

SAMCEW[©]: Sustainable Assessment Method for Civil Engineering Works

SAMCEW[®]: Sustainable Assessment Method for Civil Engineering Works

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SAMCEW[©]: Sustainable Assessment Method for Civil Engineering Works

Introduction



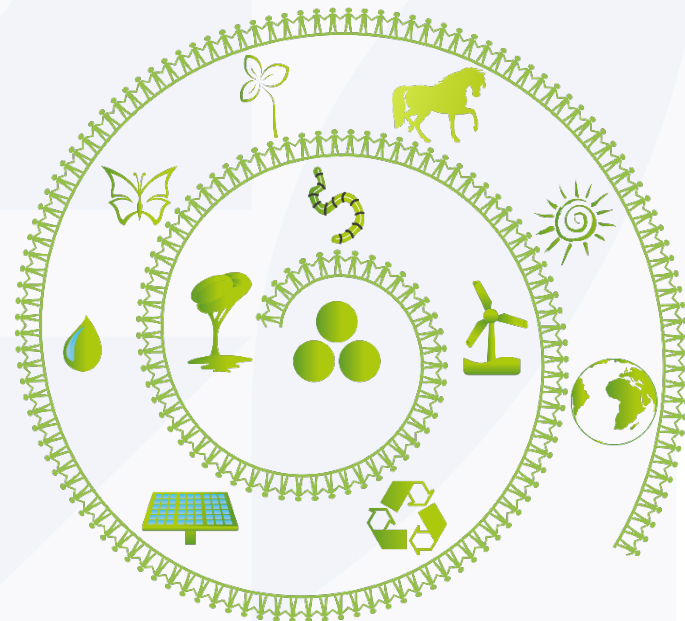
Introduction

FCC Construcción's commitment

FCC Construcción's **Environmental Management System** is certified according to ISO 14001:2015 in all the countries where construction projects are developed.

FCC Construcción has implemented a **System of Environmental Good Practices**:

- Set of environmental and social practices in all our projects.
- Specific requirement of the company with greater demands than those required by law or by the client.
- The score obtained is an indicator of the environmental and social performance of the undertaken projects.



Introduction

FCC Construcción's commitment

FCC Construcción holds the presidency of the following Working Groups:

- ISO/TC59/SC17/WG5
- CEN/TC350/WG6

Both groups are working on the **elaboration of frameworks** intended to give guidelines for the assessment of sustainability in civil engineering works.



Introduction

Aim of the project

There are not many assessment methods for civil engineering works as there are for buildings. FCC Construcción has developed an internal **S**ustainability **A**ssessment **M**ethod for **C**ivil **E**ngineering **W**orks (**SAMCEW**®).

Based on internationally recognised methods:

- Work undertaken with international civil engineers in ISO and CEN working groups.
- Experience with the application of the Sustainable Management System at our worksites.
- Other international methodologies.



Introduction

Aim of the project

- SAMCEW[®] is a **self-assessment rating system**:
 - Internal management programme to:
 - Plan the construction work
 - Identify needed improvements
 - Enables designers and managers to:
 - Share advances in sustainable practices
 - Demonstrate the sustainable credentials of their project to clients, planners and other interested parties



Introduction

Aim of the project



- **SAMCEW[®]** covers the three-pillar model of sustainable development.
- This model includes the environmental, social and economic dimensions and seeks to achieve a balance among them.



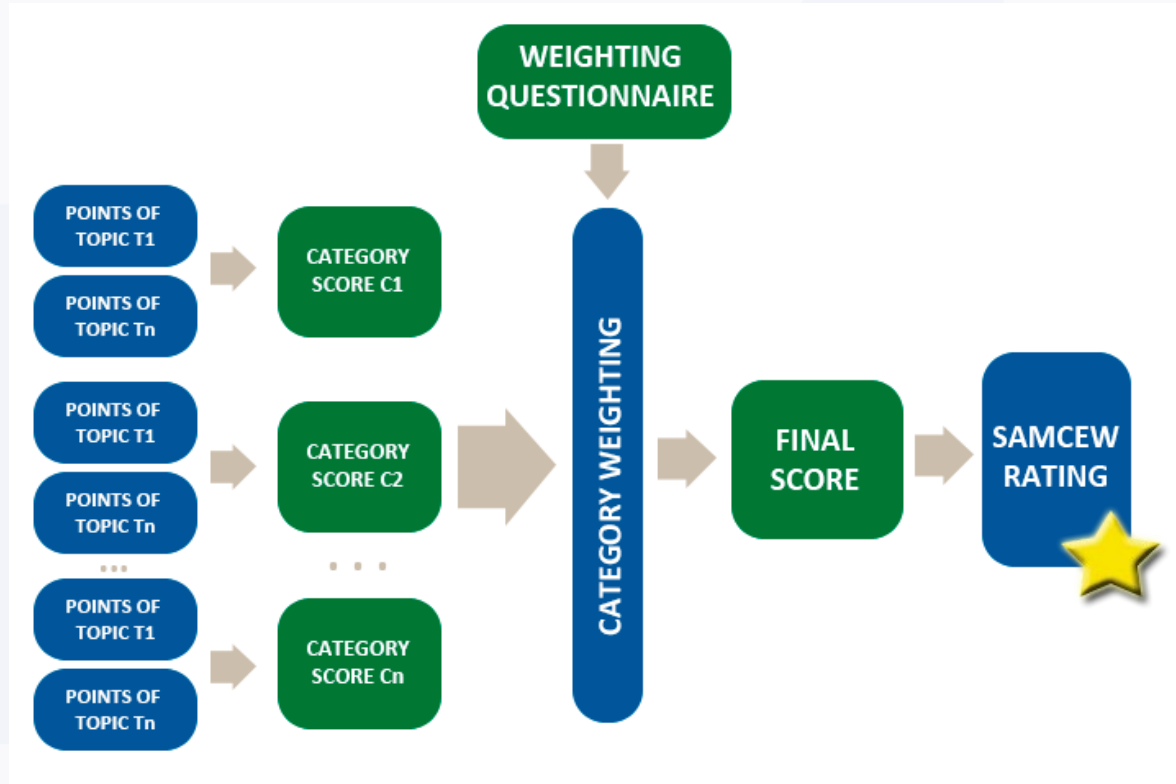
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Methodology

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Methodology

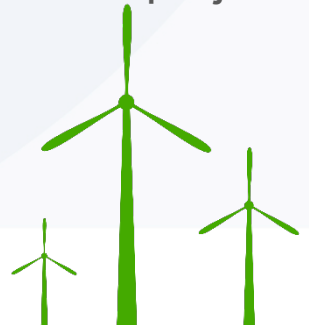
SAMCEW[®] Structure



Methodology

Weighting system

- SAMCEW[®] is a ***flexible and customizable*** assessment methodology.
 - Depending on:
 - Type of civil engineering works
 - Specific location
 - Project characteristics
 - Stage assessed
- Certain aspects will be more important than others, regarding the sustainable performance of the project.
- The **relative importance** of each category is established for each project according to its specific circumstances.
 - It is necessary to answer an initial set of questions.
 - The answers to this questionnaire will define the weighting system of the project.



Methodology

Typology of civil engineering works

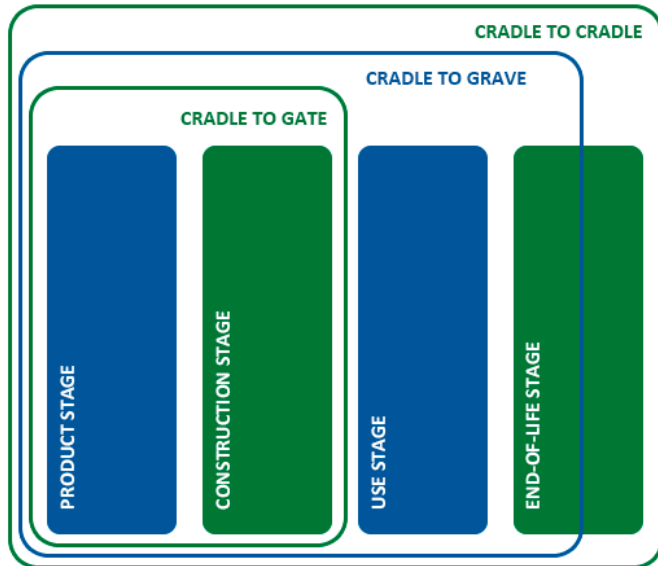


Other civil engineering works: earthworks, landfill, public realm works, etc.

Methodology

Life Cycle Stages

SAMCEW can be applied at the different life cycle stages of a civil engineering works:



- **Product stage:** considers the period from the extraction of material to the factory, “from cradle to gate”.
- **Construction stage:** considers the period between the point of time when construction work start and the point when the civil engineering works is ready to be used and the transportation of products to the site. (Planning, design and procurement stages included).
- **Use stage:** considers the period in which the civil engineering works is used or gives its service to the community.
- **End-of-life stage:** considers all the stages that occur during the end-of-life process.

SAMCEW[®]: Sustainable Assessment Method for Civil Engineering Works

Categories

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SAMCEW® is organised into 15 categories. These categories consider significant issues developed throughout the project within the three dimensions of sustainability.



PROJECT
MANAGEMENT



PARTICIPATION AND
ACCEPTABILITY



ECOSYSTEMS AND
BIODIVERSITY



LAND PLANNING



CULTURAL HERITAGE
ELEMENTS



USE OF NATURAL
RESOURCES



LIFE CYCLE COSTS



WELFARE



WASTE



EXTERNAL COSTS



EFFECTS ON SOCIETY



EMISSIONS TO THE
ENVIRONMENT



EFFECTS ON LOCAL
ECONOMY



RISK AND RESILIENCE



NOISE AND
VIBRATIONS

Categories



PROJECT MANAGEMENT

- Strategy for the project
- Commitment of sub-contractors, suppliers and clients
- Training



LAND PLANNING

- Land use change
- Land use efficiency



LIFE CYCLE COSTS

- Purchase costs
- Professional fees
- Works costs
- Bureaucratic costs
- Operation and maintenance costs
- Deconstruction costs
- Income



EXTERNAL COSTS

- Construction-related user costs
- Environmental damage costs



EFFECTS ON LOCAL ECONOMY

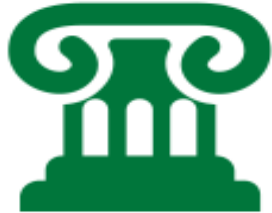
- Job creation
- Population system

Categories



PARTICIPATION AND ACCEPTABILITY

- Consultation and communication
- Acceptability and engagement
- Necessity/urgency of the project



CULTURAL HERITAGE ELEMENTS

- Cultural heritage baseline study
- Public information
- Conservation and enhancement



WELFARE

- Safety and rights of workers
- Health and comfort
- Accessibility
- Adaptability



EFFECTS ON SOCIETY

- Effects on transport network
- Loadings on the surroundings



RISK AND RESILIENCE

- Adaptation and vulnerability to climate change
- Safety and security

Categories



ECOSYSTEMS AND BIODIVERSITY

- Ecosystems
- Flora and fauna
- Landscape (visual impacts)



USE OF NATURAL RESOURCES

- Energy
- Materials
- Water



WASTE

- Waste prevention
- Management



EMISSIONS TO THE ENVIRONMENT

- Air
- Water
- Soil
- Lighting



NOISE AND VIBRATIONS

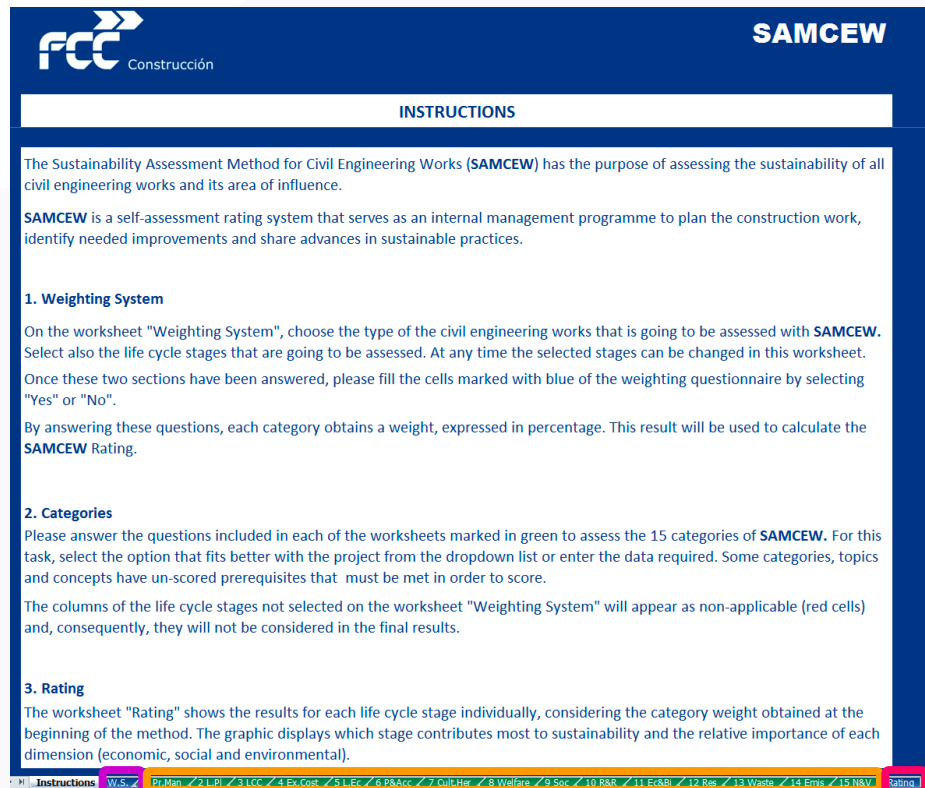
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SAMCEW[®] Application

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SAMCEW[®] Application

Instructions



The screenshot shows the 'INSTRUCTIONS' page of the SAMCEW application. The header includes the FCC Construcción logo and the title 'SAMCEW'. The main content area is titled 'INSTRUCTIONS' and contains the following text:

The Sustainability Assessment Method for Civil Engineering Works (SAMCEW) has the purpose of assessing the sustainability of all civil engineering works and its area of influence.

SAMCEW is a self-assessment rating system that serves as an internal management programme to plan the construction work, identify needed improvements and share advances in sustainable practices.

1. Weighting System

On the worksheet "Weighting System", choose the type of the civil engineering works that is going to be assessed with SAMCEW. Select also the life cycle stages that are going to be assessed. At any time the selected stages can be changed in this worksheet. Once these two sections have been answered, please fill the cells marked with blue of the weighting questionnaire by selecting "Yes" or "No".

By answering these questions, each category obtains a weight, expressed in percentage. This result will be used to calculate the SAMCEW Rating.

2. Categories

Please answer the questions included in each of the worksheets marked in green to assess the 15 categories of SAMCEW. For this task, select the option that fits better with the project from the dropdown list or enter the data required. Some categories, topics and concepts have un-scored prerequisites that must be met in order to score.

The columns of the life cycle stages not selected on the worksheet "Weighting System" will appear as non-applicable (red cells) and, consequently, they will not be considered in the final results.

3. Rating

The worksheet "Rating" shows the results for each life cycle stage individually, considering the category weight obtained at the beginning of the method. The graphic displays which stage contributes most to sustainability and the relative importance of each dimension (economic, social and environmental).

The bottom of the screenshot shows a navigation bar with tabs for 'Instructions', 'W.S.', 'Pr.Man', '2.L.P.', '3.L.C.', '4.En.Cost', '5.L.Ec', '6.P&Acc', '7.Qul&Her', '8.Welfare', '9.Soc', '10.R&R', '11.E&Bt', '12.Re', '13.Waste', '14.Emiss', '15.N&V', and 'Rating'.

SAMCEW Application guides the user during the implementation of the methodology.

Structured in three sections:

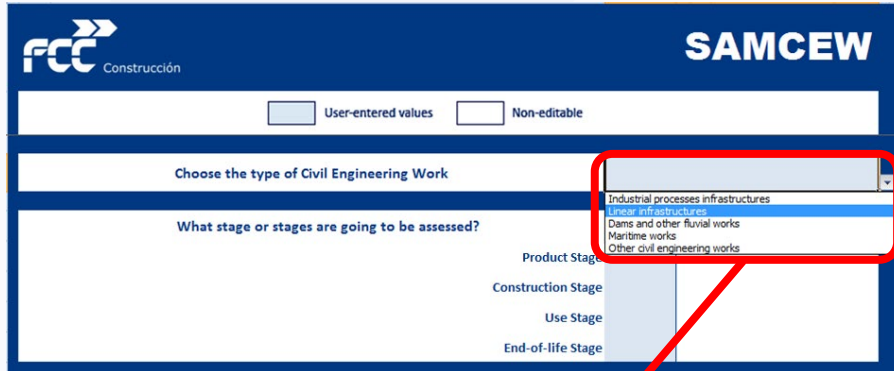
- Weighting System
- Categories
- Rating

SAMCEW[©] Application

Weighting system

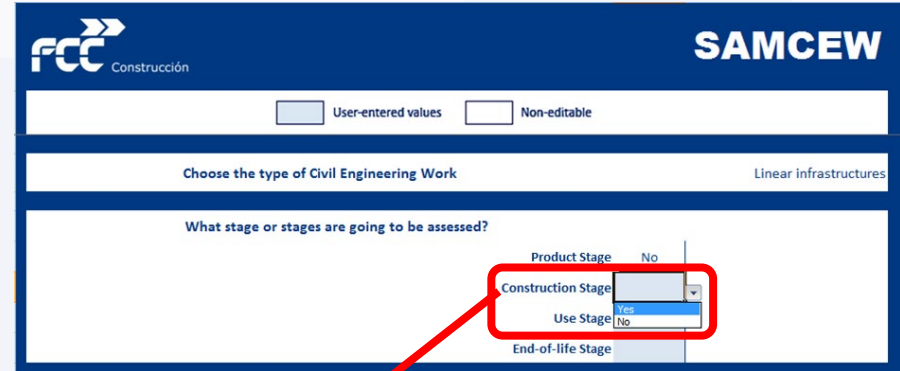
The worksheet **“Weighting System”** allows the user:

- ✓ to choose the **type of civil engineering works** that is going to be assessed.
- ✓ to select the **life cycle stages** that are going to be assessed.
- ✓ to answer a **weighting questionnaire**. According to the specific answers and circumstances of the project, each of the 15 categories obtains a weight expressed in %



The screenshot shows the SAMCEW application interface. At the top, there is a header with the FCC Construcción logo and the text 'SAMCEW'. Below the header, there is a legend with two boxes: 'User-entered values' (light blue) and 'Non-editable' (light grey). The main content area is divided into two sections. The first section is titled 'Choose the type of Civil Engineering Work' and contains a dropdown menu. The second section is titled 'What stage or stages are going to be assessed?' and contains a table with columns for 'Product Stage', 'Construction Stage', 'Use Stage', and 'End-of-life Stage'. The dropdown menu is open, showing a list of options: 'Industrial processes infrastructures', 'Linear infrastructures', 'Dams and other fluvial works', 'Maritime works', and 'Other civil engineering works'. A red box highlights the dropdown menu, and a red arrow points from it to the text 'Choose the type of civil engineering works' below the screenshot.

Choose the type of civil
engineering works



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Choose the assessed stage

SAMCEW[®] Application Guidance

- In addition to the application, a **manual** has been developed.
- It provides guidance on answering categories' questions.

Long-term unemployed				
Available points	Product Stage	Construction Stage	Use Stage	End-of-life Stage
		3	3	3
Objective/Aim				
Prioritise inclusion of long-term unemployed people in the labour market.				
Does the hiring process for job offers at the civil engineering works consider the time that candidates have spent in unemployment?				
Score one point for each of the cases accomplished.				
1 point	This requisite will be formally communicated to the Human Resources Department of the main contractor (FCC CONSTRUCCIÓN) and/or to public employment services.			
1 point	Long-term unemployed candidates are or will be positively evaluated during the hiring process.			
1 point	There is a commitment that more than 20% of the hired workers are long-term unemployed.			
Instructions				
$\text{Long-term unemployed \%} = \frac{\text{Number of hired workers unemployed} > 1 \text{ year}}{\text{Number of hired workers}} \cdot 100$ <p><u>Long-term unemployed workers</u>: workers which were unemployed during more than one year. Workers hired by sub-contractors are not considered.</p> <p><u>Number of hired workers</u>: employees directly hired by the main contractor (FCC CONSTRUCCIÓN) for the assessed stage. Workers hired by sub-contractors are not considered.</p> <p>Scope-out: when the sub-contractors are in charge of the recruitment.</p>				
Documentation required				
When scoring the point related to the recruitment commitment, it is necessary to provide the data used for the calculation as evidence.				

SAMCEW[®] Application

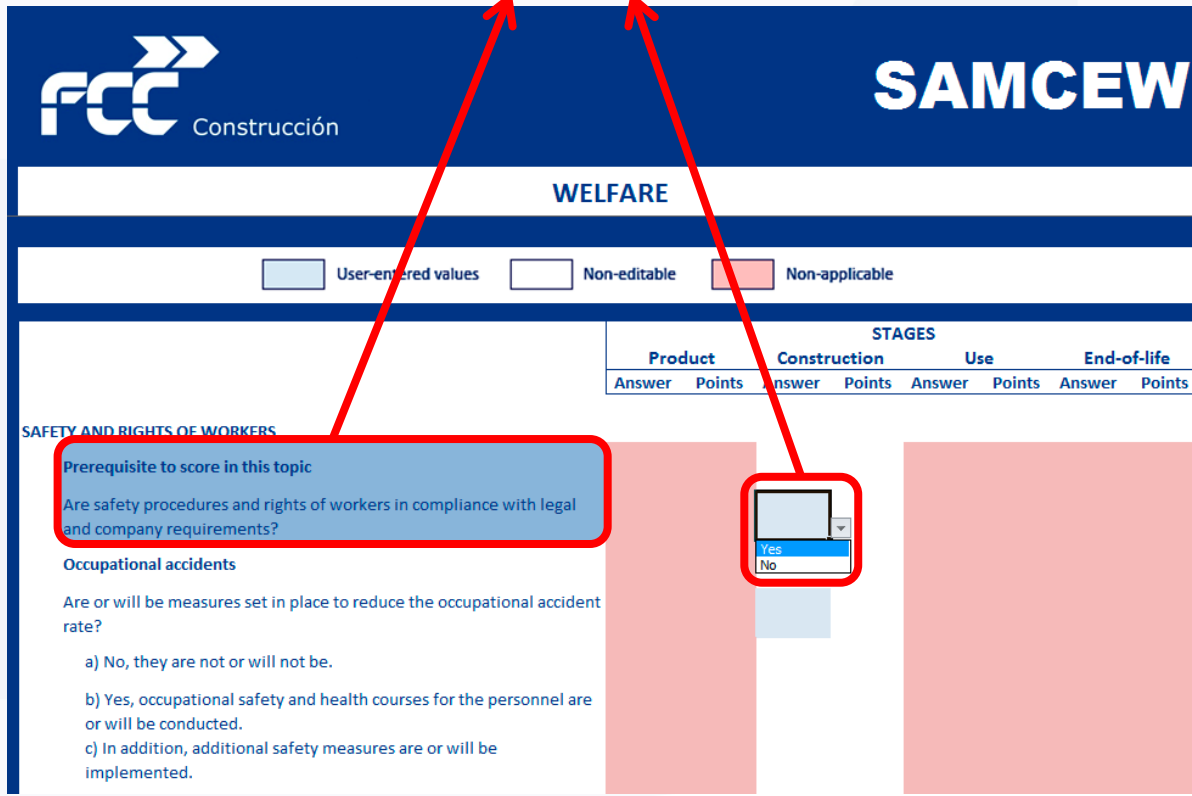
Categories

- Considerations when answering the categories' questions:
 - ✓ Only the stages selected in the worksheet "Weighting system" are available to answer.
 - ✓ Non-selected stages or questions that do not apply for the stage appear in red and are non-available.
 - ✓ The user enters the answers in the blue cells.
 - ✓ Points are scored depending on the answer given.
 - ✓ Some questions are prerequisites that must be met to score in the category, topic or concept.
 - ✓ Some questions can be scoped-out if the criteria specified in the guidelines are met by the project's characteristics.



SAMCEW[®] Application Categories

Prerequisites must be met to score in the category,
topic or concept



The screenshot displays the SAMCEW application interface. At the top, the FCC Construcción logo and the SAMCEW title are visible. Below this, the 'WELFARE' category is selected. A legend indicates that blue boxes represent 'User-entered values', white boxes are 'Non-editable', and red boxes are 'Non-applicable'. A table titled 'STAGES' is shown with columns for 'Product', 'Construction', 'Use', and 'End-of-life', each with 'Answer' and 'Points' sub-columns. The 'SAFETY AND RIGHTS OF WORKERS' topic is highlighted with a red box, and a prerequisite question is shown in a blue box: 'Are safety procedures and rights of workers in compliance with legal and company requirements?'. A dropdown menu for this question shows 'Yes' and 'No' options. Two red arrows point from the prerequisite box to the 'WELFARE' category header and the 'STAGES' table header, indicating that prerequisites must be met to score in the category, topic, or concept.

WELFARE

User-entered values Non-editable Non-applicable

STAGES							
Product		Construction		Use		End-of-life	
Answer	Points	Answer	Points	Answer	Points	Answer	Points

SAFETY AND RIGHTS OF WORKERS

Prerequisite to score in this topic

Are safety procedures and rights of workers in compliance with legal and company requirements?

Occupational accidents


Are or will be measures set in place to reduce the occupational accident rate?

a) No, they are not or will not be.

b) Yes, occupational safety and health courses for the personnel are or will be conducted.

c) In addition, additional safety measures are or will be implemented.

SAMCEW[®] Application Categories



SAMCEW

EMISSIONS TO THE ENVIRONMENT

Measures to reduce and control dust

Which measures to reduce and control dust are or will be undertaken?

Scope-out: When no dust is generated by the activities of the assessed stage.

Reduction of dust by spraying tracks and stockpiles with water.

Use of additives in spray water to create surface crust, paving and other lasting dust control.

Use of screens to prevent dust dispersion.

Use of molecular crushers in the installations that generate dust, such as aggregates treatment plants, etc.


Use of drilling machinery with dust damping system, use of water curtain in the outlets of ventilation ducts or other systems for collecting dust.

Reduction of dust emission in auxiliary premises.

Appropriate selection of the location for dust production machines and activities.

Paving of the worksite's tracks in order to reduce dust dispersion.

Use of ducts for tipping rubble from heights and covering of containers with canvas.



Scope-out

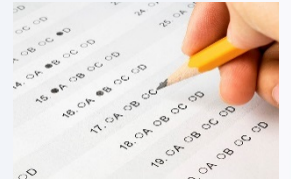
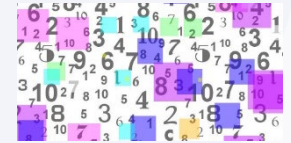
Some questions may not apply if specific criteria are met by the project. In this case, the question can be scoped-out.

SAMCEW[©] Application

Categories

SAMCEW[©] method has three types of questions:

- **Data questions:** the user enters the requested data in the blue cells.
- **Multiple-choice questions:** the user chooses only one option from the possible answers.
- **Yes/No questions:** the user can choose more than one option by answering “Yes” or “No” to the alternatives given.



SAMCEW[®] Application Categories

Enter the requested data in the blue cells

FCC Construcción **SAMCEW**

EXTERNAL COSTS

User-entered values
 Non-editable
 Non-applicable

	STAGES							
	Product		Construction		Use		End-of-life	
	Answer	Points	Answer	Points	Answer	Points	Answer	Points
CONSTRUCTION-RELATED USER DELAY COSTS								
Enter the sum of user delay costs.			35.000	2				
Enter the sum of inspection and repair costs.			48.000	2				
ENVIRONMENTAL DAMAGE COSTS								
Enter the sum of building and material damages costs.			4.000	2				
Scope out: when no building is affected by the pollutant emissions of the civil engineering works.								
Enter the sum of environmental restoration costs.			7.000	2				
CATEGORY SCORE		0%		0%		0%		0%

SAMCEW[®] Application Categories

FCC Construcción

SAMCEW

WELFARE

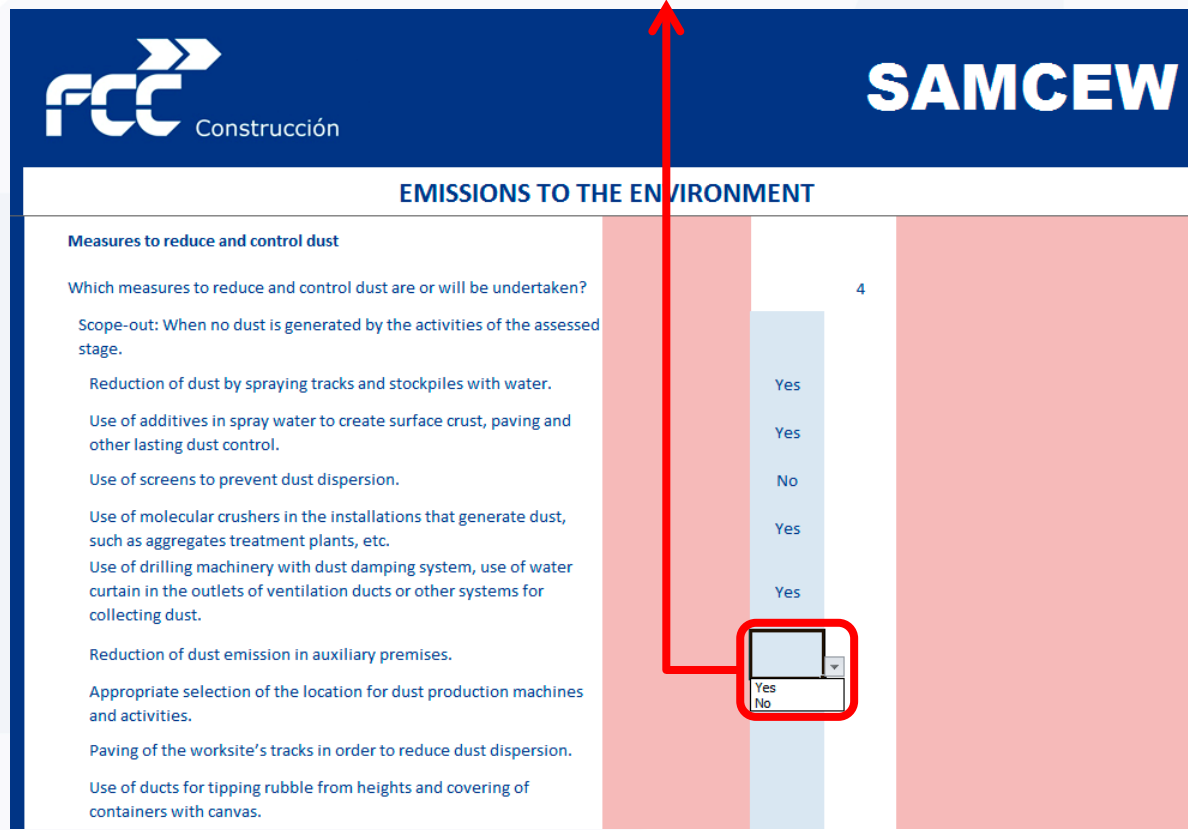
User-entered values
 Non-editable
 Non-applicable

				STATES			
Product		Construction		Use		End-of-life	
Answer	Points	Answer	Points	Answer	Points	Answer	Points
SAFETY AND RIGHTS OF WORKERS							
Prerequisite to score in this topic							
Are safety procedures and rights of workers in compliance with legal and company requirements?							
		Yes					
Occupational accidents							
Are or will be measures set in place to reduce the occupational accident rate?							
a) No, they are not or will not be.				<div style="border: 2px solid red; padding: 5px; display: inline-block;"> <div style="width: 20px; height: 20px; background-color: #ADD8E6; border: 1px solid black; margin-bottom: 2px;"></div> <div style="font-size: 8px;">a b c d</div> </div>			
b) Yes, occupational safety and health courses for the personnel are or will be conducted.							
c) In addition, additional safety measures are or will be implemented.							
d) In addition, the safety programme is proven to be effective.							

Select the option that better fits

SAMCEW[®] Application Categories

Answer "Yes" when true



FCC Construcción **SAMCEW**

EMISSIONS TO THE ENVIRONMENT

Measures to reduce and control dust

Which measures to reduce and control dust are or will be undertaken? 4

Scope-out: When no dust is generated by the activities of the assessed stage.

Reduction of dust by spraying tracks and stockpiles with water. Yes

Use of additives in spray water to create surface crust, paving and other lasting dust control. Yes

Use of screens to prevent dust dispersion. No

Use of molecular crushers in the installations that generate dust, such as aggregates treatment plants, etc. Yes

Use of drilling machinery with dust damping system, use of water curtain in the outlets of ventilation ducts or other systems for collecting dust. Yes

Reduction of dust emission in auxiliary premises. Yes

Appropriate selection of the location for dust production machines and activities. Yes

Paving of the worksite's tracks in order to reduce dust dispersion. Yes

Use of ducts for tipping rubble from heights and covering of containers with canvas. Yes

We are creating eco-efficient communities