundations		1,324,671	1,324,671	1,324,671
Mast Fittings		2,203,281	2,203,281	2,203,281
Transportation		372,744	372,744	372,744
Construction		1,125,649	1,125,649	1,125,649

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www.railindustrycarbon.com

9 How to Analyse Carbon Models

This section provides detailed instructions on how to analyse carbon models that are generated by the carbon calculations. The key tools for this in the RCT are the data interrogation and graphing functions. These functions enable users to inspect the data in carbon models by:

- expanding and contracting the levels in a Project Tree to view different tiers of data;
- viewing project data;
- viewing Custom Fields;
- viewing the Project Tree data in Flat View;
- creating graphical profiles of the carbon data in the Project Tree; and
- creating graphical profiles to compare carbon data from different parts of a Project Tree, e.g. comparing two different options.

The graphing functionality consists of a data selection and graph design process which allows user to create a wide range of graphical profiles. The range of graphing options is extensive and thus only one version is outlined below, in order to explain the basic functionality. Beyond this, users are encouraged to experiment and identify the type of graphing most suited to their needs.

Note: At the time of producing this User Guide only data within one Project Tree can be analysed at any one time. However, the tool's software does have the potential to be developed to allow for analysis across different Project Trees. This development will take place where and when it is deemed necessary and this User Guide will be updated accordingly.

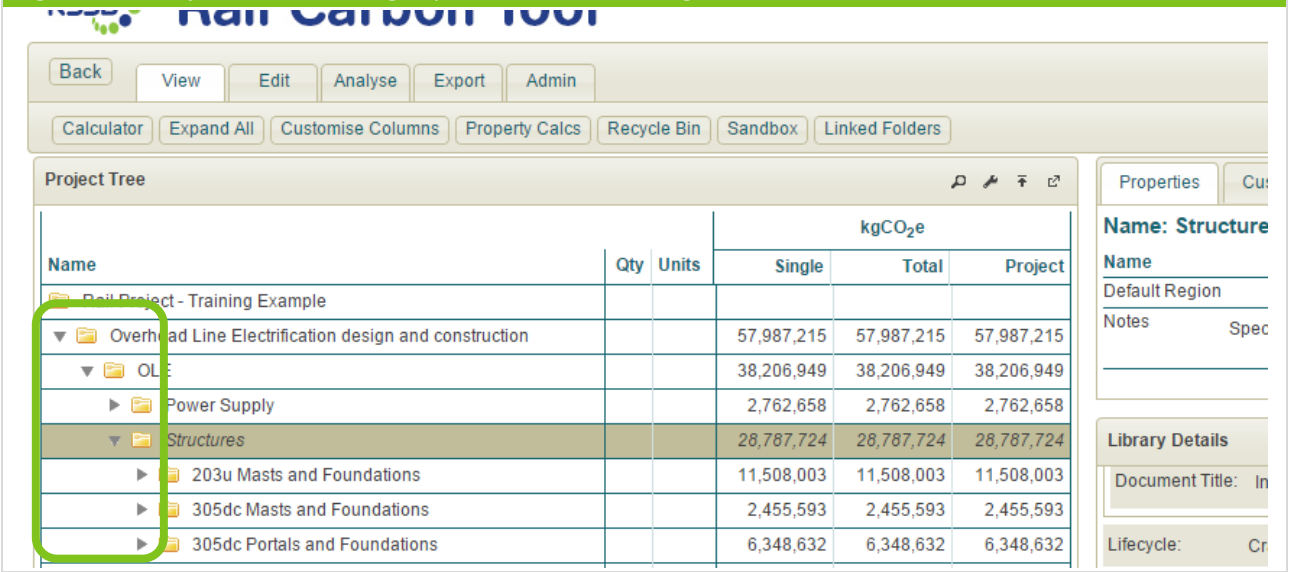
9.1 Expand and Contract the Project Tree

The Project Tree can be expanded and contracted at any level. In analysis terms this allows users to detect hot-spots by following data trails through the Project Tree levels to identify specific items or sources with high carbon emissions.

9.1.1 Expand / Contract Vertically

As explained in Section 3.3, the Project Tree is expanded and contracted using the **Expand** and **Contract** triangle arrows on the left hand edge of the Project Tree.

Segment of Project Tree showing expand / contract triangles:

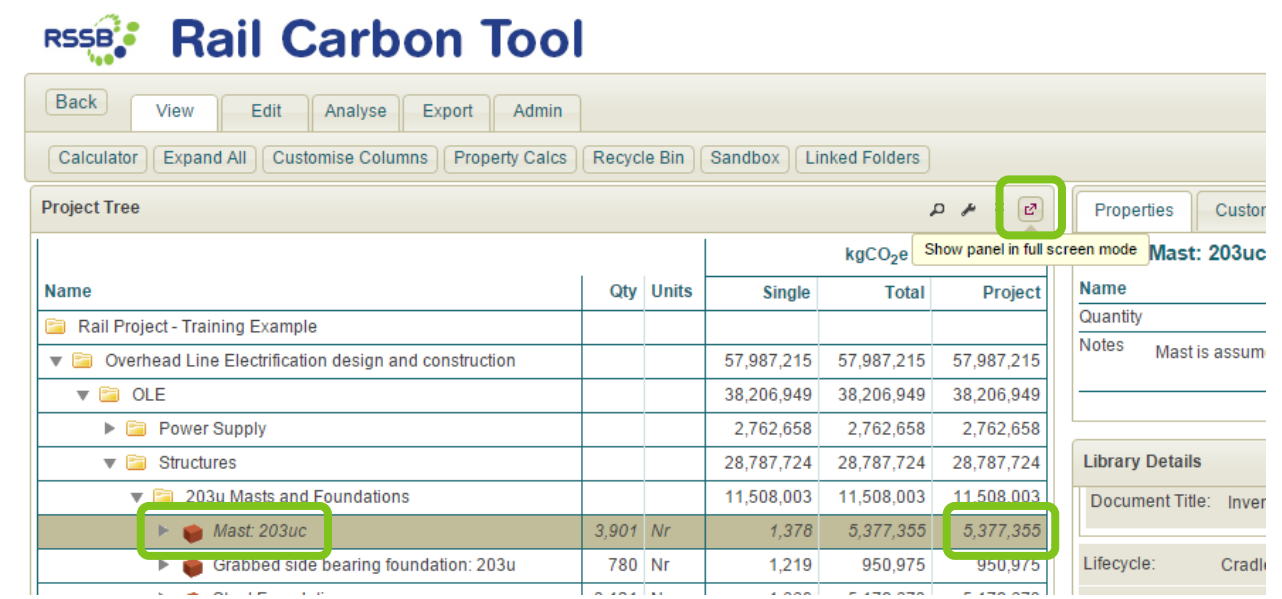


9.1.2 Expand / Contract Horizontally

In addition to expanding the Project Tree vertically, the single panel, full view function can be used to expand a Project Tree horizontally. This is useful for viewing carbon models with a lot of tiers, or when **Property** or **Custom Calcs** are showing (see Section 9.2 for instructions on how to show these).

To expand the Project Tree to single panel view using the panel **Expand** button.

Project Tree expanded vertically with 203uc mast hot-spot showing, and full panel button with tool tip:



Project Tree expanded in single panel mode, and kg Project Calcs showing:

9.2 View Project Calculations and Custom Fields Information

Project data calculations and Custom Fields can be viewed alongside carbon data in Project Trees to support more informed analysis, e.g. wider sustainability analysis, such as resource efficiency performance.

The data available to view is defined by the calculations and Custom Fields included on Project Tree line items.

The process to view the project data and Custom Fields is as follows:

1) open the relevant **Project Tree**;

2) go to the **View** tab and click either the **Customise Columns** or the **Property Calcs** buttons to select either Customs Fields or project calculations;

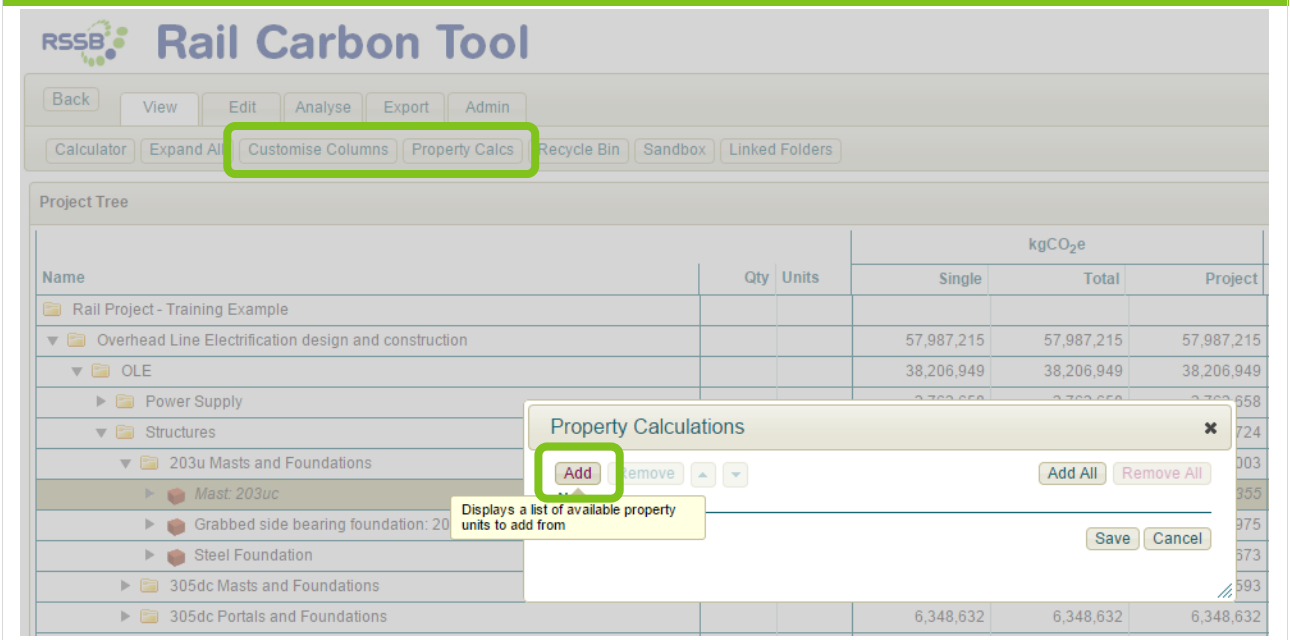
3) in the pop-up panel click the **Add** button to select specific data or fields or the **Add All** button to view all data and fields;

4) for the **Add** button select the required data or field from the drop down menu and click the intermediate **Save** button, to select the specific data or field (this step can be repeated to add additional data sets or fields); and

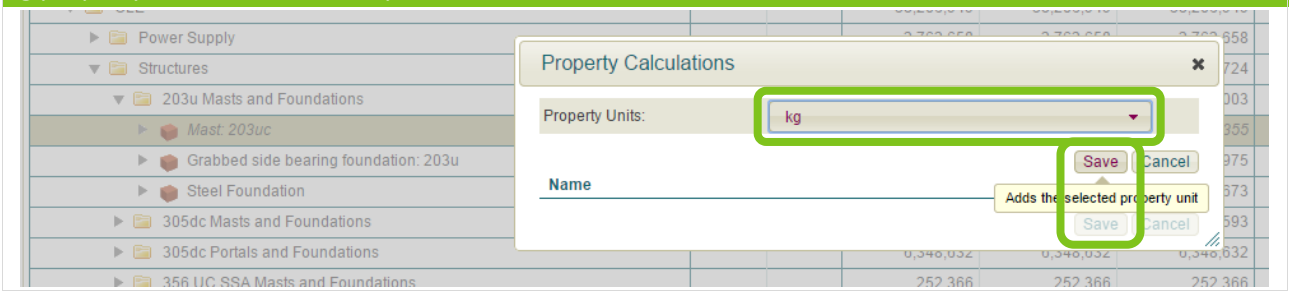
5) click the **Save** button to show the requested data or fields in the **Project Tree**.

To clear the data and fields from the **Project Tree**, use the same process as above, but instead use the **Remove** or **Remove All** buttons.

Customise Columns and Properly Calcs buttons, and pop-up with Add button:



kg property selected from the options list, and the intermediate and main Save buttons:



9.3 View the Project Tree in Flat View

Flat View allows any part of the Project Tree to be viewed as one single table. Once generated, the Flat View table will show all carbon data and any Custom Fields or project calculations currently showing in the Project Tree, and it can be sorted by each column. To view and assess the Project Tree in Flat View, use the following steps:

1) open the relevant **Project Tree**;

2) go to the **Analyse** tab;

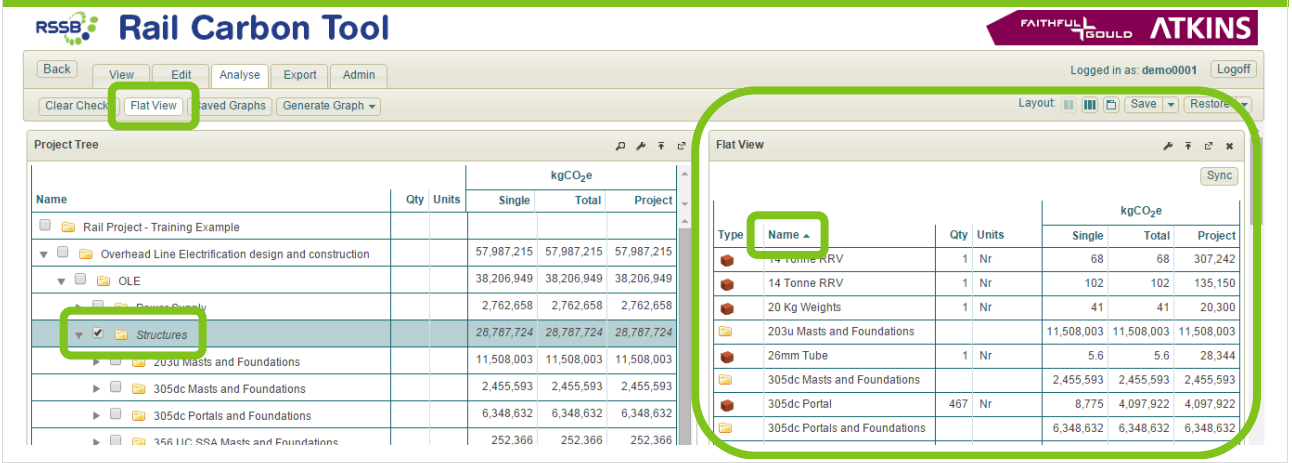
3) using the tick boxes against each line item, tick the parts of the **Project Tree** to be viewed in the **Flat View** format;

4) click the **Flat View** button;

5) sort each column in the **Flat View** panel by clicking on the relevant heading; and

6) remove the **Flat View** panel by re-clicking the **Flat View** button.

Flat View button, ticked Project Tree line item, and Flat View panel sorted by Name:



9.4 Graphing

Graphing of a Project Tree is carried out as follows:

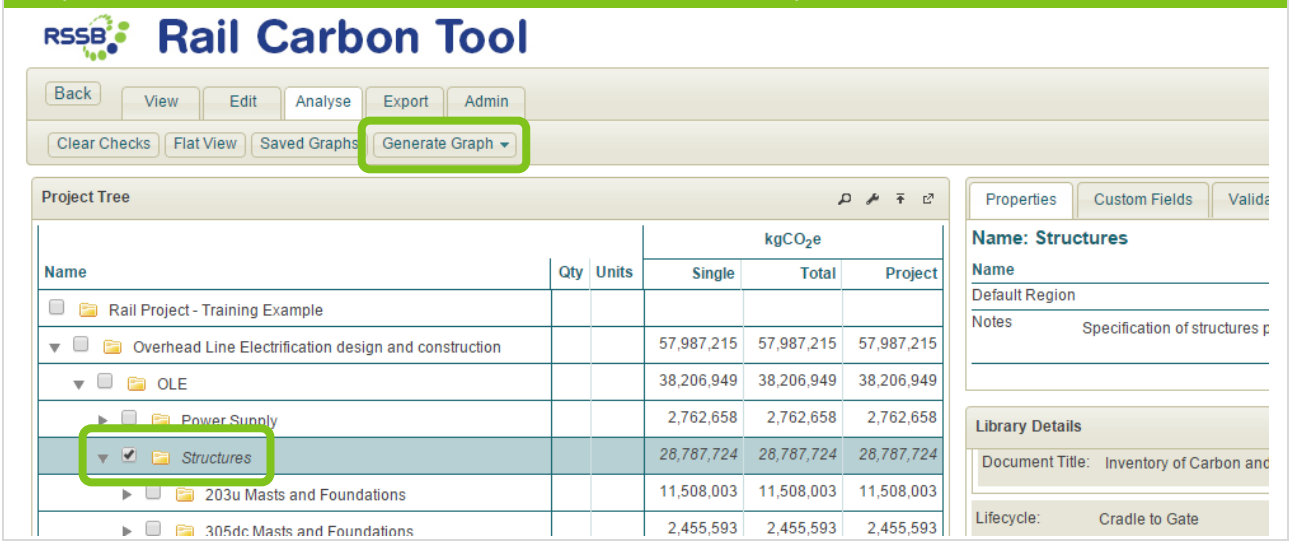
1) go to the **Analyse** tab, which introduces tick boxes at the start of each line item in the **Project Tree**;
2) tick the line items of the **Project Tree** that are to be included in the graph;
3) click the **Generate Graph** button;
4) select the type of graph required;
5) click the chosen graph type on the list to open the set-up pop-up window;
6) add a name to the graph and choose the settings to be used;
7) create the graph by pressing the **Show** button, which shows the graph in a new panel; and
8) save the graph by pressing the **Save** button in the graph panel.

Once generated, the data used for the graph can be viewed using the **Data** button, and the graph bars can be set in size order using the order buttons next to the **Data** button.

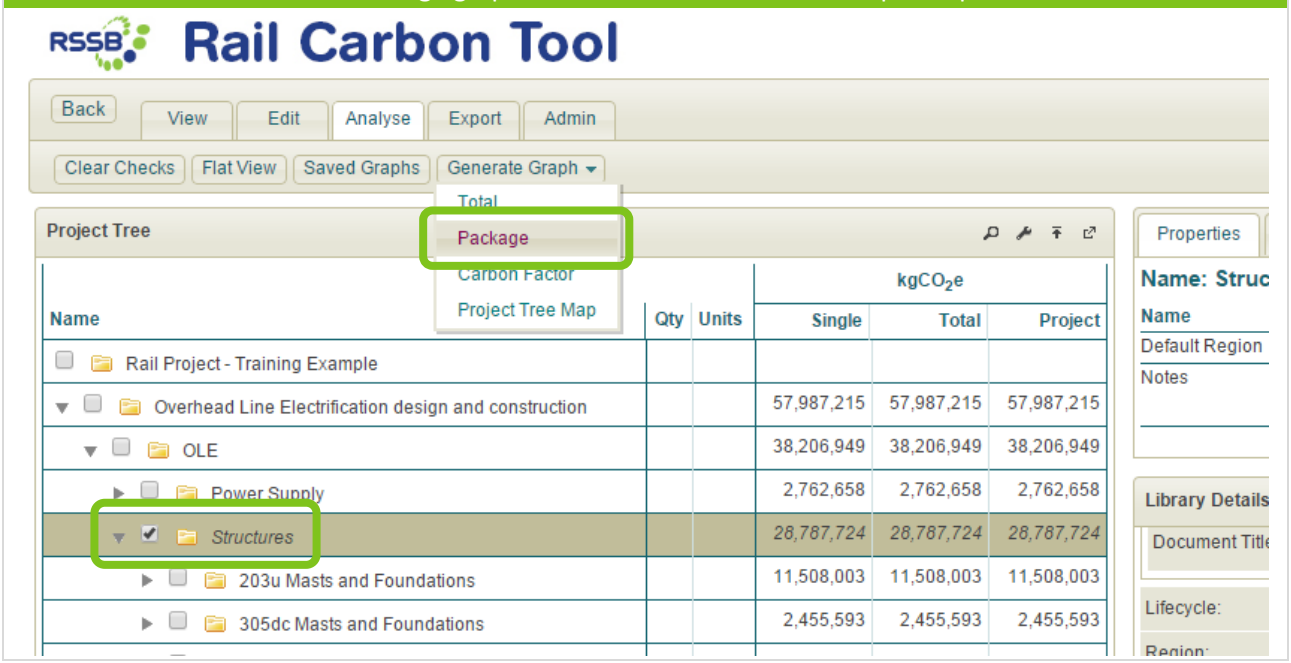
Saved graphs can be accessed as follows:

1) click the **Saved Graphs** button on the **Analysis** tab, which opens the Saved Graphs panel;
2) select the saved graph in the panel; and
3) click the **Show** button.

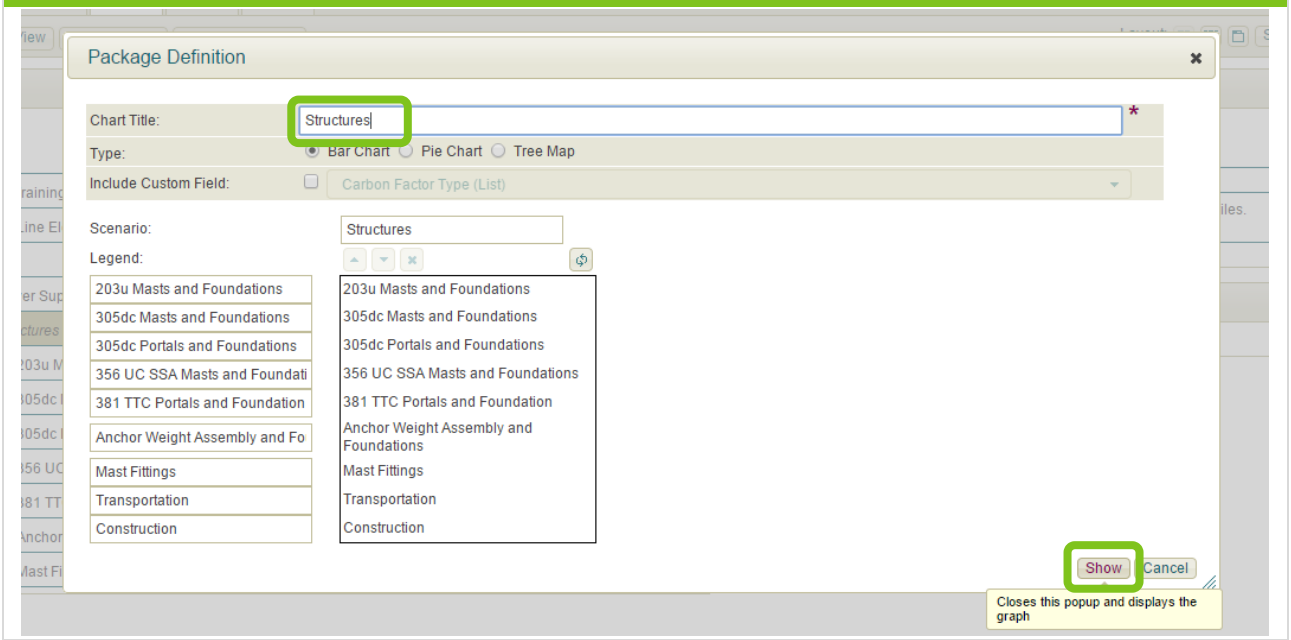
Analyse tab selected, Structures tick box ticked, and Generate Graph button:



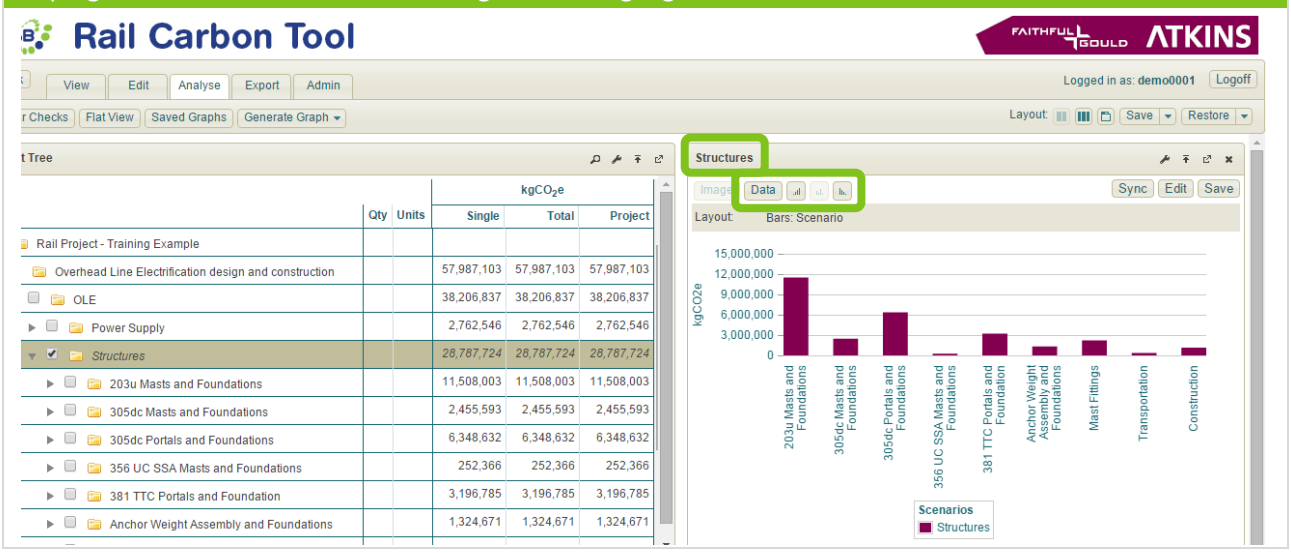
Structures Folder ticked and Package graph selected on the Generate Graph drop-down button:



Graph pop-up window, with name added and Show button ready to be pressed:



Graph generated, and Data and ordering buttons highlighted:



10 How to do Options Evaluation and Selection

As outlined in sections 1.2and 4.2.4, there is no specific functionality for options evaluation and selection. Rather it is an approach and series of techniques that are used to assist with identification of low carbon solutions. Given this, this section does not explain how to use functions in the tool. Instead it sets out the core process for using the tool for options evaluation and selection.

Note:

- only a core process is defined because options evaluation and selection has many variations and it would be neither practical nor effective to try and identify and detail them all. In preference, users are encouraged to use the core process as a guide and utilise the skills of associated specialists and teams in order to understand carbon performance and drive carbon reduction.
- the process for options evaluation and selection is dependent on the specific scenario(s) or item(s) concerned as they dictate:
  - the quality of data available to produce a carbon model;
  - the structure and expertise of the project management and technical team involved; and
  - the specific carbon reduction objectives and the extent of the opportunities to make changes.
- there are no rules to the structure and sequence for options evaluation and selection, and users are encouraged to use the tool and the skills of associated teams in any way they need in order to understand carbon performance, and drive carbon reduction, from basic informal ad hoc testing of ideas in a user's Sandbox, to full-scale formal options analysis.

10.1 Options Evaluation and Selection Process

The core process consists of the following seven tasks:

1) **Create a carbon model**

   Create a carbon model in a Project Tree for the scenario(s) / item(s) being investigated.

2) **Analyse the carbon model to identify carbon hot-spots**

   Use the analysis functionality to identify the carbon hot-spots, resource efficiency performance, etc. in the carbon model.

   Note: All of the tools analysis functionality should be used to generate the best possible insights into the carbon and sustainability performance that is quantified in the carbon model.

3) **Use the carbon model to inform specialists and teams about carbon performance**

   Use the carbon model to inform specialists and teams about the carbon performance, resource efficiency, etc. of the scenario(s) / item(s) covered in the model, and use these insights to drive participation in the following tasks.

   Note: The tool's transparent structure immediately allows users to visually and numerically see how their data translates into carbon performance. This clarity enables users to fully focus on the carbon performance issues defined in a carbon model, as they are not distracted by the trying to understand the tool's functions.

4) **Use the carbon hot-spots to drive low carbon innovation and identification of alternative low carbon solutions / options**

   Use the identified carbon hot-spots and other performance data with inputs from relevant specialists to drive innovation and identification of possible alternative lower carbon solutions / options for the scenario(s) / item(s) linked to for the identified hot-spots etc.

   Note:

   – Carbon value engineering workshops are a key means to carry out this task.
   – It is important to note this task will raise a wide range of secondary points about the performance of each hot-spot, such as construction time, operating efficiency, wider environmental opportunities and challenges. All of the additional information will define the lower carbon solutions and assist in the generation of clear agenda of some of the sustainability opportunities and risks for each option.
   – It is important to ensure that the sustainability opportunities and risks are captured and used going forwards in the options evaluation and selection process.

5) **Verify the performance of the alternative low carbon solutions / options**

   Calculate and analyse the carbon footprint for each alternative solution / option and benchmark them against the associated hot-spots that have been identified to verify the performance of the alternatives.

   Note:

   – This task has the potential to draw heavily on the edit functionality in the tool, which allows for any section of a model or the whole model to be copied, data changed, and the Project Tree to be rearranged to create an alternative carbon model without having to repeat carbon calculations.
   – The findings from the additional carbon footprinting and analysis in this task may also support the identification of further hot-spots (reiterating the process to refine options selection).

6) **Identify the preferred lower carbon solutions**

   Identify the preferred lower carbon solutions using the outputs from task 5 above and the sustainability risks and opportunities identified from point 4.

7) **Report the preferred lower solutions and use the information to drive their selection**

   Report the preferred lower carbon solutions to the relevant specialists and teams, and use the information to drive selection of these solution, thus creating a lower carbon footprint for the UK rail industry.

   Note: Details regarding both the carbon performance and the sustainability opportunities and risks should also be provided as supporting information to each preferred solution.

10.2 Options Selection and Evaluation Scope

This process is capable of handling single items (e.g. a single user developing and testing overhead line electrification masts), through to assessing a whole project / operating scenario with numerous options with technical input from a large project or operating team, and it is entirely up to the user / project team and their associated carbon reduction requirements as to how the tool is used.

10.3 Options Evaluation and Selection Examples

Examples of options evaluation and selection are:

- use the carbon model, and the tool's calculation and analysis functionality to educate designers, engineers, contractors and operators on carbon performance;
- use the carbon hot-spots shown in a model to drive carbon reduction innovation, such as in a carbon value engineering workshop;
- test out different options against carbon hot-spots in the carbon model by calculating new options and analysing them against the baseline hot-spots. This can include copying and editing an existing Project Tree section to test design variations;
- create parallel carbon models to carry out extensive analysis of different options;
- use the tool's copy and edit functionality to quickly compare design variations against a baseline model;
- use the tool's full calculation and analysis functionality to compare multiple design options as part of an options selection process; and
- use the tool to clearly present a carbon footprint model in a workshop format with teams of specialists, to identify and understand carbon hot-spots.

This information gained from any of these examples is subsequently used to drive innovation to identify lower carbon alternatives.

11 How to Operate Security Groups and Security Controls

This sections provides the specific instructions for how to use and set the security controls for the security controlled content in the RCT. The purpose and general arrangements for security controls are described in section 2.3. The instructions provided in this section specifically cover:

- administration of Security Groups, and
- applying security settings on security controlled content.

11.1 Security Groups

Operation of the Security Group functionality is described in the following sections and includes:

- navigating to Security Groups records;
- creating a new Security Group;
- identifying which records a Security Group is used on; and
- deleting a Security Group.

Note: Users with Project Manager access have full authority to create and manage Security Groups. However, they cannot edit any Security Groups for which they do not have access.

11.1.1 Navigating to Security Groups

Navigate to Security Groups by the following route**:**

1) click the **Projects** segment on the home page navigation wheel;

2) click the **Security Groups** button in the Projects library; and

3) click the **Search** button in the **Security Groups Search** panel.

Security Groups and Search buttons:

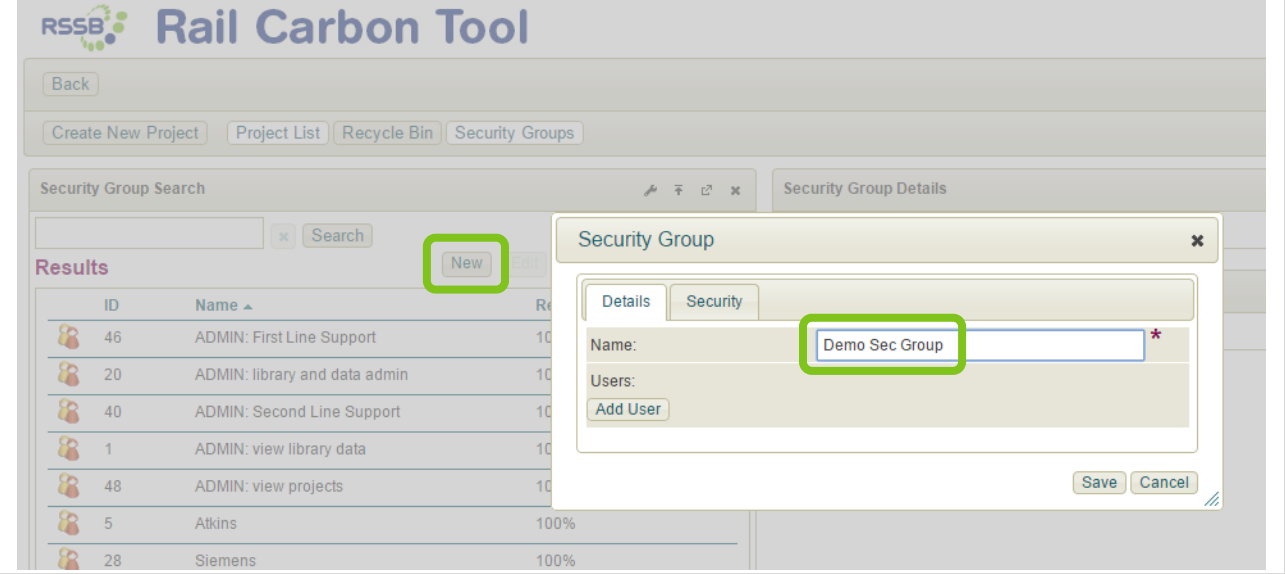
11.1.2 Create a New Security Group

To create a new Security Group:

1) navigate to the **Security Group Search** panel;

2) click the **New** button to open a new **Security Group** pop-up panel and enter the name for the new Security Group in the **Name** field; and

New Security Group button and pop-up panel , with new name added:



3) click the **Save** button to create the new Security Group record. The record can then be accessed in the **Results list** on the **Security Group Search** panel.

11.1.3 View Security Group Usage

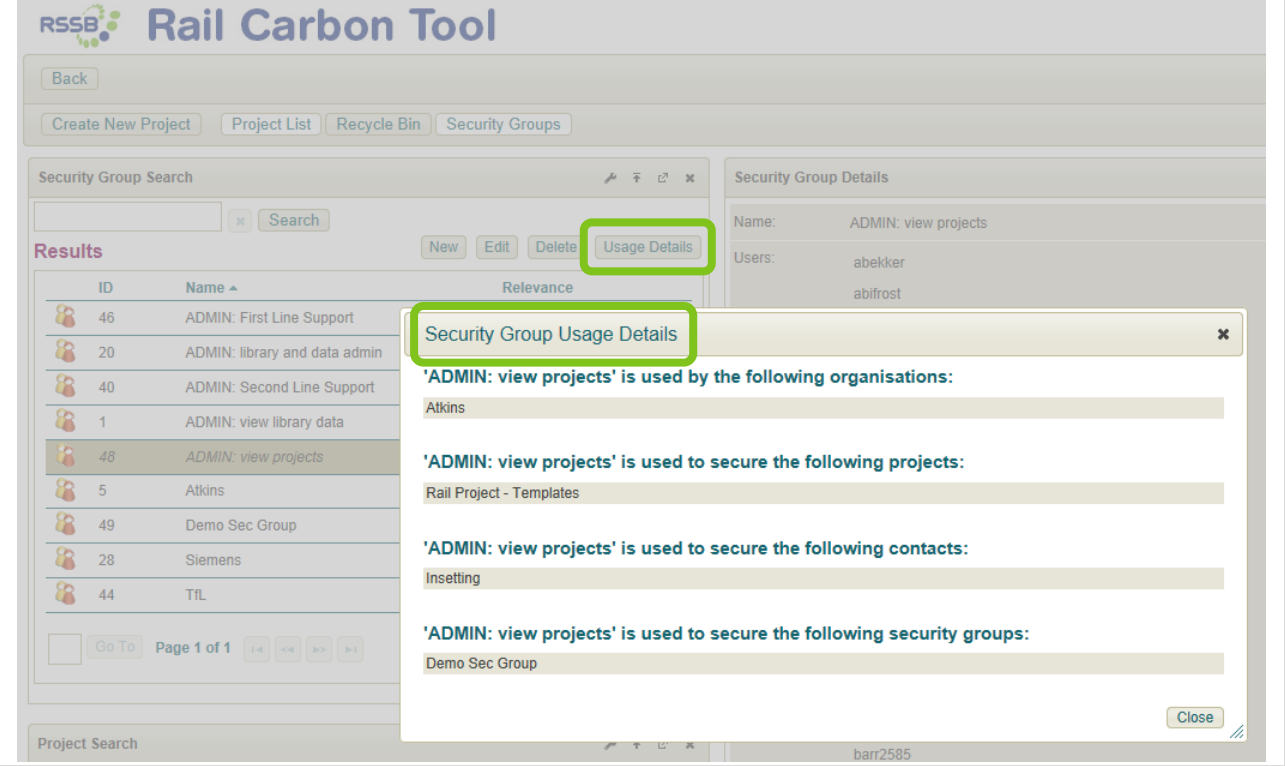
To view the records that a Security Group is used on:

1) go to the Security Groups Search panel;

2) select the required record; and

3) click the **Usage Details** button.

Security Group selected, Usage Details button pressed, and usage details showing in pop-up panel:



11.1.4 Delete a Security Group

To delete a Security Group:

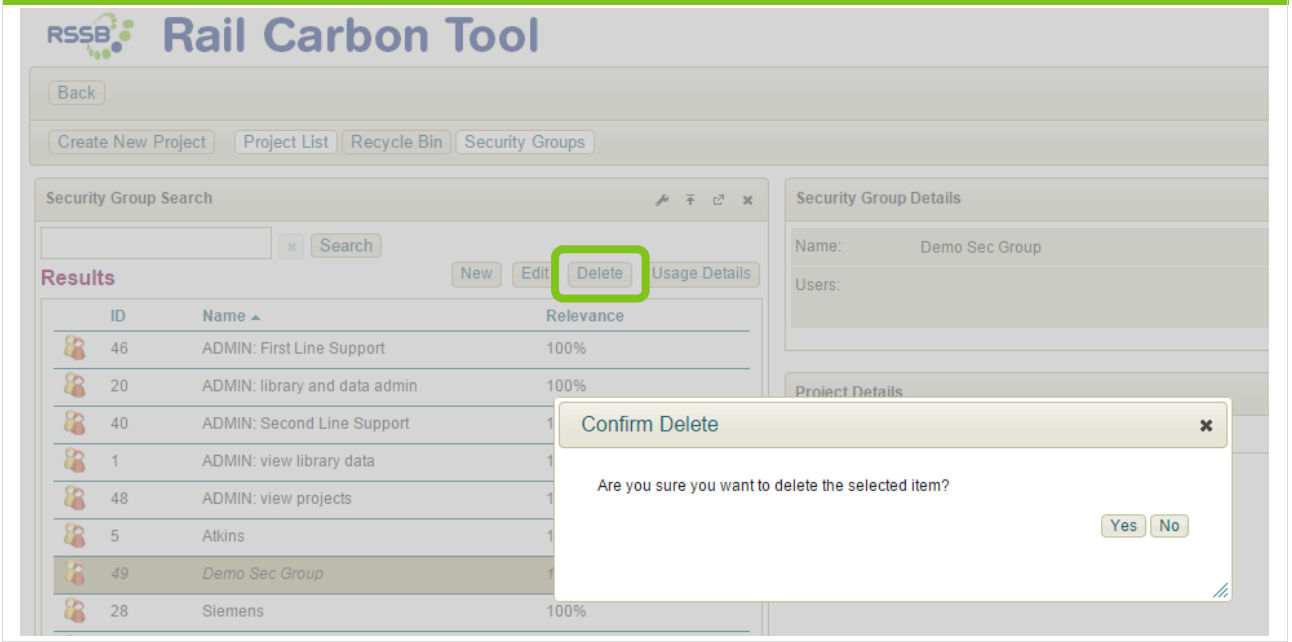
1) go to the **Security Groups Search** panel in the Projects library screen;

2) select the required record;

3) click the **Delete** button; and

4) click the **Yes** button in the pop-up window that appears, to confirm the deletion.

Delete button and confirm delete pop-up window:



Note: A Security Group can only be deleted if it is not being used. Use the **Usage Details** button described in Section 11.1.3 to check where a group is being used if it cannot be deleted.

11.2 Security Controls

11.2.1 How to Apply Security Controls on a Records

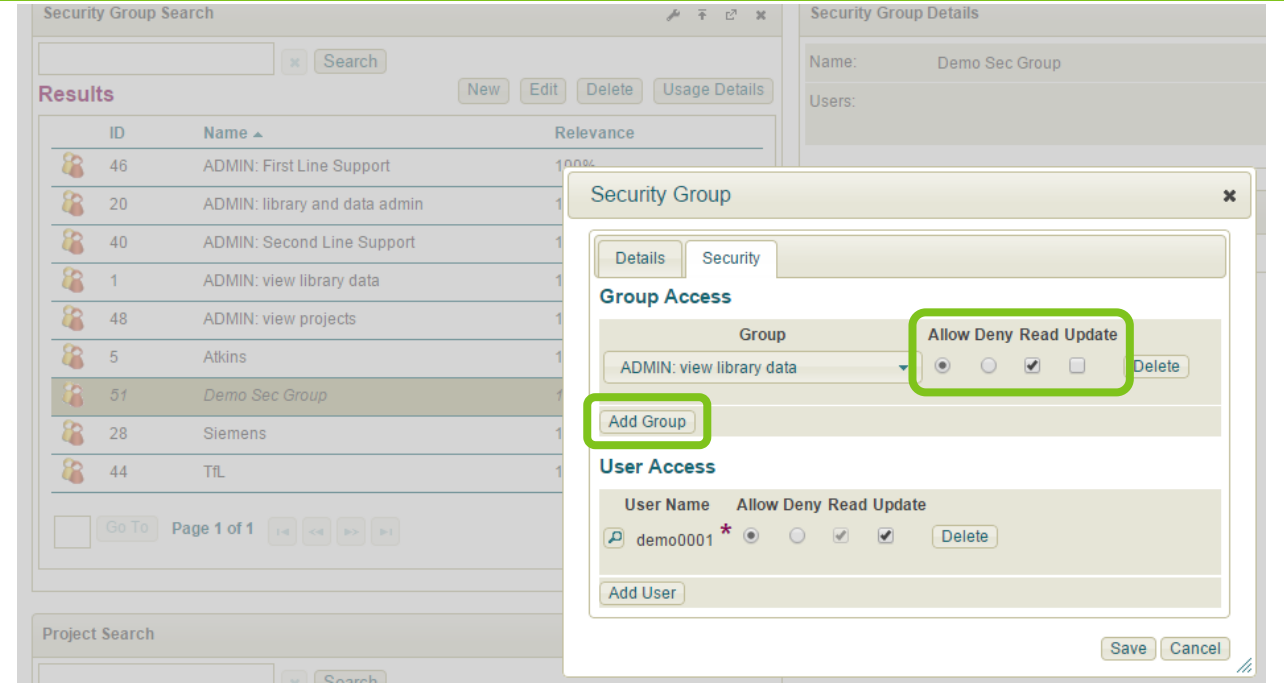
To apply Security Group or user specific security controls to an item of security controlled content use the following steps:

1) navigate to the relevant record;
2) open it in **Edit** mode;
3) go to the **Security** tab;
4) click the **Add Group**, or **Add User** button:
   - for Security Groups select the relevant group from the Group Access drop-down list; or
   - for users select the relevant user using the magnifying glass search function.
5) define the access type and levels by ticking the required radio buttons (**Allow**, **Deny**, **Read**, **Update** and **Admin**); and
6) click **Save** to complete setting the security controls.

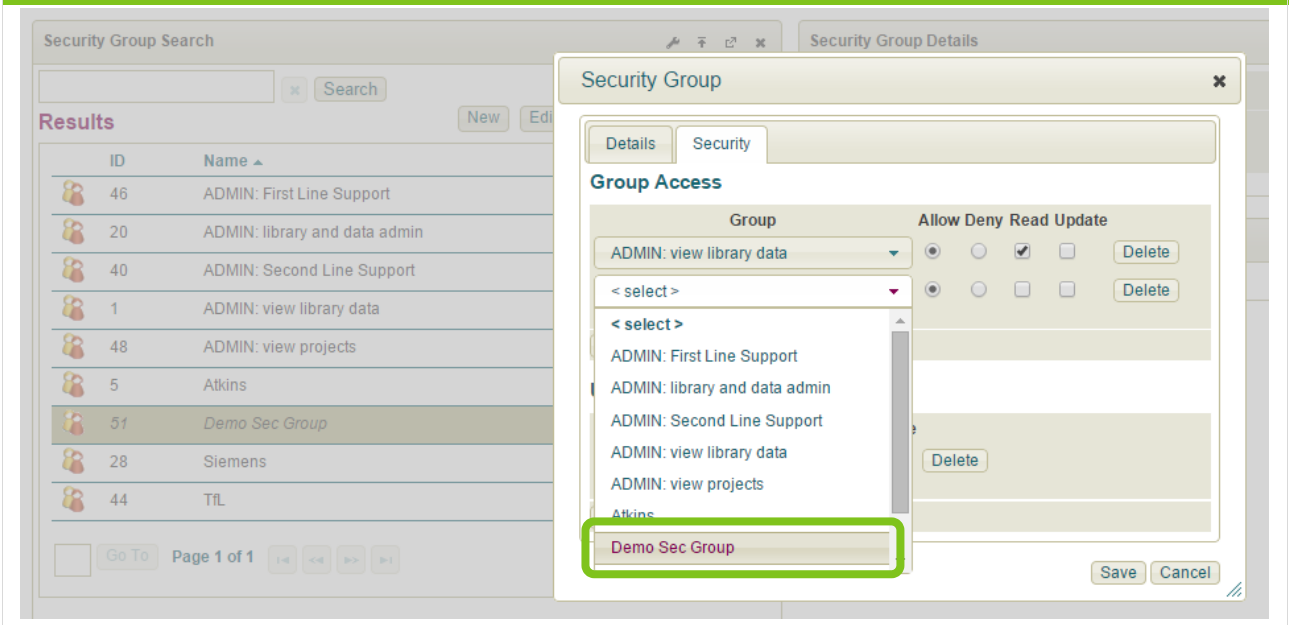
Note:

- the **Add Group** and **Add User** buttons can be clicked multiple times to add multiple fields for adding multiple groups or users;
- for new **Security Groups** that are to be controlled by itself it is necessary to **Save**, then re-open the new group in **Edit** mode before it will show in the drop-down list;
- the **ADMIN: view projects** and **ADMIN: view library data** Security Groups are designed to provide access for all users to all public library content and Projects. Therefore, they should never be included on a Project's security settings, unless the Project is to be viewed by all users; and
- user specific controls override group level controls.

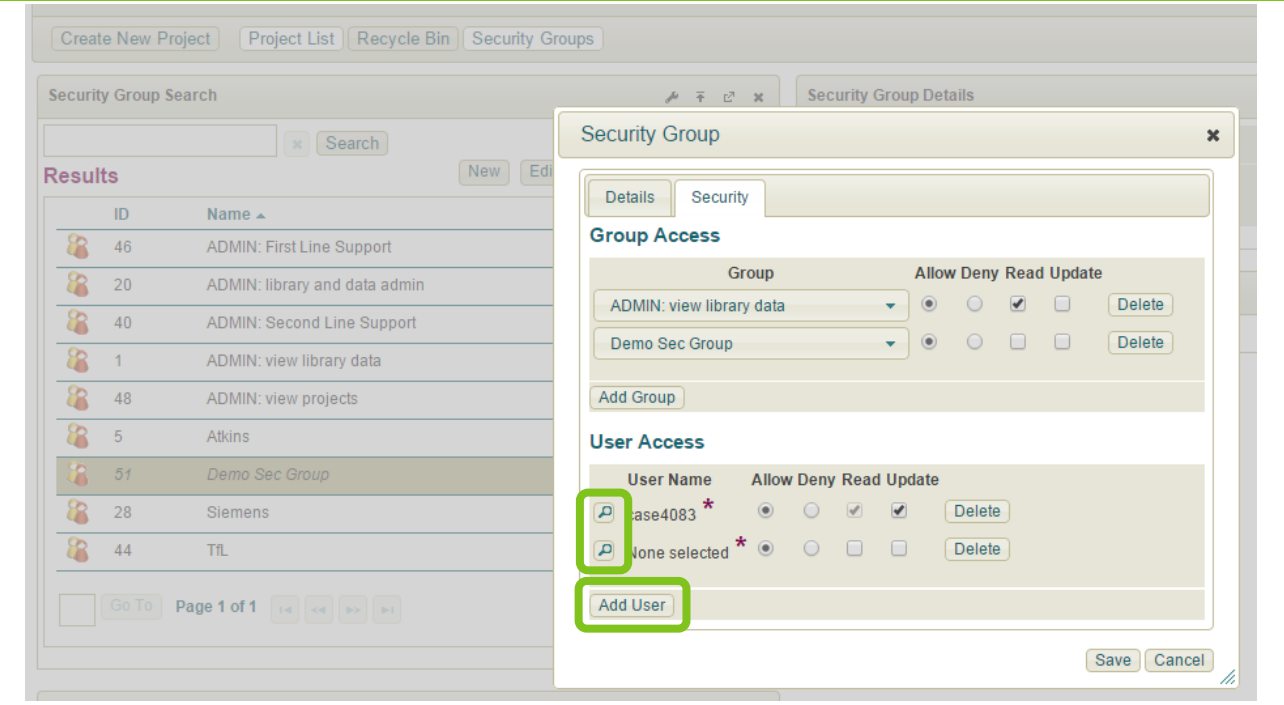
Add Group button and access type and level radio buttons:



Adding a group from the drop-down list:



Add User button and magnifying glass:



11.2.2 Adding and Removing Users on Security Groups

For Security Groups to be effective for the relevant users it is necessary to add them to the relevant Security Group. Users can be added in two ways:

- Either manually enter the user name on the **Security Group** record; or
- Edit the user's individual account (this method can only be used by the RSSB RCT Support Team).

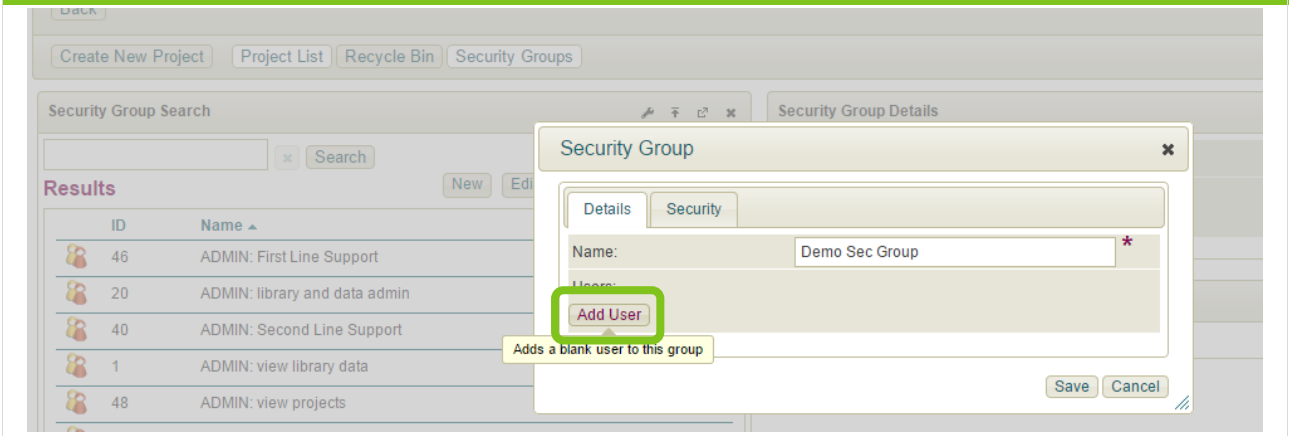
To add a user directly to a **Security Group** use the followings steps:

1) navigate to the **Security Group Search** panel and use the search function to find the required group;

2) open the required Security Group in **Edit** mode;

3) click the **Add User** button on the pop-up window (multiple users can be added at once by repeatedly clicking the **Add User** button);

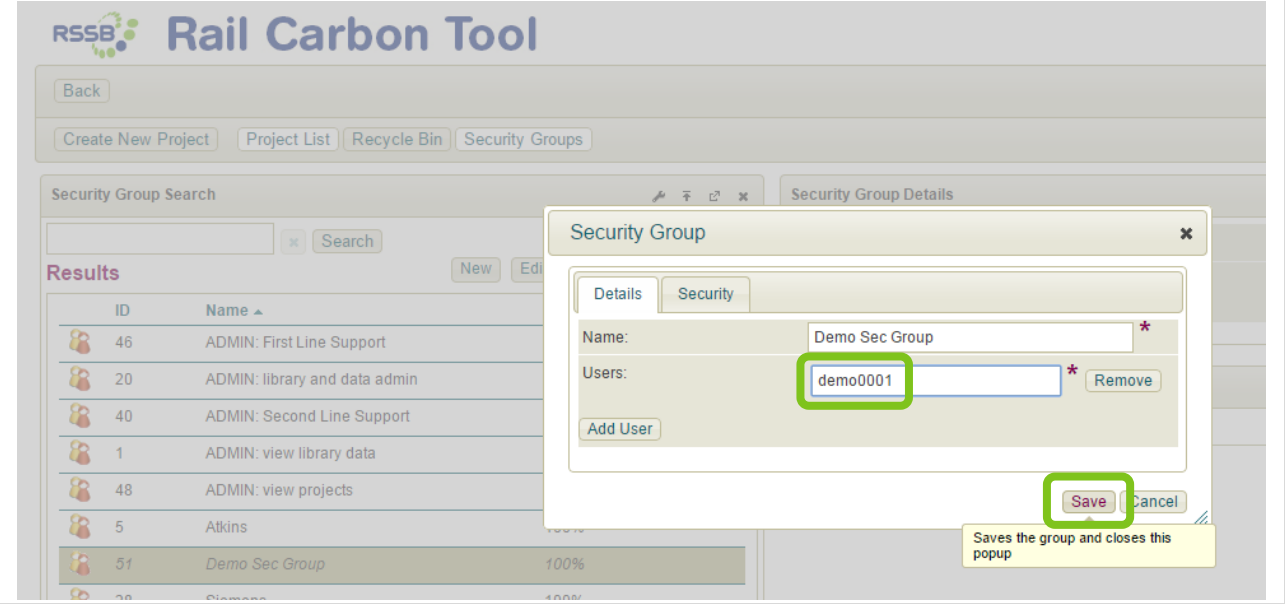
Add User button:



4) Enter the user(s) username(s);and

5) Click **Save** to complete adding the user(s). The user name(s) will be checked before the save completes and any misspelt names will be highlighted.

Added user and record about to be saved:



11.2.3 Editing Security Controls

Security controls can be edited at any time. The possible options are:

- add security controls for additional groups or users;
- edit security controls for existing groups or user; or
- delete security controls for existing groups or users.

All of the functions for adding and editing existing and additional users and groups are carried out as described above for setting security controls, once the required record is opened in **Edit** mode. The removal and deletion functions are set out below.

To remove groups or users from a group's security settings:

1) open the relevant record in **Edit** mode;

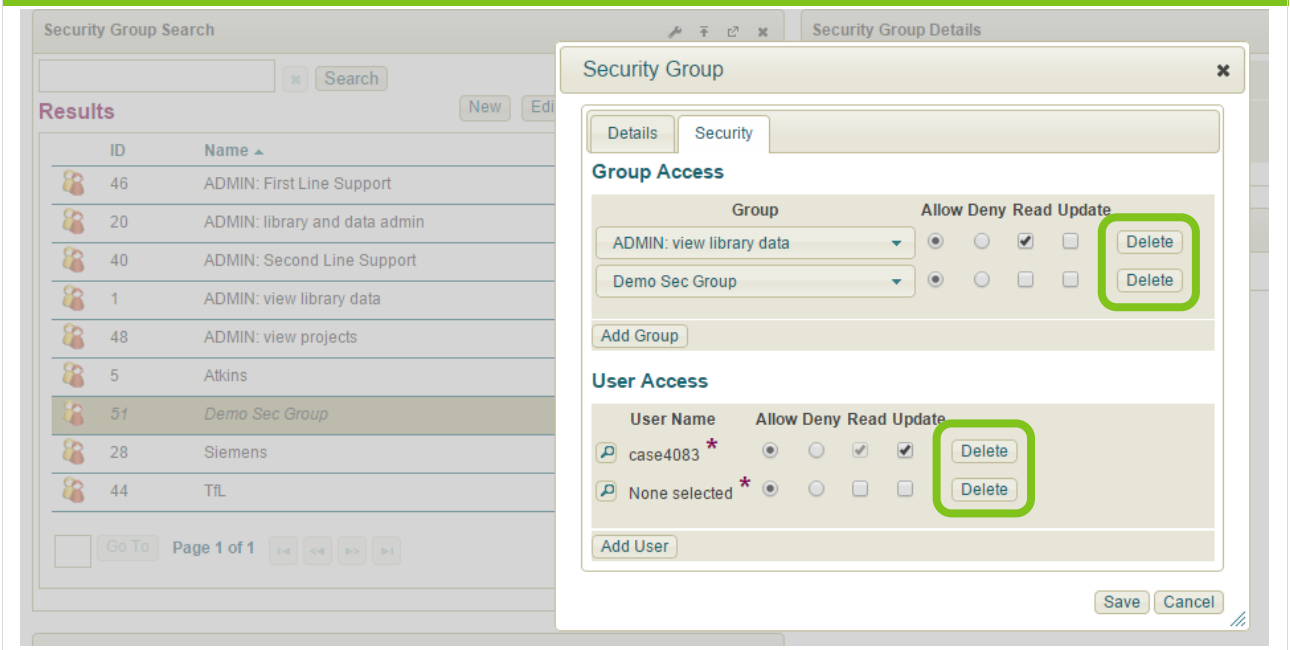
2) go to the **Security** tab;

3) click the **Delete** button next to the group or user entry that is to be deleted; and

4) click the **Save** button to complete this action.

Note: multiple groups and / or users can be deleted before the changes have to be saved.

Security Group and User Delete buttons:



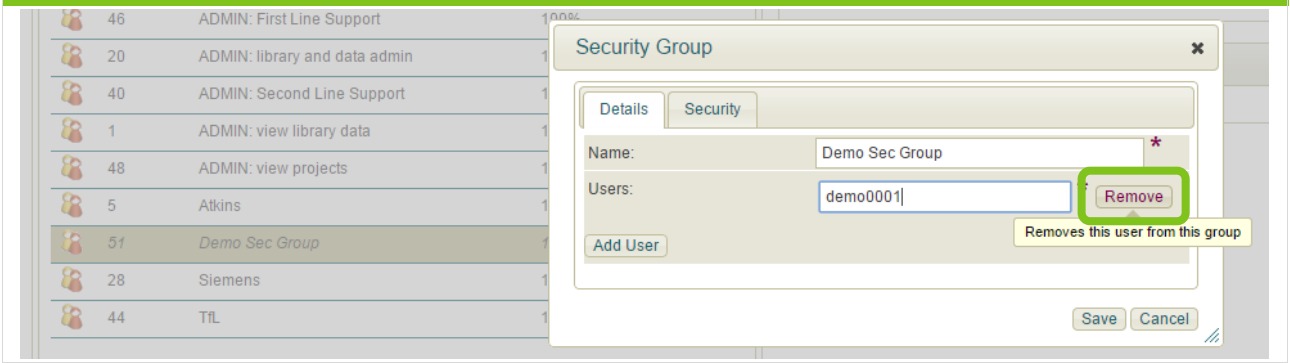
To remove an existing users from a group:

1) open the relevant group in **Edit** mode;

2) on the **Details** tab click the **Remove** button next to the username entry that is to be removed; and

3) click the **Save** button to complete this action. Note: multiple users can be removed before the changes have to be saved.

Remove button for removing users from a Security Group:



Note: When the Save button is pressed a warning will be displayed if the user has removed themselves from the list of users who can update this group. If the user ignores the warning and removes themselves they will no longer be able edit the Security Group and will not be allowed re-add themselves. The user may be re-added by virtue of another user with the required security edit control.